Introduction

This instruction manual describes how to use NC Designer2. Incorrect handling may lead to unforeseen accidents, so make sure to read this instruction manual thoroughly before operation to ensure correct usage.

NC Designer2 supports the following NC series. Some of the functions are not adapted to the NC Designer2, depending on its series.

Supported models Abbreviations in this manual

M800W (Windows-based display unit) M800/M80 (Windows-based display unit)

M80W (Windows-based display unit)

M800W (Windows-less display unit) M800/M80 (Windows-less display unit)

M800S

M80W (Windows-less display unit)

M80

E80

M700VW M700VW

M700VS M700VS/M70V/E70

M70V

E70

Notes on Reading This Manual

(1) For the specifications of individual machine tools, refer to the manuals issued by the respective machine tool builders. The "restrictions" and "available functions" described by the machine tool builders have precedence over this manual.

(2) This manual describes as many special operations as possible, but it should be kept in mind that operations not mentioned in this manual cannot be performed.

In this manual, the following abbreviations might be used.

MTB: Machine tool builder

Notes on Using This Software

(1) Decimal point

Regardless of the language used on the OS which NC Designer 2 is installed on, "." is used for decimal points.

(2) Properties in property sheets and property setup dialogs for which a numerical value is entered

(a) "-" or "+" at the start if the numerical value is handled as a number.

(b) When characters (other than numbers and decimal points".") are included, the sequence of numbers and decimal points from the start are handled as numerical values.

Example: When "0123AB" is entered, it is handled as"123".

When "67@89" is entered, it is handled as "67".

(c) When multiple decimal points "." are included, the second decimal point and the values that follow are ignored.

Example: When "78.9.12" is entered, it is handled as"78.9".

(d) When two-byte numbers are entered, they are handled as a character string and the error message "It is not a numerical value" is displayed. Enter one-byte numbers.

Precautions for Safety

Always read the specifications issued by the machine tool builder, this manual, related manuals and attached documents before installation, operation, programming, maintenance or inspection to ensure correct use.

Understand this numerical controller, safety items and cautions before using the unit.

This manual ranks the safety precautions into "DANGER", "WARNING" and "CAUTION".

DANGER When the user may be subject to imminent fatalities or major injuries if handling is mistaken.

WARNING When the user may be subject to fatalities or major injuries if handling is mistaken.

CAUTION When the user may be subject to injuries or when property damage may occur if handling is mistaken.

The following sings indicate prohibition and compulsory.

This sign indicates prohibited behavior (must not do).

For example, indicates "Keep fire away".

This sign indicated a thing that is pompously (must do).

For example, indicates "it must be grounded".

The meaning of each pictorial sing is as follows.

CAUTION CAUTION

rotated object

CAUTION

HOT

Danger

Electric shock

risk

Danger

explosive

Prohibited Disassembly

is prohibited

KEEP FIRE

AWAY

General

instruction

Earth ground

Note that even items ranked as " CAUTION", may lead to major results depending on the situation. In any case, important information that must always be observed is described.

DANGER

Not applicable in this manual.

WARNING

Not applicable in this manual.

CAUTION

1. Items related to product and manual

If the descriptions relating to the "restrictions" and "allowable conditions" conflict between this manual and the machine tool builder's instruction manual the latter has priority over the former.

The operations to which no reference is made in this manual should be considered impossible.

This manual is compiled on the assumption that your machine is provided with all optional functions. Confirm the functions available for your machine before proceeding to operation by referring to the specification issued by the machine tool builder.

In some NC system versions there may be cases that different pictures appear on the screen the machine operates in a different way on some function is not activated.

To protect the availability, integrity and confidentiality of the NC system against cyber-attacks including unauthorized access, denial-of-service (Dos) (*1) attack, and computer virus from external sources via a network, take security measures such as firewall, VPN, and anti-virus software.
(*1) Denial-of-service (Dos) refers to a type of cyber-attack that disrupts services by overloading the system or by exploiting a vulnerability of the system.
Mitsubishi Electric assumes no responsibility for any problems caused to the NC system by any type of cyber-attacks including DoS attack, unauthorized access and computer virus.

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CONTENTS

1. Outline 1
1.1 What Is NC Designer2? 1
1.1.1 GUI Design Tool 2
1.1.2 What Is the GUI Library? 2
1.1.3 Interpreter Method and Compilation Method 2
2. Features and Specifications of NC Designer2 3
2.1 Features of NC Designer2 3
2.2 Specifications of NC Designer2 4
2.2.1 Screen Elements of NC Designer2 4
2.2.2 What Is "Project"? 5
2.2.3 Operating Environment of NC Designer2 6
2.2.4 Specification List 6
2.2.5 Precautions 7
2.3 Menu List 8
2.3.1 File 8
2.3.2 Editing 8
2.3.3 View 9
2.3.4 Control 10
2.3.5 Figure 11
2.3.6 Setting 11
2.3.7 Layout 11
2.3.8 Tool 12
2.3.9 Window 12
2.3.10 Help 12
2.4 Flow of Development Using NC Designer2 13
3. Startup and Termination of NC Designer2 14
3.1 Starting NC Designer2 14
3.2 Exiting From NC Designer2 14
3.3 User Interface 15
3.3.1 Function of Each Part of Basic Screen 15
3.4 Installing NC Designer2 15
4. Creating a Project 16
4.1 Creating a New Project 16
4.2 Entering Project Properties 18
4.3 Saving the Project 19
4.4 Saving the Project as 19
4.5 Opening a Project 20
4.6 Opening a Recently Used Project 20
4.7 Template Function 21
4.7.1 Outline 21
4.7.2 Dialog specifications 22
4.7.3 Operation Specifications 23
5. Creating and Saving the Page 25
5.1 What Is Page? 25
5.2 Creating a New Panel 25
5.3 Creating a New Window 25
5.4 Entering Panel Properties 26
5.5 Entering Window Properties 27
5.6 Saving the Panel/Window 28
5.7 Save All 28
5.8 Opening a Panel/Window 29
5.9 Closing the Panel/Window 29
5.10 Switching the Editing Window 30
5.10.1 Previous Screen 30
5.10.2 Next Screen 30
5.10.3 Cascade 30
5.10.4 Tile 31
5.10.5 Arrange Icons 31
5.10.6 Switching Locale 31
5.10.7 Zoom 32
5.10.8 Refresh 32
5.10.9 Changing the Theme Color 33

5.11 Creating View Frame....33
5.11.1 Switching the View Frame 35
5.12 Importing a Page....36
5.12.1 Operation Screen....37
5.12.1.1 Page Import Dialog....37
5.12.1.2 Resource Data Name Conversion Table Dialog....39
5.12.1.3 Message Log....45
5.12.2 Flow of Import Operation 46
5.12.3 Selecting the Import Source/Destination....48
5.12.4 Deleting a Page in the Import Source 50
5.12.5 Changing a Resource Data Name 51
5.12.6 Restrictions 52
6. Resource 53
6.1 Resource....53
6.2 Resource Tree....53
6.3 Locale....54
6.3.1 Creating a New Locale....54
6.3.2 Deleting a Locale 54
6.3.3 Locale Setup....55
6.3.4 Switching the Locale 55
6.4 Character Sequence Resource 56
6.4.1 Creating a New Character String Resource....56
6.4.2 Editing or Creating Character String Resource....57
6.4.3 Replacing the Character String Resource....57
6.4.4 Deleting Character String Resource 57
6.4.5 Importing or Exporting Character String Resource 58
6.5 Font Resource....62
6.5.1 Creating a New Font Resource....62
6.5.2 Deleting Font Resource 62
6.5.3 Specifying Font Resource....63
6.6 Image Resource....64
6.6.1 Creating a New Image Resource....64
6.6.2 Deleting an Image Resource 64
6.6.3 Specifying an Image File....64
6.7 Solid Frame Resource....65
6.7.1 Creating a New Solid Frame Resource....65
6.7.2 Deleting a Solid Frame Resource 65
6.7.3 Specifying a Solid Frame File 66
6.8 Filling Pattern Resource....67
6.8.1 Editing the Filling Pattern 67
6.9 Line Pattern Resource....68
6.9.1 Editing the Line Pattern....68
6.10 File Name Resource....69
6.10.1 Creating a New File Name Resource....69
6.10.2 Deleting the File Name Resource 69
6.10.3 Specifying the File Name Resource....69
6.11 Resource management....70
6.11.1 Outline 70
6.11.2 Operation Screen....71
6.11.2.1 Resource list....73
6.11.3 Operation specification 75
7. Creating Controls....76
7.1 Common Functions of Controls....76
7.1.1 Control Name....76
7.1.2 Position/Size....77
7.1.3 Color/Pattern....78
7.1.4 Image....78
7.1.5 Text....78
7.1.6 Character Attribute....79
7.1.7 Scrolling Caption Character String....80
7.1.8 Blink....81
7.1.9 Solid Frame 82
7.1.10 Callback Function 82
7.1.11 Event List Dialog Box....83
7.1.12 Switch Screen Dialog Box....84
7.1.13 Show/Hide 84
7.1.14 Input Permission 84
7.1.15 Touch Gesture 85
7.1.16 Property Setup Dialog....86
7.1.16.1 Standard Control 87
7.1.16.1.1 [Style] Tab....87
7.1.16.1.2 [Text] Tab....89
7.1.16.2 NC Control....91
7.1.16.2.1 [Style] Tab....91
7.1.16.2.2 [Text] Tab....92
7.1.16.3 Operation Procedures 93
7.1.16.4 Input Assist Function 94
7.1.16.4.1 Input Assist Window....94
7.1.16.4.2 Operation Procedure....95
7.1.16.4.3 Precautions 95
7.2 Standard Control 96
7.2.1 Basic Control Object (GCBasicControl) 96
7.2.1.1 Property Settings....96
7.2.2 Button Object (GCButton)....97
7.2.2.1 Property Setup Dialog 97
7.2.2.1.1 [Behavior Settings] Tab....98
7.2.2.1.2 [Style] Tab....99
7.2.2.1.3 [Text] Tab....100

7.2.2.1.4 [Extended] Tab....101
7.2.2.2 Property Settings....102
7.2.3 Text Box Object (GCTextBox) 105
7.2.3.1 Property Setup Dialog 105
7.2.3.1.1 [Display Settings] Tab 106
7.2.3.1.2 [Style] Tab....107
7.2.3.1.3 [Text] Tab....108
7.2.3.1.4 [Input Range] Tab 109
7.2.3.1.5 [Extended] Tab....110
7.2.3.2 Property Settings....111
7.2.4 Label Object (GCLabel)....114
7.2.4.1 Property Settings....114
7.2.5 List Object (GCList)....115
7.2.5.1 Property Settings....115
7.2.5.2 Complements 116
7.2.6 Picture Object (GCPicture) 117
7.2.6.1 Property Setup Dialog 117
7.2.6.1.1 [Style] Tab....118
7.2.6.1.2 [Text] Tab....119
7.2.6.1.3 [Extended] Tab....120
7.2.6.2 Property Settings....121
7.2.7 Check Box Object (GCCheckBox)....123
7.2.7.1 Property Settings....123
7.2.8 Radio Button Object (GCRadioButton) 125
7.2.8.1 Property Settings....125
7.2.9 Progress Bar Object (GCProgressBar)....127
7.2.9.1 Property Settings....127
7.2.10 HTML Browser Object (GCHtmlBrowser) 129
7.2.10.1 Property Setup Dialog 129
7.2.10.1.1 [Display/Action] Tab 130
7.2.10.1.2 [Style] Tab....131
7.2.10.1.3 [Text] Tab....132
7.2.10.2 Property Settings....133
7.2.10.3 Complements 135
7.2.11 Scroll Bar Object (GCScrollBarEx)....136
7.2.11.1 Property Settings....136
7.2.11.2 Complements 139
7.2.12 Edit Control Object (GCEdit)....140
7.2.12.1 Property Settings....140
7.2.13 Table Object (GNCTable) 142
7.2.13.1 Property Settings....142
7.2.13.2 Complements 144
7.2.14 Input Box Object(GInputBox)....148
7.2.14.1 Property Setup Dialog 148
7.2.14.1.1 [Input/View] Tab 149
7.2.14.1.2 [Style] Tab....150
7.2.14.1.3 [Text] Tab....151
7.2.14.1.4 [Extended] Tab....152
7.2.14.2 Property Settings....153
7.2.14.3 Complements 156
7.2.14.4 Restrictions....162
7.2.15 Ten-key object (GsoftKey) 163
7.2.15.1 Property Setup Dialog 164
7.2.15.1.1 [Input/View] Tab 165
7.2.15.1.2 [Style] Tab....166
7.2.15.1.3 [Text] Tab....167
7.2.15.1.4 [Extended] Tab....168
7.2.15.2 Property Settings....169
7.2.15.3 Complements 173
7.2.15.4 Restrictions....184
7.3 NC Control Object 185
7.3.1 Counter (GNXCounter); Counter Display Part 185
7.3.1.1 Property Settings....185
7.3.1.2 Complements 188
7.3.2 CycleTime (GNXCycleTime); Cycle Time Display Part....189
7.3.2.1 Property Settings....189
7.3.2.2 Complements 190
7.3.3 Feedrate (GNXFeedrate); F Display Part....191
7.3.3.1 Property Settings....191
7.3.3.2 Complements 192
7.3.4 Gmodal M (GNXGModal); M System Modal Display Part....193
7.3.4.1 Property Settings....193
7.3.4.2 Complements 194
7.3.5 Gmodal L (GNXGModal_L); L System Modal Display Part....195
7.3.5.1 Property Settings....195
7.3.5.2 Complements 196
7.3.6 Gmodal Simple (GNXGModalSimple); Simple Modal Display Part....197
7.3.6.1 Property Settings....197
7.3.6.2 Complements 198
7.3.7 LoadMeter (GNXLoadMeter); Load Meter Display Part 199
7.3.7.1 Property Settings....199
7.3.7.2 Complements 200
7.3.8 MSTB (GNXMSTB); MSTB display part.... 201
7.3.8.1 Property Settings....201
7.3.8.2 Complements 203
7.3.9 ONB (GNONB); ONB Display Part....204
7.3.9.1 Property Settings....204
7.3.9.2 Complements 205

7.3.10 ProgramBuffer (GNXPrgBuff); Program Buffer Display Part 206
7.3.10.1 Property Settings....206
7.3.10.2 Complements 207
7.3.11 SPCommand (GNXSPCommand); S Display Part 208
7.3.11.1 Property Settings....208
7.3.11.2 Complements 209
7.3.12 PLC Button Object (GNCPLCButton)....210
7.3.12.1 Property Setup Dialog 210
7.3.12.1.1 [Device] Tab....211
7.3.12.1.2 [Style] Tab....213
7.3.12.1.3 [Text] Tab....214
7.3.12.1.4 [Extended] Tab....215
7.3.12.2 Property Settings....216
7.3.12.3 Complements 220
7.3.13 PLC Text Box Object (GNCPLCTextBox)....225
7.3.13.1 Property Setup Dialog 225
7.3.13.1.1 [Device] Tab....226
7.3.13.1.2 [Style] Tab....229
7.3.13.1.3 [Text] Tab....230
7.3.13.1.4 [Input Range] Tab 231
7.3.13.1.5 [Extended] Tab....232
7.3.13.2 Property Settings....233
7.3.13.3 Complements 235
7.3.14 NC Data Textbox (GNCDataTextBox) 241
7.3.14.1 Property Setup Dialog 241
7.3.14.1.1 [Device] Tab....242
7.3.14.1.2 [Style] Tab....244
7.3.14.1.3 [Text] Tab....245
7.3.14.1.4 [Extended] Tab....246
7.3.14.2 Property Settings....247
7.3.14.3 Complements 250
7.3.15 PLC extension button (GNCPLCExButton) 254
7.3.15.1 Property Setup Dialog 254
7.3.15.1.1 [Device] Tab....255
7.3.15.1.2 [Style] Tab....258
7.3.15.1.3 [Text] Tab....259
7.3.15.1.4 [Extended] Tab....260
7.3.15.1.5 [Dynamic change property (Status 1 - 7)] Tab 262
7.3.15.2 Property Settings....264
7.3.15.3 Complements 271
7.3.16 PLC Message (GNCPLCMessage)....279
7.3.16.1 Property Settings....279
7.3.16.2 Complements 282
7.3.17 Menu (GNXMenu) ; Menu display part.... 284
7.3.17.1 Property Settings....284
7.3.17.2 Complements 285
7.3.18 Extension Menu (GNCExMenu); Extension Menu Display Part....286
7.3.18.1 Property Setup Dialog 286
7.3.18.1.1 [Behavior Settings] Tab.... 287
7.3.18.1.2 [Style/Text] Tab....289
7.3.18.2 Property Settings....291
7.3.18.3 Complements 299
7.3.19 FileInOut (GNXFileTransfer) ; Input/Output Control....306
7.3.19.1 Property Settings....306
7.3.19.2 Complements 307
7.3.20 AlarmMessage (GNXAlarmMessage) ; Alarm Display Part 309
7.3.20.1 Property Settings....309
7.3.20.2 Complements 310
7.3.21 MonitorStatus (GNXMonitorStatus) ; Operation Status Display Part 312
7.3.21.1 Property Settings....312
7.3.21.2 Complements 313
7.3.22 Time (GNXTime) ; Time Display Part....314
7.3.22.1 Property Settings....314
7.3.22.2 Complements 314
7.3.23 Page Change Button (GNCPageChangeButton) 315
7.3.23.1 Property Setup Dialog 315
7.3.23.1.1 [Behavior Settings] Tab.... 316
7.3.23.1.2 [Style] Tab....318
7.3.23.1.3 [Text] Tab....319
7.3.23.1.4 [Extended] Tab....320
7.3.23.1.5 [Open] Tab....322
7.3.23.1.6 [Close] Tab....323
7.3.23.2 Property Settings....324
7.3.23.3 Complements 327
7.3.24 Stacked Graph (GNCStackedGraph)....338
7.3.24.1 Property Settings....338
7.3.24.2 Complements 340
7.3.25 Statistics Graph (GNCStatisticsGraph) 341
7.3.25.1 Property Settings....341
7.3.25.2 Complements 342
7.3.26 Alarm List (GNCAlarmList)....344
7.3.26.1 Property Setup Dialog 344
7.3.26.1.1 [Alarm Settings] Tab....345
7.3.26.1.2 [Style] Tab....346
7.3.26.1.3 [Text] Tab....347
7.3.26.1.4 [Extended] Tab....348
7.3.26.2 Property Settings....349
7.3.26.3 Complements 352

7.3.26.4 Restrictions....361
7.3.27 Meter (GNCMeter)....362
7.3.27.1 Property Setup Dialog 363
7.3.27.1.1 [Device/Style] Tab....364
7.3.27.1.2 [Extended] Tab.... 368
7.3.27.2 Property Settings....369
7.3.27.3 Complements 374
7.3.27.4 Precautions 375
7.3.27.5 Restrictions....375
7.3.28 Trend Graph (GNCTrendGraph)....376
7.3.28.1 Property Setup Dialog 377
7.3.28.1.1 [Data] Tab 378
7.3.28.1.2 [Style] Tab....381
7.3.28.1.3 [Extended] Tab....383
7.3.28.2 Property Settings....384
7.3.28.3 Complements 389
7.3.28.4 Precautions 391
7.3.28.5 Limitations 391
8. Parts Library 392
8.1 Operation Screen 393
8.1.1 Image List Dialogue 393
8.2 Operation Procedure....394
8.3 Precautions 396
9. Figure 397
9.1 What Is Figure?....397
9.2 Figure Creation Method....398
9.2.1 Drawing a New Figure 398
9.3 Common Functions of Figure 400
9.3.1 Position/Size....400
9.3.2 Perimeter Line 400
9.3.3 Color/Pattern....401
9.4 Figure Settings 402
9.4.1 Rectangle....402
9.4.2 Circle and Oval 402
9.4.3 Line....402
9.4.4 Connected Line....403
9.4.5 Sector 403
9.4.6 Polygon....403
9.4.7 Arc 404
10. Screen Editing 405
10.1 Editing Operation....405
10.1.1 Undo 405
10.1.2 Redo 405
10.1.3 Cut 406
10.1.4 Copy 406
10.1.5 Paste....407
10.1.6 Delete 407
10.1.7 Find....408
10.1.8 Select All....409
10.1.9 Continuous copy 410
10.1.9.1 Operation Specifications....413
10.1.9.2 Limitations 414
10.2 Layout Function....415
10.2.1 Size Change 415
10.2.2 Move....416
10.2.3 Arrangement and Alignment 416
10.2.4 Arrange to Uniform Size....418
10.2.5 Order....419
10.2.6 Fine Adjustment....419
10.2.7 Rotation/Flip....420
10.2.8 Deformation 422
10.2.9 Grouping and Ungrouping....424
10.2.10 Grid....426
10.3 Control List 427
10.3.1 Operation Screen.... 428
10.3.1.1 The list....430
10.3.2 Operation Specifications 432
10.3.3 Restrictions 432
10.4 Focus Setup 433
10.5 Error Check 436
10.5.1 Error Check Item List 437
10.5.2 Result of Error Check....438
10.6 Development by Multiple Users....439
10.6.1 Option Setting....439
10.7 Sub Cursor Setting....440
10.7.1 Screen Specifications 441
10.7.2 Sub Cursor Setting Screen Displaying Method....445
10.7.3 Sub Cursor Setting Procedure....448
10.7.3.1 Move the Sub Cursor by Key Input (Arrow Key, TAB Key, Input Key)....448
10.7.3.2 Set the Input Value to the Target Control 450
10.7.3.3 Change the Display Start Position....450
10.7.3.4 Transfer a Key to Other Control....451
10.7.4 Limitations....454
11. Simulation....455
11.1 Simulation Function....455
11.1.1 Starting Simulation....455
11.1.2 Simulation Screen....455
11.1.3 Function List 456

11.1.4 Quitting Simulation....456
11.2 Simulation Tools....457
11.3 Message Window....458
12. Simulation (NC Trainer2 plus)....459
12.1 Simulation (NC Trainer2 plus)....459
12.2 Operation Procedure....460
12.3 Limitations....462
13. Generating a Document....463
13.1 Document Generation Function....463
13.1.1 Generating a Project Information Document....463
13.1.2 Generating a Screen Information Document....464
13.1.3 Output Image....465
14. Project Convert....467
14.1 Export for the Project Executing the Intepreter....467
14.1.1 Export....467
14.1.2 File Configuration....469
14.2 Project Convert to the ND2 Format....470
15. Source Code Generation....471
15.1 Generating Screen Data Source Codes....471
15.2 User Code Protection....475
16. Features and Configuration of GUI Library....477
16.1 Features of GUI Library....477
16.2 Configuration of GUI Library....478
16.3 Folder Configuration for Data File....479
17. Application Execution Method....480
17.1 Application Execution Method....480
17.1.1 Outline....480
17.1.2 Independent/Combinational Execution....482
17.2 Interpreter Method....483
17.2.1 What Is Interpreter Method?....483
17.2.2 Flow of Operation....483
17.3 Compilation Method....485
17.3.1 What Is Compilation Method?....485
17.3.2 Flow of Operation....485
17.3.2.1 Operation Procedure with Visual Studio2010....486
17.3.2.2 Operation Procedure with NC Compiler/NC Compiler2....490
17.4 Application Window....493
17.4.1 What Is Application Window?....493
17.4.2 Launching the Application Window....494
17.4.3 Functions of Application Window....494
17.4.4 Screen Configuration....495
17.4.5 Closing the Application Window....495
17.5 Screen Switching....496
17.5.1 Outline....496
17.5.2 Screen Switching Method....496
17.5.2.1 Changing From the Custom Screen to the Standard Screen (F0 Release)....498
17.5.2.2 Changing the Menu Name While Displaying Custom Screen (Menu Release)....500
17.5.2.3 Closing the Custom Screen (Menu Release)....503
17.5.3 Screen No. Designation Method....504
17.5.4 Panel Switching History....505
17.5.5 Displaying Previously Displayed Custom Screen....506
17.6 Custom Release....509
17.6.1 Outline....509
17.6.2 S/W Configuration....511
17.6.2.1 Necessary Applications....511
17.6.2.2 Necessary Files....512
17.6.3 Development Procedure of Custom Release S/W....514
17.6.4 F0 Release....515
17.6.4.1 Interpreter Method....515
17.6.4.1.1 Config.ini....515
17.6.4.1.2 customdef.ini....517
17.6.4.2 Compilation Method....518
17.6.4.2.1 Config.ini....518
17.6.4.2.2 customdef.ini....519
17.6.4.3 Switching of "Onboard" and "Execution File by F0 Release" by Bit Selection Parameter (#6451 bit0)....520
17.6.5 Menu Release....521
17.6.5.1 Interpreter Method....521
17.6.5.1.1 Config.ini....521
17.6.5.1.2 customdef.ini....521
17.6.5.1.3 Icon Image....527
17.6.5.2 Compilation Method....528
17.6.5.2.1 Config.ini....528
17.6.5.2.2 customdef.ini....528
17.6.5.2.3 Icon Image....528
17.6.5.3 Changing the Arrangement of the Main Menu....529
17.6.5.3.1 customdef.ini....529
17.6.5.4 Focus while the Instance Is Held....531
17.6.5.5 Settings of an Operation Message....532
17.6.6 Screen Part Assignment....533
17.6.6.1 Screen Selection Bar Display Open....534
17.6.6.2 Operation Screen Base Display Open....535
17.6.6.3 Interpreter Method....536
17.6.6.3.1 config.ini....536
17.6.6.3.2 customdef.ini....536
17.6.6.4 Compilation Method....537
17.6.6.4.1 config.ini....537
17.6.6.4.2 customdef.ini....537

17.6.6.5 Caution for Creating Customized Window for Screen Part Assignment 537
17.6.6.5.1 Size and Display Coordinate of Displayed Customized Window.....537
17.6.6.5.2 Customized Window Focus/ Available Event.....538
17.6.6.5.3 Sample Code (Timer Processing).....539
17.6.6.5.4 Sample Code (Process to Pass the Key to the Standard Screen
When Input Is Enabled).....542
17.6.7 Selectable Display Assignment.....549
17.6.7.1 Interpreter Method.....551
17.6.7.1.1 config.ini.....551
17.6.7.1.2 customdef.ini.....551
17.6.7.2 Compilation Method.....552
17.6.7.2.1 config.ini.....552
17.6.7.2.2 customdef.ini.....552
17.6.7.3 Caution for Creating Customized Window for Selectable Display Assignment.....552
17.6.7.3.1 Size and Display Coordinate of Displayed Customized Window.....552
17.6.7.3.2 Customized Window Focus/ Available Event.....553
17.6.7.3.3 Sample Code (Switching Axis to Be Displayed with Page Key/
Part System Switch Key).....554
17.6.7.3.4 Sample Code (Displaying the Next Axis by Touching a Button).....559
17.6.8 G Code Guidance Release, M Code Guidance Release 564
17.6.8.1 Designation of the Guidance File Folder 565
17.6.8.1.1 Config.ini.....565
17.6.8.2 Format of the Guidance File.....566
17.6.8.2.1 File Name.....566
17.6.8.2.2 HTML File 569
17.6.8.2.3 Precautions 571
17.6.9 Limitation of Number of Project Registration.....572
17.6.9.1 Register Two or More Windows in One Project.....572
17.6.9.2 Register Two or More Screens in One Project 573
17.6.10 About the Switch of Display/Non-display of the Menu by the Parameter.....574
17.6.11 Adjusting Standard and Customized Screen Size according to Resolution 575
17.6.12 Displaying an Original Logo on the Standard Screen 576
17.6.13 Parameter.....577
17.6.13.1 User Parameters 577
17.6.13.2 Machine Parameters 577
17.6.14 Limitations.....578
17.7 Custom Release File Setting.....580
17.7.1 Operation Screen..... 580
17.7.1.1 Custom Screen Configuration Dialog 580
17.7.2 Operation Procedure.....591
17.7.3 Precautions.....594
17.8 Memory Card Transfer 595
17.8.1 Operation screen 595
17.8.2 Operation Procedure.....600
17.9 Home Screen 602
17.9.1 Types of MTB's App.....602
17.9.2 Configuration Settings Files 603
17.9.2.1 List of Configuration Settings Files 603
17.9.2.2 Storage Location of Applications and Configuration Settings Files.....604
17.9.2.3 Files Required for Registration 604
17.9.3 Fixed Home Screen Display 605
17.9.3.1 Interpreter Method.....605
17.9.3.1.1 Setting Home Screen Config File (HomeScrnCustomConfig.ini) 605
17.9.3.1.2 Setting Application Definition File (HomeScrn_.ini) 606
17.9.3.1.3 Setting Application Language File (HomeScrn__.ini) 610
17.9.3.2 Compilation Method.....611
17.9.3.2.1 Setting Home Screen Config File (HomeScrnCustomConfig.ini) 611
17.9.3.2.2 Setting Application Definition File (HomeScrn_.ini) 611
17.9.3.2.3 Setting Application Language File (HomeScrn__.ini) 611
17.9.3.3 Precaution When Creating Customized Screen with Fixed Home Screen Display.....611
17.9.3.3.1 Displayable Area on Customized Screen.....611
17.9.3.3.2 Changing Operation Menu Display 612
17.9.3.3.3 Receiving Notification When Operation Menu Is Pressed on Home Screen.....614
17.9.3.3.4 Notifying Key Input from Application 616
17.9.3.4 Caution.....618
17.9.4 Full-Screen Display.....619
17.9.4.1 Interpreter Method.....619
17.9.4.1.1 Setting Home Screen Config File (HomeScrnCustomConfig.ini) 619
17.9.4.1.2 Setting Application Definition File (HomeScrn_.ini) 620
17.9.4.1.3 Setting Application Language File (HomeScrn__.ini) 620
17.9.4.2 Compilation Method.....621
17.9.4.2.1 Setting Home Screen Config File (HomeScrnCustomConfig.ini) 621
17.9.4.2.2 Setting Application Definition File (HomeScrn_.ini) 621
17.9.4.2.3 Setting Application Language File (HomeScrn__.ini) 621
17.9.4.3 Caution.....621
17.10 S/W Keyboard 622
17.10.1 Outline 622
17.10.2 Function Specifications 623
17.10.3 Programming Method 624
17.10.3.1 Open S/W Keyboard Window..... 624
17.10.3.2 Close S/W Keyboard Window..... 625
17.10.3.3 Set S/W Keyboard Position 626
17.10.3.3.1 Set the Initial Display Position of the S/W Keyboard Window 626
17.10.3.3.2 Change the S/W Keyboard Window Position Arbitrarily
While the Window Is Being Displayed.....627
17.10.3.4 Set the Status of Entry Area of S/W Keyboard Window 628
17.10.3.4.1 Display the Entered Characters on the Entry Area of S/W Keyboard Window.....629
17.10.3.4.2 Process When the [INPUT] Key Is Pressed.....630

17.10.3.5 Get the Entry Area Status of S/W Keyboard Window.....631
17.10.3.6 Clear S/W Keyboard Entry Area.....632
17.10.3.7 Set Character String in S/W Keyboard Entry Area 633
17.10.3.8 Get Character String from S/W Keyboard Entry Area.....634
17.10.3.9 Display S/W Keyboard Window in the Foreground..... 635
17.10.4 Example.....636
Appendix.....640
Appendix 1. Error Message List 640
Appendix 2. Shortcut Key List 646
Appendix 3. About NC Designer2 647
Appendix 4. Pattern List 648
Appendix 4.1 Filling Pattern List 648
Appendix 4.2 Line Pattern List.....648
Appendix 5. Default Palette Color 649
Appendix 6. Data Type Definitions 651
Appendix 7. HTML Tag List.....659
Appendix 8. Executing File Registration Method.....661
Appendix 8.1 F0 Release.....661
Appendix 8.1.1 melAppCtrl.ini 661
Appendix 8.1.2 Details of melAppCtrl.ini 661
Appendix 8.1.3 Function of Update Cycle Setting 667
Appendix 8.2 Menu Release.....668
Appendix 8.2.1 customdef.ini 668
Appendix 8.2.2 Icon Image.....668
Appendix 8.3 Using a Function Key (Screen Switching Key) in the Custom Screen 669
Appendix 8.3.1 Utilization Method 1 by Adding a Definition to melAppCtrl.ini
(Only the Meaning of Function Key Can Be Changed with "F0" Key) 670
Appendix 8.3.2 Utilization Method 2 by Adding a Definition to melAppCtrl.ini
(Changing to a Specific Standard Screen with "F0" Key).....671
Appendix 8.3.3 Utilization Method 3 by Adding a Definition to melAppCtrl.ini
(Changing to the Specific Standard Screen with "Menu" Key) 673
Appendix 8.3.4 The Standard Screen After Changing.....675
Appendix 8.4 Home Screen.....676
Appendix 8.4.1 Setting Home Screen Config File (HomeScrnCustomConfig.ini).....676
Appendix 8.4.2 Setting Application Definition File (HomeScrn_.ini).....676
Appendix 8.4.3 Setting Application Language File (HomeScrn__.ini)..... 677
Appendix 8.4.4 Precautions.....677
Appendix 9. HMI Integrated Installer.....678
Appendix 9.1 Outline 678
Appendix 9.2 Configuration.....679
Appendix 9.3 Screen Configuration 680
Appendix 9.4 Operation Methods 685
Appendix 9.4.1 Installing the Application.....685
Appendix 9.5 Details for Functions 690
Appendix 9.5.1 Installation Method 690
Appendix 9.5.2 About the Memory Card or USB Memory for Upgrade 692
Appendix 9.6 Parameter..... 704
Appendix 9.7 Operation/Alarm Messages 705
Appendix 9.8 Limitations..... 706
Appendix 9.9 Precautions.....706
Appendix 10. Installing Custom Data (M700VS/M70V/E70).....707
Appendix 11. Installing Custom Data (M800/M80 (Windows-less Display Unit)).....710
Appendix 12. Entry Key Code List at KeyPress/KeyRelease 714

1. Outline

This section describes an outline of NC Designer2.

1.1 What Is NC Designer2?

NC Designer2 provides you with a GUI development environment consisting of a GUI design tool for generating the source code of host equipment on the drawn GUI screen and a GUI library that does not depend on specific platforms.

NC Designer2 consists of a GUI design tool, which substantially reduces GUI development work-hours, and a fast and compact graphic library.

GUI design tool
GUI screen development
Simulation of drawing screen
Documentation of settings
The source code is
automatically generated.
GUI library
Window control
Resource management
Event control
Fast drawing logic
Part dependant on platform
Source code
(C++)
Compilation
Link
The execution module is
built in the target board.
PC (Windows environment)

1.1.1 GUI Design Tool

With NC Designer2, figures and parts having various functions are laid out on the screen during creation of screen data. Source codes (C++) matching the GUI library are automatically generated according to the created screen data.
NC Designer2 has various functions such as the simulation function for the PC, so that the development process which required many work-hours with conventional development methods are now automated, and re-working after assembly in the actual machine is minimized.
1.1.2 What Is the GUI Library?
The GUI library strongly supports development of the graphic user interface.
The GUI library contains functions for mouse and key events and window system, which are indispensable for the configuration of the GUI, as well as the drawing function.
1.1.3 Interpreter Method and Compilation Method
The screen development method includes two types: interpreter method (C++ language is not needed) and compilation method (C++ language is needed). The intended purposes etc. of these methods are the table below.
Interpreter method Compilation method
Purpose Development of comparatively
simple screen
Development of screen with more
complex control operation
Programming Unnecessary (with Macro
function)
C++ language programming
Development
(compilation)
environment
Unnecessary The compiler is necessary
Execution speed Slower than the compilation
method
Faster than the interpreter
method

2. Features and Specifications of NC Designer2
In this section, what can be done with NC designer2 is described for those who operate NC Designer2 for the first time. Specifications and functions are referred to in the description.
2.1 Features of NC Designer2
NC Designer2 has the following features.
Ultimate GUI development framework applicable to various embedded systems (platforms)
Automatic generation of source code
Various source codes are automatically generated from the data created with NC Designer2.
Possible to load various fonts
GUI library which does not depend on the platform
The GUI library allows you to match every platform through repetitive generation.
Substantial improvement of GUI development efficiency through embedded system
Powerful editing functions (cut, copy, paste, rotation, alignment, zoom, etc.)
Automatic generation of development document
NC Designer2 automatically creates documents such as the screen list and property data in a file (rich text format).
Simulation function for PC
Screens created with NC Designer2 can be simulated.
Simple GUI simulation such as screen switching is realized.
Using the simulation tool, you can change properties of the GUI part.
(Modification event history is also supported.)

2.2 Specifications of NC Designer2
2.2.1 Screen Elements of NC Designer2
The screen elements displayed (that is, created) with NC Designer2 include the followings.
Screen
Panel
Window
Figure
Control
Screen element Description
Screen Physical hardware display area. Available only one screen for each system.
That is, only one screen for each project.
Page Screen. The page includes the panel and the window.
Panel Screen displayed in full size on the screen.
Window Screen displayed in a window state on the screen.
Object The object is a screen element arranged on the page. The object includes the control, figure and view frame.
Control The control is a group of GUI functions including buttons and pictures.
Figure The figure can be drawn with the basic drawing function of the GUI library. The figure includes rectangles, circles, lines, continuous lines, polygons, sectors and arcs.
View frame The view frame is a display area in the page having multiple pages. Controls and figures can be arranged on each page of the view frame.

2.2.2 What Is "Project"?
With NC Designer2, a group of GUI screens used for a certain application is called "project".
The project mainly consists of a folder of which screen files are stored and a project data file.
When "M800/M80 Series" is selected in the model selection of the wizard creating new projects and a project "Sample" is created, a "Sample" folder and a "Sample.ND2" project data file are created in the folder designated as a destination of saving.

Sample pnlpg###.ipw Screen file
.bmp,.jpg,
*.png, *.vgf
Background, or BMP/JPG/PNG/VGF
files set in control
*.res Resource file
Sample.ND2 Project data file
(Note 1): ###: A three-digit hexadecimal value indicating the page number
(Note 2): When "M700V/M70V/E70 Series" is selected, a project with the IPP file extension,
Sample.IPP, is created.
To open an existing project, select the file having extension ND2.
IMPORTANT
To move or copy project data to another PC, select both the folder and project data file. Because the project
consists of these two pieces of data, the project does not open with only one of them.
Settings related to the screen size and display scale are stored in the CONFIG.INI file, that is in a same folder
with melhi.exe.
To modify the screen size or the display magnification, adjust the values in the [SCREEN].
[SCREEN]
WIDTH = 640
HEIGHT = 480
SCALE = 100

2.2.3 Operating Environment of NC Designer2
The system environment necessary for the operation of NC Designer2 is shown below.
OS Windows 8.1
Windows 10
CPU Processor with CPU clock 1 GHz or more
HD 400MB or more (excluding the free space necessary for running the OS)
Memory 2GB or more
Screen Resolution : SVGA (800 600) or higher
2.2.4 Specification List
Function Outline
Screen 1 for each project
Panel/window Max. 256 sheets of panels and windows in total for each project
View frame Max. 10 frames for each panel or window
Screen size Horizontal: 1 to 2560 dots
Vertical: 1 to 1920 dots
Number of controls that can be
created on each page
Max. 512
Number of controls that can be
created in each frame
Max. 256. However, the maximum limit of the page (512) may not be
exceeded inside the page of the frame.
Number of locales Max. 32
Background image file BMP, JPG, PNG or VGF file (Note)
Filling pattern Up to 38 types can be registered.
Line pattern Up to 8 types can be registered.
(Note): When controls that designate VGF files are any of the following, they are not displayed on
screen editing windows.
- When a width exceeding 2048 pixels is designated.
- When the display start position coordinate is placed on a position that exceeds 2048.
To display the controls on screen editing windows, designate a width of 2048 pixel or less
and place the display start position coordinate on the position of 2048 or less.

2.2.5 Precautions
(1) Touch panel
Take note of the following when displaying a screen created for a display unit that is touch panel
compatible.
- Multi-touch is not compatible. Do not touch multiple positions at the same time.
- For M700VS/M70V/E70/M700VW, if two or more positions are touched, the middle point of those
is detected.
- For M800/M80, if two positions are touched, the first position is detected. If three or more
positions are touched, no position is detected.

2.3 Menu List
A list of pull-down menus of NC Designer2 and the usage of each item are described below.
2.3.1 File
Item Function
New Project Create a new project/copy data.
Open Project Open an existing project.
Save Project Overwrite the project being edited.
Save Project As Save the project being edited, under a new name.
New Panel Add a new panel to the project being edited.
New Window Add a new window to the project being edited.
Open Panel/Window Open the panel/window of the project being edited.
Close Panel/Window Close the panel/window being edited.
Import Panel/Window Copy the panel/window of another project to the project being edited.
Save Panel/Window Save the panel/window being edited.
Save All Overwrite all the project data being edited.
Source code generation Convert the created data into source code of various formats.
Project convert Convert the created data into an interpreter method file.

Convert the projects being edited into the ND2 form.
Document generation Output project and window data into a file (rich text format).
Custom screen configuration Create a setting file to display the customized screen on an NC display.
Recent Projects Read and display up to four recently edited projects.
Write to the memory card Generate the custom data, setting files, etc. in each installer format configuration.
Exit Exit from NC Designer2.

2.3.2 Editing

Item Function
Undo Abandon changes and restore the original state.
Redo Execute the operation canceled with "undo".
Cut Delete the selected object and copy it in the clipboard.
Copy Copy the selected object and copy it in the clipboard.
Paste Paste the object from the clipboard.
Delete Delete the selected object (without copying it in the clipboard).
Find Search for a control or caption.
Edit of a caption Edit the caption of each part directly on the editing screen.
Select All Select all objects or all controls or figures of the same type on the editing page.
Continuous copy Copy the selected object by the designated number vertically or horizontally.

2.3.3 View

Item Function
Toolbars Select the tool bar displayed with NC Designer2.
Resource Display or hide the resource tree.
Screen tree Display or hide the screen tree.
Control Toolbox Display or hide the control toolbox.
Property Display or hide the properties sheet.
Image Display or hide the image view.
Message Display or hide the message window.
Statusbar Display or hide the status bar.
Switch Locale Switch the locale being displayed.
Previous Screen Display the previous page.
Next Screen Display the next page.
Previous Frame Page Select the previous view frame.
Next Frame Page Select the next view frame.
Zoom Specify the zoom ratio of the page.
Refresh Redraw the page.
Change theme color Switch the NC control display by the theme color. (Only for the project of M800/M80 series)

2.3.4 Control

Item Function
Basic object Select to draw the basic control.
Button object Select to draw a button.
Checkbox object Select to draw a check box.
Edit control object Select to draw an edit control.
HTML browser object Select to draw an HTML browser.
Label object Select to draw a label.
List object Select to draw a list.
Picture object Select to draw a picture.
Progressbar object Select to draw a progress bar.
Radiobutton object Select to draw a radio button.
Textbox object Select to draw a text box.
Vertical scroll bar object Select to draw a vertical scroll bar.
Horizontal scroll bar object Select to draw a horizontal scroll bar.
Input box Select to draw an input box.
Ten-key Select to draw a ten-key.
NC data text box Select to draw an NC data textbox.
PLC button Select to draw a PLC button.
PLC extension button Select to draw a PLC extension button.
PLC textbox object Select to draw a PLC textbox.
PLC message Select to draw a PLC message.
Page change button Select to draw the page change button.
Stacked graph Select to draw the stacked graph.
Statistics graph Select to draw the statistics graph.
Table object Select to draw a table.
Counter Select to draw a counter display part.
CycleTime Select to draw a cycle time display part.
Feedrate Select to draw a feedrate (F) display part.
GModal M Select to draw an M system modal display part.
GModal L Select to draw an L system modal display part.
GModal Simple Select to draw a simple modal display part.
LoadMeter Select to draw a load meter display part.
Menu Select to draw a menu part.
Extension Menu Select to draw an extension menu part.
MSTB Select to draw a MSTB part.
ONB Select to draw an ONB display part.
ProgramBuffer Select to draw a program buffer display part.
SPCommand Select to draw a spindle (S) display part.
FileInOut Select to draw an input/output control part.
AlarmMessage Select to draw an alarm message display part.
Monitor Select to draw an operation status display part.

Time Select to draw a time display part.
Alarm list Select to draw an alarm list part.
Meter Select to draw a meter part.
TrendGraph Select to draw a TrendGraph part.
Frame Select to draw a view frame.

2.3.5 Figure
Item Outline
Rectangle Select to draw a rectangle.
Circle&Oval Select to draw a circle or ellipse.
Straight Line Select to draw a line.
Poryline Select to draw a continuous line.
Polygon Select to draw a polygon.
Sector Select to draw a sector.
Arc Select to draw an arc.
2.3.6 Setting
Item Function
Project Properties Enter the project property settings.
Panel/Window Properties Enter the panel/window property settings.
Focus setup Enter the focus destination setting.
Panel macro edit Edit the macro used in the screen.
Project macro edit Edit the macro used in the project.
2.3.7 Layout
Item Function
Align/Distribution Change the alignment or arrangement of selected multiple objects.
Make Same Size Resize the horizontal or vertical width of selected multiple objects to the smallest or largest object size.
Order Display the selected object at the far front or far back position.
Nudge Move the selected object left, right, up or down by a dot or grid.
Rotate/Flip Rotate the object or create a mirror image of it.
Modify Deform the polygon or arc.
Group Group multiple objects. Or cancel a group.
Grid Enter the grid setting.

2.3.8 Tool
Item Function
Screen Maintenance Copy or delete the screen.
Error check Perform an error check of the created data.
Functional Object List Display a list of controls and jump to the selected control.
Export of a character sequence resource
Export the character string resource in a CSV file.
Import of a character sequence resource
Import the character string in a CSV file into the character string resource.
Test Perform an action test of the screen.
Open at NC Trainer2 plus Perform an action test with NC Trainer2 plus.
Options Customize NC Designer2 operations or specified values.
Resource management Delete the unnecessary resources being used in a project in a batch.
2.3.9 Window
Item Function
Cascade Overlap screen editing windows.
Tile Arrange screen editing windows like tiles.
Arrange Icons Arrange minimized window icons.
2.3.10 Help
Item Function
About NC Designer2 Display the version of the product.

2.4 Flow of Development Using NC Designer2
The flow of GUI development using NC Designer2 is shown below.
Resources such as the character strings and image data are controlled by a single user because they are common project data. Create the character string of each control and the window title character string in advance as resources. After creating resources, each screen layout can be arranged by multiple users.
After source codes are generated, add the user-specific program to the source code and perform application development.
Create panels/windows.
Layout the screen
Simulate on PC
Generate the document (design document).
Generate source codes.
Creation by multiple users is allowed.
Add user programs to source codes.
Create a project.
Create resources.

3. Startup and Termination of NC Designer2
The startup and termination methods of NC Designer2 are described in this section.
Refer to "3.4 Installing NC Designer2" for how to install NC Designer2.

3.1 Starting NC Designer2

To launch NC Designer2, select the start button of Windows, followed by "Programs", "MELSOFT application", "NC Designer2" and "NC Designer2". (The displayed names may vary according to the "program folder" designated during installation.

After NC Designer2 is launched, the main window is displayed.

Selected dialogues of the project are displayed according to the setting.

3.2 Exiting From NC Designer2

Perform one of the following procedures to exit from NC Designer2.

Select [Exit] from the [File] menu.

Click on the button at the upper right of the main window.

Double click on the NC Designer2 icon at the upper left of the main window.

Click on the NC Designer2 icon at the upper left of the main window and select [Close] from the displayed control menu box

While holding down the [Alt] key, press the [F4] key.

If the open project data has not been saved, a confirmation message is displayed.

3.3 User Interface

3.3.1 Function of Each Part of Basic Screen

The configuration of the operation screen of NC Designer2 and the name of each part are described in the following.

Control tool box

Resource tree

Screen tree

Message window

Image viewer

Property sheet

Status Bar

The position of the cursor and descriptions about the selected function or control are displayed.

The selected menu or description about the function of the icon in the tool bar is displayed.

The selected view frame page number is displayed.

The cursor position is displayed.

The current displaying scale is displayed.

The editing right of the panel/window data is displayed.

The editing right of the common project data is displayed.

The currently selected locale name is displayed

The coordinates of the upper left point of the object are displayed.

3.4 Installing NC Designer2

Double-click NC Designer2.exe to install NC Designer2. Follow the explanations.

(Note 1) If an old version of NC Designer has already been installed, the software will be updated to NC Designer2.

4. Creating a Project

Basic operations about the project where various pieces of created data are stored are described in this section.

4.1 Creating a New Project

The procedure from creation of a new project to editing of the screen is described.

1. Select [New Project] from the [File] menu or select the [New Project] button in the tool bar.

2. The New Project wizard is displayed. Follow the instructions in the wizard to enter settings about the project.

Project setting NC type selection

(1)

(2)

(3)

No. Item Description

(1) Project Enter the project name.

(2) Folder Designate the folder where the project is stored with a full path.

(3) NC type Select a NC type.

NOTE

In the compilation method, the following project names cannot be used.

- The same name as the panel/window name
- "SampleScreen"
- The combination of the panel/window name and the view frame name is same as the project name.

Example

- Project name: TestMonitor
- Panel/window name: Test
- View frame name: Monitor

Project property setting
(1)
(2)
No. Item Description
(1) Page size Select the default screen size of the page.
(2) Background Color Designate the default background color of the page. Click on the Select button and select the desired color in the displayed [Color] dialog box.
3. Click on the [Finish] button to create the project.
NOTE
After a project is created, the panel of page 0 is automatically created.
If a new project is created while another project is being edited, a message urging to save the currently edited project is displayed.
Settings related to the screen size and display scale are stored in the CONFIG.INI file, that is in a same folder with melhi.exe.
To modify the screen size or the display magnification, adjust the values in the [SCREEN].
[SCREEN]
WIDTH = 640
HEIGHT = 480
SCALE = 100

4.2 Entering Project Properties
Enter the properties of the currently edited project.
1. Select [Project Properties] from the [Setting] menu.
2. Project properties are displayed in the property sheet.
3. Enter each item.
Enter the following items.
Item Description
Project Title Enter a comment about the project.
System font Select the resource ID of the character font displayed in the title bar of the window.
Title bar active color Specify the color of the title bar of the active window.
Title bar inactive color Specify the color of the title bar of the inactive window.
System background color Specify the background color of the button displayed in the title bar of the window.
System foreground color Specify the foreground color of the button displayed in the title bar of the window.
Window frame Select the shape of the window frame from the solid frame resource ID.
Unicode Correspondence Select "Yes" for Unicode character code of each locale.
Execution start screen No. Specify the page number of the panel displayed first.
Default background color of a screen
Specify the default background color of the panel and window.
Screen width Designate the screen width in dots (1 to 2560).
Screen height Designate the screen height in dots (1 to 1920).
Display magnification Designate the display scale of the application in percent (25 to 800).
The setting is confirmed when it is entered.
The system font and color settings are reflected as shown below.
Window frame
(The size is fixed at 1 dot. The selected colors of the solid frame ID
(upper left: coor 1. lower right: color 2) are reflected.)
System background color
(button color)
Title bar (active/inactive color)
System font
System foreground color
(character color and "x" button color)
NOTE
The user who has opened the project to "Edit" common project data can change the project properties.

4.3 Saving the Project
The method for saving the project file is described.
1. Select [Save Project] from the [File] menu or select the [Save Project] button in the tool bar.
NOTE
If the edited project has not been saved, an overwrite confirmation dialog box is displayed when the project is closed.
4.4 Saving the Project as ...
Save the currently edited project under another file name or at another location.
1. Select [Save Project as ...] from the [File] menu.
2. The [Save Project as] dialog box is displayed.
Designate the destination directory and file name and click on the [Save] button.
NOTE
If the project is saved under a new name, all the currently opened files are copied to the directory of the new project.
In the compilation method, the following project names cannot be used.
- The same name as the panel/window name.
- "SampleScreen"
- The combination of the panel/window name and the view frame name is same as the project name.
Example
- Project name: TestMonitor
- Panel/window name: Test
- View frame name: Monitor

4.5 Opening a Project

Open an existing project.

1. Select [Open Project] from the [File] menu or select the [Open Project] button in the tool bar.
2. The Open Project dialog box is displayed.

Select a project file (extension: ND2, IPP) and click on the [Open] button.

4.6 Opening a Recently Used Project

Up to four most recent projects can be opened directly.

1. Select [Recent Projects] from the [File] menu.
2. The recently used projects are displayed with directory.

Select the desired project.

4.7 Template Function

4.7.1 Outline

The template function makes screen creation more efficient by allowing the copying of a template project when creating a new project.

The screen image of the template project is displayed on the copy data (project) dialog to make selecting the optimal project easy.

This function is only for M800/M80 Series.

Create panels/windows
Layout the screen
Create a macro
Create a project
Create resources
Simulate
Create a new project
Copy data (Project)

4.7.2 Dialog specifications

On the copy data (project) dialog, the details of the template projects are displayed to help selecting the template project. A new project using the selected template can be created by designating the destination folder to store the project and the project name.

The following items are displayed in this dialog box.

No. Item Description

(1) Screen size Select the screen size of the template project.
The projects with the selected screen size are displayed on the list.

(2) List Display the list of the template projects.
Display the file name, data size and the date modified.

(3) Preview Display the images of the panels/windows set in the template project that is selected on the [List].

(4) Details Display the details of the template project that is selected on the [List]

(5) Folder Designate the full path of the destination folder for storing the project.
The copy data project is saved to the designated path.

(6) Project name Specify the project name. (Up to 31 letters)

NOTE

An interpreter method macro file and a compilation method source file are imported with the project.

(2)
(1)
(3)
(4)
(5)
(6)

4.7.3 Operation Specifications

Project Select Dialog

1. Start up NC Designer2.

2. The project select dialog box is displayed. (Note)
3. Press the [Copy data] button to display the copy data (project) dialog box.
4. After the setting, press the [OK] button.

5. A project is created in the designated folder.

(Note) Project select dialog is displayed only when "Show project select dialog when start" on the option dialog box is checked.

File menu [Copy data (Project)]

1. Start up NC Designer2.

2. Select [New Project]-[Copy data (Project)] from the [File] menu.
3. [Copy data (Project)] dialog box is displayed.
4. After the setting, press the [OK] button.

5. A project is created in the designated folder.

5. Creating and Saving the Page

In this section, the page (screen) that can be displayed on the target board and the basic operations available in each page are described.

5.1 What Is Page?

The "page" indicates a screen displayed with NC Designer2.

The page includes the following two types.

Item Description

Panel Screen displayed in full size on the screen.

Window Screen displayed in a window state on the screen.

5.2 Creating a New Panel

To create a new panel in a project being editing, perform one of the following operations.

- Select [New Panel] from the [File] menu.
- Click [New Panel] button in the tool bar.
- Select [New Panel] in popup menu which is displayed by right-click on the screen tree.
- Click [New Panel] button of the screen tree.

NOTE

After a new panel is created, the smallest page number among unused page numbers is automatically assigned to the new panel.

5.3 Creating a New Window

To create a new panel in a project being editing, perform one of the following operations.

- Select [New Window] from the [File] menu.
- Click [New Window] button in the tool bar.
- Select [New Window] in popup menu which is displayed by right-click on the screen tree.
- Click [New Window] button of the screen tree.

NOTE

After a new window is created, the smallest page number among unused page numbers is automatically assigned to the new window.

5.4 Entering Panel Properties

Enter the properties of the currently edited panel.

1. To view panel properties, perform one of the following operations.

- Select [Panel/Window Properties] from the [Setting] menu.
- Select [Panel/Window Properties] from the popup menu which is displayed by right-click on the panel.
- Select the panel name of the panel that is open on the screen tree.
- Select [Panel/Window Properties] from the popup menu which is displayed by right-click on the panel being edited of the screen tree.

2. Enter each item.

The setting items include the followings.

Item Description

Panel Title Enter a one-byte character string to specify the panel title (up to 31 characters). The first character must be a one-byte letter (A to Z or a to z).
The second and later characters must be one-byte letters, numbers or underscores (_).

WIDTH Specify the panel width in dots (1 to 2560).

HEIGHT Specify the panel height in dots (1 to 1920).

Background Color Specify the background color.

Background File Select "Yes" to use the background, or select "No" to refrain from using it.

Background Image Select the ID of the image resource used for the background. Use the resource tree to register the image resource.

Blink off time Enter the OFF interval (regular display) of the control blink in ms (100 to 60000).

Blink on time Enter the ON interval of the control blink in ms (100 to 60000).

The setting is confirmed when entry is finished.

NOTE

For the blink, refer to "Blink" in Section 7.1 "Common Control Functions".

In the compilation method, the following panel names cannot be used.

- The same name as the project name
- The same name as the window name
- "SampleScreen"
- The combination of the view frame name and the panel name is "SampleScreen".
- The combination of the view frame name and the panel name is same as the project name.

Example

- Project name: TestMonitor
- Panel name: Test
- View frame name: Monitor

5.5 Entering Window Properties

Enter the properties of the currently edited window.

1. To view panel properties, perform one of the following operations.

- Select [Panel/Window Properties] from the [Setting] menu.
- Select [Panel/Window Properties] from the popup menu which is displayed by right-click on the window.
- Select the window name of the window that is open on the screen tree.
- Select [Panel/Window Properties] from the popup menu which is displayed by right-click on the panel being edited of the screen tree.

2. Enter each item.

The following items can be entered.

Item Description

Window Name Specify the window name (up to 31 characters).
The first character must be a one-byte letter (A to Z or a to z).
The second and later characters must be one-byte letters, numbers or underscores (_).

X Specify the X coordinate of the upper left corner of the window in dots (0 to 2559).

Y Specify the Y coordinate of the upper left corner of the window in dots

(0 to 1919).
WIDTH Specify the panel width in dots (1 to 2560).
HEIGHT Specify the panel height in dots (1 to 1920).
Background Color Specify the background color.
Background File Select "Yes" to use the background image, or select "None" to retrain from using it.
Background Image Select the ID of the image resource used as a background image.
Use the resource tree to register the image resource.
Title Select the character string displayed in the title bar of the window from the character string resource, or enter a new one.
Existence of a title bar Select "Yes" to display the window with a title bar, or select "None" to display it without a title bar.
Existence of a close button Select "Yes" to display a close button in the title bar of the window, or select "None" to refrain from displaying the close button.
Existence of a window frame Select "Yes" to display the window with the window frame, or select "None" to display the window without the window frame.
Blink off time Specify the OFF interval (regular display) of the blink of the control in ms (100 to 60000).
Blink on time Specify the ON interval of the blink of the control in ms (100 to 60000).
The setting is confirmed when entry is finished.
NOTE
For the blink, refer to "Blink" in Section 7.1 "Common Control Functions".
In the compilation method, the following project names cannot be used.
- The same name as the project name
- The same name as the window name
- "SampleScreen"
- The combination of the view frame name and the panel name is "SampleScreen".
- The combination of the view frame name and the panel name is same as the project name.
Example
- Project name: TestMonitor
- Panel name: Test
- View frame name: Monitor
The window size includes the title bar size.

5.6 Saving the Panel/Window
To save the panel /window being editing, perform one of the following operations.
- Select [Save Panel/Window] from the [File] menu.
- Click the [Save Panel/Window] button on the tool bar.
- Select [Save Panel/Window] from the popup menu which is displayed by right-click on the screen tree.
NOTE
The shortcut key for [Save Panel/Window] is [Ctrl] + [S].
If the panel/window being edited has not been saved, a confirmation dialog box is displayed when the panel/window is closed. To save, click on the [Yes] button.
5.7 Save All
The entire project is saved.
After this procedure, not only the opened page but also the entire project is saved.
1. Select [Save All] from the [File] menu.
2. After the project is saved, a message dialog box is displayed.
Click on the [OK] button.
NOTE
Saving the entire project causes a change in the common project data. Only the user holding the right of editing the common project data can execute the function.

5.8 Opening a Panel/Window
To open the panel/window of the current open project, perform one of the following operations.
- Select [Open Panel/Window] from the dialogue.
- Double-click the existing panel/window on the screen tree.
- Select [Open] from the popup menu which is displayed by right-click on the screen tree.
1. Select [Open Panel/Window] from the [File] menu, or select the [Open Panel/Window] button in the tool bar, to display [Open Panel/Window].
2. Select the desired screen and click on the [OK] button.
(1)
(2)
(3)
(4)
No. Item Description
(1) Window The window is marked with an asterisk (*).
(2) Operation state The page being used is marked with an asterisk (*).
(3) Preview A preview of the selected page is displayed.
(4) Jump Designate the page number and click on the [Jump] button to jump to the designated page.
3. The selected screen is displayed.
NOTE
The shortcut key for [Open Panel/Window] is [Ctrl] + [0].
If a page with an unused page number is opened, a new panel is created.
The number of pages that can be edited simultaneously is 16.
5.9 Closing the Panel/Window
To close the open panel /window, perform one of the following operations.
- Select [Close Panel/Window] from the [File] menu.
- Click mark in the top right of the page.
- Select [Close] from the popup menu which is displayed by right-click on the screen tree.

5.10 Switching the Editing Window

The method for switching the editing window is described.

5.10.1 Previous Screen

The editing window of the previous page number is displayed.

1. Select [Previous Screen] from the [View] menu or select the [Previous Screen] button in the tool bar.

NOTE

The editing window is the screen area created in the editing page (panel or window) units.

If there is no panel or editing window one the page earlier than the currently opened panel or window, this function may not be used.

An error is caused if a new screen is opened beyond the limit in the number of editing pages.

5.10.2 Next Screen

The screen of the next screen page number is displayed.

1. Select [Next Screen] in the [View] menu or select [Next Screen] button in the tool bar.

NOTE

If there is no panel or editing window for the page numbers later than the currently opened panel or window, this function may not be used.

An error is caused if a new screen is opened beyond the limit in the number of editing pages.

5.10.3 Cascade

The active window is brought to the front.

1. Select [Cascade] from the [Window] menu.

5.10.4 Tile

Open page windows are displayed in tiles.

1. Select [Tile] from the [Window] menu.

5.10.5 Arrange Icons

Minimized page windows are arranged neatly.

Minimized page windows are arranged from left to right below the application window.

1. Select [Arrange Icons] from the [Window] menu.

NOTE

This function may not be used if there is no minimized page window.

5.10.6 Switching Locale

When two or more locales are registered, the locale is switched.

1. Select [Switch Locale] from the [View] menu or select the desired locale in the tool bar.

Or, select the desired locale in the source view, and select "Switch" from the popup menu displayed upon a click of the right mouse button.

NOTE

The currently displayed locale is marked with a check mark in the icon.

5.10.7 Zoom

The editing window display is enlarged or reduced.

The scale can be selected in the range between 25% and 800%. Or select "fit" to enlarge or reduce according to the current window size.

1. Select [Zoom] from the [View] menu.
2. The [Zoom] dialog box is displayed.
3. Select the scale and click on the [OK] button.

If [Fit] is selected, the window width fits the width of the editing window.

The scale automatically
changes so that the
window is displayed in the
full screen.

[100%] [Fit]

5.10.8 Refresh

Refresh the screen to erase garbage from the screen or display the current screen again.

1. Select [Refresh] from the [View] menu.

5.10.9 Changing the Theme Color

The NC control located on the screen is displayed with the color pattern of the selected theme color.

Gray tone (standard color for M8) or blue tone (standard color for M7) can be selected as a theme color.

<Gray tone> <Blue tone>

1. Select the theme color to display with the [Change theme color] from the [View] menu.

The screen is displayed with the color pattern of the selected theme color.

NOTE

If opening the project for M700V/M70V/E70 series, the menu is grayed out.

5.11 Creating View Frame

Use the view frame to switch a part of the displayed page.

The view frame consists of multiple view frame pages. Switch each view frame page according to the variable to switch the displayed image.

The following parts can be arranged in the view frame.

Controls

Figures

1. Select [Frame] from the [Control] menu or select the [Frame] button in the control toolbox.
2. The cursor changes to the following shape.
3. Move the cursor to the starting point of the view frame.
4. Drag the cursor (move the mouse while holding down the left mouse button) to the end point of the display area of the view frame.

Drag

5. Select the view frame. The view frame properties are displayed.
6. Enter each item.

The setting items include the followings.
Item Description
Frame Name Specify the view frame name (up to 31 characters).
The first character must be a one-byte letter (A to Z or a to z).
The second and later characters must be one-byte letters, numbers or
underscores (_).
X 0 to 2559
Y 0 to 1919
WIDTH 8 to 2560
HEIGHT 8 to 1920
The number of the maximum
frames
Specify the maximum number of frames.
Edit Frame Designate the frame page No. to be edited.
The setting is confirmed when entry is finished.
NOTE
The view frame may not be created in another view frame.
The frame of the view frame is highlighted with the reverse color of "Background color" that is specified in
properties of panel or window.
In the compilation method, the following project names cannot be used.
- The combination of panel/window name and the view frame name is "SampleScreen"
- The combination of the panel/window name and the view frame name is same as the project name.
Example
- Project name: TestMonitor
- Panel/window name: Test
- View frame name: Monitor
Next, the drawing method of each page of the view frame is described.
1. Double click on the view frame area.
2. The editing mode starts in the view frame.
3. Draw using the operation method similar to that of the regular page.
4. Edit other view frame pages.
5. Click on the area outside the view frame of the drawn page to return to the regular drawing mode.

5.11.1 Switching the View Frame
The method for switching the view frame page is described.
Switching to Previous or Next View Frame Page
Switch to the previous or next view frame page.
1. Select [Previous Frame] or [Next Frame] from the [View] menu or select [Previous Frame] or [Next Frame]
button in the tool bar.
Switching to an Arbitrary View Frame Page
Display the desired view frame page.
1. Select a view frame and display view frame properties in the property sheet.
2. Designate the desired view frame page to be edited.

5.12 Importing a Page
The page import function enables to copy the desired page (panel/window) from another
designated project to the currently editing project.
This function brings high productivity by reusing of panel/window for expanding the NC types and
functions.
During the page import, the resource data, macro data and C++ source codes are imported in
addition to the screen data.
The page of the project created with NC Designer2 under the different version can be also
imported.

5.12.1 Operation Screen
5.12.1.1 Page Import Dialog
The page import dialog enables to import the designated pages (panel/window) from a project of
the import source location to the desired pages in the editing project. It is also possible to set
whether to import the resource used in the pages.
Dialog Image
(1)
(2)
(3)
(4)
Display Item
The import dialog consists of the following items.
No. Item Detail
(1) The page list of the project
in the import source
Displays the page list of the project specified in the import source.
"*" appears on the left side of the existing page.
"*" appears on the right side of the window page.
(2) The page list of the project
in the import destination
Displays the page list of the currently edited project.
"*" appears on the left side of the existing page. "I" appears on the
imported page.
"*" appears on the right side of the window page.
(3) Import source preview Previews the page selected in "The page list of the project in the import
source" as in 1.
(4) Resource import (R) Sets whether to import the resource used in the page which has import
setting.

(Note 1) When [Import resources as well] is checked, the resource is
imported, and the desired resource data name can be specified.
(Note 2) When [Import resources as well] is not checked, the resource is
not imported, and the different control from the import source may
displayed.

Menu
The menus are displayed below.
No. Item Detail
(1) Execute (S) Saves the setting and closes the dialogue.
Starts import.
(2) Cancel Cancels the setting and closes the dialogue.
(3) button Cancels the setting and closes the dialogue.
(4) Import (I) Configures the import of the page specified in the import source to the
page specified in the import destination.
(Note 1) Pressing this button does not start import.
(5) Delete page (D) This is enabled when the cursor is on the page pointed by "I" in the
import destination page list.
The page to which import has been configured can be deleted from the
project in the import destination.
NOTE
 Even when no pages are available in the page list of the project in the import source or the page list of the
project in the import destination, the page numbers 0000 to 0255 are still displayed in the [No.] field.
 The incorrect pages in the import destination are not displayed in the page list of the project in the import
source.

5.12.1.2 Resource Data Name Conversion Table Dialog
The [Resource Data Name Conversion Table] dialog appears when import is performed when the
[Import resources as well] is checked on the page import dialog. By editing the field in [After
Conversion], you can rename the resource data after conversion to your desired name.
Dialog Image
Dialog Configuration
The Resource Data Name Conversion Table dialog consists of the following five tabs.
No. Tab Description
(1) Character sequence Displays a list of the character sequence resources to be imported.
(2) Font Displays a list of the font resources to be imported.
(3) Image Displays a list of the image resources to be imported.
(4) Solid frame Displays a list of the solid frame resources to be imported.
(5) File name Displays a list of the file name resources to be imported.
NOTE
 When multiple pages are imported, the list of all resource data to import is displayed.
 If there is no duplicated resource, even though [Import resource as well] is checked on the page import dialog,
this dialog is not displayed. The [Open Panel/Window] dialog appears.

Display Item
The display items of each tab are described below.
(1) [Character sequence] tab
No. Item Description
(1) Character sequence Displays the character sequence of the selected locale.
(2) Before Conversion Displays the resource data name before the conversion
(3) After Conversion Displays the resource data name after the conversion.
NOTE
 The resource data name after the conversion is assigned from "ID_STRINGXXXXX(XXXXX: the total registered
resource number plus 1)" in sequence.
 The character sequence properties of each control which use the character sequence resource are also
converted.
 Only the [After Conversion] field can be edited. Up to 32 characters can be entered as a resource data name.
For the usable characters, refer to "6.4.1 Creating a New Character String Resource".
 If the same character sequence exists in the import source and import destination, it is registered with new
resource data name. The character sequence and the resource data name in the import destination are
maintained.
 If the number of locales in the import destination is smaller than the one in the import source, only the character
sequence resource of the locales that exist in the import destination is copied. If the number of the locales in the
import destination is larger than the one in the import source, the character sequence resource of Local0 is
copied and imported for the insufficient locales.
 (1)
(3)
(2)

(2) [Font] tab
No. Item Description
(1) Font Name Displays the font name of the selected locale.
(2) Size Displays the font size of the selected locale.
(3) Hoz. Displays the horizontal zoom of the character size of the selected locale.
(4) Vert. Displays the vertical zoom of the character size of the selected locale.
(5) Thckns. Displays the character thickness of the selected locale.
(6) Style Displays the font style of the selected locale.
(7) Before Conversion Displays the resource data before conversion.
(8) After Conversion Displays the resource data after conversion.

NOTE

The resource data name after the conversion is assigned from "ID_FONTXXXXX(XXXXX: the total registered resource number plus 1)" in sequence.

The font properties of each control which use the font resource are also converted.

Only the [After Conversion] field can be edited. Up to 32 characters can be entered as a resource data name. For the usable characters, refer to "6.5.3 Specifying Font Resource".

If the font resources of the same settings exist in the import source and the import destination, the font resource is not additionally registered. The information of the font resource which was not imported is saved in a log file.

If the number of locales in the import destination is smaller than the one in the import source, only the character sequence resource of the locales that exist in the import destination is copied. If the number of the locales in the import destination is larger than the one in the import source, the character sequence resource of Local0 is copied and imported for the insufficient locales.

When the font file which does not exist in the import destinationthe file saved in the "C:\WINDOWS\Fonts" directoryis imported, the default font name of the import destination is displayed in the resource data name conversion table. The font file is not imported, therefore the dialog that appears after import may be different from the import source.

(1)

(8)

(5)

(2)

(3)

(6)

(4)

(7)

(3) [Image] tab

No. Item Description

(1) File name Displays the file name.

(2) Before Conversion Displays the resource data name before the conversion.

(3) After Conversion Displays the resource data name after the conversion.

NOTE

The resource data name after the conversion is assigned from "ID_IMAGEXXXXX(XXXXX: the total registered resource number plus 1)" in sequence.

When import is executed, the file is also imported to the project folder.

The image properties of each control which use the image resource are also converted.

Only the [After Conversion] field can be edited. Up to 32 characters can be entered as a resource data name. For the usable characters, refer to "6.6.3 Specifying an Image File".

If the same image exists in the import source and the import destination, it is registered with new resource data name. The image and the resource data name in the import destination are maintained.

When the file does not exist in the import source, the empty file name is displayed but the file is not imported. The information of the image resource which was not imported is saved in a log file.

(1)

(3)

(2)

(4) [Solid frame] tab

No. Item Description

(1) SolFm Yes/None Displays existence of a solid frame.

(2) Perim Yes/None Displays existence of a Perimeter line

(3) Frame Size Displays the frame size.

(4) Before Conversion Displays the resource name before conversion.

(5) After Conversion Displays the resource name after conversion.

NOTE

The resource data name after the conversion is assigned from "ID_BORDERXXXXX(XXXXX: the total registered resource number plus 1)" in sequence.

The solid frame properties of each control which use the solid frame resource are also converted.

Only the [After Conversion] field can be edited. Up to 32 characters can be entered as a resource data name. For the usable characters, refer to "6.7.3 Specifying a Solid Frame File".

If the same solid frame exists in the import source and the import destination, it is registered with new resource data name. The solid frame and the resource data name in the import destination are maintained.

(1)

(5) (2)

(3)

(4)

(5) [File name] tab

No. Item Description

(1) File name Displays the file name.

(2) Before Conversion Displays the resource data name before conversion.

(3) After Conversion Displays the resource data name after conversion.

NOTE

The resource data name after the conversion is assigned from "ID_FILEXXXXX(XXXXX: the total registered resource number plus 1)" in sequence.

When import is executed, the file is also imported to the project folder

The file name properties of each control which use the file name resource are also converted.

Only the [After Conversion] field can be edited. Up to 32 characters can be entered as a resource data name. For the usable characters, refer to "6.10.3 Specifying the File Name Resource".

Only the [After Conversion] field can be edited. Up to 32 characters can be entered as a resource data name. For the usable characters, refer to "6.7.3 Specifying a Solid Frame File".

If the same solid frame exists in the import source and the import destination, it is registered with new resource data name. The solid frame and the resource data name in the import destination are maintained.

When the file does not exist in the import source, the empty file name is displayed but the file is not imported.

The information of the image resource which was not imported is saved in a log file.
(1)
(3)
(2)

5.12.1.3 Message Log
The conversion state of the resource is output to a message log file.
Log File Output Image
Output Item
A log file is output in the following composition
No. Item Description
(1) Message type Displays the type of the message. The following three types are mainly used.
Information: Each resource has converted
WARNING:Not imported
ERROR:Unable to import
(2) Message Displays messages.
(3) Resource data name Displays a resource data name.
Message List
The list of the messages to be output to a log file is described below.
Message
XXX Resource conversion has completed.
XXX:A character sequence, font, image, solid frame or file name.
Did not import this font resource because another resource of the same property already exists.
Import failed because the specified file does not exist in the import source.
Import failed because 2 or more files in the import destination have the same name.
NOTE
The log file (ConvResource.log) is saved in the folder at the same layer as the project information file (ND2file).
When the log file is in the following states, it is unable to write to the file.
(1) The file is read-only.
(2) Free disk space is insufficient.
(3) The project was read from the network area and the file network connection was cut.
Pressing the [Close] button on the resource name conversion dialog will display the resource conversion result on a message window.

(1)
(3)
(2)

5.12.2 Flow of Import Operation
1. Select [Import Panel/Window] from the [File] menu, or [Page Import] from the popup menu which is displayed by right-click on the screen tree.
2. Specify the project in which contains the page to import, press the [Open] button.
3. The [Import Panel/Window] screen appears.

4. After the setting, press the [Execute] button.
5. The [Open Panel/Window] dialogue appears. Select the panel/window to open, and press the OK button.

6. The selected panel/window appears.
NOTE
If the project in the import destination is being referred to, or any one of the panel/window in the project in the import destination is being referred to, [Import Panel/Window] of the [File] menu is grayed out, and it cannot be selected.
If the project in the import source is being referred to, or any one of the panel/window in the project in the import source is being referred to, an error dialogue of process execution appears when the project is specified in the "Open Project" dialog, and then the [Open] button is pressed. This disables the import process.

5.12.3 Selecting the Import Source/Destination
1. Select the page to import from the page list of the project in the import source.
2. Select the location to import from the page list of the project in the import destination.
3. Pressing the [Import] button inserts the panel/window name.
Repeat the step 1 to step 3 to import multiple pages.

If the page of the same name exists in the import destination, the Title Designation dialog appears.
Specify another page name which does not overlap with other pages, then press the OK button.
4. Pressing the [Execute] button executes the import for the designated panel/window.
NOTE
"I" appears on the left end of the page that has the import setting.
If the Cancel button is pressed after the page import is set, the import is not executed.
The page that has the import setting can be deleted. Follow [Procedure how to delete pages] to delete the added pages.

5.12.4 Deleting a Page in the Import Source

1. Click the page to delete in the page list of the project in the import destination.
2. Pressing the [Delete page] button deletes the panel/window name.
NOTE
The [Delete page] button is enabled when the cursor is moved to the page that has the import setting (the page marked with "I" appears on the left end).

5.12.5 Changing a Resource Data Name
1. Click the position or press the ENTER key to change the resource data name.
2. Change the resource data name in the [After Conversion] field.
3. Pressing the Enter key changes the data name.

5.12.6 Restrictions
1. Painting-out pattern resources and line pattern resources are not imported.
2. The HTML file and PLC message file described in the macro are not imported. The file registered to the file name resource is imported. However, files are not imported in the following cases.
1) When the same file exists in the import source and the import destination.
2) No files exist in the import source.
3. The screen No. and the resource ID used in the macro are not converted.
4. If the screen files that have the same extension but different data formats exist in the import source, the page does not appear in the import source page list.

6. Resource
With NC Designer2, the settings and data used commonly in the controls are registered in advance as resources.
This section describes the resource.
6.1 Resource
With NC Designer2, the settings and data used commonly in the controls can be registered as resources.
The following data is handled as resources with NC Designer2.
Item Description
Locale Character strings used for controls and window title, and font data
Image Figure data used for background image and picture controls
Painting out pattern Filling pattern data used for controls and figures
Line pattern Line pattern data used for figures
Solid frame External frame specified for controls
File name File data used for HTML browser controls
6.2 Resource Tree
Resources registered in the currently opened project are displayed. Resources can be added, deleted or the settings of them can be changed.

6.3 Locale
The set of a character string resource and font resource is called locale.
Up to 32 locales can be registered for each project.
Because two or more locales can be registered for each project, there is no need to divide a project according to the language, but screen data and settings can be handled as an integral group.
6.3.1 Creating a New Locale
1. Move the mouse cursor to "Locale" in the resource tree and click the right mouse button. Select "New locale" from the displayed popup menu.
2. A new locale is registered.
6.3.2 Deleting a Locale
1. Move the mouse cursor to the desired locale name and select "Delete" from the popup menu displayed upon a click of the right mouse button.

6.3.3 Locale Setup
1. Double click on the desired locale name or move the mouse cursor to the local name and select "Properties" from the popup menu displayed upon a click of the right mouse button.
2. Locale setting items are displayed in the property sheet.
Item Description
Locale name Specify the locale name.
The first character of the locale name must be a one-byte letter (A to Z or a to z).
The second and later characters must be one-byte letters, numbers or underscores (_).
The locale name must be within 16 characters.
Character code Select the character code of the locale.
The "character code" is available only in Unicode.
Language discerment
character sequence
Select the language being used.
NOTE
The locale of all languages has already been registered according to the language specification. Thus, do not change the setting of the locale.

6.3.4 Switching the Locale

The displaying locale can be switched on NC Designer2.

1. Move the mouse cursor to the desired locale name and select "Switch" from the popup menu displayed upon a click of the right mouse button.

2. The locale is switched. The currently selected locale is marked with a check mark.

NOTE

When the lang parameter of NC is switched, the language is automatically switched because the interpreter method and the compilation method (DLL method) synchronize with NC. The compilation method (execution file method) should embed the language switch function in the source code.

6.4 Character Sequence Resource

Register the character sequence set in the control.

Up to 5000 character sequence resources can be registered in the character string resource.

6.4.1 Creating a New Character String Resource

1. Move the mouse cursor to "Character sequence table" under "Locale" in the resource tree and double click on it or select "Edit" from the popup menu displayed upon a click of the right mouse button.

2. The [character sequence table] is displayed.

3. To register a new character sequence resource, select an arbitrary resource and select [Create] from the popup menu displayed upon a click of the right mouse button, or double click on the area where no resource is displayed.

The [character sequence property] dialog box is displayed.

4. Enter the "resource data name" and "character sequence" and click on the [OK] button.

NOTE

The first character of the resource data name of the character string resource must be a one-byte letter (A to Z or a to z). The second and later characters must be one-byte letters, numbers or underscores (_). The resource data must be within 32 characters.

Up to 256 one-byte characters (each two-byte character is equivalent to two characters) can be entered as a character string.

The character string resource is automatically created in the following case.

The character string displayed in the control is entered at control properties setup.

If two or more locales are registered and a character string resource is registered to one of those locales, the character string resource data name and character strings are reflected on the character string table of the other locales.

During multi-user development, the character string resource is controlled by a single user because it is common project data.

6.4.2 Editing or Creating Character String Resource

1. To edit the character string resource, select desired resource data and select [Edit] from the popup menu displayed upon a click of the right mouse button, or double click on the resource data.

2. The [Character String Properties] dialog box is displayed. Change the setting.

6.4.3 Replacing the Character String Resource

1. To replace registered character resource data, select the desired resource data and select [Replace] from the popup menu displayed upon a click of the right mouse button.

2. The [Replace] dialog box is displayed.

(d)

(a)

(b)

(c)

(e)

No. Item Description

(a) Find what Designate the character string to be replaced.

(b) Replace With Designate the character string to replace.

(c) Next Search for the character string designated in "Find what".

(d) Replace Replace the found character string each time a match is found.

(e) Replace All Replace all the target character string at once.

NOTE

The target character string is the one included in the currently edited locale.

6.4.4 Deleting Character String Resource

1. To delete character string resource, select the desired resource data and select [Delete] from the popup menu displayed upon a click of the right mouse button.

NOTE

If two or more locales are registered, the character string resource is deleted from the character string table of the other locales, too.

6.4.5 Importing or Exporting Character String Resource

Export the character string resource in a text file and edit it with spreadsheet software or the like, then import the result to enter the character string resource at a time.

Exporting Character String Resource

Export the character string resource into a text file.

1. Select [Export Character String Resource] from the [Tool] menu. Or move the cursor to "Locale" in the resource tree and select "Export of a character sequence resource" from the popup menu displayed upon a click of the right mouse button.

2. The [Export of a character sequence resource] dialog box is displayed.

(a)

(c)

(b)

(d)

(e)

(f)

No. Item Description

(a) File name Designate the export file name (default file name: StrTable.txt).The file name is up to 64 one-byte characters (each two-byte character is equivalent to two

characters).
(b) Folder Designate the destination of the file. (The maximum number of characters of
the folder and file names is 200.)
(c) Open file after
exporting
Place a check mark here to launch the application associated with the
extension of the file designated in the "file name" field and open the file.
If there is no associated application, Windows opens a dialog to select the
application to be launched. Designate the application to be launched.
(d) Delimiter Select either comma or tab as a delimiter used in the export file.
(e) Locale to export Select the export locale among each locale and "all locales".
(f) Character code The character code corresponding to the export file is only the Unicode.
3. Click on the "OK" button to start to export.
NOTE
Before exporting the character string resource, save the project ([File] - [Save Project]).

Editing Text File
Use spreadsheet software or text editor to edit the exported text file. The character code name,
resource data name of the character string resource, and character string data in the text file can be
edited.
1. Use spreadsheet software or text editor to open the exported text file.
If the "Open file after exporting" checkbox is marked when the file is exported, spreadsheet software or the
like is launched automatically to load the generated text file.
Character code key
Data key
Character code
Locale name
Character string data
Resource data name
2. Edit the text file.
NOTE
Do not delete [CHARSET] and [DATA].
The first character of the locale and resource data names must be a one-byte letter (A to Z or a to z).
The second and later characters must be letters, numbers or underscores (_). The locale name must be within
16 characters.
The character string registered in the character string resource is within 256 one-byte characters (each
two-byte character is equivalent to two characters).
When editing the text file to be imported, enclose each character string including a comma, tab, line feed and
carrier return codes, or double quotation mark in double quotation marks (" "). Specify two repetitive double
quotation marks for each double quotation mark.
Example
To import [AB, CD], enter [AB, CD].
To import [AB" CD], enter [AB"" CD].

Importing Character Sequence Resource
Import the edited text file.
An error check is performed when the file is imported.
1. Select [Import of a character sequence resource] from the [Tool] menu. Or move the mouse cursor to
"Locale" in the resource tree, and select "Import of a character sequence resource " from the popup menu
displayed upon a click of the right mouse button.
2. The "Import of a character sequence resource" dialog box is displayed.
(a)
(b)
(c)
No. Item Description
(a) Import file Designate the file to be imported. Click on "Load File" and designate the
desired file in the displayed file selector.
(b) Dataform of an
import file
Designate the data format of the file to be imported.
Character code
of an import file
The character code of the file to be imported is only the Unicode.
(c) Dilimiter Select the delimiter of the file to be imported.
3. Click on the OK button to start to import.
NOTE
If a duplicate resource data name is found in the importing text file, the duplicate data will overwrite the original
data in the application. Check for duplicate resource data name before starting to import.
The character string resource can be imported only if the project is opened with the edit flag.
If importation is interrupted during importation, the character string data having been imported up to the timing
is reflected on the character string resource.

Error Check
If an error is detected during importation, the message view displays an error list.
Message Remedy
Invalid locale name "XXX" was discovered by the file
under import. The information on this column is not
imported.
Correct the locale name.
The character sequence with a blank locale name
was discovered by the file under import. The
information on this column is not imported.

Correct the locale name.
Invalid resource data name "XXX" was discovered
by the file which is under import. The information on
this line is not imported.
Correct the resource data name.
The column with a blank resource data name was
discovered by the file under import. The information
on this line is not imported.
Correct the resource data name.
The line to which a locale name overlaps the file
under import was discovered. The information on
this column is not imported.
Enter an unused locale name.
The character sequence to which length exceeds
256 characters in the file under import was
discovered. It is not imported after 256 characters of
this character sequence.
Reset the character string registered in the
character string resource so that it is within 256
one-byte characters (each two-byte character is
equivalent to two characters).
Since the number of the maximum registration of a
locale name is 32, it is ignored after it.
The number of locale names must be within 32.
Since the number of the maximum registration of the
character sequence resource ID is 5000, the
character sequence resource after it is disregarded.
The maximum number of registered resources must
be within 5000.
In the file under import, since a data key does not
exist, a file cannot be imported.
Add a data key ([DATA]) in the imported file.
NOTE
The first character of the locale and resource data names must be a one-byte letter (A to Z or a to z). The second and later characters must be letters, numbers or underscores (_).The locale name must be within 16 characters.
Show a preview in the [Import Character String] dialog box to display errors in red. Check for errors before starting to import.

6.5 Font Resource
Register the font, style and other character attributes to be specified for the control.
Up to 5000 font sources can be registered.
6.5.1 Creating a New Font Resource
1. Move the mouse cursor to "Font" in the resource tree and select "New font" from the popup menu displayed upon a click of the right mouse button.
2. The new font resource is registered.
(Note) Resource data name is common for all locales. Therefore, a font resource will be registered in all locales if it is created in one locale.
6.5.2 Deleting Font Resource
1. Move the mouse cursor to the font resource data name to be deleted, and select "Delete" from the popup menu displayed upon a click of the right mouse button.
(Note) Resource data name is common for all locales. Therefore, a font resource will be deleted from all locales if it is deleted in one locale.

6.5.3 Specifying Font Resource
1. Double click on the desired font resource data name or move the mouse cursor to the font resource data name and select "Property" from the popup menu displayed upon a click of the right mouse button.
2. The font resource setting items are displayed in the property sheet.
Item Description
Resource data name Specify the resource data name.
The first character of the resource data name must be a one-byte letter (A
to Z or a to z).
The second and later characters must be one-byte letters, numbers or
underscores (_).
The resource data name must be within 32 characters.
Font name Specify the font name.
Font size Specify the font size. The setting is valid if the selected font is a vector
font.
Zoom horizontal Specify the horizontal zoom of the character size. The setting is valid if the
selected font is a raster font.
Zoom vertical Specify the vertical zoom of the character size. The setting is valid if the
selected font is a raster font.
Thickness Select the character thickness among "THIN", "NORMAL" and "BOLD".
Font style Select the character style among "None" and "Italics".
NOTE
In M800/M80 (Windows-less display unit) and M700VS/M70V/E70, data is displayed in the "MITSUBISHI CNC Gothic" font regardless of the specified font. The font style "Italics" is not available in the "MITSUBISHI CNC Gothic" font except for M800/M80 (Windows-based display unit).
In M700VS/M70V/E70/M700VW, the size of the displayed font is different from the specified font size. The display size is as follows.
Specified
font size
Displayed font size
M700VS/M70V/E70 M700VW M800/M80

All fonts MITSUBISHI CNC
Gothic
Other fonts All fonts
1 to 13 12 12
Same as the
specified size Same as the specified size
14 to 15 16
16 to 19 16
20 to 23 24
24 to 27 24
28 to 31 32
32 to 47 32
48 to 63 48
64 to 72 64

6.6 Image Resource
Register image data used for controls or background images.
Registrable image files : BMP, JPG, PNG, and VGF.
Up to 5000 image resources can be registered.
6.6.1 Creating a New Image Resource
1. Move the mouse cursor to "Image" in the resource tree and select "New image" from the popup menu displayed upon a click of the right mouse button.
2. The new image resource is registered.
6.6.2 Deleting an Image Resource
1. Move the mouse cursor to the desired image resource data name and select "Delete" from the popup menu displayed upon a click of the right mouse button.
6.6.3 Specifying an Image File
1. Double click on the desired image resource data name or move the mouse cursor to the image resource data name and select "Property" from the popup menu displayed upon a click of the right mouse button.
2. The image resource setting items are displayed in the property sheet.
Item Description
Resource data name Specify the resource data name.
The first character of the resource data must be a one-byte letter (A to Z or
a to z).
The second and later characters must be one-byte letters, numbers or
underscores (_).
The resource data name must be within 32 characters.
File name (Note) Specify an image file.
Click on the [...] button to display a file selector. Specify an image file from
BMP, JPG, PNG, or VGF.
(Note) Select an image resource file with the size of XGA (1024768) or smaller. If the file size is larger than XGA, the image may not be displayed on the custom screen.

6.7 Solid Frame Resource
Register the solid frame used for controls.
6.7.1 Creating a New Solid Frame Resource
1. Move the mouse cursor to "Solid frame" in the resource tree and select "New solid frame" from the popup menu displayed upon a click of the right mouse button.
2. The new solid frame resource is registered.
6.7.2 Deleting a Solid Frame Resource
1. Move the mouse cursor to the desired solid frame resource data name and select "Delete" from the popup menu displayed upon a click of the right mouse button.

6.7.3 Specifying a Solid Frame File
1. Double click on the desired solid frame resource data name or move the cursor to the solid frame resource data name and select "Property" from the popup menu displayed upon a click of the right mouse button.
2. The solid frame resource setting items are displayed in the property sheet.
Item Description
Resource data name Specify a resource data name.
The first character of the resource data name must be a one-byte letter (A
to Z or a to z).
The second and later characters must be one-byte letters, numbers or
underscores (_).
The resource data name must be within 32 characters.
Existence of a solid frame Select the existence of the solid frame between [Yes] and [None].
Color 1 Specify the color of the upper left side of the solid frame.
Color 2 Specify the color of the lower right side of the solid frame.
Line color Specify the color of the frame line.
Frame size Specify the size of the solid frame in dots (1 to 960).
Color 1 (left and top)
Color 2 (right
and bottom)
Line color
The thickness of the frame line is
fixed at 1 dot.
The thickness of the frame line is
included in the frame size. If the
frame size is set at 1 dot, only the
outer frame line is drawn with 1 dot.
Frame size

6.8 Filling Pattern Resource

Register the filling pattern used for controls and figures.

38 filling patterns are provided in the initial state.

6.8.1 Editing the Filling Pattern

1. Move the mouse cursor to the resource data name of "Painting out pattern" in the resource tree and double click on it or select "Edit" from the popup menu displayed upon a click of the right mouse button.
2. The [Pattern Edit] dialog box is displayed. Edit the pattern.

(a)
(b)
(c)
(d)
(e)
(f)

No. Item Description

(a) Painting out pattern list Select the filling pattern.

(b) Browse Copy the currently selected filling pattern to the pattern editing area.

(c) Setting Specify the filling pattern being edited in the current pattern edit area to the selected filling pattern list.

(d) Pattern Edit Edit the filling pattern in dots. Each time the mouse button is clicked, the foreground and background are switched over.

(e) Display edit pattern Display a sample of the edited filling pattern.

(f) Default Restore the default filling pattern list.

6.9 Line Pattern Resource

Register the line pattern used for figures.

Eight line patterns are provided in the initial state.

6.9.1 Editing the Line Pattern

1. Move the mouse cursor to the resource data name of "line pattern" in the resource view, and double click on it, or select "Edit" from the popup menu displayed upon a click on the right mouse button.
2. The [Line pattern edit] dialog box is displayed. Edit the pattern.

(a)
(b)
(e)
(d)
(c)
(f)

No. Item Description

(a) Line pattern list Select the line pattern.

(b) Browse Copy the currently selected line pattern to the pattern edit area.

(c) Setting Specify the line pattern edited in the current pattern editing area to the selected pattern list.

(d) Pattern edit Edit the line pattern in dots. Each time the mouse button is clicked, ON and OFF are switched over.
The left end, center and right end patterns are displayed, starting at the top.

(e) Display edit pattern Display a sample of the line pattern being edited.

(f) Default Restore the default line pattern list.

6.10 File Name Resource

Register the file name displayed first when the browser control is operated.

Up to 5000 files can be registered.

6.10.1 Creating a New File Name Resource

1. Move the mouse cursor to "File name" in the resource tree, and select "New File" from the popup menu displayed upon a click of the right mouse button.
2. The new file name resource is registered.

6.10.2 Deleting the File Name Resource

1. Move the mouse cursor to the desired file name resource data name, and select "Delete" from the popup menu displayed upon a click of the right mouse button.

6.10.3 Specifying the File Name Resource

1. Double click on the desired file name resource data name, or move the mouse cursor to the file name resource data name, and select "Property" from the popup menu displayed upon a click of the right mouse button.
2. The file name resource setting items are displayed in the property sheet.

Item Description

Resource data name Specify the resource data name.
The first character of the resource data name must be a one-byte letter (A to Z or a to z).
The second and later characters must be one-byte letters, numbers or underscores (_).
The resource data name must be within 32 characters.

File name Select the file.
Click on the [...] button to display a file selector. Specify the file displayed first.

6.11 Resource management

6.11.1 Outline

The resource management function displays resource data registered to the project being edited in a list, enabling users to select unnecessary resources and delete them in a batch.
With this function, users can delete enlarged resource data and reduce custom data size.

6.11.2 Operation Screen
In the resource management dialog box, users can arbitrarily select resource data to be deleted and delete them.
Resource data registered to the project being edited is displayed in the resource list.
The following items are displayed in this dialog box.
No. Item Description
(1) Select all unused resources Click on the [Text] / [Image] buttons to check all unused resources whose displayed types are [Text] / [Image].
(2) Deselect all unused resources
Click on the [Text] / [Image] buttons to uncheck all unused resources whose displayed types are [Text] / [Image].
(3) Resource list Displays all resource data registered to the project being edited in a list.
(Note) The painting out pattern, the line pattern and the palette resource are not displayed in the list.
(4) Delete Deletes resources whose delete fields in the resource list are checked.
(5) Total size of resources (after delete) (in bytes)
Displays the total size of the resources (byte) whose delete fields in the resource list are not checked.
(6) Close Closes the resource management dialog box.
(2) (3)
(4)
(6)
(5)
(1)

NOTE
When you open the resource management dialog box, all unused character sequence resources and image resources are checked.

6.11.2.1 Resource list
The resource data name, the resource ID, the value, the type, the operation state, the size etc. are displayed in the resource list.
The following items are displayed on the resource list.
No. Item Description
(1) Delete Check the resource data to be deleted.
For checked lines, the entire line is displayed in light blue.
(2) Resource data name The resource data name of each resource is displayed.
(3) ID The resource ID of each resource is displayed.
(4) Value The settings of each resource data is displayed. When unset, an empty file name is displayed.
(1) For character sequence resources, the character sequences of the currently selected locale are displayed.
(2) For image resources and file resources, file names are displayed.
(3) For font resources and solid frame resources, empty file names are displayed.
(5) Type The resource type (character sequence, font, image, solid frame and file) is displayed.
(6) In use Displays whether resource data is being used in the properties of controls arranged in the project or not. (Note)
When the resource data is being used, "*" is displayed, and when the data is not being used, an empty file name is displayed.
(Note) Only resource data used in properties is displayed. Note that "*" is not displayed when the data is used in the macro.
(7) Size (in bytes) Displays the resource sizes (byte).
(1)
(2)
(3)
(4)
(7)
(6)
(5)

NOTE
Because the character sequences of menu 1 to menu 10 registered in the text property of the extension menu are not registered to character sequence resources, they are not displayed in the resource list.
Example:
The character sequences "Menu1" and "Menu2" are not displayed in the resource list.
The character sequences registered to the text properties "Menu1\tMenu2\t\t\t\t\t\t\t\t\t\t" are displayed in the resource list.
For font, image, and file name resources, keep at least one resource data.
For the solid frame resource, keep at least two resource data.

6.11.3 Operation specification

1. Click on the [Resource management] from the [Tool] menu, the [Resource management] icon of the resource tree, or the [Resource management] icon of the [Operation] tool bar.
2. The resource management dialog box is displayed.
3. Select the unnecessary resource data and press the Delete button.
4. The selected resource data is deleted.

5. Press the Close button and close the resource management dialog box.

7. Creating Controls

Each control and property settings are described in this section.
The control is an object having the following functions.
Expression of GUI operation and retention of operation state
Notification of GUI operation to user program
(Note) Some of the controls or properties are not accepted depending on the models or the versions selected in a new wizard. Several properties have different setting range.

7.1 Common Functions of Controls

7.1.1 Control Name

Specify the name of the control

Item Description

ID Specify the name of the control.
The first character of the control name must be a letter (A to Z or a to z) or underscore (_).
The second and later characters must be letters, numbers or underscores (_).
The control name must be within 31 characters.
The control name specified here becomes a variable name during source code generation.

.
.
.

```
GCClassCBMP(GCPage000)
GCEndClassCBMP()
Static const ButtonPropertypbupProperty[1] =
{
{GBUTTON,GCPage000::BUTTON00001, 253 ,
 37 , 228 , 155 , GW_STYLE_CAPTION ...
```

NOTE

One of the control names is automatically given to a new control.
Basic control object : GBasicControlxxxxx
The automatically given control name can be changed later.
Specify the control name while avoiding duplication with other controls in the same page.
If there are duplicate control names, source code generation is not in order. Use the error check function to check for duplication.

7.1.2 Position/Size

Specify the displaying position and size of the control

Item Description

X Specify the horizontal position from the upper left of the page/view frame of the control (X coordinate) in dots (0 to 2559).
Y Specify the vertical position from the upper left of the page/view frame of the control (Y coordinate) in dots (0 to 1919).
WIDTH Specify the width of the control in dots (8 to 2560).
HEIGHT Specify the height of the control in dots (8 to 1920).

Position
Y
X
Control
Page/view frame
Size
Size change The size is changed , serving the upper left position of the control as the origin.
WIDTH
HEIGHT Control

7.1.3 Color/Pattern

Specify the color/pattern of the control

Item Description

Background color Specify the background color of the control.
Foreground color Specify the foreground color (pattern color) of the control.
Pattern Select the filling pattern among "background", "foreground", "pattern 0" to "pattern 37", and "none".
The relationship among the background color, foreground color and pattern is as shown in the figure below.

Background color
Pattern Foreground color (pattern color)

NOTE

The color or pattern may be specified for each control state for some controls such as the button for which "foreground color at the time of ON", "background color at the time of OFF" and "pattern at the time of focus" may be specified.
38 types of patterns are provided for NC Designer2 in the default state. For the pattern type, refer to Appendix.

7.1.4 Image

Specify the image displayed on the control.
Item Description
Design Select the image resource data name to be displayed on the control.
NOTE
Refer to Section "6. Resource" for the image source.
The image may be specified for each control state for some controls such as the button for which "Design at the time of ON", "Design at the time of OFF" and "Design at the time of focus" must be specified.
7.1.5 Text
Specify the caption character string displayed on the control.
Item Description
Caption existence Select whether or not the caption is displayed.
Text Specify the character string displayed on the control.
There are the following two methods for the entry of the character string.
Select from registered character string resources.
Click on the button at the right of the entry area and select one of registered character string resources.
Enter a new character string.
Click on the entry area and enter a character string directly.
NOTE
The new character string is registered as a character string resource.
The character string is common data for the project. A single user should enter the new character string.
If [Edit Caption] is selected from the [Edit] menu while a control is selected, you can enter the character string directly on the control.

7.1.6 Character Attribute
Specify the character attribute of the caption.
Item Description
Character color Specify the character color.
Horizontal position Select the horizontal character position among "Align left", "Center" and "Align right".
Vertical position Select the vertical character position among "Align top", "Center" and "Align bottom".
Font Select the ID of the font resource for displaying the caption.
Margin left Designate the starting position of the caption in dots from the left end of the control (0 to 2560).
Margin right Designate the starting position of the caption in dots from the right end of the control (0 to 2560).
Margin top Designate the starting position of the caption in dots from the top of the control (0 to 1920).
Margin bottom Designate the starting position of the caption in dots from the bottom of the control (0 to 1920).
The relationship between the margin and character string position is as shown below.
Bottom margin
Right margin
Left margin
Top margin
The solid frame is not included in the margin. The rectangle indicated with dot lines indicates the area where the character string is displayed.
NOTE
Avoid reserving too large a margin. Otherwise the character string may not be displayed completely.
Too large a margin causes chipped characters.

7.1.7 Scrolling Caption Character String
Scroll the caption character string displayed at the control.
Item Description
Scroll Select the scroll of the caption character string among "Yes", "No" and "When a text sticks out".
The number of times of scrolling
Select the scrolling frequency between "Only 1 time" and "Repeat".
Start delay (ms) Specify the delay from the start-to-scroll request to the start of scrolling in ms (0 to 60000).
Updating interval (ms) Specify the scroll refreshment interval in ms (0 to 5000). Specify "0" to refrain from scrolling.
Movement amount (in dots) Specify the amount of movement in scrolling in dots (0 to 100).
Scroll start position Select the starting position between "The present position" and "From a right end".
The relationship between the scroll settings and action is as shown below.
Start-to-scroll request
After a delay, the character string starts to scroll.
In case of scrolling from right end
After the character string disappears completely, scrolling is finished.
If the number of scrolling cycles is "only 1 time", the character string returns to the original state. If the number of scrolling cycles is "repeat", the character string repeats scrolling.
NOTE
The scrolling direction of the caption character string is from right to left (fixed).
If a carriage return is included in the caption character string, the character string scrolls in a single line.

Before scrolling The character string is in a single line while it scrolls.
The caption character string scrolls in the character string display area, allowing for the margins. For the margin, refer to "Character Attribute".

7.1.8 Blink
Blink the caption character string of the control.
Item Description
Blink Select whether the character string blinks or not.
The blink method Select the caption character string blinking method among "Switch Show/Hide character", "A character color is changed", and "A whole color is changed".
The character color/whole color at the time of blink
Specify the blinking character color. The setting is valid if "A character color is changed" or "A whole color is changed" is selected for "The blink method".
If "Switch Show/Hide character" is selected, the caption character string continues to blink.
Blink OFF state
(regular state)
Blink ON state
If "A character color is changed" is selected, the character color of the caption character string repeats to change.
Blink OFF state Blink ON state
If "A whole color is changed" is selected, the button, label, text box and picture objects change the color of the whole control repeatedly, except for the solid frame. With the check box and radio button objects, the color of the area where the caption character string is displayed changes.
XOR between regular color and "the character color/whole color at the time of blink"
Blink OFF state Blink ON state

Blink Refreshment Interval
The control for which the blink is specified alternates between the blink OFF and blink ON states. Specify the intervals of both states at [panel/window properties] in the [Settings] menu. For the details on the setting method, refer to Section 5.4 "Entering Panel Properties" and Section 5.5 "Entering Window Properties".
Blink OFF interval
Blink ON interval

7.1.9 Solid Frame
Specify the solid frame of the control.
Item Description
Use of solid frame Select the presence of the solid frame between "Yes" and "No".
Solid frame Select the resource data name of the solid frame resource.
NOTE
For the solid frame resource, refer to Section 6 "Resource".
7.1.10 Callback Function
The callback function is an event-driven function for the user to add the original process in the C++ language. The callback function is generated in source codes after it is specified in the property sheet of NC Designer2.
Item Description
OnKeyPress Select "Yes" to add a process to be executed after the key is pressed.
OnKeyRelease Select "Yes" to add a process to be executed after the key is released.
OnPress Select "Yes" to add a process to be executed after the mouse or another pointing device is pressed.
OnRelease Select "Yes" to add a process to be executed after the mouse or another pointing device is released.
OnClick Select "Yes" to add a process to be executed after the mouse or another pointing device is clicked. If the pointing device is released on the same control, an event occurs, following OnRelease.
OnDraw Select "Yes" to add a process to be executed after the image is drawn.
OnTimer Select "Yes" to add a process to be executed after the timer event is called.
OnSetFocus Select "Yes" to add a process to be executed after the focus is located.
OnKillFocus Select "Yes" to add a process to be executed after the focus moves apart from the control.
OnCreate Select "Yes" to add a process to be executed after the page/control is generated.
OnDelete Select "Yes" to add a process to be executed before the page/control is deleted.
OnUser Select "Yes" to add an original process of the user.
OnScroll Select "Yes" to add a process to be executed after the scroll bar is clicked on with the mouse or another pointing device.
OnScrollFinish Select "Yes" to add a process to be executed after the caption character string has finished scrolling.
OnSelectChange Select "Yes" to add a process to be executed when the selection line is changed in the list.
If "yes" is selected at each item, a [...] button is displayed in the setting area.
Click on the [...] button to display an [Event list] dialog box where details of the action can be specified.
NOTE
If the character string does not overflow though "When a text sticks out" is selected as a caption character string scrolling method, OnScrollFinish is called immediately without scrolling after the character string starts to scroll. For the caption character string scroll, refer to "Caption Character String Scroll".
Whether each callback function can be used or not can be changed for each control by the user.

7.1.11 Event List Dialog Box
(a)
(e)
(b)
(d)
(c)
No. Item Description
(a) Event type Select the event to be added. Only "page change" can be specified.
(b) Add Add a selected event.
Click on the "Add" button to display the [switch page] dialog box.
(c) Change Change the setting of an event selected from the registration list.
(d) Delete Delete an event selected from the registration list.
(e) Entry List A list of added events is displayed.
NOTE
The page (screen) that can be switched with "page switching" is panel only. Switching to the window is not supported.

7.1.12 Switch Screen Dialog Box
(a)
No. Item Description
(a) Screen NO. Specify the destination page number.
Specify the panel page number as the destination.
NOTE
After the switch screen setting is given, the switch screen process is added automatically in the callback functions during source code generation.
7.1.13 Show/Hide
Specify whether the control is displayed or hidden.
Item Description
Show/Hide Select whether the control is displayed or hidden.
7.1.14 Input Permission
Specify whether entry is permitted or prohibited for the control.
Item Description
Input permission Select whether the entry is accepted (permission) or rejected (prohibition).
NOTE
Select "Hide" for [Show/Hide] and "Permission" for [Input Permission] to create a transparent control object.

7.1.15 Touch Gesture
Specify whether to permit or prohibit touch gesture for the control.
This function is only for M800/M80 Series.
Item Description
Touch gesture Select whether to accept (permission) or reject (prohibition) a touch gesture operation.
NOTE
Touch gesture includes the following operations.
- Pan (Run your fingertip along the screen)
The screen is scrolled along your finger motion.
- Flick (Quickly run your fingertip along the screen)
The screen is scrolled in the direction of your finger sweep.
If you touch three points or more, the operation by the touch gesture is rejected.
Lift all the fingers off the screen.

7.1.16 Property Setup Dialog
Property setup dialog consists of the tabs relating to [Basic Settings] and [Advanced Settings].
Details of each tab will be described in the following sections.
[Basic Settings] mainly consists of the following two tabs and tabs for each control.
No. Tab Description
(1) Style Set or display the background color, solid frame, blink and preview.
(2) Text Set or display the font, text, scroll and preview.
[Advanced Settings] consists of a tab to specify the setting for each control.
For specifications of the tab for each control, refer to "7.2 Standard Control" or "7.3 NC Control Object".
(1)
(2)

7.1.16.1 Standard Control
7.1.16.1.1 [Style] Tab
In [Style] Tab, specify the style, solid frame, blink, and scroll bar.
No. Item Description
(1) Control state preview
Select the control state which you want to edit the style.
(2) Pattern Select the filling pattern among "Background painting out", "Foreground painting out", "pattern 0" to "pattern 37", and "With no painting out".
(3) Foreground color Specify the foreground color.
(4) Background color Specify the background color of the state selected in (1) control state preview.
(5) Design Select the image.
Click on the Design button to display the "Image List" dialog.

(6) Use of solid frame Select the presence of the solid frame between "Yes" and "No".
(7) Solid frame Specify the solid frame.
Click on the Solid frame button to display the "Solid frame Settings" dialog.
(8) Blink Select the blink setting among "No", "Switch Show/Hide character", "A
character color is changed", and "A whole color is changed".
(9) Text color/Whole
color at blink
Specify the color to be used at blink.
(10) Bar color Specify the color of the scroll bar.
(11) Button color Specify the button color of the scroll bar.
(12) Arrow color Specify the arrow color of the scroll bar.
(13) Back color Specify the background color of the scroll bar.
(14) Scroll bar
perimeter line
color
Specify the perimeter line color of the scroll bar.
(15) Knob color Specify the knob color of the scroll bar.
(16) Use of scroll bar
solid frame
Select the presence of the solid frame of the scroll bar between "Yes" and
"No".
(17) Solid frame Specify the solid frame of the scroll bar.
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(16)
(17)

NOTE
"Pattern", "Foreground color", "Background color" and "Design" can be specified for items of the state selected
in "control state preview".
Example: The preview of ON, OFF, FOCUS and DISABLE are displayed in button control.
When selecting FOCUS, you can specify the background color at the time of focus.
The image data registered in the parts library can be selected on the "Image List" dialog.
When [OK] button is pressed on the property setup dialog, the image specified on the "Image List" dialog is
registered as a resource. If there is no resource of the same settings in the existing resources, the image is
registered as a new resource. However, if the resource of the same settings exist, the image is not registered.
For the property "Design", an ID of existing resource is specified.
Detail settings for the solid frame can be specified on the "Solid frame Settings" dialog.
When [OK] button is pressed on the property setup dialog, the data specified in "Solid frame Settings" dialog is
registered as a resource. If there is no resource of the same settings in the existing resources, the data is
registered as a new resource. However, if the resource of the same settings exist, the data is not registered. For
the property "Solid frame", an ID of existing resource is specified.

7.1.16.1.2 [Text] Tab
In [Text] tab, specify the font, text, and scroll.
No. Item Description
(1) Control state
preview
Specify the control state which you want to edit the text.
(2) Font name Specify the font name.
When a font other than "MITSIBISHI CNC Gothic" is selected, the warning
message "*Selected font is unavailable for a non-Windows-based display." is
displayed in blue characters.
(3) Character size Specify the text size.
(4) Character
thickness
Select the text thickness among "THIN", "NORMAL", and "BOLD".
(5) Font style Select the font style between "None" and "Italics".
(6) Text Specify the displayed character string of the state selected in (1) control state
preview.
(7) Text color Specify the text color.
(8) Alignment (X) Specify horizontal alignment.
The buttons are "Align left", "Center", and "Align right" from the left.
(9) Alignment (Y) Specify vertical alignment.
The buttons are "Align top", "Center", and "Align bottom" from the left.
(10) Offset to frame Specify a margin from the frame.
* The specified value is set to the property "Margin left", "Margin right",
"Margin top", and "Margin bottom".
(11) Scroll Select the scroll setting among "No", "Yes", and "When a text sticks out".
(Note)
(12) The number of

times of scrolling
Select the scrolling frequency between "Only 1 time" and "Repeat". (Note)
(13) Start delay (ms) Specify the delay from the start of scrolling (0 to 60000). (Note)
(14) Updating interval
(ms)
Specify the scroll refreshment interval (0 to 5000). (Note)
Specify "0" to refrain from scrolling.
(15) Movement amount
(in dots)
Specify the amount of movement in scrolling (0 to 100). (Note)
(16) Scroll start
position
Select the starting position between "The present position" and "From a right
end". (Note)
(Note) The items relating to the scroll setting are not reflected on the "control state preview".
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(16)

NOTE
When [OK] button is pressed on the property setup dialog, the data specified in "Font name", "Text size", "Text thickness", and "Font style" is registered as a resource. If there is no resource of the same settings in the existing resources, the data is registered as a new resource. However, if the resource of the same settings exist, the data is not registered. For the property "Font", an ID of the existing resource is specified.

7.1.16.2 NC Control
7.1.16.2.1 [Style] Tab
In [Style] Tab, specify the color type, foreground color, and background color.
No. Item Description
(1) Control state
preview
The control image is drawn with the property value specified in the [Style] tab.
(2) Color type Select the color type between "Theme color" and "Specified color".
* When "Theme color" is selected, the control is displayed in the base color
designated as the theme color. For the theme color, refer to "Changing the
Theme Color".
When "Specified color" is selected, the control is displayed in the colors
specified from (3) to (13).
(3) Value backcolor Specify the background color of the value part.
(4) Label backcolor Specify the background color of the label part.
(5) Frame visible Select the presence of the solid frame between "True" and "False".
(6) Title backcolor Specify the background color of the title part.
(7) Axis name
backcolor
Specify the background color for the axis name display.
(8) Axis status
backcolor
Specify the background color for the axis status display.
(9) Value reverse
backcolor
Specify the background color of the highlighted part.
(10) Bargraph forecolor Specify the foreground color of the bar graph area.
(11) Bargraph
backcolor
Specify the background color of the bar graph area.
(12) Normal message
backcolor
Specify the background color of the normal message.
(13) Error message
backcolor
Specify the background color of the error message.
(Note) The items relating to the existing properties for each control can be specified. For the properties which does not exist in the control, the entry is disabled (grayout) and the properties cannot be specified.
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7.1.16.2.2 [Text] Tab
In [Text] tab, specify the font type, and text color.
No. Item Description
(1) Control state
preview
The control image is drawn with the property value specified in the [Text] tab.
(2) Font type Specify the font type.
* The items which can be specified in the font type differ by each control. The selection items of the property "Font Type" are displayed.
For SPCommand (S display part), "Normal", "Middle" and "Big" are displayed as the selection Items.
(3) Value forecolor Specify the character color of the value.
(4) Label forecolor Specify the character color of the label part.
(5) Title forecolor Specify the character color of the title part.
(6) Axis name
forecolor
Specify the character color of the axis name.
(7) Axis status
forecolor
Specify the character color of the axis status.
(8) Value reverse
forecolor
Specify the character color of the highlighted part.
(9) Normal message
forecolor
Specify the character color of the normal message.
(10) Error message
forecolor
Specify the character color of the error message.
(Note) The items relating to the existing properties for each control can be specified. For the properties which does not exist in the control, the entry is disabled (grayout).
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7.1.16.3 Operation Procedures
Open Property Setup Dialog
1. Double-click the control allocated on the panel or window, or select [Change Property Settings] from the popup menu which is displayed by right-clicking the control.
2. Property setup dialog is displayed.
3. After the setting, press the [OK] button.
NOTE
When you press the [OK] button, the setting data are reflected on each property. When you press the [Cancel] button, the setting data are not reflected on each property.

7.1.16.4 Input Assist Function
This function enables you to search the "Sec/Sub-sec No." of "Custom API library variable" by the keyword input in the NC data input field on the propery setup dialog to narrow down the NC data candidates.
This function is only for M800/M80 Series.
7.1.16.4.1 Input Assist Window
List of Custom API library variable is displayed on the input assist window.
No. Item Description
(1) Sec/Sub-sec No. Display the Sec/Sub-sec No. of the Custom API library variable.
(2) Description Display the description of the Custom API library variable.
(3) Part sys Displays whether the Custom API library variableneeds part system designation or not.
(4) Axis Displays whether the Custom API library variableneeds axis designation or not.
(5) R/W Displays whether the Custom API library variable can be read/write or not.
(6) Data Type Display the data type of the Custom API library variable.
NOTE
Up to 20 candidates can be displayed in the input assist window.
When 21 or more candidates are searched, a vertical scroll bar is displayed and the displayed data can be switched with the PageUp key, PageDown key or the mouse wheel.
Up to 1,000 Custom API library variable can be searched.
(1) (2) (3) (4) (5) (6)

7.1.16.4.2 Operation Procedure
Set the Sec/Sub-sec No. to the NC data
1. To display the input assist window, input the keyword in the NC data field on the property setup dialog, or press the "" button.

2. Depending on the keyword input in the NC data field, the input assist window display changes with the following conditions.
- The "Sec/Sub-sec No." or "Description" that are relevant to the input keyword.
(Uppercase and lowercase characters are not distinguishable. Two-byte characters and one-byte characters are distinguishable.)
3. To set the Sec/Sub-sec No. in the NC data field, perform one of the following operations.
- Click the Custom API variable line to be specified.
- Select the Custom API variable to be specified with the up/down keys on the keyboard and press the Enter key.
7.1.16.4.3 Precautions
- When there is no "Description" display field, or no "Part System Number" and "Axis" input field such as the Property setup dialog of trend graph control, the "Description" fields etc. are not displayed even if a Custom API variable corresponding to the input NC data exists.
NOTE
"Description" of the Custom API variable corresponding to Sec/Sub-sec No. is displayed on the property setup dialog after setting the NC data on it.
Display of the description field of "Part System Number" on the property setup dialog becomes invalid when "Part sys" of Custom API variable corresponding to Sec/Sub-sec No. of the NC data is "-".
Display of the description field of "Axis Number" on the property setup dialog becomes invalid when "Axis" of Custom API variable corresponding to Sec/Sub-sec No. of the NC data is "-".
NC data field becomes blank when both Section No. and Sub-section No. are "0".

7.2 Standard Control
7.2.1 Basic Control Object (GCBasicControl)
The basic control object is a control for providing an area where original drawing for the user or process can be performed.
The basic control does not have a specific function and appearance, action and other properties are described by the user after the source is generated.
7.2.1.1 Property Settings
The property settings of the basic control object are divided into the followings.
Control name : Specify the control name.
Position/size : Specify the position and size of the control.
Callback function : Specify the presence of the callback function.
Show/hide : Specify whether the control is displayed or hidden.
Input permission : Select whether the entry is accepted (permission) or rejected (prohibition).
For properties, refer to "7.1 Common Functions of Controls".

7.2.2 Button Object (GCButton)
The button object holds the ON/OFF status internally and the status changes each time it is pressed or released.
Two types of actions can be selected for the button action: momentary and alternate.
Touch, click, ...
OFF ON
7.2.2.1 Property Setup Dialog
Property setup dialog of button control object consists of the tabs relating to [Basic Settings] and [Advanced Settings]. Details of each tab will be described in the following sections.

[Basic Settings] consists of the following three tabs.
No. Tab Description
(1) Behavior Settings Specify the action.
(2) Style Set or display the background color, solid frame, blink and preview.
(3) Text Set or display the font, text, scroll and preview.
[Advanced Settings] consists of one tab.
No. Tab Description
(4) Extended Set the item relating to the extended condition for the style.
(1)
(2)
(3)
(4)

7.2.2.1.1 [Behavior Settings] Tab
In [Behavior Settings] tab, specify the button action.
No. Item Description
(1) Action Select the button action among "None", "Momentary", or "Alternate".
(1)

7.2.2.1.2 [Style] Tab
In [Style] tab, specify the background color, solid frame, and blink.
No. Item Description
(1) Display type Select the display type among "Square", "Circle", and "Image".
For the items other than the above, refer to "7.1.16.1.1 [Style] Tab".
(1)

7.2.2.1.3 [Text] Tab
In [Text] tab, specify the font, text, and scroll.
For each item, refer to "7.1.16.1.2 [Text] Tab".

7.2.2.1.4 [Extended] Tab
In [Extended] tab, set whether to provide the background color when the button is selected, and when the button does not work.

No.	Item Description
(1)	Set the style / text to be applied when the focus is on the button When this is checked, the pattern, foreground color, background color, and design for when the button is selected (Focus) can be specified on the [Style] tab and [Text] tab.
(2)	Set the style / text to be applied when the button does not work When this is checked, the pattern, foreground color, background color, and design for when the button does not work (Disable) can be specified on the [Style] tab and [Text] tab.

(1)
(2)

7.2.2.2 Property Settings
The property settings for the button object are divided into followings.
Control name : Specify the control name.
Position/size : Specify the position and size of the control.
Button type : Select the button action.
Display type : Select the display type of the button.
Color/pattern : Specify the color and pattern of the control.
Image : Specify the image of the control.
Caption : Specify the caption (character string) displayed on the control.
Character attribute : Specify the character attribute of the caption.
Solid frame : Specify the solid frame of the control.
Caption character string scroll : Specify the scroll of the caption character string.
Blink : Specify the blink of the caption character string.
Callback function : Specify whether or not the callback functions are provided.
Show/hide : Select whether the control is displayed or hidden.
Input permission : Select whether the entry is accepted (permission) or rejected (prohibition).

Button Type

Item	Description
Button type	Select the button action among the following three types.
Momentary	The button turns on when it is pressed. It turns off when it is released.
Alternate	The button alternates ON and OFF each time it is pressed.
None	The button does not turn on or off even if it is pressed.

Display Type

Item	Description
Display type	Select the button type among the following three types.
Square	Rectangular button. The button is indicated in the designated color and pattern.
Circle	Round button. The button is indicated in the designated color and pattern.
Image	The button is indicated with the designated image resource.

Color/Pattern

Item	Description
Pattern at the time of ON*1	Specify the pattern of the ON button.
Foreground color at the time of ON*1	Specify the foreground color of the ON button.
Background color at the time of ON*1	Specify the background color of the ON button.
Design at the time of ON*2	Specify the image of the ON button.
Pattern at the time of OFF*1	Specify the pattern of the OFF button.
Foreground color at the time of OFF*1	Specify the foreground color of the OFF button.
Background color at the time of OFF*1	Specify the background color of the OFF button.
Design at the time of OFF*2	Specify the image of the OFF button.

*1: The setting is valid if the [Display Type] is "Square" or "Circle".
*2: The setting is valid if the [Display Type] is "Image".

Image
Item Description
Effect at the time of focus Specify whether the color of the button when the focus is located changes or not. Select between "change color" and "no change".
Pattern at the time of focus*1 Specify the pattern of the button when the focus is located.
Foreground color at the time of focus*1
Specify the foreground color of the button when the focus is located.
Background color at the time of focus*1
Specify the background color of the button when the focus is located.
Design at the time of focus*2 Specify the image of the button when the focus is located.
Pattern at the time of disable*1 Specify the pattern of the button when the entry is disabled.
Foreground color at the time of disable*1
Specify the foreground color of the button when the entry is disabled.
Background color at the time of disable*1
Specify the background color of the button when the entry is disabled.
Design at the time of disable*2 Specify the image of the button when the entry is disabled.
*1: The setting is valid if the [Display Type] is "Square" or "Circle".
*2: The setting is valid if the [Display Type] is "Image".
For the other properties, refer to "7.1 Common Functions of Controls".

7.2.3 Text Box Object (GCTextBox)
The text box object is a control for the values and character strings to display or enter in the designated rectangle.
For values, character string/binary conversion is made.
7.2.3.1 Property Setup Dialog
Property setup dialog of text box control consists of the tabs relating to [Basic Settings] and [Advanced Settings]. Details of each tab will be described in the following sections.
[Basic Settings] consists of four tabs.
No. Tab Description
(1) Display Settings Set or display the display format, format, and preview.
(2) Style Set or display the background color, solid frame, blink and preview.
(3) Text Set or display the font, text, scroll and preview.
(4) Input Range Set or display the input range.
[Advanced Settings] consists of one tab.
No. Tab Description
(5) Extended Set the item relating to the extended condition for the style.
(1)
(2)
(3)
(4)
(5)

7.2.3.1.1 [Display Settings] Tab
In [Display Settings] tab, specify the display format, format, etc.
No. Item Description
(1) Display format Specify the display format.
(Character sequence/signed short/unsigned short/signed long/unsigned long/float/double)
(2) Format Specify the value-to-character string conversion format.
(3) Max. number of characters Specify the maximum number of characters to display.
(4) Display comma Check here to display the value with commas.
A comma is inserted after every three digits, if "comma" is set to the display.
(5) Display onscreen numbers with asterisks
Check here to display the entered characters by asterisks (*).
(6) Input possible For entry in the text box, select whether one-byte numbers, lower case letters, upper case letters, one-byte symbols, and two-byte characters are allowed or not.
Check here to allow the entry.
(7) Sample Value Specify the value to be displayed on the preview.
(8) Preview Display the "Sample Value" specified in combination with the property "Display format", "Comma" and "Password setting" on the preview.
(Note) When lower case letters, upper case letters, one-byte symbols, or two-byte characters are specified in the "Sample Value", specify "Character sequence" in "Display format".
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(2)
(3)
(4)

7.2.3.1.2 [Style] Tab
In [Style] tab, specify the background color, solid frame, and blink.

For each item, refer to "7.1.16.1.1 [Style] Tab".
NOTE
The following is the combination of "Display format" and "Format".
Change the setting of "Format" depending on the item specified in "Display format".
Display format Format
signed short, unsigned short,
signed long, unsigned long
%hd, %hu, %ld, %lu
float, double %f, %lf
Character sequence %s

7.2.3.1.3 [Text] Tab
In [Text] tab, specify the font, text, and scroll.
No. Item Description
(1) Effect at the time of focus Select the effect at the time of focus among "No effect", "With cursor", or "Selected".
To display the cursor in the text box where the focus is located, select "With cursor". To display no cursor, select "No effect". To select all characters, select "Selected".
For the items other than the above, refer to "7.1.16.1.2 [Text] Tab".
(1)

7.2.3.1.4 [Input Range] Tab
In [Input Range] tab, specify the input range.
No. Item Description
(1) Range Display the range.
(2) Minimum value Specify the minimum value.
(3) Comparison operator for minimum value
Select the comparison operator for minimum value between "<=" and "None".
(4) Maximum value Specify the maximum value.
(5) Comparison operator for maximum value
Select the comparison operator for maximum value between "<=" and "None".
(4) (1)
(2)
(3) (5)

7.2.3.1.5 [Extended] Tab
In [Extended] tab, set whether to provide the background color at the time of focus and disable.
No. Item Description
(1) Set background color at the time of focus
Check here to specify the background color at the time of focus on [Style] tab.
(2) Set background color at the time of disable
Check here to specify the background color at the time of disable on [Style] tab.
(1)
(2)

7.2.3.2 Property Settings
The property settings for the text box object are divided into the followings.
Control name : Specify the control name.
Position/size : Specify the position and size of the control.
Color/pattern : Specify the color and pattern of the control.
Display type : Select the display type.
Password : Specify the password.
Caption : Specify the caption (character string) to be displayed on the control.
Character attribute : Specify the character attribute of the caption.
Solid frame : Specify the solid frame of the control.
Caption character string scroll
: Specify the scroll of the caption character string.
Blink : Specify the blink of the caption character string.
Callback function : Specify the presence of callback functions.
Show/hide : Select whether the control is displayed or hidden.
Input permission : Select whether the entry is accepted (permission) or rejected (prohibition).
Color/Pattern
Item Description
Use of background color Select if the background color is provided or not. If "No" is selected, the background is transparent.
Background color Specify the background color.
Background color at the time of focus
Specify the background color when the focus is located.

Background color at the time
of disable
Specify the background color when the entry is disabled.

Display Type/Display Format
Item Description
Type Select the displaying and entry type among the following six types.
Character sequence A character string is displayed or entered.
signed short A signed short value is displayed or entered.
unsigned short An unsigned short value is displayed or entered.
signed long A signed long value is displayed or entered.
unsigned long An unsigned long value is displayed or entered.
float A floating point value is displayed or entered.
double A value of double-precision floating-point is displayed or entered.
Display format (Note) Specify the value-to-character string conversion type.
Number of the maximum
characters
Specify the maximum number of characters to be displayed (1 to 256).
Maximum check For the value field, select whether to check for the maximum value limit or
not.
Maximum Specify the maximum value for the maximum value check.
(-2147483648 to 4294967295).
Minimum check For the value field, select whether to check for the minimum value limit or
not.
Minimum Specify the minimum value for the minimum value check.
(-2147483648 to 4294967295).
Comma For the value field, select whether to display commas or not.
Half-size number For entry in the text box, select whether one-byte numbers are allowed or
not.
Half-size English small letter For entry in the text box, select whether one-byte lower case letters are
allowed or not.
Half-size English capital letter For entry in the text box, select whether one-byte upper case letters are
allowed or not.
Half-size sign For entry in the text box, select whether one-byte symbols are allowed or
not.
Full size For entry in the text box, select whether two-byte characters are allowed
or not.
(Note) Specify the suitable type specifier for each type. If the combination of type and display format is not
suitable, it will not be displayed correctly.
NOTE
Correspondence table for the combination of the type and the display format
Type Display format
signed short, unsigned short,
signed long, unsigned long
%hd, %hu, %ld, %lu
float, double %f, %lf
Example) When displaying in hexadecimal notation, specify %X to the display format.
* Set with the combination above when the type and the display format are set with GCSTextboxSetTextType
function or GCSTextboxSetFormatID function.

Password
Item Description
Password setup Select "Yes" to display entered characters with asterisks (*).
Character Attribute
Item Description
Effect at the time of focus To display the cursor in the text box where the focus is located, select
"With cursor". To display no cursor, select "No effect". To select all
characters, select "Selected".
For the other properties, refer to "7.1 Common Functions of Controls".

7.2.4 Label Object (GCLabel)
The label object is a control for displaying a character string inside the designated rectangle.
Screen title created with label
7.2.4.1 Property Settings
The property settings of the label object are divided into the followings.
Control name : Specify the control name.
Position/size : Specify the position and size of the control.
Caption : Specify the caption (character string) displayed on the control.
Character attribute : Specify the character attribute of the caption.
Caption character
string scroll
: Specify the scroll of the caption character string.
Blink : Specify the blink of the caption character string.
Callback function : Specify whether or not the callback functions are provided.
Show/hide : Select whether the control is displayed or hidden.
For properties, refer to "7.1 Common Functions of Controls".

7.2.5 List Object (GCList)
The list object is a control for allowing the user to select from a list of several character strings.
7.2.5.1 Property Settings

The property settings of the list object are divided into the followings.
Control name : Specify the name of the control.
Position/size : Specify the position and size of the control.
Color/Pattern : Specify the color and pattern of the control.
Scroll bar : Specify the color and width of the scroll bar and scroll bar button.
Selection bar : Specify the color of the selection bar.
Max. number of lines : Specify the maximum number of lines of character strings shown in the list.
Character attribute : Specify the character attribute of the caption.
Solid frame : Specify the solid frame of the control.
Callback functions : Specify whether or not the callback functions are provided.
Show/hide : Select whether the control is displayed or hidden.
Input permission : Select whether the entry is accepted (permission) or rejected (prohibition).
Operation : Specify the operation of the control.
Color/Pattern
Item Description
Background color Specify the background color of the control.
Background color at the time
of focus
Specify the background color of the list where the focus is located.
Background color at the time
of disable
Specify the background color of the disabled list.

Scroll Bar
Item Description
Scroll bar color Specify the color of the scroll bar.
Scroll button color Specify the color of the scroll button.
Scroll bar width Specify the width of the scroll bar in dots (16 to 960).
Selection Bar
Item Description
Select bar color Specify the color of the selection bar.
The scroll bar and selection bar settings are reflected on the following parts.
Scroll bar width
Scroll button color
Selection bar color
Scroll bar color
Max. Number of Lines
Item Description
Number of the maximum lines Specify the maximum number of lines of character strings displayed in the
list (1 to 512).
For the other properties, refer to "7.1 Common Functions of Controls".
7.2.5.2 Complements
Operation specifications
(1) Pan (Run your fingertip along the screen)
The touched line is scrolled along your finger motion (Vertical direction).
On the scroll bar, the slider follows your finger motion.
(2) Flick (Quickly run your fingertip along the screen)
The screen is scrolled in the direction of your finger sweep (Vertical direction).

7.2.6 Picture Object (GCPicture)
The picture object is a control where the image is switched according to the state of an external
device or the internal state of software to notify the user of the state.
The picture supports up to 32 states. Each state has separate appearance.
State 0 State 1 State 2
7.2.6.1 Property Setup Dialog
Property setup dialog of picture object consists of the tabs relating to [Basic Settings] and
[Advanced Settings]. Details of each tab will be described in the following sections.

[Basic Settings] consists of two tabs.
No. Tab Description
(1) Style Set or display the background color, solid frame, blink, and preview.
(2) Text Set or display the font, text, scroll, and preview.
[Advanced Settings] consists of one tab.
No. Tab Description
(3) Extended Set the start effect and slide amount.
(1)
(2)
(3)

7.2.6.1.1 [Style] Tab
In [Style] Tab, specify the background color, solid frame, and blink, etc.
No. Item Description
(1) number of status Specify the number of states expressed with the picture.
(1 to 31)
(2) Design Select the image.
Click on the [...] button and select the desired image.
Click on the "Reference Library" button to display the "Image List"
dialog.
(3) Clear Clear the design setting.
For the items other than the above, refer to "7.1.16.1.1 [Style] Tab".
(1)
(2)

(3)

7.2.6.1.2 [Text] Tab
In [Text] tab, specify the font, text, and scroll, etc.
For each item, refer to "7.1.16.1.2 [Text] Tab".

7.2.6.1.3 [Extended] Tab
In [Extended] tab, specify the start effect and slide amount.
No. Item Description
(1) Start Effect Set the start effect.
(none, Fade In, Slide In, Shake, Zoom In)
This setting is available for the images with the property "Pattern"
set to "Background painting out".
(2) Slide Amount Set a travel amount of images (the distance the top left position of
the image moves before and after the travel). (1 to 2000)
(1)
(2)

7.2.6.2 Property Settings
The property settings of the picture object are divided into the followings.
Control name : Specify the name of the control.
Position/size : Specify the position and size of the control.
Display type : Select the display type of the picture.
Number of states : Specify the number of states expressed with the picture.
Color/pattern : Specify the color and pattern of the control.
Image : Specify the image given to the control.
Caption : Specify the caption (character string) displayed on the control.
Character attribute : Specify the character attribute of the caption.
Solid frame : Specify the solid frame of the control.
Caption character
string scroll
: Specify the scroll of the caption character string.
Blink : Specify the blink of the caption character string.
Callback function : Specify whether or not the callback functions are provided.
Show/hide : Select whether the control is displayed or hidden.

Display
Item Description
Display type Select the button type among the following three types.
Square Rectangular button.
The button is indicated in the designated color and pattern.
Circle Round button.
The button is indicated in the designated color and pattern.
Image The button is indicated with the designated image resource.
Start Effect Set the start effects.
(none, Fade In, Slide In, Shake, Zoom In)
This setting is available for the images with the property "Pattern" is set to
"Background painting out".
Slide Amount Set a travel amount of images
(the distance how far the top left position of the image moves before and
after the travel). (1 to 2000)
Number of States
Item Description
Number of states Specify the number of states expressed with the picture (1 to 32).
Color/Pattern/Image
Item Description
State0 to 31 pattern*1 Specify the filling pattern of the picture for each state.
State0 to 31 foreground color*1 Specify the foreground color (pattern color) of the picture for each state.
State0 to 31 background
color*1
Specify the background color of the picture for each state.
State0 to 31 Design*2 Select the ID of the image resource displayed for the picture for each
state.
State0 to 31 Draw type*3 Specify the drawing method of pictures in each state.
(still picture, Animation(loop), Animation(one time), Animation(reverse
loop), Animation(reverse one time))
State0 to 31 Start frame
(1 to 10000)*3
Specify the start frame in each state.
State0 to 31 End frame
(1 to 10000)*3
Specify the end frame in each state.
State0 to 31 Play
magnification (1 to 10000)
*3
Specify the playing magnification in each state.
*1: The setting is valid if the [Display type] is "Square" or "Circle".
*2: The setting is valid if the [Display type] is "Image".
*3: This setting is used if the animation file is set to [Design].
For the other properties, refer to "7.1 Common Functions of Controls".

7.2.7 Check Box Object (GCCheckBox)
The check box object is a control where the ON/OFF state is held and the ON/OFF state is graphically displayed upon a user-driven state change.
The check box holds the ON/OFF state internally, and the state changes according to events.
7.2.7.1 Property Settings
The property settings of the check box object are divided into the followings.
Control name : Specify the control name.
Position/size : Specify the position and size of the control.
Box : Specify the color, size and solid frame of the box.
Caption : Specify the caption (character string) displayed on the control.
Character attribute : Specify the character attribute of the caption.
Focus : Specify the displaying method and color of the check box where the focus is located.
Caption character string scroll : Specify the scroll of the caption character string.
Blink : Specify the caption character string.
Callback function : Specify whether or not the callback functions are provided.
Show/hide : Select whether the control is displayed or hidden.
Input permission : Select whether the entry is accepted (permission) or rejected (prohibition).

Box
Item Description
Size of box Specify the box size in dots (8 to 1920).
The box is a square.
Use of box frame Specify presence/absence of the box frame.
Frame of a box Select the ID of the solid frame resource to be given to the box.
Color of a box Specify the color of the box.
Size of box
Frame of a box
Color of a box
Focus
Item Description
Effect at the time of focus Select the displaying method of the check box where the focus is located.
(Only "Change color" can be selected with this version.)
Background color at the time of focus Specify the background color of the check box where the focus is located.
Color of a box at the time of disable Designate the color of the disabled box.
Character color at the time of disable Designate the character color of the disabled check box.
For the other properties, refer to "7.1 Common Functions of Controls".

7.2.8 Radio Button Object (GCRadioButton)
The radio button object is a control for realizing exclusive selection among a group of multiple radio buttons.
The radio button holds the ON/OFF state internally, and the state changes according to events.
7.2.8.1 Property Settings
The property settings of the radio button object are divided into the followings.
Control name : Specify the control name.
Position/size : Specify the position and size of the control.
Box : Specify the color, size and solid frame of the box.
Caption : Specify the caption (character string) displayed on the control.
Character attribute : Specify the character attribute of the caption.
Focus : Specify the displaying method and color of the radio button where the focus is located.
Caption character string scroll : Specify the scroll of the caption character string.
Blink : Specify the blink of the caption character string.
Callback function : Specify whether or not the callback functions are provided.
Show/hide : Select whether the control is displayed or hidden.
Input permission : Select whether the entry is accepted (permission) or rejected (prohibition).

Box
Item Description
Group NO. Specify the group number to which the radio button belongs (0 to 32767).
Only one radio button among those belonging to the same group number is allowed to be active.
Size of box Specify the box size in dots (8 to 1920).
Use of box frame Specify the presence of the box frame.
Frame of a box Select the ID of the solid frame resource to be given to the box.
Color of a box Specify the color of the box.
Size of box
Frame of a box
Color of a box

Focus
Item Description
Effect at the time of focus Select the displaying method of the radio button where the focus is located
(Only "Change color" can be selected with this version.)
Background color at the time
of focus
Designate the background color of the radio button where the focus is
located.
Color of a box at the time of
disable
Designate the color of the disabled box.
Character color at the time of
disable
Designate the character color of the disabled radio button.
For the other properties, refer to "7.1 Common Functions of Controls".

7.2.9 Progress Bar Object (GCProgressBar)
The progress bar object is a control expressing the progress of a process with the filled amount.
30%
60%
100%
7.2.9.1 Property Settings
The property settings of the progress bar object are divided into the followings.
Control name : Specify the control name.
Position/size : Specify the position and size of the control.
Color/pattern : Specify the color and pattern.
Filling direction : Specify the filling direction of the progress bar.
Callback function : Specify whether or not the callback functions are provided.
Show/hide : Select whether the control is displayed or hidden.

Color/Pattern
Item Description
Main part background color Specify the background color of the main body of the progress bar.
Main part foreground color Specify the foreground color of the main body of the progress bar.
Main part painting out pattern Specify the filling pattern of the main body of the progress bar.
Bar background color Specify the background color of the bar.
Bar foreground color Specify the foreground color of the bar.
Bar painting out pattern Specify the filling pattern of the bar.
The color settings are reflected in the following way.
Bar background color, bar foreground color, bar painting out pattern
Main part background color, main body foreground color,
main part painting out pattern
Filling Direction
Item Description
Direction Select the direction of progress of the bar among the following options:
"From left to right", "From right to left", "From top to bottom" and "From
bottom to top".
Minimum Designate the 0% bar length (-2147483648 to 2147483647).
Maximum Designate the 100% bar length (-2147483648 to 2147483647).
For the other properties, refer to "7.1 Common Functions of Controls".

7.2.10 HTML Browser Object (GCHtmlBrowser)
The HTML browser object is a control displayed on the screen upon interpretation of the data of an
HTML file.
7.2.10.1 Property Setup Dialog
Property setup dialog of HTML browser control consists of the tab relating to [Basic Settings].
Details of the tab will be described in the following sections.
[Basic Settings] consists of three tabs.
No. Item Description
(1) Display/Action Specify the file name and HTML folder etc.
(2) Style Specify the style of the background color, solid frame, and scroll.
(3) Text Specify the font, text color, and the color of links.
(1)
(2)
(3)

7.2.10.1.1 [Display/Action] Tab
In [Display/Action] tab, specify the file name and HTML folder etc.
No. Item Description
(1) File name Specify the HTML file. Click on the "" button to display the file
selection dialog.
If the designated file does not exist in the HTML folder, a message
"The specified file does not exist" will be displayed.
(2) Clear Clear the file name setting.
(3) HTML folder (Note) Select the folder that stores the HTML files. Select from
HTMLDATA0 to HTMLDATA7
(4) Enable touch gestures Place a check mark here to accept a touch gesture operation.
(5) Preview Display the window to check the specified property design.
Sample data is displayed when the file name is not designated.
(Note) Description of the HTML file designated in file name is displayed on the preview regardless of the HTML

folder setting.
(5)
(3)
(4)
(2) (1)

7.2.10.1.2 [Style] Tab
In [Style] tab, specify the background color, solid frame, and the scroll setting.
No. Item Description
(1) Display scroll bar Select the scroll bar display from "Painting out" / "Image" / "With no
painting out".
(2) Button image Specify the image of the ON/OFF button to display on the scroll
button.
(3) Preview ON/OFF Select the status to display on the preview between ON and OFF.
(4) Width of scroll bar Specify the width of the scroll bar.
(5) Color of bars Specify the color of the the scroll bars.
(6) Color of buttons Specify the color of the scroll buttons.
(7) Arrow color Specify the arrow color of the scroll bar.
(8) Back color Specify the background color of the scroll bar.
(9) Show/Hide outlines (around
scrollbar)
Specify the presence/absence of the outlines around the scroll
bars.
(10) Color of outlines Specify the color of the outlines of the scroll bar.
(11) Use of scroll bar solid frame Specify the presence/absence of the solid frame of the scroll bar.
(12) Solid frame Specify the solid frame of the scroll bar.
For the items other than the above, refer to "7.1.16.1.1 [Style] Tab".
(2)
(4)
(5)
(6)
(8)
(9)
(10)
(11)
(12)
(1)
(3)
(7)

7.2.10.1.3 [Text] Tab
In [Text] tab, specify the text color and color for the links.
No. Item Description
(1) Text color Specify the text color.
This color is applied when a text color is not specified in the HTML
file.
(2) Color for links Specify the color of the links.
This color is applied when a color of the links is not specified in the
HTML file.
(1)
(2)

7.2.10.2 Property Settings
The HTML browser property settings are divided into the followings.
Control name : Specify the control name.
Position/size : Specify the position and size of the control.
Default : Specify the default character color, default background color, and default
character attribute applied when they are not specified in the HTML file.
Solid frame : Specify the solid frame of the control.
HTML file : Specify the HTML displayed at the control.
Scroll bar : Specify the color and width of the scroll bar and the color and image of the
scroll bar button.
Show/Hide : Select whether the control is displayed or hidden.
Input permission : Select whether the entry is accepted (permission) or rejected (prohibition).
Operation : Specify the operation of the control.
Default
Item Description
Default character color Specify the default character color used when it is not specified in the
HTML file.
Default background color Specify the default background color used when it is not specified in the
HTML file.
Default link color Specify the default link color used when it is not specified in the HTML file.
Default font Specify the default font used when it is not specified in the HTML file.

HTML File
Item Description
HTML Folder Select the folder containing an HTML file
HTML File Select the ID of the HTML file resource as an HTML file displayed first as
a control.
NOTE

To store HTML files in HTML folders, absolute paths have to be defined in the Config.ini file. The relationship between the description in the combo boxes and actual folders is shown below.

< Example of M800/M80 (Windows-based display unit) and M700VW >

[HTML_BROWSER]
HTMLDATA0=D:/Custom/HTMLDATA0/
HTMLDATA1=D:/Custom/HTMLDATA1/
HTMLDATA2=D:/Custom/HTMLDATA2/
:
HTMLDATA7=D:/Custom/HTMLDATA7/

< Example of M800/M80 (Windows-less display unit) and M700VS/M70V/E70 >

(For 15-type display units, designate /custom/ instead of /custom15/.)

[HTML_BROWSER]
HTMLDATA0=/custom/HTML/
HTMLDATA1=
HTMLDATA2=
:
HTMLDATA7=

Scroll Bar

Item Description

Display scroll bar Select between "Painting out" and "Image".

Scroll bar color*1 Specify the color of the scroll bar.

Scroll button color*1 Specify the color of the scroll button.

Scroll arrow color*1 Specify the color of the arrow of the scroll bar.

Button1 to 4 design at the time of ON*2 Specify the image displayed at the ON scroll bar.

Button1 to 4 design at the time of OFF*2 Specify the image displayed at the OFF scroll bar.

Use of perimeter line Select the perimeter line between "Yes" and "No".

Perimeter line color Specify the color of the perimeter line.

Scroll background color Specify the background color of the scroll bar.

Scroll width Specify the width of the scroll bar in dots (16 to 96).

*1: The setting is valid if "display scroll bar" is "painting out".

*2: The setting is valid if "display scroll bar" is "image".

The scroll bar settings are reflected on the following parts.

Scroll width
Scroll button color
Scroll arrow color
Scroll bar color
Scroll background color
Perimeter line color
Button 1 design
Button 2 design
Button 3 design
Button 4 design

NOTE

If the displaying area of the HTML file is larger than that of the HTML browser control, the vertical and/or horizontal scroll bar(s) is (are) displayed. If the displaying area of the HTML file is smaller than that of the HTML browser control, the remaining screen area is filled with the background color and no scroll bar is displayed.

For the other properties, refer to "7.1 Common Functions of Controls".

7.2.10.3 Complements

Operation specifications

(1) Pan (Run your fingertip along the screen)

The screen is scrolled along your finger motion (Vertical, horizontal or diagonal direction).

On the scroll bar, the slider follows your finger motion and moves in the direction of each bar.

(2) Flick (Quickly run your fingertip along the screen)

The screen is scrolled in the direction of your finger sweep (Vertical or horizontal direction).

7.2.11 Scroll Bar Object (GCScrollBarEx)

The scroll bar object is a sliding button used to scroll the screen image up/down or left/right. The scroll bar includes two types: vertical scroll bar for vertical movement and horizontal scroll bar for horizontal movement.

Horizontal scroll bar

Vertical scroll bar

7.2.11.1 Property Settings

The Property settings of the scroll bar are divided into the followings. The same settings are used for both the vertical and horizontal scroll bars.

Control name : Specify the control name.

Position/size : Specify the position and size of the control.

Display type : Select the displaying type of the button.

Color/image : Specify the color and width of the scroll bar and the color and image of the scroll button.

Scroll movement : Specify the minimum and maximum values of the scroll bar.

Knob : Specify the width and color of the knob.

Solid frame : Specify the solid frame of the control.

Perimeter line : Specify the perimeter line of the control.

Perimeter solid frame : Specify the perimeter solid frame of the control.

Callback function : Specify whether or not the callback functions are provided.

Show/hide : Select whether the control or bar is displayed or hidden.

Input permission : Select whether entry is accepted (permission) or rejected (prohibition).

Operation : Specify the operation of the control.

Display Type
Item Description
Display type Select the button type from the following two options.
Painting out The button is expressed in the designated scroll button and scroll arrow colors.
Image The button is expressed with the designated image resource.
Color/Image
Item Description
Scroll bar color*1 Specify the color of the scroll bar.
Scroll button color*1 Specify the color of the scroll button.
Scroll arrow color*1 Specify the color of the scroll button arrow.
Button 1 to 2 design at the time of ON*2
Specify the image of the ON button.
Button 1 to 2 design at the time of OFF*2
Specify the image of the OFF button.
Scroll background color Specify the background color of the scroll bar.
*1: The setting is valid if the [Display type] is "Painting out".
*2: The setting is valid if the [Display type] is "Image".
The scroll bar settings are reflected on the following parts.
Scroll arrow color
Scroll bar color
Scroll background color
Scroll button color
Button design 1
Button design 2

Scroll Movement
Item Description
Scroll minimum Specify the minimum value of the movement range of the scroll bar (0 to 32767).
Scroll maximum Specify the maximum value of the movement range of the scroll bar (0 to 32767).
1 page size Specify the amount scrolled upon a click of the background color area of the scroll bar (1 to 32767).
Knob
Item Description
Knob width Specify the width of the knob (0 to 2560).
Knob color Specify the color of the knob.
Perimeter Line
Item Description
Use of perimeter line Select the presence of the perimeter line of the scroll between "Yes" and "No".
Perimeter line color Specify the color of the perimeter line.
Perimeter Solid Frame
Item Description
Use of perimeter line Select the perimeter solid frame of the whole scroll bar between "Yes" and "No".
Perimeter solid frame Select the ID of the solid frame resource.
The knob, solid frame, perimeter line, and perimeter solid frame settings are reflected on the following parts.
Knob
Perimeter line color
Solid frame
Perimeter solid frame
For the other properties, refer to "7.1 Common Functions of Controls".

7.2.11.2 Complements
Operation specifications
(1) Pan (Run your fingertip along the screen)
On the scroll bar, the slider follows your finger motion and moves in the direction of each bar (Vertical or horizontal direction).

7.2.12 Edit Control Object (GCEdit)
The edit control object is a control for displaying, inserting or overwriting a character string in the designated rectangle. The cursor is displayed and carriage return can be entered.
7.2.12.1 Property Settings
The property settings of the edit control object are divided into the followings.
Control name : Specify the control name.
Position/size : Specify the position and size of the control.
Color/pattern : Specify the color and pattern of the control.
Solid frame : Specify the solid frame of the control.
Insert/overwrite : Select between the insertion and overwriting of the entered characters.
Buffer size : Specify the internal buffer size and line buffer size.
Scroll bar : Specify the color and width of the scroll bar and the color and image of the scroll bar button.

Character attribute : Specify the character attribute of the displayed character string.
Callback function : Specify whether or not the callback functions are provided.
Show/hide : Select whether the control is displayed or hidden.
Input permission : Select whether the entry is accepted (permission) or rejected (prohibition).
Insert/Overwrite
Item Description
Insert/Overwrite Select the character entry mode between "Insert" and "Overwrite".
Buffer Size
Item Description
Internal buffer size(KB) Specify the total buffer size of the displayed character strings in kilo bytes
(1 to 5123).
Single line buffer size(B) Specify the line buffer size in bytes (2 to 2048).
NOTE
The calculation method of the buffer size is shown below.
(Line buffer size) = (1 character (2B)) x (number of characters in line)
(Internal buffer size) = ((line buffer size) x (number of lines)) / 1000
If characters exceeding the buffer size are entered, characters are stored up to the limit and overflowing
characters are abandoned.

Scroll Bar
Item Description
Display scroll bar Select the scroll bar between "Painting out" and "Image".
Scroll bar color*1 Specify the color of the scroll bar.
Scroll button color*1 Specify the color of the scroll button.
Scroll arrow color*1 Specify the color of the arrow of the scroll button.
Use of scroll bar solid frame Select the solid frame of the scroll bar between "Yes" and "No".
Scroll bar solid frame Select the ID of the solid frame resource of the scroll bar.
Button1 to 4 design at the time
of ON*2
Specify the image of the ON scroll bar.
Button1 to 4 design at the time
of OFF*2
Specify the image of the OFF scroll bar.
Use of scroll bar perimeter line Select the perimeter of the scroll bar between "Yes" and "No".
Scroll bar perimeter line color Specify the color of the perimeter line of the scroll bar.
Scroll bar background color Specify the background color of the scroll bar.
Scroll width Specify the width of the scroll bar in dots (16 to 96).
*1: The setting is valid if [Display scroll bar] is "Painting out".
*2: The setting is valid if [Display scroll bar] is "Image".
The scroll bar settings are reflected on the following parts.
Scroll width
Scroll button color
Scroll arrow color
Scroll bar color
Scroll bar background color
Scroll bar perimeter line color
Button 1 design
Button 3 design
Button 2 design
Button 4 design
For the other properties, refer to "7.1 Common Functions of Controls"

7.2.13 Table Object (GNCTable)
Table control (GNCTable) is a control that uses cells with the number (n) of rows and columns to
manage and display the character string data. Each row and column can have its own title.
7.2.13.1 Property Settings
The property settings of the table control object are divided into the followings.
Control name : Specify the control name.
Position/Size : Specify the position and the size of the control.
Show/Hide : Specify whether the control is displayed or hidden.
Input permission : Select whether the entries are accepted (permission) or rejected (prohibition).
Table : Specify the number of rows/columns and the column width in the control.
Solid frame : Specify the solid frame of the control.
Character attribute : Specify the character attribute of captions.
Sub cursor
:
Specify whether to show/hide the Sub cursor, as well as its color attribute and
default display position.
Row title
:
Specify whether to show/hide the row title, as well as its displayed character,
color attribute and the space between the rows.
Column title
:
Specify whether to show/hide the column title, as well as its displayed
character, color attribute and the space between the columns.
Data area : Specify the solid frame, color attribute and the space between the cells.
Callback function : Specify whether or not the callback functions are provided.
Table
Item Description
Number of the rows Specify the number of rows in the data area. (1 to 20).
Number of the columns Specify the number of columns in the data area. (1 to 32)
Kind of the columns ratio Select whether to use percentage or pixel values to specify the width of
columns.

Columns ratio Specify the width of columns according to the type selected in "Kind of the columns ratio". Use "\t" to delimit each value of width.

Sub Cursor

Item Description

Use of sub cursor Select the existence of a sub cursor between "Yes" and "No".

Initial row position of the Sub cursor

Specify the Sub cursors initial position in rows.

Initial column position of the Sub cursor

Specify the Sub cursors initial position in columns.

Background color of the Sub cursor

Select the background color of the Sub cursor.

Row Title

Item Description

Show/Hide of the row title Select whether the row titles are displayed or hidden.

Character sequence of the row title Input character strings for each row title. Use "\t" to delimit each character string.

Row spacing of the row title Specify the space between the row title cells in pixels.

Column spacing of the row title Specify the space between the row title and the data area in pixels.

Background color of the row title Select the background color of the row title.

Boundary color of the row title Select the boundary color of the row title cells.

Horizontal character position of the row title

Select "Align left"/"Center"/"Align right" for the horizontal character position in the row title.

Vertical character position of the row title

Select "Align top"/"Center"/"Align bottom" for the vertical character position in the row title.

Use of row title solid frame Select the existence of the solid frame between "Yes" and "No".

Row title solid frame Select the ID of the solid frame resource.

Column Title

Item Description

Show/Hide of the column title Select whether the column titles are displayed or hidden.

Character sequence of the column title

Input character strings for each column title. Use "\t" to delimit each character string.

Row spacing of the column title Specify the space between the column title cells in pixels.

Column spacing of the column title Specify the space between the column title and the data area in pixels.

Background color of the column title Select the background color of the column title.

Boundary color of the column title Select the boundary color of the column title cells.

Horizontal character position of column title

Select "Align left"/"Center"/"Align right" for the horizontal display position of characters in the column title.

Vertical character position of the column title

Select "Align top"/"Center"/"Align bottom" for the vertical display position of characters in the column title.

Use of column title solid frame Select the existence of the solid frame between "Yes" and "No".

Column title solid frame Select the ID of the solid frame resource.

Data Area

Item Description

Use of whole data area solid frame Select the existence of the solid frame for the whole data area between "Yes" and "No".

Whole data area solid frame Select the resource ID of the solid frame for the whole area.

Row spacing of the data area Specify the space between the rows in the data area in pixels.

Column spacing of the data area Specify the space between the columns in the data area in pixels.

Background color of the data area Select the background color of the data area.

Boundary color of the data area Select the boundary color of the data area.

Horizontal character position of the data area

Select "Align left"/"Center"/"Align right" for the horizontal character position in the data area.

Vertical character position of the data area

Select "Align top"/"Center"/"Align bottom" for the vertical character position in the data area.

Use of data area solid frame Select the existence of the solid frame for each cell between "Yes" and "No".

Data area solid frame Select the resource ID of the solid frame for each cell.

Callback Function

Item Description

OnChangeString Select "Yes" to add a process to be executed after the contents of data area has changed.

OnSubCursorMove Select "Yes" to add a process to be executed after the sub-cursor position has changed.

For the other properties, refer to "7.1 Common Functions of Controls".

7.2.13.2 Complements

Movement of the Sub Cursor

The following table shows how the Sub cursor moves in the table control object.

key key Tab key Shift+Tab key Enter key

Sub cursor moves
up in the same
column.

Sub cursor moves
down in the same
column.

Sub cursor moves
to the right.

Sub cursor moves
to the left.

Sub cursor moves
down in the same
column.

Cursor movement when the
orkey is pressed

Cursor movement when
the Tab key is pressed

Cursor movement when the
Shift+Tab keys are pressed

Cursor movement when
the Enter key is pressed

Usage Examples

The followings show the initial display of the control object and the screen images when the
properties were changed.

Screen Properties value Image

1 Number of rows 1

Number of columns 1

Columns ratio Blank

2 Number of rows 10

Number of columns 2

Columns ratio 1\t2\t3

3 Use of row title
solid frame

No

Use of column title
solid frame

No

Use of data area
solid frame

No

Background color
of the row title

RGB
(220,230,155)

Background color
of the data area

RGB
(255,255,255)

Sub Cursor RGB
(0,255,255)

Screen Properties value Image

4 Perimeter solid
frame

ID_BORDER0
0003

Whole data
area solid frame

ID_BORDER0
0003

Row spacing of
the data area

1

Column spacing
of the data area

1

5 Character
sequence of the
row title

Row title01\t
Row title02\t
Row title03\t
Row title04\t
Row title05\t
Row title06\t
Row title07\t
Row title08\t
Row title09\t
Row title10

Boundary color of
the row title
RGB
(220,230,155)
Horizontal
character position
of the row title
Align Right
Character
sequence
of the column title
Column title
01\t Column
title 02
Boundary color of
the column title
RGB
(192,192,192)
Horizontal color of
the column title
Center
Column title01 Column title02
Row title01
Row title02
Row title03
Row title04
Row title05
Row title06
Row title07
Row title08
Row title09
Row title10

Remarks
Restrictions
Restrictions for creating a control object are shown below.
(1) Properties of the control on the on-memory panel or window
The setting values in the properties of the control on the on-memory panel or window, after having been changed with public functions, are retained when redisplayed with a screen change.
(2) Availability of GCSTableGetCellNumFromPoint( ) when the control object has never been displayed
If the table control object, allocated on the on-memory panel or window, has never been displayed, an attempt to get a cell No. with GCSTableGetCellNumFromPoint( ) leads an error (GERR_NCTABLE_RANGEOVER).
(3) Setting range of a character string in GCSTableSetCellString( )
GCSTableSetCellString( ) can contain only 128 characters to specify a character string for a cell in the data area.
(4) Data after the number of rows and columns were changed with public functions
If the smaller number of rows than displayed is specified in GCSNCTableSetLineCount( ) to change the number of rows, the data (displayed character string and background color) in the rows to be hidden will be cleared.
If a control object with 20 rows, for example, is changed to be displayed with 17 rows with GCSNCTableSetLineCount( ), the data that has been set in 18th to 20th rows is all lost after the change.
The data will not be restored if the number of rows is set to 20 again with GCSNCTableSetLineCount( ).
The same happens when the number of columns is changed with GCSNCTableSetRowCount( ).
(5) Setting range of the font resource ID with public functions
When changing the font with GCSNCTableSetFontID( ), specify a font resource ID for the 2nd argument "usID" from the ones registered as NC Designer2 resource in designing.
Timing of the Display with the Changed Font and the Number of Rows/Columns
The following table shows the time to display the updates for the control object allocated on the panel or window, when the configurations (font, number of rows/columns) are changed with public functions.
Function name When the control object is
displayed
When the control object is
hidden (on-memory)
GCSNCTableSetFontID
GCSNCTableSetLineCount
GCSNCTableSetRowCount
: Updates instantly
: Updates when the control object is displayed again
: Execution is not available

7.2.14 Input Box Object(GInputBox)
The input box object is a control that displays numerical values and character strings as well as entered keys. It has the same functions as the text box object but differs in the following points.
- Operation function was added.
- The input values can be reflected to another specified control (Specification of a control to reflect the INPUT).
For the specification of a control to reflect the INPUT, refer to GCSInputBoxSetRefrectControl in "5.26 InputBox" of "NC Designer2 Macro Function Manual" (IB-1501500).
In combination with the sub cursor setting, the input value can be set in the control at which the sub cursor is pointed and the control can be moved by the arrow key/TAB key.
For the details of sub cursor settings, refer to "10.7 Sub Cursor Setting".
7.2.14.1 Property Setup Dialog

Property setup dialog consists of the tabs relating to [Basic Settings] and [Advanced Settings].
Details of each tab will be described in the following sections.
[Basic Settings] consists of three tabs.
No. Item Description
(1) Input/View Set or display the sub cursor and preview.
(2) Style Set or display the background color, solid frame, and preview.
(3) Text Set or display the font, text, cursor, and preview.
[Advanced Settings] consists of one tab.
No. Item Description
(4) Extended Set the item relating to the extended condition for the style/text.
(1)
(2)
(3)
(4)

7.2.14.1.1 [Input/View] Tab
In [Input/View] tab, specify the sub cursor and the sample value.
No. Item Description
(1) Sub cursor Specify the sub cursor.
Click on the sub cursor button to display the "Sub cursor Setting"
dialog.
(Note) The sub cursor button is valid when one of the following
controls is arranged either on the input box control which is located
on the panel/window or on the view frame
- Text box
- PLC text box
- NC data text box
For the "Sub cursor Setting", refer to "10.7 Sub Cursor Setting"
(2) Background color Specify the sub cursor background color.
(3) Text color Specify the sub cursor text color.
(4) Add the data to the value
set on the sub cursor
display control
Place a check mark here to add the input value to the value of the
control which displays the sub cursor when pressing the INPUT
key.
(5) Displays the echo of the
value set on the sub
cursor display control
Place a check mark here to echo back the value specified on the
control which displays the sub cursor to the input box.
(6) Max. number of
characters
Specify the maximum number of the characters to display.
(7) Display onscreen
numbers with asterisks
Place a check mark here to display the input characters with
asterisks.
(8) Enables computation
function
Place a check mark here to enable the computation function.
(9) Sample Value Specify the value to be displayed on the preview.
(10) Preview A preview of the input value is displayed.
(1)
(3)
(4)
(10)
(2)
(9)
(5)
(6)
(7)
(8)

7.2.14.1.2 [Style] Tab
In [Style] tab, specify the background color and the solid frame.
For each item, refer to "7.1.16.1.1 [Style] Tab".

7.2.14.1.3 [Text] Tab
In [Text] tab, specify the font, text, and the cursor.
No. Item Description
(1) Effect at the time of focus Select the effect at the time of focus among "With cursor", "No
effects", or "Selected".
To display the cursor in the text box where the focus is located,
select "With cursor". To display no cursor, select "No effects". To
select all characters, select "Selected".
(2) Shape Select the cursor shape from "Vertical line" or "Block".
(Note) This item is valid when either "With cursor" or "Selected" in
"Effect at the time of focus" is selected.
(3) Color Specify the cursor color.
(Note) This item is valid when either "With cursor" or "Selected" in
"Effect at the time of focus" is selected.

For the items other than the above, refer to "7.1.16.1.2 [Text] Tab".
(2)
(3)
(1)

7.2.14.1.4 [Extended] Tab
In [Extended] tab, set whether to provide the background color at the time of focus and disable.
No. Item Description
(1) Set the background
color/text color to be
applied when focused
Place a check mark here to enable to set the background/text color
on the [style] tab/[text] tab when focused.
(2) Set the background color to
be applied when disabled
Place a check mark here to enable to set the background color on
the [style] tab at the time of disable.
(1)
(2)

7.2.14.2 Property Settings
The property settings for the input box object are divided into the followings.
Control name : Specify the control name.
Position/size : Specify the position and size of the control.
Show/hide : Select whether the control is displayed or hidden.
Color/pattern : Specify the color and pattern of the control.
Display type/
Display format : Specify the format of character strings to be displayed in the control.
Password : Specify the password.
Character attribute : Specify the character attribute of the caption.
Solid frame : Specify the solid frame of the control.
Operation function : Specify whether or not the operation function is provided.
Echo back : Specify whether or not the echo back is provided.
Input method : Specify the input method (Absolute/Incremental)
Sub cursor
Extended function
:
:
Specify the display color of the sub cursor.
Specify whether to enable or disable extended functions.
Callback function : Specify the presence of callback functions.

Color/pattern
Item Description
Use of background color Select whether to provide the background color. If "No" is selected, the
background will be transparent.
Background color Specify the background color.
Character color Specify the character color.
Background color at the time
of focus
Specify the background color of an input box where the focus is located.
Character color at the time
of focus
Specify the character color of an input box when the focus is located.
Background color at the time
of disable
Specify the background color of an input box when the entry is disabled.
When the entry is disabled, entered contents will be cleared.
Display type/Display format
Item Description
Number of the maximum
characters
Specify the maximum number of characters to display. (1 to 256)
Password
Item Description
Password setup Select "Yes" to display entered characters with asterisks (*).
Character attribute
Item Description
Effect at the time of focus To display the cursor in the input box where the focus is located, select
"With cursor". Not to display a cursor, select "No effect". To select all
characters, select "Selected".
Cursor type Select the type of cursor from "Vertical line" or "Block", when "Effect at the
time of focus" is set as "With cursor" or "Selected".
Cursor color Specify the color of cursor.
Operation function
Item Description
Operation function Select "Yes" or "None" to provide the operation function.

Echo back
Item Description

Echo back Select whether to echo back the positional value of the control to which
INPUT will be reflected or the sub cursor, from "Yes"/"No".
* The control to which INPUT will be reflected can be designated by the
function "GCSInputBoxSetRefrectControl".
Input method
Item Description
Abs/Inc Specify whether to directly set the input value to the control when entering
the INPUT key (absolute), or to add the positional value of the sub cursor
or the control to which INPUT will be reflected, to the input value when
entering the INPUT key (incremental).
Sub cursor
Item Description
Sub cursor Background color Specify the background color of the control where the sub cursor is
displayed.
Sub cursor Character color Specify the character color of the control where the sub cursor is
displayed.
Extended function
Item Description
Extended function (A7)
enabled
Specify whether to enable or disable the functions extended in NC
Designer2 version A7 or later.
When "Enable" is selected, the functions extended in version A7 or later
for input box control can be used.
When "Disable" is selected, only the functions of version A6 or earlier can
be used.
Callback function
Item Description
OnSubCursorMove Execute this function after the sub cursor position changed.
OnError Execute this function if setting the contents to the control to which the
INPUT will be reflected failed.
OnInit Select "Yes" to add a process to be executed after the panel/window is
displayed.
OnQuit Select "Yes" to add a process to be executed before the panel/window is
hidden.
For the other properties, refer to "7.1 Common Functions of Controls".

7.2.14.3 Complements
Cursor type
The cursor type can be changed between "Vertical line" and "Block" as shown below.
Display example: Cursor type "Vertical line"
Display example: Cursor type "Block"

Operations with Keys
Types of Keys
The following keys are available for the input box.
Key type Key Operation
Data setting keys A B C D E F G H I J K
L M N O P Q R S T U
V W X Y Z
a b c d e f g h i j k
l m n o p q r s t u
v w x y z
0 1 2 3 4 5 6 7 8 9
+ - / * = . , ; ( ) etc.
Press these keys to set alphabetic characters, numerals
and operation symbols, etc.
Data correction
keys
INSERT(Data insert key) When cursor type is "block", the data insertion mode is
entered. Press a data setting key to insert a character
before the current cursor position.
(The overwrite mode is entered when the DELETE, C.B,
INPUT, cursor or TAB, etc., key is pressed, or when the
screen is changed.)
DELETE(Data delete key) Press DELETE to delete a character in the data setting
area.
- When the cursor is "Vertical line", the character after the
cursor position will be deleted.
- When the cursor is "Block", the character before the
cursor position will be deleted.
C.B(Cancel key) Press C.B to cancel the setting in the data setting area.
Cursor keys When the sub cursor settings are made, press these keys
to move the target control.
| | When the sub cursor settings are made, press these keys
to move the target control.
Press these keys to move the cursor one character to the
left or right in the data setting area.
If a control is set as the destination of these arrow keys
(,) by the sub cursor settings, the cursor will not move
within the data setting area and, instead, will move to the
target control.
INPUT key INPUT Press INPUT to fix the data in the data setting area and
reflect the input value to the control which is specified to

reflect the INPUT.
When the sub cursor settings are made, the input value
will be reflected before the sub cursor moves.
Operation key SP(Space key) Inserts a blank.
(Note) If any key other than those listed above is entered, it will be ignored. If [Key transfer control]
is set by the sub cursor setting, the focus will move to the target control and transfers the key.
For the sub cursor setting, refer to "10.7 Sub Cursor Setting".

Set the input numerals and alphabetic characters
Input numeric, alphabetical and other keys while the focus is placed on the control to display the
character strings.
By specifying a control to reflect the INPUT beforehand, the input data can be reflected to the
specified control when pressing the INPUT key.
Operation example:
(1)
(2)
(Note) When reflecting the input data to the specified control is conducted successfully, the data in
the data setting area will be cleared. And if it fails, the data will remain displayed in the data
setting area.
Operations in the data setting area
Keys will be input to where the cursor is displayed.
When a key is input, the data will be displayed at the current cursor position and the cursor will shift
a character to the right.
Numeric keys/Alphabetical keys
Operation example: Cursor type "Vertical line"
(1)
(2)
Operation example: Cursor type "Block"
(1)
(2)
Input data keys
1 2 3 4 5
The input data will be displayed in the data setting area
Press INPUT key.
The input value will be reflected to the specified control.
Control to reflect the
INPUT
Input box
The cursor is placed as shown in
the right.
Press 2 key.
The character will be inserted to the current cursor position.
The cursor is placed as shown in
the right.
Press 2 key.
The input character will overwrite the character currently
located at the cursor position.

/ Key
These keys move the cursor one character to the left or right.
Operation example: Cursor type "Vertical line"
(1)
(2)
Operation example: Cursor type "Block"
(1)
(2)
INSERT Key
When cursor type is "block", the data insertion mode is entered. The characters input after the
mode is entered will be inserted before the cursor position. When cursor type is "Vertical line", it
is always in the data insertion mode, so this key will be ignored.
Operation example:
(1)
(2)
(Note) The overwrite mode is entered when DELETE, C.B, INPUT, cursor or TAB, etc., keys are pressed,
or when the screen is changed.
The cursor is placed as shown in
the right.
Press key.
The cursor moves one character to the right.
The cursor is placed as shown in
the right.
Press key.
The cursor moves one character to the right.
Move the cursor to the position
where the data is to be inserted.
Press the INSERT key, and then
the data keys.
INSERT 7 7 7
The data will be inserted and the cursor will move to the right.
The cursor will move in the data setting area.

DELETE Key

(1) When the cursor type is "Vertical line"
This key deletes the character to the right of the cursor.
Operation example:
(a)
(b)
(2) When the cursor type is "Block"
This key deletes the character to the left of the cursor.
Operation example:
(a)
(b)
C.B Key
This key deletes all the characters in the data setting area.
Operation example:
(1)
Move the cursor to the position
where the data is to be deleted.
Press DELETE key.
The character after the cursor will be deleted and the
cursor will not move.
Move the cursor to the data to be
deleted.
Press DELETE key.
Press C.B key.
(Verticalline)
(Block)
The cursor will move in the data setting area.
The cursor will move in the data setting area.
All the characters in the data setting area will be
deleted and the cursor will move to the far left.
The character before the cursor will be deleted and
the cursor will not move.

Inputting Operations
In addition to the method of directly inputting numeric data for specific data settings, the method of
inputting the operation results using four rules operators and function symbols can be used.
Input method
Input numerical values, function symbols, operators and parentheses () in the data setting area. Press
INPUT key to display the operation results.
By specifying a control to reflect the INPUT beforehand, the input data can be reflected to the specified
control when pressing INPUT key again.
Setting examples of operators and functional symbols and the results are as follows.
Function symbols, setting examples and results
Function Function
symbol
Setting example Result
Absolute value ABS =ABS (50-60) 10
Square root SQRT =SQRT (3) 1.7320508
Sine SIN =SIN (30) 0.5
Cosine COS =COS (15) 0.9659258
Tangent TAN =TAN (45) 1
Arc tangent ATAN =ATAN (1.3) 52.431408
Operation examples
(1)
(2)
(Note) When reflecting the input data to the specified control is conducted successfully, the data in
the data setting area will be cleared. And if it fails, the data will remain displayed in the data
setting area.
Examples of operator settings, and results
Operation Setting example Result
Addition =100+50 150
Subtraction =100-50 50
Multiplication =12.3*4 49.2
Division =100/3 33.3333333
Function =1.2*(2.5+SQRT(4)) 5.4
Set as below and press INPUT
key.
=12*20 INPUT
The operation results will appear in the data setting area.
Press INPUT key again.
The input value will be reflected to the specified control.
Control to reflect
the INPUT
Input box

Precautions for using arithmetic operators and functions
- Division : An error will occur if the denominator of a division is zero.
- Square root : An error will occur if the value in parentheses () is negative.
- Trigonometric function : The unit of angle is degree ().
- Arc tangent : -90calculation result90
Restrictions
Followings are the restrictions for operation function.
(1) Always input "="before any characters.
(2) Do not use the following characters as the second or the last character.
- Invalid as second character: *, /,)

- Invalid as last character: *, /, (, +, -
(3) An error will occur when the number of opening and closing parentheses is not equal.
(4) The 360 limit does not apply on the angle. SIN (500) is interpreted as SIN (140).
(5) The exponential setting, like "1.23E-4", cannot be used. The operation result is not displayed with exponential.
(6) It is not possible to set characters exceeding the number of characters which can be input to the data setting area.
(7) It is not possible to omit "0" before a decimal point, like ".5", when inputting operations.
(8) The accuracy is guaranteed for the calculation with 15 digits or less. An unintended rounding will occur to calculations with over 15 digits.
Ex.1) When the 18th to 20th digits are rounded down.
(=12345678901234567890*1 12345678901234567000)
Ex.2) When the 18th digit is rounded to the positive direction.
(=123456789012345678*1 123456789012345680)
(9) Operators and functions which are not mentioned above, such as "ASIN", cannot be used.
(10) Regardless of the input setting unit and metric system/inch system, the maximum digit number below the decimal point of the operation result is seven.
7.2.14.4 Restrictions
(1) When the control to reflect the INPUT is a text box (when "float" is set in the "Type" property), a value different from the one displayed in the data setting area may be set.
(2) When a value is input after "0", "0" will be attached at the top of the value.
The "0" will be cleared only when an arithmetic processing is executed.

7.2.15 Ten-key object (GsoftKey)
The ten-key is a control which displays numerical values and character strings as well as input keys.
The key buttons within the ten-key control and the keys on the operation board can be used as input keys.
The following operations are also available with the ten-key control.
Operation function
The input values can be reflected to another specified control (Specification of a control to reflect the INPUT).
For the specification of a control to reflect INPUT, refer to GCSSoftKeySetRefrectControl in "5.27 SoftKey" of "NC Designer2 Macro Function Manual" (IB-1501500).
In combination with the sub cursor function, the input value can be set in the control at which the sub cursor is pointed and the control can be moved by the arrow key/TAB key.
For the details of sub cursor setting, refer to "10.7 Sub Cursor Setting".
The ten-key is a control which facilitates input processing to the text box and others by saving the need for using macro description. The SW keyboard is a keyboard window which substitutes the NC keyboard. The following table shows the difference in functions.
Ten-key SW keyboard
Purpose SW keyboard control which can interface
with text box, PLC text box, NC data text
box.
Simple NC keyboard window
No macro creation needed for data input
processing
Macro creation needed for the data input
processing
Layout can be custmized Layout fixed (Left, center, right)
Function
Key type Three (Decimal/Hexadecimal/ALL key) Two (Ten-key/ALL key)
Abs/Inc Yes No
Calculation Yes No

7.2.15.1 Property Setup Dialog
Property setup dialog of ten-key control consists of the tabs relating to [Basic Settings] and [Advanced Settings]. Details of each tab will be described in the following sections.
[Basic Settings] consists of three tabs.
No. Tab Description
(1) Input/View Set or display the sub cursor and preview.
(2) Style Set or display the background color, solid frame, and preview.
(3) Text Set or display the text color, cursor, and preview.
[Advanced Settings] consists of one tab.
No. Tab Description
(4) Extended Set the item relating to the extended styles and title bar.
(1)
(2)
(3)
(4)

7.2.15.1.1 [Input/View] Tab
In [Input/View] Tab, specify the sub cursor and the sample value of the preview.
No. Item Description
(1) Sub cursor Specify the sub cursor.
Click on the sub cursor button to display the "Sub cursor Setting" dialog.
(Note) The sub cursor button is valid when one of the following controls is arranged either on the ten-key control which is located on the panel/window or on the view frame
- Text box
- PLC text box

- NC data text box
For the "Sub Cursor Setting", refer to "10.7 Sub Cursor Setting".
(2) Background color Specify the sub cursor background color.
(3) Text color Specify the sub cursor text color.
(4) Add the data to the value
set on the sub cursor
display control
Place a check mark here to add the input value to the value of the
control which displays the sub cursor when pressing the INPUT key.
(5) Input type Select the input type from "Decimal number", "Hexadecimal" or "ALL
key type".
(6) Show original data Place a check mark here to display the original value part.
(7) Uppercase/Lowercase Select the input method to be displayed at the first time from
"ABC"/"abc".
When "abc" is set, the ABC/abc key button on the ten-key
control will be highlighted.
(8) Max. number of
characters
Specify the maximum number of the characters to display.
(9) Display onscreen
numbers with asterisks
Place a check mark here to display the input characters with
asterisks.
(10) Enables computation
function
Place a check mark here to enable the computation function.
(11) Sample Value Specify the value to be displayed on the preview.
(1)
(3)
(4)
(11)
(2)
(12)
(5)
(6)
(7)
(8)
(9)
(10)

No. Item Description
(12) Preview Display the window to check the specified property design.
7.2.15.1.2 [Style] Tab
In [Style] tab, specify the background color and solid frame.
No. Item Description
(1) Original data Specify the background color of the original value part.
(2) Input data display Specify the background color of input data display part.
(3) Disable Specify the background color of an input data display part when the
entry is allowed but the focus is OFF or the entry is disabled.
For the items other than the above, refer to "7.1.16.1.1 [Style] Tab".
(1)
(3)
(2)

7.2.15.1.3 [Text] Tab
In [Text] tab, specify the text color and cursor.
No. Item Description
(1) Original data Specify the text color of the original value part.
(2) Input data display Specify the text color of input data display part.
(3) Effect at the time of focus Select the effect at the time of focus among "No effect" or "With
cursor".
(4) Text color Specify the text color of the cursor position.
(5) Shape Select the cursor shape from "Vertical line" or "Block".
(6) Color Specify the cursor color.
(1)
(3)
(2)
(4)
(5)
(6)

7.2.15.1.4 [Extended] Tab
In [Extended] tab, specify the extended styles and title bar.
No. Item Description
(1) Movement of control
display position
Specify how much the control moves with the position movement
button.
(2) Display size Select the display size of the key buttons from "Small" / "middle" /
"Horizontal".
The selected display size will become valid when the input type is
set to "Decimal number" or "Hexadecimal".

(3) Show title bars Place a check mark here to display the title bar.
(4) Text Specify the character string of the title bar.
(1)
(2)
(3)
(4)
Display position
movement button

7.2.15.2 Property Settings
The property settings for the ten-key object are divided into the followings.
Control name : Specify the control name.
Position/size : Specify the position and size of the control.
Show/hide : Select whether the control is displayed or hidden.
Color/pattern : Specify the color and pattern of the control.
Display type/
Display format : Specify the format of character strings to be displayed in the control.
Password : Specify the password.
Character attribute : Specify the character attribute of the caption.
Solid frame : Specify the solid frame of the control.
Operation function : Specify whether or not the operation function is provided.
Input method : Specify the input method (Absolute/Incremental) and the switching over
between uppercase and lowercase characters.
Sub cursor : Specify the display color of the sub cursor.
Input type : Specify the input type.
Display type : Specify the display type of buttons.
Control display position
movement amount
: Specify the movement amount of the display position.
Callback function : Specify the presence of callback functions.
Position/Size
Item Description
X Specify the horizontal position from the upper left of the page/view frame
of the control (X coordinate) in dots (0 to 2559).
Y Specify the vertical position from the upper left of the page/view frame of
the control (Y coordinate) in dots (0 to 1919).
WIDTH (Note) Specify the width of the control in dots (8 to 2560).
HEIGHT (Note) Specify the height of the control in dots (8 to 1920).
(Note) If an area smaller than the entire ten-key is specified, the drawings will not be updated correctly while
key input can be handled. Make sure that the specified area is as large as the ten-key.

Show/Hide
Item Description
Show/Hide Select whether to display the control.
Title bar Show/Hide Select "Show" to display and "Hide" not to display the title bar.
Title bar
Displayed character string
(Note)
Specify the character string to be displayed on the title bar.
There are two specification methods for character string.
- Select from the registered character string resources.
- Newly input character strings.
Original value Show/Hide Select "Show" to display and "Hide" not to display the original value.
(Note) The maximum number of characters for the title name differs depending on the input type and display
type. When the title name exceeds the limit, it will overlap with the movement mark . Make sure that
the title name does not exceed the maximum number of characters.
Type Button (Small) Button (middle) Horizontal ALL key
Dec. Hex. Dec. Hex. Dec. Hex. type
Max. no. of
characters
M800/M80
(Windows-based
display unit)
11 11 18 18 34 43 18
* When characters are input as one-byte characters.

Color/pattern
Item Description
Original value Background
color
Specify the background color of the original value part.
Original value Character color Specify the character color of the original value part.
Input data display
Background color
Specify the background color of input data display part.
Input data display
Character color
Specify the character color of input data display part.
Background color at the time
of disable
Specify the background color of an input data display part when the entry
is allowed but the focus is OFF or the entry is disabled. When the entry is
disabled, entered contents will be cleared.
Display type/Display format

Item Description
Number of the maximum
characters
Specify the maximum number of characters to display/set. (1 to 256)
Characters exceeding the display range will be displayed by scrolling.

Password
Item Description
Password setup Select "Yes" to display entered characters with asterisks (*).
Characters will also be displayed with asterisks (*) at original value part.
Character attribute
Item Description
Cursor Display (Note) When the entry is allowed and the focus is ON, select "With cursor" to
display the cursor and "No effect" not to display the cursor.
Cursor type (Note) Select the cursor type which will be displayed when the entry is allowed
and the focus is ON, from "Vertical line" or "Block".
Cursor background color
(Note)
Specify the background color of the sub cursor.
Cursor character color
(Note)
Specify the character color of the sub cursor.
(Note) The settings will be valid only when "ALL key type" is selected for the property item "Input type".
Solid Frame
Item Description
Control Use of solid frame Select the presence of the solid frame between "Yes" and "No".
Control Solid frame Select the ID of the solid frame resource.
Operation function
Item Description
Operation function (Note) When the "Input type" is set to "ALL key type", select whether to provide
the operation function between "Yes" and "None". When not provided, an
operator will be counted as a character.
When the "Input type" is set to "Decimal number" or "Hexadecimal", the
operation function will always be valid.
(Note) The settings will be valid only when "ALL key type" is selected for the property item "Input type".
Input method
Item Description
Abs/Inc Specify whether to directly set the input value to the control when entering
the INPUT key (absolute), or to add the positional value of the sub cursor
or the control to which INPUT will be reflected, to the input value when
entering the INPUT key (incremental).
When "Inc" is set, the Inc key button on the ten-key control will be
highlighted.
ABC/abc
(Note)
Select the input method from uppercase/lowercase character.
When "abc" is set, the ABC../abc.. key button on the ten-key control will
be highlighted and lowercase character will be selected.
(Note) The settings will be valid only when "ALL key type" is selected for the property item "Input type".

Sub cursor
Item Description
Sub cursor Background color
(Note)
Specify the background color of the control where the sub cursor is
displayed.
Sub cursor Character color
(Note)
Specify the character color of the control where the sub cursor is
displayed.
(Note) For the details of sub cursor setting, refer to "10.7 Sub Cursor Setting".
Input type
Item Description
Input type Select the input type for the ten-key from Decimal number/
Hexadecimal/ALL key type.
Display type
Item Description
Display type Select the display type of the key buttons from
"Small"/"middle"/"Horizontal".
The selected display type will become valid when the input type is set to
"Decimal number"/"Hexadecimal".
Control display position movement amount
Item Description
Control display position
movement amount
Specify how much the control moves with the position movement button.
If the size of the display after the movement with the position movement
button exceeds the size of the panel or the window, the display position of
the ten-key control will not change. Also, if the ten-key control is placed
inside a frame, it will not move beyond the frame. (1 to 2560)
Callback function
Item Description
OnSubCursorMove Execute this function after the sub cursor position changed.
OnError Execute this function if setting the contents to the control to which the

INPUT will be reflected failed.
OnInit Select "Yes" to add a process to be executed after the panel/window is displayed.
OnQuit Select " Yes" to add a process to be executed before the panel/window is hidden.
For the other properties, refer to "7.1 Common Functions of Controls".

7.2.15.3 Complements
Screen configuration
Screen image
The input types of the ten-key control are divided into decimal input (normal/horizontal), hexadecimal input (normal/horizontal), and all key type input (normal). Also, two button sizes are available for decimal input/hexadecimal input (normal).
Display image for each input type
The decimal/hexadecimal/all key type input can be switched over by changing the property item "Input type". Images of each input type are shown below.
<Decimal input type> <Hexadecimal input type>
<All key type input>

Content
The configuration of a numerical control keypad is shown below. The title bar and the original value part can be hidden by changing the setting in the property item "Title bar Show/Hide" and "Original value Show/Hide".

Name Details
(a) Title bar Displays the title name, the position movement button, and the close button. Specify the movement amount handled by the position movement button in the property. The title bar can be hidden by the property setting.
(b) Input data display part Displays the value to be set. Press the [INPUT] key button to set this value to the control specified to reflect the INPUT.
(c) Original value part Displays the value in the control specified to reflect the INPUT. Original value part can be hidden by the property setting.
(d) Abs/Inc Change the setting method between absolute and incremental. When the incremental method is selected ([INC] key is highlighted), the value in the input data display part will be added to the value in the control to reflect the INPUT. But when the character string type of the control is "character string", inputting a value to the control will be disabled.
(a) Title bar
(b) Input data display part
(c) Original value part
(d) Abs/Inc

Highlighting the key button
When touched, the keys will be highlighted as below.

(Note) The position movement button and the close button on the title bar will not be highlighted.
Type of sub cursor
When "With cursor" is selected for the property item "Cursor Display", the type of the cursor will be as follows depending on the property setting "Cursor type".
Display example) Cursor type "Vertical line"
Display example) Cursor type "Block"

Operations with Keys
Buttons on the title bar
The "position movement button" and the "close button" are located on the title bar. The operations of controls with these buttons are explained below. Be aware that, when the title bar is hidden, these buttons cannot be used.
<Position movement button>
Click these buttons to move the ten-key to the direction indicated by the button.
The ten-key will move up and down when the "Input type" is "Decimal number" or "Hexadecimal" and also the "Display type" is "Horizontal". In other cases, it will move to right and left. Set the movement amount in the property item "Position movement".
<Close button>
Click this button to hide the ten-key. When the ten-key is specified as the "input control" in the sub cursor setting, the sub cursor will remain displayed.
The ten-key will reappear if the sub cursor movement is made when the ten-key is hidden. Also, touch the control to which the sub cursor setting is made to display the ten-key at the coordinate set as the "display start position" in the sub cursor setting.
For the details of sub cursor setting, refer to "10.7 Sub Cursor Setting".
Types of key buttons
The operations with key buttons displayed in the ten-key control and with those on the NC keyboard are received.
Keys Details
[0] to [9], [A] to [Z] These reflect the input numerals and alphabets to the input data display part.
[.] This reflects the decimal point to the input data display part.
[+/-] This highlights the sign of the value in the input data display part.
[+], [], [*], [/] These set the four rules operators to the input data display part.
[SP] This puts a character space to the input data display part.

[C.B] This clears (blank) the value in the input data display part.
[INPUT] When an operation is not being performed (when the four rules operators are displayed), this sets the value in the input data display part to the control to reflect the INPUT.
When an operation is being performed (when the four rules operators are displayed), this sets the operation result to the input data display part.
[INC] Change the setting method between absolute and incremental. When the incremental method is selected ([INC] key is highlighted), the value in the input data display part will be added to the value in the control to reflect the INPUT.
[SHIFT] Press this key to select the characters written in the lower part of each button.
Example)
Press [SHIFT] and then [G] to input "C".
[ABC/abc] Press this key to switch between uppercase and lowercase alphabets.
Others The input values will be reflected to the input data display part.

Key type Key Operation
Keys related to data input (Keys available for the ten-key control)
Data setting keys A B C D E F G H I J K L
M N O P Q R S T U V W
X Y Z
a b c d e f g h I j k l m n
o p q r s t u v w x y z
0 1 2 3 4 5 6 7 8 9 + -
= * / . ; ( ) etc.
Press these keys to set alphabetic characters, numerals and operation symbols, etc.
Data correction keys INSERT
(Data insert key)
When the type of the cursor is "block", the data insertion mode is entered. Press a data setting key to insert a character before the current cursor position.
(The overwrite mode is entered when the DELETE, C.B, INPUT, cursor or TAB, etc., keys are pressed, or when the screen is changed.)
DELETE
(Data delete key)
Press DELETE to delete a character in the data setting area.
- When the cursor is "Vertical line", the character after the cursor position will be deleted.
- When the cursor is "Block", the character before the cursor position will be deleted.
CB
(Cancel key)
Press CB to cancel the setting in the data setting area.
Cursor keys When the sub cursor settings are made, press these keys to move the target control.
(*)The values in the data setting area will not be cleared even if the sub cursor moves.
| | When the sub cursor settings are made, press these keys to move the target control.
(*)The values in the data setting area will not be cleared even if the sub cursor moves.
Press these keys to move the cursor one character to the left or right in the data setting area.
If a control is set as the destination of these arrow keys (,) by the sub cursor settings, the cursor will not move within the data setting area and, instead, will move between the target controls.
(*)The values in the data setting area will not be cleared even if the sub cursor moves.
INPUT key INPUT Press INPUT to fix the data in the data setting area and reflect the input value to the control which is specified to reflect the INPUT.
When the sub cursor settings are made, the input value will be reflect before the cursor moves to the target control.
When operators are displayed in the ten-key display part, the operation result will be displayed in the input part but the input value will not be reflected to the specified control.
Operation key SP
(Space key)
Inserts a blank.
(*) If INPUT is entered when only a space is input, the display characters in the control to which the sub cursor setting is made will be cleared.
(Note) If any key other than those listed above is entered, it will be ignored. If [Key transfer control] is set by the sub cursor setting, the focus will move to the set control and transfers the key.
For the sub cursor setting, refer to "10.7 Sub Cursor Setting".

Set the input numerals and alphabetic characters
Input numeric, alphabetical and other keys while the focus is placed on the control to display the character strings.
By specifying a control to reflect the INPUT beforehand, the input data can be reflected to the specified control when pressing the INPUT key.
DecimalHexadecimal input
(1)
The input data will be displayed in the input data display part of the ten-key control.
(2)
The input value will be reflected to the control specified to reflect the INPUT.
(Note 1) Data will be right-aligned in the input data display part and the original value part.
(Note 2) When the setting succeeds, the content in the input data display part will be cleared and the display of the original value part will be updated.
(Note 3) When the setting fails, neither displayed content in the input data display part nor the original value part will be changed.
(Note 4) When "0" before a decimal point is omitted, like . 3 5, ".35" will be displayed in the input data display part. And if the INPUT key is pressed, the character string ".35" will be set in the specified control. The setting will fail if the specified control to reflect the INPUT accepts numerals only.
Input data keys.
Press 0 . 3 5 key buttons.
Press the INPUT key button.
Pressed key button will be highlighted.
Release the key button to clear the highlighting and to display the value to the input data display part.

All key type input
(Note 1) Data will be left-aligned in the input data display part and the original value part.
(Note 2) When the setting succeeds, the content in the input data display part will be cleared and the display of the original value part will be updated.
(Note 3) When the setting fails, neither displayed content in the input data display part nor the original value part will be changed.
(Note 4) When the character string type of the control is "character string", press SP key to insert a blank and then press INPUT key button to clear the content of the control. But if more than one blank are inserted, the blanks will be set in the control.
When data is set to the hexadecimal display control from a decimal input ten-key
The value in the input data display part will be converted to hexadecimal number before being reflected to the control to reflect the INPUT. Likewise, when a value is set to a decimal display control from a hexadecimal input ten-key, the value in the input data display part will be converted to decimal number before being reflected. All key type input can be operated as same as when using a decimal input ten-key.
The input data will be displayed in the input data display part of the ten-key.
Set Hexadecimal to the property item Input type.
INPUT
The value in the input data display part will be reflected to the control after being converted according to the settings of the control.
(Note) The content of the control to which the INPUT is to be reflected will directly be displayed in the original value part regardless of the ten-key input type.
When the input type is "Decimal number" and the control to reflect the INPUT is a hexadecimal display control, a hexadecimal number will be displayed in the original value part.
When data setting fails
Setting an input data may fail depending on the property setting of the control to reflect the INPUT.
If the data setting fails, the process written in the callback function OnError will be executed.

Operation in the input data display part
For the all key type input, set the property item "Cursor Display" to "With cursor" to display the cursor in the input data display part.
Key input will be performed to where the cursor is currently displayed.
When a key is input, data will be displayed at the cursor position and the cursor will move a character to the right.
When the cursor is hidden, the data will be overwritten as well as when the cursor type is "Block".
The data will be inserted to the far right when the input type is decimal or hexadecimal.
Numeric keys/Alphabetical keys
For the details of operation, refer to "7.2.14 Input box(GinputBox)".
/ key
For the details of operation, refer to "7.2.14 Input box(GinputBox)".
(Note 1) The cursor will not moved during decimal and hexadecimal input. Characters will always be inserted to the far right even using / key.
(Note 2) When a control is specified as the destination of sub cursor movement in the sub cursor setting, / key operation gives priority to the sub cursor movement between controls. So the / key operation will become unable to move the sub cursor within the input data display part.
INSERT key

For the details of operation, refer to "7.2.14 Input box(GinputBox)".
(Note) For the decimal and hexadecimal input, it is always in the data insertion mode, so this key will be ignored.

DELETE key

(1) All key type input

When the cursor type is "Vertical line", the character after the cursor position will be deleted.
When the cursor is "Block", the character before the cursor position will be deleted.
For the details of operation, refer to "7.2.14 Input box(GinputBox)".
(Note) When a control is specified as the destination of sub cursor movement in the sub cursor setting, the sub cursor will not move within the input data display part. So when the cursor type is "Vertical line", DELETE key will become unable to delete data. Use C.B key to delete characters in the input data display part.

(2) For the decimal and hexadecimal input, the character at the far right will be deleted.

C.B key

This key deletes all the characters in the input data display part. When an operator is being displayed, the operator will be cleared, too.
For the details of operation, refer to "7.2.14 Input box(GinputBox)".

Input operation

The ten-key control provides a four rules operation function. The following operation procedure applies also when the input type is set to "ALL key type" and the operation function is set to "Yes".

Operation example

(1)
The input data will be displayed in the input data display part of the ten-key control.

(2)
The operator will be displayed in the input data display part and the first item will be memorized.

(3)
The first item will be cleared and the second item will be displayed in the input data display part of the ten-key control.

(4)
The operator will disappear and the operation result will be displayed.

(5)
The operation result will be reflected to the specified control.

(Note) Press an operator key button after inputting the second item, instead of the INPUT key button, to display the operation result and the operator in the input data display part and to continue with another operation.

Input the first item.
Press 1 2 3 key buttons.
Press the operation key button
+.
Press the INPUT key button
again.
The operator will be displayed.
Input the second item.
Press 4 3 2 key buttons.
Press the INPUT key button.

Example of operation failure

If the operation fails, neither displayed content in the input data display part or the original value part will be updated. But the operator will be cleared and the operator input will be canceled.

(1)
The input data will be displayed in the input data display part of the ten-key control.

(2)
The operator will be displayed in the input data display part.

(3)
The first item will be cleared and the second item will be displayed in the input data display part of the ten-key control.

(4)
The operator will be cleared but the content in the input data display part will not be changed because the operation result is illegal.

Input the first item.
Press . . . key buttons.
Press the operation key button
+.
Input the second item.
Press 4 3 2 key buttons.

Press the INPUT key button.

Canceling the operation input
Press the INPUT key after inputting the operator to cancel the operator input.
(1)

(2)
The operator will be displayed in the input data display
part.

(3)
The operator will be cleared.

(4)
The first item will not be cleared and "4" will be added
to the far right.

The operator display when character string is displayed by scrolling
If a character string exceeding the display range of the input data display part is input, a scroll display will be applied. The characters to be scrolled are those set with the data setting keys and the +/- key. When an operator is being displayed, its position is fixed and will not be scrolled.
(1)

(2)
The "1" at the far left will be hidden and "2" will appear
at the far right.
The operator will not be cleared.

Press 4 key button.
Press the operator key button +
and input as many characters as
possible to display.
Press 2 key button.
Input the first item.
Press 1 2 3 key buttons.
Press the operation key button
+.
Press the INPUT key button.

Precautions for using operators and functions
(1) An error will occur if the denominator of a division is zero.
(2) When more than one operator is pressed one after another, the last one will become valid.
(3) Several decimal points can be displayed at a time, but an operation will be illegal with several decimal points displayed.
(4) The operation will be illegal when a "0" before a decimal point is omitted, like . 3 5.
(5) In the all key type input mode, the operation will be handled in decimal number. Operations in hexadecimal number are illegal.
Restrictions of operation function
Followings are the limitations of operation function.
(1) The accuracy is guaranteed for the calculation with 15 digits or less in decimal number. An unintended rounding will occur to calculations with over 15 digits.
Ex.1) When the 18th to 20th digits are rounded down.
(=12345678901234567890*1 12345678901234567000)
Ex.2) When the 18th digit is rounded to the positive direction.
(=123456789012345678*1 123456789012345680)
The calculation accuracy is the same for switching the sign of values using the +/- key button.
(2) Regardless of the input setting unit and metric system/inch system, the maximum digit number below the decimal point of the operation result is 7.
(3) Operation using () cannot be performed.
(4) Operation using a function symbol not provided in the key buttons cannot be performed.
(5) Operation will not be performed by pressing "=" key.
7.2.15.4 Restrictions
(1) When the property item "Original value Show/Hide" is set to "Show" and the character string set in the control to reflect the INPUT exceeds the "maximum number of characters" set in the property, the original value part will be blank.
(2) When a text box is set as the control to reflect the INPUT (when the "type" property is set to "float"), a value different from the one displayed in the input data display part may be set in the text box.
(3) If the ten-key is moved over a control with a display updating cycle (such as counter and F command), it will not be displayed correctly. Make sure that the layout does not cause any overlapping. Also, hide the title bar to invalidate the movement button operation.
(4) When a value is input after "0", "0" will be attached at the top of the value. The "0" will be cleared only when an arithmetic processing is executed.
(5) The hexadecimal input type ten-key cannot handle decimal numbers. A decimal point will not be displayed even by pressing "." key button.

7.3 NC Control Object
7.3.1 Counter (GNXCounter); Counter Display Part
The counter display part can display the current position, workpiece coordinate position, etc.
7.3.1.1 Property Settings
The property settings of the Counter are divided into the followings.

Control name : Specify the control name.
Position/Size : Specify the position and the size of the control.
Part system designation : Specify the part system.
Character attribute : Specify the character attribute of captions.
Counter kind : Specify the kind of counter to display.
Display : Specify the number of axes to display and the presence of space between
the rows.
Axis status : Specify the display of the axis status.
Title : Specify the display of the title.
Axis name : Specify the display of the axis name.
Coordinate : Specify the display of the coordinate.
Color type : Specify the color type.
Callback function : Specify whether or not the callback functions are provided.
Part system designation
Item Description
NumberOfSystems Specify the part system.
Character Attribute
Item Description
FontType Specify the font size and thickness.
Font12: Font size 12
Font12 Bold: Font size 12, bold
Font14: Font size 14
Font14 Bold: Font size 14, bold
Normal: Normal size
Normal Bold: Normal size, bold
Middle: Middle size
Middle Bold: Middle size, bold
Font28: Font size 28
Font28 Bold: Font size 28, bold
Font32: Font size 32
Font32 Bold: Font size 32, bold
Big: Double height and width
Big Bold: Double height and width, bold
Font40: Font size 40
Font40 Bold: Font size 40, bold
Font48: Font size 48
Font48 Bold: Font size 48, bold
Font48 Bold(Type2): Font size 48, bold(Type2)
Font64: Font size 64
Font64(Type2): Font size 64(Type2)
Font64 Bold: Font size 64, bold

Counter Kind
Item Description
CounterKind Specify what kinds of coordinate values to display.
Current Position: Current position
Work Coordinate Position: Workpiece coordinate position
Machine Position: Machines position
Program Position: Program position
Program 0 Point: Programmed 0 Point
Error Compensation: Error compensation amount
Remain Command: Remaining command
Manual Interruption Amount: Manual interruption amount
Next Command: Next command
Restart Position: Restart position
Restart Remain Distance: Remaining distance for the restart
Tip Wk Coord Position: Tip workpiece coordinate position
Distance(Machine Axis
Movement): Machine axis movement
Pulse(Tool Axis Movement): Tool axis movement
Tip Mach Position: Tip machining position
Relative Position: Relative position
PLC axis: PLC axis position (Note)
All the other settings are invalid.
However, work installation position, table coordinate position,
and inclined surface coordinate position can be specified from
GCSCounterSetCounterType function.
(Note) If the axis name of a PLC axis is not designated, the axis name for
the counter is displayed as "P+axis number"(P1, P2,,,).
Display
Item Description
LineNumber Specify the number of axes to display. (1 to 16)
LineGapVisibleLineGapVisible Specify whether the space is provided or not between the rows.
Axis Status
Item Description
AxisStatusVisible Specify the presence of the axis status.
AxisStatusType Select "Normal Type".
DiameterAxisVisible Specify whether to display the diametrical axis
AxisStatusForeColor Specify the character color for the axis status display.
AxisStatusBackColor Specify the background color for the axis status display.
Title
Item Description
TitleForeColor Specify the character color of the title.
TitleBackColor Specify the background color of the title.
Axis name
Item Description

AxisNameForeColor Specify the character color for the axis name display.
AxisNameBackColor Specify the background color for the axis name display.

Coordinate
Item Description
ValueForeColor Specify the character color for the coordinate value display.
ValueBackColor Specify the background color for the coordinate value display.
CharacterNumber Specify the digit number of the coordinate value. (1 to 18)
PicoUnitVisible Specify whether to enable the Pico unit.
AxisCross Specify whether to enable to switch over the display of axes names during
mixed synchronization control.
1: Enable
0: Disable
Color Type
Item Description
ColorType Specify the color type.
Theme color: Specify the base color designated as the theme color.
Specified color: The colors set for each property are reflected.
For the other properties, refer to "7.1 Common Functions of Controls".

7.3.1.2 Complements
Image
The following are the configurations of the counter display parts.
Table 1 Details for the axis states
Type of axis state Displayed contents Description
Normal type No. of reference
position #1 to #4
Returned to the reference position corresponding with the
reference position number.
][In emergency stop
MR Mirror image executed
>< Axis removed state
CT Auxiliary axis selected
Restart type RP Thx axis has returned to the restart position.
Table 2 Details for the axis types
Displayed contents Meaning
* Non-control axis
Diameter axis
(No indication) Other axes than those above.
An item is indicated in order from the top of the table 2, if the axis has the several specifications of
the list.
Title
Axis name
(by system)
Axis type
Coordinates
Axis state

7.3.2 CycleTime (GNXCycleTime); Cycle Time Display Part
The cycle time display part is used to display the automatic start-up time and the cycle time.
Automatic start-up time (STL) ..... Total accumulated time during the automatic operation,
from when the automatic start-up button is pressed in the
memory (tape) mode or MDI to when the feed hold stop,
block stop or reset button is pressed.
Cycle time (CYC) ..... The automatic operation time from when the automatic
start-up button is pressed in the memory (tape) mode or
MDI to when the feed hold stop, block stop or reset button
is pressed.
This is preset to "0" by turning the power OFF.
Date (DAT) The current date set in the NC is displayed.
Year: 4 digits, Month: 2 digit, Date: 2 digit
(YYYY.MM.DD)
Time (TIM) ..... The current time set in the NC is displayed with the
24-hour system. (HH:MM:SS)
Power-ON time (PON) .. This displays the total integrated time of the time from NC
power ON to OFF. (HH:MM:SS)
Automatic operation time (OP) .. The total integrated time from NC power ON to OFF.
(HH:MM:SS)
External accumulated time1 (EX1) This content differs depending on the PLC sequence.
(HH:MM:SS)
External accumulated time2 (EX2) This content differs depending on the PLC sequence.
(HH:MM:SS)
Cut time (CUT) .. The total time of the cutting commands (G1/G2/G3, etc.)
given in the memory (tape) mode or MDI mode, from
when the automatic start-up button is pressed until a feed
hold stop, block stop, or a press of the reset button.
(HHHHH:MM:SS)
This is preset to "0" by the automatic start-up button or
turning the power OFF.
7.3.2.1 Property Settings
The property settings of the CycleTime are divided into the followings.
Control name : Specify the control name.

Position/Size : Specify the position and the size of the control.
Part system designation : Specify the part system.
Character attribute : Specify the character attribute of captions.
Time type : Specify the time type
Display : Specify the existence of frame, as well as space between the rows.
Label : Specify the display of the label.
Value : Specify the display of the value.
Color type : Specify the color type.
Callback function : Specify whether or not the callback functions are provided.
Part system designation
Item Description
NumberOfSystems Specify the part system.
Character attribute
Item Description
FontType Specify the font size and thickness.
Normal: Normal font
Normal Bold: Normal bold font
Middle: Middle font
Big: Font with double height and width

Time type
Item Description
UpperTimeType Specify the time type to be displayed at first time.
DATE .. Date
TIME Time
POWERON Power ON
AUTORUN . Automatic operation
AUTOEXEC .. Automatic start-up
OUTSIDE1 . External accumulated time1
OUTSIDE2 .. External accumulated time2
CYCTIME Cycle time
CUTTIME . Cut time
DEFAULT Default (upper: automatic start / lower: cycle time)
LowerTimeType
Display
Item Description
LineGapVisible Specify whether the space is provided or not between the rows.
FrameVisible Specify the frame is provided or not.
Label
Item Description
LabelForeColor Specify the character color of the label.
LabelBackColor Specify the background color of the label.
Value
Item Description
ValueForeColor Specify the character color of the value.
ValueBackColor Specify the background color of the value.
Color Type
Item Description
ColorType Specify the color type.
Theme color: Specify the base color designated as the theme color.
Specified color: The colors set for each property are reflected.
For the other properties, refer to "7.1 Common Functions of Controls".
7.3.2.2 Complements
Screen Specifications
Screen Images
a b c 1 2 3 4 5 6 7 8 9 0 1
d e f 1 2 3 4 5 6 7 8 9 0 1
(1) Label (2) Value (Time)

7.3.3 Feedrate (GNXFeedrate); F Display Part
F display part shows the vector direction speed currently being moved in during interporation feed, the speed of the axis with highest speed during each axis independent feed. This part also shows dwell (code: G04).
Setting the property (speed display type) enables the display of tool tip speed.
7.3.3.1 Property Settings
The property settings of the Feedrate are divided into the followings.
Control name : Specify the control name.
Position/Size : Specify the position and the size of the control.
Part system designation : Specify the part system.
Character attribute : Specify the character attribute of captions.
Speed display type : Specify the type of the speed display.
Display : Specify the frame is provided or not.
Label : Specify the display of the label.
Value : Specify the display of the value.
Color type : Specify the color type.
Callback function : Specify whether or not the callback functions are provided.
Part system designation
Item Description
NumberOfSystems Specify the part system.
Character Attribute
Item Description
FontType Specify the font size and thickness.
Font12: Font 12
Font14: Font 14

Normal: Normal font
Normal Bold: Normal bold font
Font24: Font 24
Middle: Middle font
Big: Font with double height and width
Speed Display Type
Item Description
SpeedType Specify the type of the speed display.
Normal: Normal speed display
Tool Tip Speed: Tool tip speed display
Display
Item Description
FrameVisible Specify the frame is provided or not.
AutoNumberChange Specify whether to enable the automatic adjustment of the number of digit.
False: Fixed to 12 digits.
True: Automatically adjust the digits number for speed,
according to the width.
Label/UnitVisible Specify whether to display the label and the unit. The unit is acquired from
the NC and the speed type is switched among the speed, the dwell, and
the circumferential speed according to the unit.
True: Enable Label/Enable Unit
Label True Unit False: Enable Label/Disable Unit
Label False Unit True: Disable Label/Enable Unit
False: Disable Label/Disable Unit

Label
Item Description
LabelForeColor Specify the character color of the label.
LabelBackColor Specify the background color of the label.
Value
Item Description
ValueForeColor Specify the character color of the value.
ValueBackColor Specify the background color of the value.
Color Type
Item Description
ColorType Specify the color type.
Theme color: Specify the base color designated as the theme color.
Specified color: The colors set for each property are reflected.
For the other properties, refer to "7.1 Common Functions of Controls".
7.3.3.2 Complements
Screen Specifications
Screen Images
1 2 3 4 5 6 . 1 2 3 4 5
(1) Label (2) Value

7.3.4 Gmodal M (GNXGModal); M System Modal Display Part
The G modal display part is used to show each modal state.
7.3.4.1 Property Settings
The property settings of the Gmodal M are divided into the followings.
Control name : Specify the control name.
Position/Size : Specify the position and the size of the control.
Part system designation : Specify the part system.
Label : Specify the display of the label.
Value : Specify the display of the value.
Display : Specify whether the space is provided or not between the rows and whether
to display MSTB.
Color type : Specify the color type.
Callback function : Specify whether or not the callback functions are provided.
Part system designation
Item Description
NumberOfSystems Specify the part system.
Label
Item Description
LabelForeColor Specify the character color of the label.
LabelBackColor Specify the background color of the label.
Value
Item Description
ValueForeColor Specify the character color of the value.
ValueBackColor Specify the background color of the value.
Display
Item Description
LineGapVisible Specify whether the space is provided or not between the rows.
MSTBVisible Specify whether to display MSTB.
DispType Specify the display type.
Vertical type
Horizontal type
Color Type
Item Description
ColorType Specify the color type.
Theme color: Specify the base color designated as the theme color.
Specified color: The colors set for each property are reflected.
For the other properties, refer to "7.1 Common Functions of Controls".

7.3.4.2 Complements
Screen Specifications
Screen Images
G modal list
G modal details
F modal display
MSTB display
Label Value
Restrictions
When no M command has been executed, the value in the M display shows "0".

7.3.5 Gmodal L (GNXGModal_L); L System Modal Display Part
The G modal display part (L system) is used to show each modal state.
7.3.5.1 Property Settings
The property settings of the Gmodal L are divided into the followings.
Control name : Specify the control name.
Position/Size : Specify the position and the size of the control.
Part system designation : Specify the part system.
Label : Specify the display of the label.
Value : Specify the display of the value.
Display : Specify whether the space is provided or not between the rows.
Color type : Specify the color type.
Callback function : Specify whether or not the callback functions are provided.
Part system designation
Item Description
NumberOfSystems Specify the part system.
Label
Item Description
LabelForeColor Specify the character color of the label.
LabelBackColor Specify the background color of the label.
Value
Item Description
ValueForeColor Specify the character color of the value.
ValueBackColor Specify the background color of the value.
Display
Item Description
LineGapVisible Specify whether the space is provided or not between the rows.
SSpeedMSTBVisible Specify whether to display the constant surface speed control and the
MSTB.
DispType Specify the display type.
Vertical type
Horizontal type
Color Type
Item Description
ColorType Specify the color type.
Theme color: Specify the base color designated as the theme color.
Specified color: The colors set for each property are reflected.
For the other properties, refer to "7.1 Common Functions of Controls".

7.3.5.2 Complements
Screen Specifications
Screen Images
Tool length
and wear
compensation
amount
Compensation
number
Constant surface
speed control
Label Value
G modal list
G modal details
Part size
MSTB
<Vertical type>
F modal

7.3.6 Gmodal Simple (GNXGModalSimple); Simple Modal Display Part
The G modal display part (simple) is used to show each modal state.
7.3.6.1 Property Settings
The property settings of the Gmodal Simple are divided into the followings.
Control name : Specify the control name.
Position/Size : Specify the position and the size of the control.
Part system designation : Specify the part system.
Character attribute : Specify the character attribute of captions.
Display : Specify whether the space is provided or not between the rows.
Value : Specify the display of the value.
Color type : Specify the color type.
Callback function : Specify whether or not the callback functions are provided.
Part system designation

Item Description
NumberOfSystems Specify the part system.
Character Attribute
Item Description
FontType Specify the font size and thickness.
Normal Normal font
Big Font with double height and width
Display
Item Description
LineGapVisible Specify whether the space is provided or not between the rows.
Value
Item Description
ValueForeColor Specify the character color of the value.
ValueBackColor Specify the background color of the value.
Color Type
Item Description
ColorType Specify the color type.
Theme color: Specify the base color designated as the theme color.
Specified color: The colors set for each property are reflected.
For the other properties, refer to "7.1 Common Functions of Controls".

7.3.6.2 Complements
Screen Specifications
Screen Images
<M system>
<L system>
Label Value
Value

7.3.7 LoadMeter (GNXLoadMeter); Load Meter Display Part
The Load meter display part can display the spindle load and Z axis load in the bar graphs by using user PLC.
(When the load meter is not set by user PLC, these are not displayed on the screen.))
Two load meters are displayed by using four lines (the area of the spindle standby and the load meter) when the spindle standby is not displayed.
One load meter is displayed by using two lines (the area of the spindle standby and the load meter) when the spindle standby is displayed.
7.3.7.1 Property Settings
The property settings of the LoadMeter are divided into the followings.
Control name : Specify the control name.
Position/Size : Specify the position and the size of the control.
Part system designation : Specify the part system.
Label : Specify the display of the label.
Value : Specify the display of the value.
Display type : Specify the display of the spindle load and the Z axis load.
Color type : Specify the color type.
Callback function : Specify whether or not the callback functions are provided.
Part system designation
Item Description
NumberOfSystems Specify the part system.
Label
Item Description
LabelForeColor Specify the character color of the label.
LabelBackColor Specify the background color of the label.
Value
Item Description
ValueForeColor Specify the character color of the value.
ValueBackColor Specify the background color of the value.
CharacterNumber Specify the size of the Load meter display part. (4 to 50)
Display Type
Item Description
DispType Specify the display of the spindle load and the Z axis load.
0: Displays the spindle load only
1: Displays the Z axis load only
2: Displays the both spindle and Z axis loads
Color Type
Item Description
ColorType Specify the color type.
Theme color: Specify the base color designated as the theme color.
Specified color: The colors set for each property are reflected.
For the other properties, refer to "7.1 Common Functions of Controls".

7.3.7.2 Complements
Screen Specifications
Screen Images
Label
Value
File Registers (R) for the Load Meter Display
$1 $2 $3 $4
Load meter 1 For numeral display R2520 R2720 R2920 R3120
For bar graph display R2521 R2721 R2921 R3121
Load meter 2 For numeral display R2522 R2722 R2922 R3122

For bar graph display R2523 R2723 R2923 R3123
(Note) Machines without part system use the display for $1.
Screen Image of the Load Meter Display Part and the Correspondence of the File Register (R)
S P L o a d
1 0 0 %
Z L o a d
6 0 %
$1:R2520,$2:R2720,$3:R2920 $1:R2521,$2:R2721
$4: Displays the value of R3120 in 5 digits $3:R2921,$4:R3121
(Binary 0 to 32767) Displays the values in bar graph
$1:R2522,$2:R2722,$3:R2922 $1:R2523,$2:R2723
$4: Displays the value of R3122 in 5 digits $3:R2923,$4:R3123
(Binary 0 to 32767) Displays the values in bar graph
Contents of F E D C B A 9 8 7 6 5 4 3 2 1 0
R2521,R2721,
R2921,R3121,
R2523,R2723,
R2923,R3123 Load meter display is valid
(a) Whole length of the bar graph
(b) Length of the bar in white
Difference of (a) and (b) is shown in pink.
Restrictions
The Load meter display control does not show the scale and its markings, even if they have been
set in the ladder program.

7.3.8 MSTB (GNXMSTB); MSTB display part
The MSTB display part can display each command of spindle function (S), miscellaneous function
(M), tool function (T) and 2nd miscellaneous function (B).
7.3.8.1 Property Settings
The property settings of the MSTB are divided into the followings.
Control name : Specify the control name.
Position/Size : Specify the position and the size of the control.
Part system designation : Specify the part system.
Number of displays : Specify the number of the MSTB commands displayed.
Character attribute : Specify the character attribute of captions.
Display type : Select the property setting (in "Number of displays") or the NC parameter
setting to give priority when specifying the number of the MSTB commands
to display.
Display : Specify whether to make frame, the space between lines and scroll bar
visible and whether to activate the three columns display as well as the
number of digits to be displayed.
Color type : Specify the color type.
Label : Specify the display of the label.
Value : Specify the display of the value.
Callback function : Specify whether or not the callback functions are provided.
Part system designation
Item Description
NumberOfSystems Specify the part system.
Number of Displays
Item Description
S_Number Specify the number of the S commands displayed (0 to 8).
M_Number Specify the number of the M commands displayed (0 to 4).
T_Number Specify the number of the T command displayed (0 or 1).
B_Number Specify the number of the B command displayed (0 or 1).
Character Attribute
Item Description
FontType Specify the font size and thickness.
Font12: Font 12
Font14: Font 14
Normal: Normal font
Normal Bold: Normal bold font
Middle: Middle font
Big: Font with double height and width
Font40: Font 40

Display Type
Item Description
DisplayType Select the property setting (in "Number of displays") or the NC parameter
setting to give priority when specifying the number of the MSTB commands
to display.
Type0: The number of the MSTB commands displayed is specified by
the property setting (in "Number of displays").
Type1: The number of the M commands displayed is specified by the
parameter "#12005 Mfig (Number of M)".
(When the setting value of the parameter "#12005 Mfig (Number
of M)" is larger than that of the property settings (in "Number of
displays"), the property setting value is applied to the number of
the M commands displayed. The number of the other STB
commands displayed depends on the property settings (in
"Number of displays").
Type2: The number of the S commands displayed is specified by the
parameter "#1300 ext36 (bit 0) (Multiple spindle control II)".
(When the parameter "#1300 ext36 (bit 0) (Multiple spindle
control II)" is set to "1", the number of the S commands

displayed is also set to "1", regardless of the setting of the
parameter "#1039 spinno (Number of spindles)". The number of
the other MTB commands displayed depends on the property
settings (in "Number of displays"). When the parameter "#1300
ext36 (bit0) (Multiple spindle control II)" is set to "0", the number
of the MSTB commands displayed depends on the property
settings (in "Number of displays").
Display
Item Description
LineGapVisible Specify whether the space is provided or not between the lines.
FrameVisible Specify the frame is provided or not.
ThreeSequencesType Specify whether to display the S commands, M commands, and T, B
commands in the three columns.
ScrollBarVisible Specify whether to enable the scroll bar.
(Note 1) The scroll bar will not be displayed when the three columns
display is valid.
(Note 2) When the display digit is 0, the scroll bar will not be displayed.
(Note 3) When the display width is narrow, the scroll bar will not be
displayed.
LineNumber Specify the display digit.
0: All the lines
1 to 12: Only the specified lines
(Note) When the three columns display is valid, all the data will be
displayed regardless of the display digit.
Color Type
Item Description
ColorType Specify the color type.
Theme color: Specify the base color designated as the theme color.
Specified color: The colors set for each property are reflected.
Label
Item Description
LabelForeColor Specify the character color of the label.
LabelBackColor Specify the background color of the label.

Value
Item Description
ValueForeColor Specify the character color of the value.
ValueBackColor Specify the background color of the value.
For the other properties, refer to "7.1 Common Functions of Controls".
7.3.8.2 Complements
Screen Specifications
Screen Images
Label Value
Restrictions
(1) The macro interruption codes (M96, M97) and subprogram call codes (M98, M99) will not be processed if
they are issued.
(2) When no M command has been executed, the M command value area shows "0".

7.3.9 ONB (GNONB); ONB Display Part
The ONB display part displays the program No., sequence No. and block No. currently being
executed.
When a subprogram is being executed, the subprogram's program No., sequence No., block No.
and percentage display are displayed.
7.3.9.1 Property Settings
The property settings of the ONB are divided into the followings.
Control name : Specify the control name.
Position/Size : Specify the position and the size of the control.
Part system designation : Specify the part system.
Character attribute : Specify the character attribute of captions.
Display
:
Specify the presence of frame, as well as space between the lines and
columns.
Label : Specify the display of the label.
Value : Specify the display of the value.
Device display : Specify whether or not to display the device.
Nest level display : Specify whether or not to display the nest level.
DisplayPercent : Specify whether or not to display the percentage.
Color type : Specify the color type.
Callback function : Specify whether or not the callback functions are provided.
Part system designation
Item Description
NumberOfSystems Specify the part system.
Character Attribute
Item Description
FontType Specify the font size and thickness.
Font14: Font 14
Normal: Normal font
Font24: Font 24
Middle: Middle font
Big: Font with double height and width
Display
Item Description
DispType Specify the display type

Normal: O number, fixed to 12 digits
AutoNumberChange: O number, the digits change automatically.
(Note 1)
AutoNumberChange(2Lines): O number, the digits change automatically.
(2-line display) (Note 2)
(Note 1) This is for adjusting automatically the digit number according to
the width.
A width of 9 digits or more is required.
(Note 2) NB number is displayed on the second line.
A width of at least 9 digits or more is required.
NnumberDispNum Specify the number of N number's digits to be displayed. (0 to 12)
When it is "0", N number is displayed in 6 digits.
LineGapVisible Specify whether the space is provided or not between the lines.
SequenceGapS Specify whether the space is provided or not between the columns.
FrameVisible Specify the frame is provided or not.

Label
Item Description
LabelForeColor Specify the character color of the label.
LabelBackColor Specify the background color of the label.
Value
Item Description
ValueForeColor Specify the character color of the value.
ValueBackColor Specify the background color of the value.
Device Display
Item Description
DisplayDeviceName Specify whether or not to display the device.
Nest Level Display
Item Description
DisplayNestLevel Specify whether or not to display the nest level.
When the nest level is 10, [*] will be displayed.
DisplayPercent
Item Description
DisplayPercent Specify whether or not to display the percentage.
True(Normal): Enable to display the percentage.
True(Compact): Enable to display the percentage (without margin).
False: Disable to display the percentage.
Color Type
Item Description
ColorType Specify the color type.
Theme color: Specify the base color designated as the theme color.
Specified color: The colors set for each property are reflected.
For the other properties, refer to "7.1 Common Functions of Controls".
7.3.9.2 Complements
Screen Specifications
Screen Images
Label Value

7.3.10 ProgramBuffer (GNXPrgBuff); Program Buffer Display Part
The program buffer display part displays the contents of the machining program currently being
executed.
The block being executed in the program currently is highlighted.
7.3.10.1 Property Settings
The property settings of the ProgramBuffer are divided into the followings.
Control name : Specify the control name.
Position/Size : Specify the position and the size of the control.
Part system designation : Specify the part system.
Display : Specify the number of lines to display the machining programs, the number
of characters in each line, and the presence of space between the lines.
Value : Specify the display of the value.
Character attribute : Specify the character attribute of captions.
Color type : Specify the color type.
Callback function : Specify whether or not the callback functions are provided.
Part system designation
Item Description
NumberOfSystems Specify the part system.
Display
Item Description
LineNumber Specify the number of lines to display the programs. (1 to 30)
CharacterNumber (Note) Specify the number of characters in each line to display the programs. (2 to
80)
LineGapVisible Specify whether the space between lines and the execution ratio meter are
provided.
False: Without space between lines or execution ratio
meter
Gap ON: With a space between lines.
Progress ON: With execution ratio meter
Progress/Gap ON: With a space between lines and execution ratio
meter
(Note) Spaces to separate words are counted as characters.
Value
Item Description
ValueForeColor Specify the character color of the usual value area.
ValueBackColor Specify the background color of the usual value area.

ValueReverseForeColor Specify the character color of the value area when selected and reversed.
ValueReverseBackColor Specify the background color of the value area when selected and reversed.
Character attribute
Item Description
FontType Specify the font size and thickness.
Normal .. Normal font
Normal Bold . Normal bold font
Middle Middle-sized font

Color Type
Item Description
ColorType Specify the color type.
Theme color: Specify the base color designated as the theme color.
Specified color: The colors set for each property are reflected.
For the other properties, refer to "7.1 Common Functions of Controls".
7.3.10.2 Complements
Screen Specifications
Screen Images
Value

7.3.11 SPCommand (GNXSPCommand); S Display Part
S display part can display the spindle modal (S) and the value of actual spindle rotation speed.
7.3.11.1 Property Settings
The property settings of the SPCommand are divided into the followings.
Control name : Specify the control name.
Position/Size : Specify the position and the size of the control.
Axis designation : Specify the spindle No. to be displayed.
Number of displays : Specify the number of the S commands displayed.
Character attribute : Specify the character attribute of captions.
Label : Specify the display of the label.
Value : Specify the display of the value.
Display : Specify whether to activate the three columns display and the number of digits to be displayed.
Color type : Specify the color type.
Callback function : Specify whether or not the callback functions are provided.
Axis designation
Item Description
AxisFlag Specify the spindle No. to be displayed.
- When "0" is set, axes will be displayed in ascending order.
- When the number of S display is 1, set one of 1/2/4/8/16/32, then one of 1st spindle(1) to the 6th spindle(32) will be displayed in the spindle No to be displayed.
- When the number of S display is more than 1, the spindle No. to be displayed will be decided by a combination of setting values. Set "12" to display the 3rd spindle (4) and the 4th spindle (8). The smaller spindle No. will be displayed first when several setting values are combined.
- Even when the spindle No. becomes larger than the number of S display due to combining setting values, the number of spindles to be displayed will not exceed the value designated to the number of S display.
When a value out of the setting range is set, it is regarded as the default value (0).
- When the No. of a spindle which is not mounted is set, the 1st spindle will be displayed.
Number of Displays
Item Description
S_Number Specify the number of the S commands displayed. (1 to 8)
Character Attribute
Item Description
FontType Specify the font size and thickness.
Normal Normal font
Middle Middle-sized font
Big Font with double height and width

Label
Item Description
LabelForeColor Specify the character color of the label.
LabelBackColor Specify the background color of the label.
Value
Item Description
ValueForeColor Specify the character color of the value.
ValueBackColor Specify the background color of the value.
Display
Item Description
Line_Number Specify the number of digits to be displayed.
ThreeSequencesType Specify whether to activate the three columns display.
Color Type
Item Description
ColorType Specify the color type.
Theme color: Specify the base color designated as the theme color.
Specified color: The colors set for each property are reflected.
For the other properties, refer to "7.1 Common Functions of Controls".

7.3.11.2 Complements
Screen Specifications
If two or less spindles are set, both the spindle modal and the actual spindle rotation speed (in parentheses) are displayed.
If three or more spindles are set, only the spindle modal is displayed.
Screen Images
When two spindles are set When four spindles are set
Actual spindle rotation speed
Spindle modal

7.3.12 PLC Button Object (GNCPLCButton)
The PLC button control enables to read and write data from/to the PLC bit device of NC. It also enables to change the ON/OFF state of the button according to the state of the bit device.
7.3.12.1 Property Setup Dialog
Property setup dialog of PLC button control object consists of the tabs relating to [Basic Settings] and [Advanced Settings]. Details of each tab will be described in the following sections.
[Basic Settings] consists of the following three tabs.
No. Tab Description
(1) Device Set the button actions and lamp.
(2) Style Set or display the background color, solid frame, blink, and preview.
(3) Text Set or display the font, text, scroll, and preview.
[Advanced Settings] consists of one tab.
No. Tab Description
(4) Extended Set the item relating to the extended condition for the style or text.
(3)
(1)
(2)
(4)

7.3.12.1.1 [Device] Tab
In [Device] tab, specify the device and button action.
No. Item Description
(1) Device Specify the address of the PLC device for the read or write operation.
Click on the "" button to display the "PLC Device Setting" dialog.
(2) PLC project No. Specify the project number of PLC ladder what PLC device refers. (0 to 6)
(3) Action Select the button action among "Lamp", "Switch:Momentary", and "Switch:Alternate".
(4) Lamp Specify the timing to change the style or text.
* The button status which can be set in the [Style] tab or the [Text] tab changes depending on the specified contents.
(2)
(1)
(4)
(3)

NOTE
The address of the PLC device can be specified on the "PLC Device Setting".
Lamp
When "Lamp" is selected in "Action", select between "Do not use the device2" and "To use the device2".
Item Description
Do not use the device2 Switch the button status (ON or OFF) based on the device setting specified in the button action.
To use the device2 The device2 can be specified.
Switch the button status (ON, OFF, ONON, or ONOFF) based on the combination with the device setting specified in the button action.
(Note) For device2, specify the device different from the one specified in the button action.
When "Switch:Momentary" or "Switch:Alternate" is selected in "Action", select between "Key Touch State" and "Bit-ON/OFF".
Item Description
Key Touch State Switch the button status (ON or OFF) each time the button is pressed or released.
When "Switch:Momentary" is selected in "Action", the button turns ON when it is pressed and it turns OFF when it is released.
When "Switch:Alternate" is selected, the button alternates ON and OFF each time it is pressed.
Bit-ON/OFF Switch the button status (ON or OFF) each time the device turns ON or OFF.

7.3.12.1.2 [Style] Tab
In [Style] tab, specify the style, solid frame, and blink.
No. Item Description
(1) Display type Select the display type among "Square", "Circle", and "Image".
For each item, refer to "7.1.16.1.1 [Style] Tab".
(1)

7.3.12.1.3 [Text] Tab
In [Text] tab, specify the font, text, and scroll setting.

No. Item Description
(1) OFF=ON When [OFF=ON] is checked, the contents specified in [Text] are specified to
all statuses. When [OFF=ON] is not checked, only the [Text] of the status
selected in [Control state preview] is specified.
(2) Text Specifying the display character string. (Note)
(Note) When specifying "Set the style/text to be applied when the focus is on the button" of "7.3.12.1.4
[Extended] Tab", this is disabled. When specifying "Set the style / text to be applied when the button
does not work", this is disabled either.
For the items other than the above, refer to "7.1.16.1.2 [Text] Tab".
(2)
(1)

7.3.12.1.4 [Extended] Tab
In [Extended] tab, set whether to provide the background color when the button is selected.
No. Item Description
(1) Set the style / text
to be applied when
the focus is on the
button
When this is checked, the pattern, foreground color, background color, and
design for when the button is selected (Focus) can be specified on the [Style]
tab and [Text] tab.
(2) Set the style / text
to be applied when
the button does
not work
When this is checked, the pattern, foreground color, background color, and
design for when the button does not work (Disable) can be specified on the
[Style] tab and [Text] tab.
(1)
(2)

7.3.12.2 Property Settings
The property settings of the PLC button are divided into the followings.
Control name : Specify the control name.
Position/Size : Specify the position and the size of the control.
Show/Hide : Specify whether the control is displayed or hidden.
Input permission : Select whether the entries are accepted (permission) or rejected (prohibition).
Ground : Specify the foreground and background.
Button type : Select the button action.
Display type : Specify the display type of the button.
PLC device : Specify the target PLC device.
Color/Pattern : Specify the color and pattern of the control.
Image : Specify the image of the control.
Caption : Specify the caption (character string) displayed on the control.
Character attribute : Specify the character attribute of captions.
Solid frame : Specify the solid frame of the control.
Caption character
string scroll : Specify the scroll of the caption character string.
Blink : Set the blink of the caption character string.
Update condition Specify the update condition for drawing.
Callback function : Specify whether or not the callback functions are provided.
Ground
Item Description
Ground Specify the foreground and background. (Usually set to "0".)
Button Type
Item Description
Button type Select the button action among the following three types.
Momentary The button turns ON when pressed, OFF when released.
Alternate The button alternates ON and OFF each time it is pressed.
None The button does not turn ON nor OFF when pressed.

Display type
Item Description
Display type Select the button type among the following three types.
Square Rectangular button.
The button is indicated in the designated color and pattern.
Circle Round button.
The button is indicated in the designated color and pattern.
Image The button is indicated with the designated image resource.
PLC Device
Item Description
PLC device 1 Specify the address of the PLC bit device for the read or write operation.
Action of PLC device 1 Specify the operation to the PLC bit device specified in "PLC device 1".
(Read or write)
Project No. of PLC device 1 Specify the project No. of PLC ladder what PLC device 1 refers. (0 to 6)
PLC device 2 Specify the address of the PLC bit device for reading operation.
Project No. of PLC device 2 Specify the project No. of PLC ladder what PLC device 2 refers. (0 to 6)
Action of PLC device 2 Specify the operation to the PLC bit device specified in "PLC device 2".
(Read)

Color/Pattern
Item Description
Pattern at the time of ON*1 Specify the pattern of the ON button.
Foreground color at the time of ON*1 Specify the foreground color of the ON button.
Background color at the time of ON*1 Specify the background color of the ON button.
Design at the time of ON*2 Specify the image of the ON button.
Character sequence at the time of ON Specify the character string of the ON button.
Pattern at the time of OFF*1 Specify the pattern of the OFF button.
Foreground color at the time of OFF*1 Specify the foreground color of the OFF button.
Background color at the time of OFF*1 Specify the background color of the OFF button.
Design at the time of OFF*2 Specify the image of the OFF button.
Character sequence at the time of OFF Specify the image of the OFF button.
Patten at the time of ON ON Specify the pattern of the ONON button.
Foreground color at the time of ON ON Specify the foreground color of the ONON button.
Background color at the time of ON ON Specify the background color of the ONON button.
Design at the time of ON ON Specify the image of the ONON button.
Character sequence at the time of ON ON Specify the character string of the ONON button.
Pattern at the time of ON OFF Specify the pattern of the ONOFF button.
Foreground color at the time of ON OFF Specify the foreground color of the ONOFF button.
Background color at the time of ON OFF Specify the background color of the ONOFF button.
Design at the time of ON OFF Specify the image of the ONOFF button.
Character sequence at the time of ON OFF Specify the character string of the ONOFF button.
*1: This setting is valid when the "Display type" is set to "Square or "Circle".
*2: This setting is valid when the "Display type" is set to "Image".
Image
Item Description
Effect at the time of focus Specify whether the color of the button changes or not when
the focus is located. Select between "change color" and "no
change".
Pattern at the time of focus*1 Specify the pattern of the button when the focus is located.
Foreground color at the time of focus*1 Specify the foreground color of the button when the focus is
located.
Background color at the time of focus*1 Specify the background color of the button when the focus is
located.
Design at the time of focus*2 Specify the image of the button when the focus is located.
Pattern at the time of disable*1 Specify the pattern of the button when the entry is disabled.
Foreground color at the time of disable*1 Specify the foreground color of the button when the entry is
disabled.
Background color at the time of disable*1 Specify the background color of the button when the entry is
disabled.
Design at the time of disable*2 Specify the image of the button when the entry is disabled.
*1: This setting is valid when the "Display type" is set to "Square or "Circle".
*2: This setting is valid when the "Display type" is set to "Image".
Update condition
Item Description
Update condition Select the update condition between "Always" and "At change".
"Always" updates the drawing in each cycle.
"At change" updates the drawing only when the display is changed.

Callback function
Item Description
OnInit Select "Yes" to add a process to be executed after the panel/window is
displayed.
OnQuit Select "Yes" to add a process to be executed before the panel/window is
hidden.
For the other properties, refer to "7.1 Common Functions of Controls".

7.3.12.3 Complements
PLC Device Read Function
The button can correspond to the state of PLC bit device in the NC and can display the ON/OFF
state according to the property settings.
Operation example)
Y000 is OFF
Y000 is ON
*4 types of design can be selected for the display
according to the two addresses specified.
PLC Device Write Function
The button can write the ON/OFF state into the bit device in the NC specified in the property
settings, at the time the button is pressed and its state is changed.
The button has "Momentary"(the button is ON as long as pressed) and "Alternate"(the button
alternates ON/OFF when pressed) operation types.
Turns X000 OFF
Turns X000 ON
Button's caption is displayed
The button goes OFF
The button goes ON
Turns X000 ON
(device for writing)
Y000 is goes ON
(device for display)
The button
goes ON Control operation
Example of a single operation) Example of a compounded operation)

Functional Specifications
Settings of PLC Bit Devices
Up to two PLC devices can be set for the read and write operations.
The PLC device 1 can be set to "None/Read/Write", while PLC device 2 can be set to "None/Read".
The PLC device to set should be a bit device.
Item Specifications Read Write
PLC device 1 Reads or writes data from/into the PLC bit device
PLC device 2 Reads data from the PLC bit device
Button Action Type
There are the following three types of the buttons action when pressed.
Button action Writing "ON" into the PLC device Writing "OFF" into the PLC device
Momentary
(The button is ON as long
as pressed)
Executed when the button is pressed Executed when the button is released
Executed when the ENTER key is
pressed while the focus is located at
the button.
Executed when the ENTER key is
released while the focus is located at
the button.
Alternate
(The button alternates
ON/OFF when pressed)
Executed when the OFF-state button
is pressed and released.
Executed when the ON-state button is
pressed and released.
Executed when the ENTER key is
pressed and released while the focus
is located at the OFF-state button.
Executed when the ENTER key is
pressed and released while the focus
is located at the ON-state button.
Executed at the fixed interval while
the button is ON.
Executed at the fixed interval while
the button is OFF.
None
(The button does not turn
ON/OFF when pressed)
Not executed Not executed
"Momentary" and "Alternate" have each different time to write data into the PLC device.
(1) Timing of the "Momentary" write
OFF state ON state
Pressed
Released
Writes ON into the PLC device
Writes OFF into the PLC device

(2) Timing of the "Alternate" write
Writes ON into the PLC device
OFF state Pressed
Released
OFF is selected
ON is selected
ON state Released
Pressed
Processed at
fixed intervals
Processed at
fixed intervals
Writes "OFF" into the PLC device

Display Design
The display design of the button can be changed according to its ON/OFF state. The conditions of
the display depend on how many PLC devices are set to "read". The following table shows the
display design of the button according to the number of devices for "read".
Item
Number of
PLC devices
for "read"
Specifications
Pattern at the time of ON
Foreground color at the time of ON
Background color at the time of ON
Design at the time of ON
Character sequence at the time of ON
0 Displayed while the button is ON
1 Displayed while the PLC device 1 (or 2) is
ON

2 Displayed when the PLC device 1 is ON
and the PLC device 2 is OFF
Pattern at the time of OFF
Foreground color at the time of OFF
Background color at the time of OFF
Design at the time of OFF
Character sequence at the time of OFF
0 Displayed while the button is OFF
1 Displayed while the PLC device 1 (or 2) is
OFF
2 Displayed when the PLC device 1 and 2
are both OFF
Patten at the time of focus
Foreground color at the time of focus
Background color at the time of focus
Design at the time of focus
Independent
from the
number
Displayed when the focus is located at the
button and "change color" is set for the
"Effect at the time of focus"
Pattern at the time of disable
Foreground color at the time of disable
Background color at the time of disable
Design at the time of disable
Character sequence <A> at the time of OFF
Independent
from the
number
Displayed when the button is disabled
Pattern at the time of ON OFF
Foreground at the time of ON OFF
Background at the time of ON OFF
Design at the time of ON OFF
Character string at the time of ON OFF
2 Displayed when the PLC device 1 is OFF
and the PLC device 2 is ON
Patten at the time of ON ON
Foreground at the time of ONON
Background at the time of ON ON
Design at the time of t ON ON
Character string at the time of ON ON
2 Displayed when the PLC device 1 and 2
are both ON

Ex.)
Y000 is OFF Y000 is ON
OFF state ON state
Figure 1. Display of the button when one PLC device is set to "read"
Y000 is OFF
Y001 is OFF
Y000 is ON
Y001 is OFF
Y000 is ON
Y001 is ON
Y000 is OFF
Y001 is ON
OFF state ON state
ON OFF state ON ON state
Figure 2. Display of the button when two PLC devices are set to "read"

7.3.13 PLC Text Box Object (GNCPLCTextBox)
The PLC text box control enables to read and write data from/to the PLC device of NC.
7.3.13.1 Property Setup Dialog
Property setup dialog of PLC textbox control object consists of the tabs relating to [Basic Settings]
and [Advanced Settings]. Details of each tab will be described in the following sections.
[Basic Settings] consists of four tabs.
No. Tab Description
(1) Device Set or display the device, format, and preview.
(2) Style Set or display the background color, solid frame, blink, and preview.
(3) Text Set or display the font, text, scroll, and preview.
(4) Input Range Set or display the input range.
[Advanced Settings] consists of one tab.
No. Tab Description
(5) Extended Set the item relating to the extended condition for the style.
(3)
(1)
(2)
(5)
(4)

7.3.13.1.1 [Device] Tab

In [Device] tab, specify the address of the PLC device and data format for read or write operation.

No. Item Description

(1) Device Specify the address of the PLC device for the read or write operation.

Click on the "" button to display the "PLC Device Setting" dialog.

(2) PLC project no. Specify the project number of PLC ladder what PLC device refers. (0 to 6)

(3) Format Specify the format to display the PLC device value.

(Signed decimal integer/ unsigned decimal integer/ Hexadecimal integer/ Real number (float)/ Real number (double) /Character sequence)

(Note) "Character sequence" is supported by M800/M80 version F2 or later.

When a PLC text box with "Character sequence" set for "Format" is placed in a custom screen and executed in version F1 or earlier, "0" will be set to the device and the display will be blank.

(4) Size Specify the PLC device size used for reading or writing.

When the "Real number (float)" or "Real number (double)" is specified for the property "Format", the radio buttons "2byte" and "4byte" are disabled since the device size is fixed to 4 byte.

When "Character sequence" is set for the property "Format", the radio buttons "2byte" and "4byte" are disabled.

(5) Digits (Integral) Specify the number of digits in integer part of the value. (0 to 12)

When "Character sequence" is set for "Format", this setting is disabled.

(6) Fill with 0 Check here to display 0s in the blank digits when the value does not have as many digits as specified.

When "Character sequence" is set for "Format", this setting is disabled.

(2) (1)

(3)

(9)

(10)

(11)

(12)

(13)

(8)

(6)

(7)

(16)

(14)

(4)

(5)

(15)

No. Item Description

(7) Display comma Check here to display the value with commas.

A comma is inserted after every three digits, if "comma" is set to the display.

When "Character sequence" is set for "Format", this setting is disabled.

(8) Digits (Fractional) Specify the number of digits in decimal part of the value. (0 to 12)

*When "Signed decimal integer", "unsigned decimal integer", or "Hexadecimal integer" is specified for the format, this item is disabled.

When "Character sequence" is set for "Format", this setting is disabled.

(9) Magnification Specify the magnification to the PLC device value to display. (0.000001 to 10000000.000000)

When "Character sequence" is set for "Format", this setting is disabled.

(10) Offset Specify the offset value added to the PLC device value to display. (-2147483648 to 2147483647)

When "Character sequence" is set for "Format", this setting is disabled.

(11) Maximum number of characters

Specify the maximum number of characters to display. (1 to 256)

(12) Display range These are the maximum value and the minimum value which can be displayed on the control.

Example 1: When the format is hexadecimal and the number of digits in integer part is 8, the display will be as shown below.

Display range: 0

~ FFFFFFFF

Example 2: When "Character sequence" is set for "Format", the display will be as shown below.

Display range: -

~ -

(13) Mask the characters with asterisks

Entered characters are displayed with asterisks (*).

(14) Sample Value Specify the value to be displayed on the preview.

When "Character sequence" is set for "Format", this setting is disabled.

(15) Character sequence

Set the character sequence to be displayed on the preview.

When "Format" is set to anything other than "Character sequence", this setting is disabled.

No. Item Description

(16) Preview Display the value specified in combination with the property "Display format", "The number of integer part digits", "The number of decimal part digits", "Comma", "Zero suppress", "Password", "Magnification", and "Offset" on the preview.

When "Character sequence" is set for "Format", the set character string is
displayed on the preview.
Example 1: Format: hexadecimal
The number of integer part digits: 8
Value: A10
Preview: A10
Example 2: specify the offset: 200 in example 1
Preview: AD8
Example 3: check (13) the display with asterisks in Example (2)
Preview: ********
Example 4: Format: Character sequence
Maximum number of characters: 3
Character sequence: ABC
Preview: ABC
NOTE
The address of the PLC device can be specified on the "PLC Device Setting" dialog.

7.3.13.1.2 [Style] Tab
In [Style] tab, specify the background color, solid frame, and blink.
For each item, refer to "7.1.16.1.1 [Style] Tab".

7.3.13.1.3 [Text] Tab
In [Text] tab, specify the font, text, and scroll.
No. Item Description
(1) Effect at the time
of focus
Select the effect at the time of focus among "With cursor", "No effect", or
"Selected".
To display the cursor in the text box where the focus is located, select "With
cursor". To display no cursor, select "No effect". To select all characters, select
"Selected".
For each item, refer to "7.1.16.1.2 [Text] Tab".
(1)

7.3.13.1.4 [Input Range] Tab
In [Input Range] tab, specify the input range.
No. Item Description
(1) Range Displays the range of the value that can be set to the PLC device or PLC text
box.
"Device value" indicates the setting value of the PLC device.
"Input value" indicates the input value of the PLC text box.
When "Character sequence" is set for "Format" in the "Device" tab, this setting
is disabled.
(2) Minimum/
maximum value
Specify the minimum/maximum value that can be written to the PLC device.
(-2147483648 to 4294967295)
(3) Comparison
operator for
minimum value
Select the comparison operator for minimum value between "<=" and "None".
When "None" is selected, the input range check of the minimum value will not
be performed.
(4) Comparison
operator for
maximum value
Select the comparison operator for maximum value between "<=" and "None".
When "None" is selected, the input range check of the maximum value will not
be performed.
(4)
(1)
(2)
(3) (2)

7.3.13.1.5 [Extended] Tab
In [Extended] tab, set whether to provide the background color at the time of focus and disable.
No. Item Description
(1) Set background
color at the time of
focus
Check here to specify the background color at the time of focus on [Style] tab.
(2) Set background
color at the time of
disable
Check here to specify the background color at the time of disable on [Style]
tab.
(1)
(2)

7.3.13.2 Property Settings
The property settings of the PLC text box are divided into the followings.
Control name : Specify the control name.
Position/Size : Specify the position and the size of the control.
Show/Hide : Specify whether the control is displayed or hidden.
Input permission : Select whether the entries are accepted (permission) or rejected (prohibition).
Ground : Specify the foreground and background.
Color/Pattern : Specify the color and pattern of the control.
PLC device : Specify the target PLC device.
Display type/
Display format
: Specify the format of the character string displayed on the control.
Password : Specify the password.
Caption : Specify the caption (character string) displayed on the control.
Character attribute : Specify the character attribute of captions.
Solid frame : Specify the solid frame of the control.
Caption character
string scroll
: Specify the scroll of the caption character string.
Blink : Set the blink of the caption character string.
Callback function : Specify whether or not the callback functions are provided.
Ground
Item Description
Ground Specify the foreground and background. (Usually set to "0".)
Color/Pattern
Item Description
Use of background color Select if the background color is provided or not. If "No" is selected, the
background is transparent.
Background color Specify the background color.
Background color at the time
of focus
Specify the background color when the focus is located.
Background color at the time
of disable
Specify the background color when the entry is disabled.
PLC Device
Item Description
PLC device Specify the address of the PLC word device for the read or write
operation.
PLC device project No. Specify the project No. of PLC ladder what PLC device refers. (0 to 6)
Size Specify the PLC device size used for reading or writing. (2 or 4 byte)
Type Specify the format to display the PLC device value.
(Signed decimal integer/ unsigned decimal integer/ hexadecimal integer/
real number (float)/real number (double)/character sequence)
Magnification Specify the magnification to the PLC device value to display.
Offset Specify the offset value added to the PLC device value to display.

Display Type/Display Format
Item Description
Number of the maximum
characters (Note)
Specify the maximum number of characters to display. (1 to 256)
Maximum check For the value field, select whether to check for the maximum value limit or
not.
Maximum Specify the maximum value for the maximum value check.
(-2147483648 to 4294967295)
Minimum check For the value field, select whether to check for the minimum value limit or
not.
Minimum Specify the minimum value for the minimum value check.
(-2147483648 to 4294967295)
Comma For the value field, select whether to display commas or not.
The number of integer part
digits
Specify the number of digits in integer part of the value. (0 to 12)
The number of decimal part
digits
Specify the number of digits in decimal part of the value. (0 to 12)
Zero suppress Select whether or not to display 0s in the blank digits when the value does
not have as many digits as specified.
(Note) For the property "Number of the maximum characters", set the value which satisfies the
following relational expression.
"Maximum number of characters"
"Number of digits in integer part" + "Number of digits in decimal part" + 2
("+ 2" is for decimal point and minus sign (-).)
Password
Item Description
Password setup Select "Yes" to display entered characters with asterisks (*).
Character Attribute
Item Description
Effect at the time of focus To display the cursor in the text box where the focus is located, select
"With cursor". To display no cursor, select "No effect". To select all
characters, select "Selected".
Callback Function
Item Description
OnChangeString Select "Yes" to add a process to be executed after the caption character

string has been changed.
OnInit Select "Yes" to add a process to be executed after the panel/window is displayed.
OnQuit Select "Yes" to add a process to be executed before the panel/window is hidden.
For the other properties, refer to "7.1 Common Functions of Controls".

7.3.13.3 Complements
Functional Specifications
Reading the Value from the PLC Device
PLC device read function allows the value in the specified PLC device to be read at fixed intervals and displayed in the specified numeral/character sequence form. When the value of PLC device exceeds the maximum number of characters, a blank will be displayed.
10000
Setting value of PLC device Read out
Value: 10000
Character sequence: 0x3031,0x3030,0x0030
When the property Display type is character sequence
Character codes are acquired from a specified PLC device and converted to characters. The number of PLC devices corresponding to the length of the character sequence are read, and the converted characters are connected to be displayed in a text box. When a character code read from the PLC device is not supported, the characters until immediately before the unsupported code are converted and displayed. The characters of the unsupported character code and after are not read.
In the following example, the maximum number of characters is 9, and R1000 to R1004 are the targets to be read.
(*) A line feed code is not supported.
Writing the Value into the PLC Device
PLC device write function allows the value to be written into the PLC device at the time the value has been input and confirmed. The value is "confirmed" when the user presses the ENTER key while inputting the value/character sequence and then the value/character sequence is recognized to be within the setting range of "Type".
10000
Written Setting value of PLC device
Value: 10000
Character sequence: 0x3031,0x3030,0x0030
Device Value Character
R1000 0x3231 21
R1001 0x3433 43
R1002 0x4122 A"
R1003 0x4342 CB
R1004 0x0022 \0"
R1005 ----- -----
1234"ABC"

When the property Display type is character sequence
A character sequence is converted to character code before writing the first character to the lower-side of a PLC device, and the second character to the upper-side of a PLC device. All the input characters are converted and written in consecutive PLC devices.
The following shows the relationship between the length of the character sequence and the maximum number of characters.
"Length of character sequence" > "Maximum number of characters":
The characters up to the maximum number of characters are written, and the characters after are not written.
"Length of character sequence" < "Maximum number of characters":
The characters from the first to the last are written, and a null character (\0) is written at the end.
"Length of character sequence" = "Maximum number of characters":
The characters from the first to the last are written, and a null character (\0) is not written at the end.
When inputting '1234"ABC"', the characters are written into the PLC device as shown below.
Inputting the Setting Value to be Written into the PLC Device
The followings are the operations required to write the setting value into the PLC device.
(1) Inputting the value
The operation is as same as that of the usual text box control: display the character strings by inputting with keys when the focus is located. Any change of the PLC value does not change the display on the PLC text box control while the value is being input.
(2) Confirming the value
Pressing the ENTER key writes the value into the PLC device. Pressing the ENTER key does not move the focus. The focus is still located at the control.
1234"ABC"

Display format
Set the display by specifying the type, size, the number of integer part digits, the number of decimal part digits, magnification, offset and comma.
(1) Type
Type Display range
Signed decimal integer 2 byte: -32768 to 32767 4 byte: -2147483648 to 2147483647
Unsigned decimal integer 2 byte: 0 to 65535 4 byte: 0 to 4294957296
Hexadecimal integer 2 byte: 0 to FFFF 4 byte: 0 to FFFFFFFF
Real number (float) Valid digit number 7 digits: 3.4E-38 to 3.4E+38
Real number (double) Valid digit number 15 digits: 1.7E-308 to 1.7E+308
Character sequence Up to 256 characters

[Supported characters]
- Numbers: 0123456789
- Lower-case alphabetic characters: abcdefghijklmnopqrstuvwxyz
- Upper-case alphabetic characters: ABCDEFGHIJKLMNOPQRSTUV
WXYZ
- Symbols !"#$%&'()*+,-./:;<=>?@[\]^_`{|}~
(*) When a character sequence contains an unsupported character, the
characters until immediately before the unsupported code are displayed.
(2) Size
Select 2 or 4 byte for the PLC device size used for reading and writing. When the "actual number" is set for the display type, the device size is fixed to 4 byte.
When "Character sequence" is set for "Format", this setting is disabled.
(3) The number of integer part digits
Specify the minimum number of digits displayed in integer part. If the value in integer part has the smaller number of digits than the minimum, spaces are output to the blank digits. Spaces are not output if the value in integer part has the larger number of digits than the minimum.
When "Character sequence" is set for "Format", this setting is disabled.
Display example)
1 digit for integer part 5 digits for integer part 5 digits for integer part
0 0
Spaces in 4 digits
1234567

(4) The number of decimal part digits
Specify the number of digits in decimal part to be displayed when the "actual number" is set for the display type. .If the decimal part of the value has the smaller number of digits than specified, "0"s are output to the blank digits. The digit behind the specified digits in decimal part is rounded off to the nearest value.
When "Character sequence" is set for "Format", this setting is disabled.
Display example) Displaying "23.45" in actual number
0 digit behind decimal 1 digit behind decimal 3 digits behind decimal
23 23.5 23.450
The value is rounded off as follows.
Positive value
0<X<0.5 -> Round-down (to 0)
0.5X<1 -> Round-up (to 1)
Negative value
0>X>-0.5 -> Round-down (to 0)
-0.5X>-1 -> Round-up (to -1)
(5) Magnification
Specify the magnification to the value, which is read from the PLC device, to display. The specified magnification becomes the divisor for the value, after reduced by the offset amount, to be written into the device. The magnification is available for all types. However, if the value after the magnification exceeds the available number of digits, the display will not be exact.
When "Character sequence" is set for "Format", this setting is disabled.
(6) Offset
Specify the offset value to add to the value, which is read from the PLC device, to display. The magnification, when specified, is carried out to the PLC device value before the offset value is added to. When written into the device, the input value is reduced by the offset value. The offset adjustment is available for all types. However, if the value exceeds the available number of digits after the offset adjustment, the display will not be exact.
When "Character sequence" is set for "Format", this setting is disabled.
(7) Comma
Setting the display with commas is available if the type is set to "decimal integer". A comma is inserted after every three digits, if "comma" is set to the display.
When "Character sequence" is set for "Format", this setting is disabled.

(8) Zero suppress
Zero suppress is used to display "0"s in the blank digits of integer part when the value does not have as many digits as specified. Setting "Yes" outputs spaces to the blank digits in integer part when the value to be displayed does not have as many digits as specified. Setting "No" outputs "0"s to the blank digits of integer part. However, the output which exceeds the maximum number of characters is not performed.
When "Character sequence" is set for "Format", this setting is disabled.
Display example) Display the value "1" in integer part with 5 digits
Zero suppress is set Zero suppress is not set
1 00001
Spaces in 4 digits "0"s in 4 digits
(Note 1) When the focus is not located, the number of characters to display is adjusted by the setting of "comma" or "zero suppress".
(Note 2) Commas are not included in the number of characters to display. However, when "Character sequence" is set for "Format", this setting is disabled.
Magnification and Offset
The followings are the process of the magnification and offset adjustment when the value is read and written.
(1) Process to read
The PLC device value, when read, is displayed after the following process:
1) Magnification
2) Offset adjustment
However, round off to the integer value if the setting type is other numbers than the real number and the displayed number is not integer.
(2) Process to write
The input value (123.4567) is written into the device after the following process:
1) Offset adjustment (When offset is 100, the value to be written is 23.4567)
2) Magnification (When magnification is 0.001, the value to be written is 23457)
If the value to be written into is not integer, the digit after the decimal point is rounded off.

(Note) Even when the type is double, the value is written to a PLC device as signed long. To display numbers after a decimal point, set a magnification.
When an input value is 123.4567 and magnification is 0.0001, PLC device value will be 1234567, and 123.4567 will be displayed.
When an input value is 123.4567 and magnification is 0.1, PLC device value will be 1235, and 123.5 will be displayed.

Restrictions
(1) To change the size with GCSNCPLCTextboxSetTextSize(), set the PLC device with GCSNCPLCTextboxSetDevice().
<Interpreter method>
LONG Stat;
GCSNCPLCTextboxSetTextSize(10, "GNCPLCTextBox00000", 2); 'Changes the size to 2 bytes.
Real number (float) Stat = GCSNCPLCTextboxSetDevice(10, "GNCPLCTextBox00000", "X0");
'Sets the PLC device. The current device can be set.
<Compilation method>
short nRet;
GbaseObject *pPanel;
GbaseObject *pChild;
pPanel = GetGBaseObject();
pChild = GCSGetChild(pPanel, GNCPLCTEXTBOX00000);
GCSNCPLCTextboxSetTextSize(pChild, 2); //Changes the size to 2 bytes.
nRet = GCSNCPLCTextboxSetDevice(pChild, 'X0'); //Sets the PLC device. The current device can be also set.
(2) When the focus is on a PLC text box, the displayed character sequence is not updated because an input operation is being performed. When the focus is not on the PLC text box, the value read from a PLC device is converted to a character sequence and displayed.
(3) A value within the range that can be entered may not exist due to the magnification, minimum value, or maximum value settings. In that case, when a value outside the range is entered and focus is removed, the entered value that is outside the range will be displayed even when the value of a PLC device is within the range.
(4) When setting an input range with "real number (float)" or "real number (double)", set a value for boundaries (minimum value, maximum value) that allows for the errors in the floating point of float type or double type.

7.3.14 NC Data Textbox (GNCDataTextBox)
The NC data text box is a text box part that enables reading and writing from and to the NC's internal data.
7.3.14.1 Property Setup Dialog
Property setup dialog of NC data text box control consists of the tabs relating to [Basic Settings] and [Advanced Settings]. Details of each tab will be described in the following sections.
[Basic Settings] consists of three tabs.
No. Tab Description
(1) Device Set or display the device, display format, and preview.
(2) Style Set or display the background color, solid frame, and preview.
(3) Text Set or display the font, text, and preview.
[Advanced Settings] consists of one tab.
No. Tab Description
(4) Extended Set the item relating to the extended condition for the style.
(1)
(2)
(3)
(4)

7.3.14.1.1 [Device] Tab
In [Device] tab, specify the display format and the number of digits of the NC data to read/write.
No. Item Description
(1) NC Data Set the section No./sub-section No. of the NC data to read/write.
(*) Supported by input assist function.
(2) Description Displays the description of the section/sub-section specified in NC Data field.
If NC data is not registered in input assist function, the description is displayed as a blank.
(3) Part System Number Specify the No. of the part system to which the NC data to read/write belongs.
(4) Axis Number Specify the No. of the axis to which the NC data to read/write belongs.
(5) Display Format Specify the type of the NC data to read/write.
(Character sequence/Binary integer/Signed decimal integer/ Unsigned decimal integer/Hexadecimal integer/Real number (double))
(6) Size Specify the size of the NC data to read/write.
* When "Character sequence" or "Real number (double)" is specified in "Display Format", this is invalid.
(7) Digits (Integral) Specify the number of digits in integer part of the value.
(8) Fill with 0 Check here to display 0s in the blank digits when the value does not have as many digits as specified.
(9) Display comma Check here to display the value with commas.
A comma is inserted after every three digits, if "comma" is set to the display.

(10) Digits (Fractional) Specify the number of digits in decimal part of the value.
* When other than Real number (double) is specified in "Display
Format", this item is disabled.
(11) Change to exponential
notation
Select whether or not to display exponential notation.
* When other than Real number (double) is specified in "Display
Format", this item is disabled.
(12) Magnification Specify the magnification to the NC data value to display.
(0.000001 to 10000000.000000)
(2)
(1)
(10)
(12)
(13)
(14)
(7)
(3)
(5)
(6)
(4)
(8)
(17)
(16)
(9)
(11)
(15)

No. Item Description
(13) Offset Specify the offset value added to the NC data value to display.
(- 2147483648 to 2147483647)
(14) Max. number of characters Specify the maximum number of characters to display. (1 to 256)
(15) Input possible Select whether one-byte numbers, lower case letters, upper case
letters, one-byte symbols, or two-byte characters are allowed or
not.
Check here to allow the entry.
(16) Sample Value Specify the value to be displayed on the preview.
(17) Preview Preview the value specified in combination with the property
"Display Format", "Digits (Integral)", "Digits (Fractional)", "Comma",
"Zero suppress", "Magnification", and "Offset".
(Note) When "Section Number" is 0, the value cannot be
previewed. Specify the value other than 0 for "Section Number".

7.3.14.1.2 [Style] Tab
In [Style] tab, specify the background color and solid frame.
For each item, refer to "7.1.16.1.1 [Style] Tab".

7.3.14.1.3 [Text] Tab
In [Text] tab, specify the font and text.
No. Item Description
(1) Effect at the time of focus Select the effect at the time of focus among "No effect", "With
cursor" or "Selected".
To display the cursor in the text box where the focus is located,
select "With cursor". To display no cursor, select "No effect". To
select all characters, select "Selected".
For the items other than the above, refer to "7.1.16.1.2 [Text] Tab".
(1)

7.3.14.1.4 [Extended] Tab
In [Extended] tab, set whether to provide the background color at the time of focus and disable, and set the display
refresh.
No. Item Description
(1) Set background color at the
time of focus
Check here to specify the background color at the time of focus on
[Style] tab.
(2) Set background color at the
time of disable
Check here to specify the background color at the time of disable
on [Style] tab.
(3) Refresh Cycle Specify how many cycles the screen display is refreshed once.
When 0 is set, the display is not refreshed.
(4) Refresh Timing Specify in what number cycle, among those set in Refresh Cycle,
the screen display is refreshed.
(1)
(2)
(3)
(4)

7.3.14.2 Property Settings

The property settings for the NC data text box are divided into the followings.

Control name : Specify the control name.

Position/size : Specify the position and the size of the control.

Show/Hide : Specify whether the control is displayed or hidden.

Input permission : Select whether the entry is accepted (permission) or rejected (prohibition).

Part system number : Specify the No. of part system.

Ground : Specify the foreground and background.

Color/pattern : Specify the color and pattern of the control.

NC data : Specify the target NC data.

Display type/
display format
: Specify the format of the character string displayed on the control.

Update : Specify the refresh frequency of the NC data display.

Character attribute : Specify the character attribute of captions.

Solid frame : Specify the solid frame of the control.

Callback function : Specify whether or not the callback functions are provided.

Part system number

Item Description

Part system number Specify the No. of the part system to which the NC data to read/write
belongs (1 to 10).

Ground

Item Description

Ground Specify the foreground and background (Usually set to "0").

Color/Pattern

Item Description

Use of background color Select if the background color is provided or not. If "No" is selected, the
background is transparent.

Background color Specify the background color.

Background color at the time
of focus
Specify the background color when the focus is located.

Background color at the time
of disable
Specify the background color when the entry is disabled.

NC Data

Item Description

Axis number Specify the No. of the axis to which the NC data to read/write belongs (0 to
32).

AxisCross Specify the basic part system (0) and the current part system during cross
control (1) of the NC data to be read or written.

Number of Section Set the section No. of the NC data to be read or write (0 to 999).

Number of Sub-section Set the sub-section No. of the NC data to be read or write (0 to
1000000000).

Data Type Specify the type of the NC data to read/write.
(Character sequence, double, signed char, signed short, signed long)

Type Specify the format to display the NC data value (Character sequence,
binary integer, signed decimal integer, unsigned decimal integer,
hexadecimal integer, real number(double)).

Magnification Specify the magnification to the NC data value to display.

Offset Specify the offset value to be added to the NC data value to display.

Display Type/Display Format

Item Description

Number of the maximum
characters
Specify the maximum number of characters to display. (1 to 256)

Comma For the value field, select whether to display commas or not.

Half-size number For entry in the text box, select whether one-byte numbers are allowed or
not.

Half-size English small letter For entry in the text box, select whether one-byte lower case letters are
allowed or not.

Half-size English capital letter For entry in the text box, select whether one-byte upper case letters are
allowed or not.

Half-size sign For entry in the text box, select whether one-byte symbols are allowed or
not.

The number of integer part
digits
Specify the number of digits in integer part of the value, when the NC data
is the real number type or decimal integer type (1 to 12).

The number of decimal part
digits
Specify the number of digits in decimal part of the value, when the NC
data is the real number type (1 to 10).

Exponential notation Select whether or not to display exponential notation, when the NC data is
the real number type.

Zero suppress Select whether or not to display 0s in the blank digits when the value
does not have as many digits as specified.

Update

Item Description

RefreshFrequency Specify the number of times to thin out the timer event processes (0 to
100).
When set to "0", the display is not updated at the timer event.

RefreshTiming The display is refreshed when the counted number of "RefreshFrequency"
reaches the number of counts specified with "RefreshTiming" (0 to 99).

Character Attribute
Item Description
Effect at the time of focus To display the cursor in the text box where the focus is located, select "With cursor". To display no cursor, select "No effect". To select all characters, select "Selected".

Callback Function
Item Description
OnChangeString Select "Yes" to add a process to be executed after the caption character string has been changed.
OnInit Select "Yes" to add a process to be executed after the panel/window is displayed.
OnQuit Select "Yes" to add a process to be executed before the panel/window is hidden.
For the other properties, refer to "7.1 Common Functions of Controls".

7.3.14.3 Complements
Functional Specifications
Reading the Value from NC
NC data read function allows the value in the NC data to be read at fixed intervals and displayed in the specified format.
Read out
The value set in the
internal data of NC
10000
Writing the Value to NC
NC data write function allows the value to be written to the NC at the time the value has been input and confirmed. The value is "confirmed" when the user presses the ENTER key while inputting the value and then the value is recognized to be within the setting range of "Type".
Written
The setting value of
the NC's internal data
10000
Inputting the Setting Value to be Written to NC
The followings are the operations required to write the setting value to the NC.
(1) Inputting the value
The operation is the same as of the usual text box control: display the character strings by inputting with keys when the focus is located. Any change of the NC's internal data value does not change the display on the NC data text box control while the value is being input.
(2) Confirming the value
Pressing the ENTER key writes the value into the NC. Pressing the ENTER key does not move the focus. The focus is still located at the control.

Display Format
Set the display format by specifying the type, data type, the number of integer part digits, the number of decimal part digits, magnification, offset, exponential notation, comma and zero suppress.
(1) Type and data type
The display format is determined as shown below according to the combination of the type and data type. Note that if the character sequence type is selected for the data type, the NC is notified of the number of characters (the maximum number of characters + the number of NULL characters). If the value read from the NC has a larger number of characters than the maximum, it is left blank.
Data type
Type Signed
char
Signed
short
Signed long Double Character
sequence
Binary
integer
0 or 1
(8bit)
0 or 1
(16bit)
0 or 1
(32bit)
Hexadecimal
integer
00 to FF 0000 to
FFFF
00000000 to
FFFFFFFF
Unsigned
decimal
integer
0 to 255 0 to 65535 0 to 4294967295 Same as on the left
Signed
decimal
integer
-128 to

127
-32768 to
32767
-2147483648 to
2147483647
Same as on the left
Real number
(double)
-128.0 to
127.0
-32768.0 to
32767.0
-2147483648.0 to
2147483647.0
-999999999999.9999999999 to
999999999999.9999999999
(At the exponential notation, the
minimum setting unit is 99 digits
after the decimal point
(1.0E-099).)
-999999999.0 to
999999999.0
(The minimum
setting unit is 99
digits after the
decimal point
(1.0E-099).)
Character
sequence
Character
sequence
* To display in the same format as MITSUBISHI standard screen (the standard screen, hereafter), select the "Character sequence" type for Data type, and "Character sequence" for Type.
* Select "Real number(double)" for Type to input an exponential notation value.

(2) Number of integer part digits/number of decimal part digits
When the type is real number, a real number is displayed with the specified number of integer part digits and the specified number of decimal part digits. When "Yes" is set for the exponential notation, the exponential notation display is enabled.
When "No" is selected, the value after the specified number of decimal part digits is rounded off. However, if the number of the integer part digits of the value read from the NC exceeds the set number of digits, the data displayed is all "*".
When "Yes" is set for the exponential notation, and when the value read from the NC is smaller than 1 and is exceeding the specified number of decimal part digits, or when the value is exceeding the specified number of integer part digits, exponential notation is carried out. When a value is displayed with exponential notation, the value is displayed by rounding off, depending on the number of decimal part digits.
If the value read from the NC is within the display range, but is exceeding the maximum number of characters, it is left blank.
When a data in the real number type is displayed, what is displayed is as below (Example: common variable).
Data type
Setting value Double
(6.4 digits/no exponential
notation)
Double
(6.4 digits/exponential notation)
Character sequence
type
0.00001 0.0000 1.0000E-05 1.0000E-005
0.00005 0.0000 5.0000E-05 5.0000E-005
0.00015 0.0001 0.0002 0.0002
0.00045 0.0004 0.0004 0.0004
0.00046 0.0004 0.0005 0.0005
0.00054 0.0005 0.0005 0.0005
0.00055 0.0005 0.0006 0.0006
123456.00015 123456.0001 123456.0002 123456.0002
1234567.00000 ********** 1.2346E+06 1.2346E+006
When the type is decimal integer, the number of digits specified with the number of integer part digits is displayed. However, if the value read from the NC exceeds the number of integer part digits, the data displayed is all "*".
(3) Magnification and offset
When the type is decimal integer or real number, "Magnification" and "Offset" can be reflected on the displayed data. When data is read out from the NC, the magnification is applied to the NC's internal data, and then the offset is added.
When data is written to the NC, the value obtained by subtracting the offset value from the entered value and then divided it with the magnification is written to the NC.
If the result, in which the magnification and offset are reflected, is exceeding the available number of digits, it is not possible to display the correct value.
(4) Exponential notation
When the type is real number, exponential notation is carried out by selecting "Yes" for the exponential notation.
When "Yes" is selected for the exponential notation, and when the value read from the NC is smaller than 1 and is exceeding the specified number of decimal part digits, or when the value is exceeding the specified number of integer part digits, exponential notation is carried out. When a value is displayed with exponential notation, the value is displayed by rounding off, depending on

the number of decimal part digits.
When "No" is selected for the exponential notation, the value after the number of decimal part digits is rounded down. Note that if the integer part of the value read from the NC exceeds the number of integer part digits, the data displayed is all "*".

(5) Comma
Setting the display with commas is available if the type is set to "decimal integer". A comma is inserted after every three digits, if "comma" is set to the display.
(6) Zero suppress
Zero suppress is used to display "0"s in the blank digits of integer part when the value does not have as many digits as specified. Setting "Yes" outputs spaces to the blank digits in integer part when the value to be displayed does not have as many digits as specified. Setting "No" outputs "0"s to the blank digits of integer part.
Display example) Display the value "1" in integer part with five digits
Zero suppress is set Zero suppress is not set
1
Spaces in four digits
00001
0s in four digits

7.3.15 PLC extension button (GNCPLCExButton)
PLC extension button is a control part that enables reading and writing from and to the PLC device in NC, and switching the ON/OFF state of a button in accordance with the device condition. This part is equivalent to a PLC button control, but is different from the PLC button in the following points.
"Actuator" has been added to the button types.
"Interlock", "Disable" and "Blink" have been added to PLC devices.
The group designation function has been added.
7.3.15.1 Property Setup Dialog
Property setup dialog of PLC extension button control consists of the tabs relating to [Basic Settings] and [Advanced Settings]. Details of each tab will be described in the following sections.
[Basic Settings] consists of the following tabs.
No. Tab Description
(1) Device Set the button actions.
(2) Style Set or display the background color, solid frame, blink, and preview.
(3) Text Set or display the font, text, scroll, and preview.
[Advanced Settings] consists of the following tabs.
No. Tab Description
(4) Extended Set the items relating to the extended condition for the style or text, blink device setting, group, and detail settings of the device.
(5) Dynamic change property
(Status 1 - 7)
Set or display the settings of status change device, and the style, text, solid frame, and preview of each status.
(1)
(2)
(3)
(4)
(5)

7.3.15.1.1 [Device] Tab
In [Device] tab, specify the device and button action.
No. Item Description
(1) Device1 Specify the address of the PLC device 1 for the read or write operation.
Click on the "..." button to display the "PLC Device Setting" dialog.
(2) Bit position Specify the bit position of the word device when the word device is set to PLC device 1.
(3) PLC project No. Specify the project number of PLC ladder what PLC device 1 refers. (0 to 6)
(4) Action Select the button action from the following.
Lamp
Switch:Momentary1
Switch:Momentary2
Switch:Alternate
Switch:Actuator
(5) Device2 operation Specify the action of device 2.
* The button status which can be set in the [Style] tab or the [Text] tab changes depending on the specified contents.
(6) Device2 Specify the address of the PLC device 2 for the read or write operation.
Click on the "..." button to display the "PLC Device Setting" dialog.
(7) Bit position Specify the bit position of the word device when the word device is set to PLC device 2.
(8) PLC project No. Specify the project No. of PLC ladder what PLC device refers. (0 to 6)
(2)
(1)
(5)
(6)
(3)
(7)
(4)

(8)

NOTE
The address of the PLC device can be specified on the "PLC Device Setting" dialog.
Device2 operation
When "Switch:Alternate" is selected in "Action", select the between "Read from Device2" and "Write to Device2".

Item	Description
Read from Device2	Switch the characters to display in accordance with the state of the device 2. For the other designs, switch in accordance with the exclusive OR of the device 1 and the device 2.
Write to Device2	The device 2 can be specified. Write the bit-reversal value of the device 1 to the device 2.

Switch the style or text in accordance with the state of device 1.

When "Lamp", "Switch:Momentary1", "Switch:Momentary2" or "Switch:Actuator" is selected in "Action", select between "Do not use the device2" and "To use the device2".

Item	Description
Do not use the device2	Switch the button status (ON or OFF) based on the setting of device 1.
To use the device2	The device 2 can be specified. Change the button status based on the combination with the setting of device 1. (Note) For device 2, specify the device different from the one specified in the button action.

(1) When "Lamp" is selected in "Action"
Switch the style or text in accordance with the state of device 1. The solid frame is switched in accordance with the state of device 2.
(2) When "Switch:Momentary1" is selected in "Action"
Switch the style or text in accordance with the state of device 2.
(3) When "Switch:Momentary2" or "Switch:Actuator" is selected in "Action"
Switch the style or text in accordance with the state of device 2. The solid frame is switched in accordance with the state of device 1.

7.3.15.1.2 [Style] Tab
In [Style] tab, specify the style, solid frame, and blink.

No.	Item	Description
(1)	Display type	Select the display type among "Square", "Circle", and "Image". For the items other than the above, refer to "7.1.16.1.1 [Style] Tab".

(1)

7.3.15.1.3 [Text] Tab
In [Text] tab, specify the font, text, and scroll setting.

No.	Item	Description
(1)	OFF=ON	When [OFF=ON] is checked, the contents specified in [Text] are specified to all statuses. When [OFF=ON] is not checked, only the [Text] of the status selected in [Control state preview] is specified.
(2)	Text	Specify the display character string. (Note)

(Note) When specifying "To set the style / character of when the button is selected" of "7.3.15.1.4 [Extended] Tab", this is disabled. When specifying "Control ON/OFF of button", this is disabled also.
For the items other than the above, refer to "7.1.16.1.2 [Text] Tab".

(2)
(1)

7.3.15.1.4 [Extended] Tab
In [Extended] tab, set whether to set the style or character when the button is selected, controlling ON/OFF of button, and the interlock device, etc.

No.	Item	Description
(1)	To set the style / character of when the button is selected	When this is checked, the pattern, foreground color, background color, and design for when the button is selected (Focus) can be specified on the [Style] tab and [Text] tab.
(2)	Control ON/OFF of button	When this is checked, the pattern, foreground color, background color, and design for when the button does not work (Disable) can be specified on the [Style] tab and [Text] tab.
(3)	Device (at the time of disable)	Specify the address of the PLC device for disabling the button action. Click on the "..." button to display the "PLC Device Setting" dialog.
(4)	Bit position (at the time of	

disable)
Specify the bit position of the word device when the word device is
set to PLC device (at the time of disable).
(5) PLC project No.
(at the time of disable)
Specify the project number of PLC ladder what PLC device (at the
time of disable) refers.
(6) Control interlock (Device1) Check here to specify the operation and the device of the interlock
device 1.
(7) Action of interlock device1 Select the operation of interlock device 1 between "ON" and "OFF".
(8) Device (interlock 1) Specify the address of the PLC device for the interlock operation.
Click on the "..." button to display the "PLC Device Setting" dialog.
(9) Bit position (interlock 1) Specify the bit position of the word device when the word device is
set to PLC device (interlock 1).
(10) PLC project No.
(interlock 1)
Specify the project number of PLC ladder what PLC device
(interlock 1) refers.
(11) Control interlock (Device2) Check here to specify the operation and the device of the interlock
device 2.
(12) Action of interlock device2 Select the operation of interlock device 2 between "ON" and "OFF".
(13) Device (interlock 2) Specify the address of the PLC device for the interlock operation.
Click on the "..." button to display the "PLC Device Setting" dialog.
(1)
(6)
(16)
(20)
(2)
(3)
(7)
(8)
(17)
(21)
(22)
(5)
(11)
(12)
(13)
(4)
(10)
(9)
(15)
(14)
(23)
(19)
(18)

No. Item Description
(14) Bit position (interlock 2) Specify the bit position of the word device when the word device is
set to PLC device (interlock 2).
(15) PLC project No.
(interlock 2)
Specify the project number of PLC ladder what PLC device
(interlock 2) refers.
(16) Control ON/OFF of blink
device
Check here to specify the device for controlling the blink display.
(17) Device (blink) Specify the address of the PLC device for controlling the blink
display.
Click on the "..." button to display the "PLC Device Setting" dialog.
(18) Bit position (blink) Specify the bit position of the word device when the word device is
set to PLC device (blink).
(19) PLC project No. (blink) Specify the project number of PLC ladder what PLC device (blink)
refers.
(20) Group No. Specify the group number to which the PLC extension button
belongs.
Only one PLC extension button among those belonging to the
same group number is allowed to be active on a screen.
When specifying "0", this is disabled.
When specifying "Lamp", "Switch:Momentary1", or
"Switch:Momentary2" for the action setting in the [Device] tab, this
is disabled either.
(21) Write device OFF at screen
switch
Select whether to write OFF(0) of the target PLC device at screen
switching between "Yes" and "No".
When specifying "Switch:Alternate" or "Switch:Actuator" for the
action setting in the [Device] tab, this is enabled.
(22) Automatic OFF time Specify this time to automatically turn OFF the PLC device to be
written after the specified time has passed since the button has
been pressed.
When specifying "0", this is disabled.
(23) Delay ON time Specify this time to turn ON (1) the PLC device for the writing
operation by keeping pressing the button.
When specifying "0", this is disabled.

7.3.15.1.5 [Dynamic change property (Status 1 - 7)] Tab
In [Dynamic change property (Status 1 - 7)] tab, set the settings of status change device, and the style, text, solid frame of each status.
No. Item Description
(1) Dynamic change property Specify whether to enable dynamic change property function.
When "ON" is selected,"(2) Device" to "(16) Solid frame" can be set.
(2) Device Specify the address of the PLC device that controls status change.
Click the "" button to open the "PLC Device Setting" dialog box.
(3) PLC project No. In the multi-project function, specify the PLC ladder project No. to which the status change device refers.
(4) Status No. Specify the number of the status to dynamically switch to. (1 to 7)
When switching the status No., the properties of [(5) OFF=ON] to [(16) Solid frame] of each status can be set or displayed.
(Note) When a bit device is set to status change device, the status No. is fixed to 1.
(5) OFF=ON When [OFF=ON] is checked, the contents specified in [Text] for OFF are specified to all statuses (ON and Focus). When [OFF=ON] is not checked, only the [Text] of the status selected in [Control status preview] is specified.
(6) Control status preview Displays the status (OFF/ON/Focus) of the control for [(4) Status No.].
Select the status (OFF/ON/Focus) of the control that edits style/text/solid frame.
(7) Set the style/text to be applied when the focus is on the button
When checked, the pattern/foreground color/background color/design/text color when the button is selected (Focus) can be set.
(8) Button type Select the button type from "Momentary (Type 1)"/"Momentary (Type 2)"/"Alternate"/"Actuator"/"None".
(1)
(6)
(2)
(4) (5)
(8)
(7)
(10)
(9)
(13)
(12)
(3)
(11)
(15)
(16)
(14)

No. Item Description
(9) Pattern Select the painting out pattern from "Background painting out"/"Foreground painting out"/"Pattern 0" to "Pattern 37"/"With no painting out".
(10) Foreground color Specify the foreground color of the status selected in "(6) Control status preview".
(11) Background color Specify the background color of the status selected in "(6) Control status preview".
(12) Design Specify the design of the status selected in "(6) Control status preview".
(13) Text color Specify the text color of the status selected in "(6) Control status preview".
(14) Text Specify the text of the status selected in "(6) Control status preview".
(Note) Disabled when Focus is selected.
(15) Use of solid frame Specify the use of solid frame of the status selected in "(6) Control status preview".
(Note) Disabled when Focus is selected.
(16) Solid frame Specify the solid frame of the status selected in "(6) Control status preview".
(Note) Disabled when Focus is selected.

7.3.15.2 Property Settings
The property settings for the PLC extension button are divided into the followings.
Control name : Specify the control name.
Position/size : Specify the position and the size of the control.
Show/Hide : Specify whether the control is displayed or hidden.
Input permission : Select whether the entry is accepted (permission) or rejected (prohibition).
Ground : Specify the foreground and background.
Button type : Select the button action.
Display type : Select the display type of the button.
PLC device : Specify the target PLC device.
Color/pattern : Specify the color and pattern of the control.
Image : Specify the image of the control.

Caption : Specify the caption (character string) displayed on the control.
Character attribute : Specify the character attribute of captions.
Solid frame : Specify the solid frame of the control.
Caption character
string scroll
: Specify the scroll of the caption character string.
Blink : Set the blink of the caption character string.
Group : Specify the group number.
Dynamic change property : Specify the property values which can be switched to depending on whether the dynamic change property function is ON/OFF, the status change device,
and the reading values of the status change device.
Status 0 is specified in a category other than [Dynamic change property].
Callback function : Specify whether or not the callback functions are provided.

Ground
Item Description
Ground Specify the foreground (0) and background (1) (Usually set to "0").
Button Type
Item Description
Button type Select the button action among the following three types.
Momentary (Type 1) The button turns ON when it is pressed. It turns OFF when it is released.
Momentary (Type 2) The display action is different between Type 1 and Type 2.
Alternate The button alternates ON and OFF each time it is pressed.
Actuator The display action is different between Alternate and Actuator.
None (Lamp) The button does not turn ON or OFF even if it is pressed.
Display Type
Item Description
Display type Select the button type among the following three types.
Square Rectangular button.
The button is indicated in the designated color and pattern.
Circle Round button.
The button is indicated in the designated color and pattern.
Image The button is indicated with the designated image resource.

PLC Device
Item Description
PLC device 1 Specify the address of the PLC device for the read or write operation.
Action of PLC device 1 Specify the operation to the PLC device specified in "PLC device 1"
(Read, Write or None).
Bit position of PLC device 1 Specify the bit position when the word device is set to PLC device 1 (0 to 15).
PLC device 1 project No. Specify the project No. of PLC ladder what PLC device 1 refers. (0 to 6)
PLC device 2 Specify the address of the PLC device for the read or write operation.
Action of PLC device 2 Specify the operation to the PLC device specified in "PLC device 2"
(Read, Write or None).
Bit position of PLC device 2 Specify the bit position when the word device is set to PLC device 2 (0 to 15).
PLC device 2 project No. Specify the project No. of PLC ladder what PLC device 2 refers. (0 to 6)
Disable function Specify whether to enable the function that controls the entry using a PLC
device.
When "Permission" is selected for Input permission, this setting is
enabled.
Disable device Specify the address of the PLC device for disabling the entry.
This setting is enabled when the disable function is valid.
Bit position of disable device Specify the bit position of the word device when the word device is set to Disable device (0 to 15).
This setting is enabled when the disable function is valid.
Disable device project No. Specify the project No. of PLC ladder what the disable device refers. (0 to 6)
Blink device Specify the address of the PLC bit/word device for controlling the blink
display.
Bit position of blink device Specify the bit position of the word device when the word device is set to Blink device (0 to 15).
Blink device project No. Specify the project No. of PLC ladder what the blink device refers. (0 to 6)
Interlock device 1 Specify the address of the PLC device for the interlock operation.
Action of interlock device 1 Specify the type of Interlock 1 (At the time of ON / At the time of OFF/No).
Bit position of interlock device
1
Specify the bit position of the word device when the word device is set to
Interlock device 1 (0 to 15).
Interlock device 1 project No. Specify the project No. of PLC ladder what the interlock device 1 refers. (0 to 6)
Interlock device 2 Specify the address of the PLC device for the interlock operation.
Action of interlock device 2 Specify the type of Interlock 2 (At the time of ON / At the time of OFF/No).
Bit position of interlock device
2
Specify the bit position of the word device when the word device is set to
Interlock device 2 (0 to 15).
Interlock device 2 project No. Specify the project No. of PLC ladder what the interlock device 2 refers. (0 to 6)
PLC device OFF Select whether to write OFF(0) of the target PLC device at screen
switching between "Yes" and "No".
This setting is enabled when "Alternate" or "Actuator" is selected for the
button type.

Automatic OFF time*1 Specify this time to automatically turn OFF the PLC device to be written after the specified time has passed since the button has been pressed (0 to 3600 seconds. 0 is invalid).
Delay ON time Specify this time to turn ON (1) the PLC device for the writing operation by keeping pressing the button (0 to 60 seconds. 0 is invalid).
*1: If the button is kept pressed, the device is automatically turned OFF after the specified time has passed since the button has been pressed.

Color/Pattern
Item Description
Pattern at the time of ON*1 Specify the pattern of the ON button.
Foreground color at the time of ON*1 Specify the foreground color of the ON button.
Background color at the time of ON1 Specify the background color of the ON button.
Design at the time of ON*2 Specify the image of the ON button.
Pattern at the time of OFF*1 Specify the pattern of the OFF button.
Foreground at the time of OFF*1 Specify the foreground color of the OFF button.
Background at the time of OFF*1 Specify the background color of the OFF button.
Design at the time of OFF*2 Specify the image of the OFF button.
Pattern at the time of interlock*1 Specify the pattern in the interlock state.
Foreground color at the time of interlock*1 Specify the foreground color of the button in the interlock state.
Background color at the time of interlock*1 Specify the background color of the button in the interlock state.
Design at the time of interlock*2 Specify the image to display in the interlock state.
*1: This setting is valid if [Display Type] is "Square" or "Circle".
*2: The setting is valid if the [Display Type] is "Image".
Image
Item Description
Effect at the time of focus Specify whether the color of the button when the focus is located changes or not. Select between "change color" and "no change".
Pattern at the time of focus*1 Specify the pattern of the button when the focus is located.
Foreground color at the time of focus*1 Specify the foreground color of the button when the focus is located.
Background color at the time of focus*1 Specify the background color of the button when the focus is located.
Design at the time of focus*2 Specify the image of the button when the focus is located.
Pattern at the time of disable*1 Specify the pattern of the button when the entry is disabled.
Foreground color at the time of disable*1 Specify the foreground color of the button when the entry is disabled.
Background color at the time of disable*1 Specify the background color of the button when the entry is disabled.
Design at the time of disable*2 Specify the image of the button when the entry is disabled.
*1: This setting is valid if [Display Type] is "Square" or "Circle".
*2: The setting is valid if the [Display Type] is "Image".
Caption
Item Description
Character string at the time of ON Specify the character string to be displayed at the time of ON.
The setting is valid if "provided" is selected for the caption existence.
Character string at the time of OFF Specify the character string to be displayed at the time of OFF.
The setting is valid if "provided" is selected for the caption existence.
Character string at the time of interlock Specify the character string to be displayed in the interlock state.
The setting is valid if "provided" is selected for the caption existence.

Character Attribute
Item Description
Character color at the time of ON Specify the character color to be displayed at the time of ON.
Character color at the time of OFF

Specify the character color to be displayed at the time of OFF.
Character color at the time of
interlock
Specify the character color to be displayed in the interlock state.
Character color at the time of
Focus
Specify the character color to be displayed at the time of Focus.
These settings are valid if the [caption] is "provided".
Solid frame
Item Description
Use of solid frame at the time
of ON
Select the presence of the solid frame to be displayed at the time of ON
between "Yes" and "No".
Solid frame at the time of ON Select the ID of the solid frame resource to be displayed at the time of ON.
Use of solid frame at the time
of OFF
Select the presence of the solid frame to be displayed at the time of OFF
between "Yes" and "No".
Solid frame at the time of OFF Select the ID of the solid frame resource to be displayed at the time of
OFF.
Use of solid frame at the time
of interlock
Select the presence of the solid frame to be displayed at the time of
interlock between "Yes" and "No".
Solid frame at the time of
interlock
Select the ID of the solid frame resource to be displayed at the time of
interlock.
Use of solid frame at the time
of disable
Select the presence of the solid frame to be displayed at the time of
disable between "Yes" and "No".
Solid frame at the time of
disable
Select the ID of the solid frame resource to be displayed at the time of
disable.
Blink
Blink the caption character string of the control.
Item Description
Blink Select the existence of blink from "Yes", "No" or "Blink device".
Group
Item Description
Group No. Specify the group number to which the PLC extension button belongs (0
to 100. 0 is invalid).
Only one PLC extension button among those belonging to the same group
number is allowed to be active on a screen.

Dynamic change property
Dynamically switches properties (show/hide, style/text/solid frame for ON/OFF/Focus) depending
on the values obtained from devices.
Switching between eight statuses is possible in dynamic change property. Switch to statuses 1 to 7
in the value of dynamic change property (Status 1 - 7). However, switch to status 0 in the value
specified by a category other than [Dynamic change property].
Settings of status change device
Item Description
ON/OFF Select ON/OFF for dynamic change property function.
PLC device*1 Set the address of the PLC device for status change.
PLC device project No. In the multi-project function, specify the PLC ladder project No. which
refers to the PLC device.
*1: Bit devices and word devices can be set to the PLC device.
Dynamic change property (Status 1 - 7)
Item Description
Show/Hide Select whether the control is shown or hidden.
When hidden, the dynamic change property function is disabled. In this
case, a macro must be used to change the shown/hidden properties.
Button type Select the button action among the following five types.
Momentary (Type 1) The button turns ON when it is pressed. It turns OFF when it is released.
Momentary (Type 2) The display action is different between Type 1 and Type 2.
Alternate The button alternates ON and OFF each time it is pressed.
Actuator The display action is different between Alternate and Actuator.
None (Lamp) The button does not turn ON or OFF even if it is pressed.
Pattern at the time of ON*1 Specify the pattern of the ON button.
Foreground color at the time of
ON*1
Specify the foreground color of the ON button.
Background color at the time
of ON*1
Specify the background color of the ON button.
Design at the time of ON*2 Specify the image of the ON button.
Character sequence at the
time of ON
Specify the character string of the ON button.
The setting is valid if "Yes" is selected for the caption existence.
Character color at the time of
ON

Specify the character color to be displayed at the time of ON.
Use of solid frame at the time
of ON
Select the presence of the solid frame to be displayed at the time of ON
between "Yes" and "No".
Solid frame at the time of ON Select the ID of the solid frame resource to be displayed at the time of ON.
Pattern at the time of OFF*1 Specify the pattern of the OFF button.
Foreground color at the time of
OFF*1
Specify the foreground color of the OFF button.
Background color at the time
of OFF*1
Specify the background color of the OFF button.
Design at the time of OFF*2 Specify the image of the OFF button.
Character sequence at the
time of OFF
Specify the character string to be displayed at the time of OFF.
The setting is valid if "Yes" is selected for the caption existence.
Character color at the time of
OFF
Specify the character color to be displayed at the time of OFF.
Use of solid frame at the time
of OFF
Select the presence of the solid frame to be displayed at the time of OFF
between "Yes" and "None".
Solid frame at the time of OFF Select the ID of the solid frame resource to be displayed at the time of
OFF.
Effect at the time of focus Specify whether the color of the button when the focus is located changes
or not. Select between "Change color" and "No effect".
Pattern at the time of focus*1 Specify the pattern of the focus button.

Item Description
Foreground color at the time of
focus*1
Specify the foreground color of the focus button.
Background color at the time
of focus*1
Specify the background color of the focus button.
Design at the time of focus*2 Specify the image of the focus button.
Character color at the time of
focus
Specify the character color to be displayed at the time of Focus.
*1: This setting is valid if [Display Type] is "Square" or "Circle".
*2: The setting is valid if the [Display Type] is "Image"
Callback Function
Item Description
OnInit Select "Yes" to add a process to be executed after the panel/window is
displayed.
OnQuit Select "Yes" to add a process to be executed before the panel/window is
hidden.
For the other properties, refer to "7.1 Common Functions of Controls".

7.3.15.3 Complements
Functional Specifications
PLC Device Setting
Up to two PLC devices can be set for the read and write operations.
The combinations of the operation modes (Read/Write/None) are limited according to the specified
button type.
If a combination other than below is selected, the operation is the same as when the input
permission is set to "Prohibition".
Item PLC device Write Read None
Momentary (Type 1) PLC device 1
PLC device 2
Momentary (Type 2) PLC device 1
PLC device 2
Alternate PLC device 1
PLC device 2
Actuator PLC device 1
PLC device 2
None (Lamp) PLC device 1
PLC device 2
Priority of PLC devices
The image displayed by the PLC extension button changes in accordance with the states of PLC
devices.
Each PLC device has a priority level, therefore when a PLC device with a higher priority is active,
the state of a PLC device with a lower priority is not referred to.
The priority order of the PLC devices is determined as shown below.
Priority PLC device
Higher

Lower
Disable device
Interlock device 1/Interlock device 2

Blink device
PLC device 1/PLC device 2
(Note) The status change device overwrites the values of the properties (color/pattern for ON/OFF/Focus) displayed by PLC device 1/PLC device 2 according to the reading values. It has the highest priority, but refers to other PLC devices.

Button Action Type
(1) Momentary (Type 1)
While the button is kept pressed, ON(1) is written to the PLC device specified with PLC device 1 (Write). When the button is released, OFF(0) is written.
The button can correspond to the state of PLC device 2 (Read) and can display the ON/OFF state according to the property settings.
Display action changes as follows according to the ON/OFF of the PLC device 2.
PLC device 2 (Read) OFF(0) ON(1)
Color/Pattern At the time of OFF*1 At the time of ON*1
Caption/Character attribute At the time of OFF*2 At the time of ON*2
Solid frame At the time of OFF*3 At the time of ON*3
*1: Color/Pattern refers to the patterns, foreground colors, background colors and images at the time of ON and OFF.
*2: Caption/Character attribute refers to the character strings and character colors at the time of ON and OFF.
*3: Solid frame refers to the solid frames at the time of ON and OFF.
Operation example)
Pressed
Released
Write "ON" to PLC device 1.
PLC device 2 is ON.
PLC device 2 is OFF.
Write "OFF" to PLC device 1.
PLC device 2 is OFF.
PLC device 2 is ON.
NOTE
When the action mode of PLC device 1 is set to "None", the states at the time of ON/OFF, which are set in the properties, can also be displayed in line with the state of PLC device 2 (Read).
Blink display cannot be controlled with the blink device.
The group No. setting is invalid.

(2) Momentary (Type 2)
While the button is kept pressed, ON(1) is written to the PLC device specified with PLC device 1 (Write). When the button is released, OFF(0) is written.
The button can correspond to the combination of PLC device 1 (Write) and PLC device 2 (Read) and can display the ON/OFF state according to the property settings.
Display action changes as follows according to the ON/OFF of PLC device 1 and 2.
PLC device 1 (Write) OFF(0) ON(1)
PLC device 2 (Read) OFF(0) ON(1) OFF(0) ON(1)
Color/Pattern At the time of OFF*1 At the time of
ON*1
At the time of
OFF*1
At the time of
ON*1
Caption/Character
attribute
At the time of OFF*2 At the time of
ON*2
At the time of
OFF*2
At the time of
ON*2
Solid frame At the time of OFF*3 At the time of ON*3
Blink device Enable Disable Disable
*1: Color/Pattern refers to the patterns, foreground colors, background colors and images at the time of ON and OFF.
*2: Caption/Character attribute refers to the character strings and character colors at the time of ON and OFF.
*3: Solid frame refers to the solid frames at the time of ON and OFF.
Operation example)
Pressed
Released
Write "ON" to PLC device 1.
PLC device 2 is ON.
PLC device 2 is OFF.
Write "OFF" to PLC device 1.
PLC device 2 is OFF.
PLC device 2 is ON.
NOTE
Only when both PLC device 1 and PLC device 2 are OFF, blink display can be controlled with the blink device.
The group No. setting is invalid.

(3) Alternate
Each time the button is pressed, ON(1)/OFF(0) of PLC device 1 (Write) is written alternately.
When PLC device 1 (Write) is OFF, the button can correspond to the state of PLC device 2

(Read) and can display the ON/OFF state according to the property settings.
When PLC device 1 (Write) is ON, the display action is reversed to the above-mentioned operation, except for a character string.
Display action changes as follows according to the ON/OFF of PLC device 1 and 2.
PLC device 1 (Write) OFF(0) ON(1)
PLC device 2 (Read) OFF(0) ON(1) OFF(0) ON(1)
Color/Pattern At the time of
OFF
*1 At the time of
ON
*1 At the time of
ON
*1 At the time
of OFF
*1
Character attribute
(character color)
At the time of
OFF
At the time of
ON
At the time of
ON
At the time
of OFF
Solid frame At the time of
OFF
*2 At the time of
ON
*2 At the time of
ON
*2 At the time
of OFF
*2
Caption (character string) At the time of
OFF
At the time of
ON
At the time of
OFF
At the time
of ON
Blink device Enable Disable Disable
*1: Color/Pattern refers to the patterns, foreground colors, background colors and images at the time of ON and OFF.
*2: Solid frame refers to the solid frames at the time of ON and OFF.
Operation example)
Pressed Write "ON" to PLC device 1 (processed at fixed intervals)
PLC device 2 is OFF.
PLC 2 OFF
PLC device 2 is ON.
Released
Released
PLC device 2 is OFF.
Write "OFF" to Pressed PLC device 1 (processed at fixed intervals)
PLCPLC device 2 is ON. 2 ON
NC Designer2 Instruction Manual
7. Creating Controls
275 IB-1501250-J
With the alternating button, the action mode of PLC device 2 can be set to "Write".
When the action mode of PLC device 2 is set to "Write", ON(1)/OFF(0) of PLC device 2 (Write) is written alternately each time the button is pressed.
The button can correspond to the state of PLC device 1 (Write) and can display the ON/OFF state according to the property settings.
Display action changes as follows according to the ON/OFF of PLC device 1.
PLC device 1 (Write) OFF(0) ON(1)
Color/Pattern At the time of OFF*1 At the time of ON*1
Caption/Character attribute At the time of OFF*2 At the time of ON*2
Solid frame At the time of OFF*3 At the time of ON*3
*1: Color/Pattern refers to the patterns, foreground colors, background colors and images at the time of ON and OFF.
*2: Caption/Character attribute refers to the character strings and character colors at the time of ON and OFF.
*3: Solid frame refers to the solid frames at the time of ON and OFF.
Operation example)
Pressed
Released
Write "OFF" to PLC device 1.
Write "ON" to PLC device 2.
Write "OFF" to PLC device 1.
Write "ON" to PLC device 2.
Write "ON" to PLC device 1.
Write "OFF" to PLC device 2.
Write "ON" to PLC device 1.
Write "OFF" to PLC device 2.
Pressed
Released
NC Designer2 Instruction Manual

(4) Actuator
Each time the button is pressed, ON(1)/OFF(0) of PLC device 1 (Write) is written alternately.
The solid frame corresponds to the state of PLC device 1 (Write) and the items other than the solid frame correspond to the state of PLC device 2 (Read).
Display action changes as follows according to the ON/OFF of PLC device 1 and 2.
PLC device 1 (Write) OFF(0) ON(1)
PLC device 2 (Read) OFF(0) ON(1) OFF(0) ON(1)
Color/Pattern At the time of
OFF
*1 At the time of
ON
*1 At the time of
OFF
*1 At the time of
ON
*1
Character attribute
(character color)
At the time of
OFF
At the time of
ON
At the time of
OFF
At the time of
ON
Solid frame At the time of
OFF
*2 At the time of
OFF
*2 At the time of
ON
*2 At the time of
ON
*2
Caption (character string) At the time of
OFF
At the time of
ON
At the time of
OFF
At the time of
ON
Blink device Enable Disable Enable Disable
*1: Color/Pattern refers to the patterns, foreground colors, background colors and images at the time of ON and OFF.
*2: Solid frame refers to the solid frames at the time of ON and OFF.
Operation example)
Pressed Write "ON" to PLC device 1 (processed at fixed intervals)
PLC device 2 is OFF.
PLC 2 OFF
PLC device 2 is ON.
Released
Released
PLC device 2 is OFF.
Write "OFF" to Pressed PLC device 1 (processed at fixed intervals)
PLCPLC device is ON. 2 ON

(5) None (Lamp)
Nothing is written to the PLC device, but the display action changes according to the combination of PLC device 1 (Write) and PLC device 2 (Read).
Display action changes as follows according to the ON/OFF of PLC device 1 and 2.
PLC device 1 (Write) OFF(0) ON(1)
PLC device 2 (Read) OFF(0) ON(1) OFF(0) ON(1)
Color/pattern At the time of
OFF
*1 At the time of
OFF
*1 At the time of
ON
*1 At the time of
ON
*1
Character attribute
(character color)
At the time of
OFF
At the time of
OFF
At the time of
ON
At the time of
ON
Solid frame At the time of

OFF
*2 At the time of
ON
*2 At the time of
OFF
*2 At the time of
ON
*2
Caption (character string) At the time of
OFF
At the time of
OFF
At the time of
ON
At the time of
ON
Blink device Enable
*1: Color/Pattern refers to the patterns, foreground colors, background colors and images at the
time of ON and OFF.
*2: Solid frame refers to the solid frames at the time of ON and OFF.
Operation example)
Both PLC device 1 and 2 are ON.
Both PLC device 1 and 2 are OFF.
PLC device 1 is ON.
PLC device 2 is ON.
NOTE
When the action of PLC device 1 is set to a mode other than "Read", PLC device 1 is displayed always in the
OFF state.
When the action of PLC device 2 is set to a mode other than "Read", PLC device 2 is displayed always in the
OFF state.
When Disable device is ON with Disable function set to "Enable", the image at the time of disable is displayed.
When the settings of Interlock device 1 and 2 are valid, the image at the time of interlock is displayed.
The group No. setting is invalid.

Dynamic change property
The value of the status change device is constantly read, and when the reading value is different to
the previous reading value, it switches to the status of the value set to the reading value.
In each status, properties (show/hide, style/text/solid frame for ON/OFF/Focus) can be set, thus
display image patterns increase when combined with [button action type].
The status change device types and valid values are as follows.
Type Valid values
Bit device 0 to 1
Word device 0 to 7
(Note) Do not specify a value outside the valid value range.
(1) Bit device
Can switch between status 0 and status 1 according to the reading value.
(2) Word device
Can switch to any of status 0 to status 7 according to the reading value.
NOTE
When the PLC extension button is hidden, the dynamic change property function is disabled. In this case, a
macro must be used to change the shown/hidden properties.
When reading value is "0" to "7"
Status change device
When reading value is "0"
When reading value is "1"
Status change device

7.3.16 PLC Message (GNCPLCMessage)
PLC message is a control that displays a message according to the status of PLC device in NC, by
obtaining it from the message definition text file (UNICODE text).
7.3.16.1 Property Settings
The property settings for the PLC message are divided into the followings.
Control name : Specify the control name.
Position/size : Specify the position and size of the control.
Show/Hide : Specify whether the control is displayed or hidden.
Ground : Specify the foreground and background.
Default : Specify the default character color and default background color to be applied
when they are not specified in the message definition text file.
Message file : Specify the message definition text file to be displayed at the control.
PLC device : Specify the target PLC device.
Character attribute : Specify the character attribute of captions.
Caption character
string scroll
: Specify the scroll of the caption character string.
Blink : Set the blink of the caption character string.
Callback function : Specify whether or not the callback functions are provided.
Ground
Item Description
Ground Specify the foreground and background (Usually set to "0").
Default
Item Description
Default character color Specify the default character color.
This color is applied when a character color is not specified in the
message definition text file.

Default background color Specify the default background color.
This color is applied when there is no message or when a background
color is not specified in the message definition text file.

Message File
Item Description
Message folder Select the folder in which the message definition text file is stored.
Message file Select the message definition text file name from the file resource ID.
NOTE
To store the message definition text file in the selected message folder, the absolute path has to be defined in
the Config.ini file. The relationship between the description in the combo box and the actual folder is shown
below.
<Example of M800/M80 (Windows-based display unit) and M700VW>
[MESS_CONTROL]
MESSDATA0=C:\MESSDATA0\
MESSDATA1=C:\MESSDATA1\
MESSDATA2=C:\MESSDATA2\
:
MESSDATA7=C:\MESSDATA7\
<Example of M800/M80 (Windows-less display unit) and M700VS/M70V/E70>
[MESS_CONTROL]
MESSDATA0=/custom/MESSDATA0/
MESSDATA1=/custom/MESSDATA1/
MESSDATA2=/custom/MESSDATA2/
:
MESSDATA7=/custom/MESSDATA7/
When the message file size is large, the file consumes the custom release data storage capacity.
Therefore, the size of each message file should be 200K byte or less.
Up to eight message files are available.
When more than one message file is used, the total number of lines in the message files has to be 65535 or
less.
The file name to be described in the file resource ID has to be 40 or less characters in length (including the
extension).

PLC Device
Item Description
PLC device method Select the method to display a message between "Bit designation" and
"No. designation".
PLC device Specify the address of the PLC bit device word device for the PLC
message display.
Starting bit position Specify the start position to read the PLC device (0 to 15).
This setting is valid when a word device is selected for the PLC device for
which "Bit designation" is selected (but not used when a bit device is
selected (fixed to zero)).
When a word device is selected, a message is displayed according to the
state between the starting bit position and the number of bits to use.
Number of bits to use Specify the number of bits for reading the PLC device.
When "Bit designation" is selected, the bit devices between the starting bit
position and the number of bits to use are read in the ascending order to
display the message (1 to 512).
When "No. designation" is selected, specify the number of bits to be
handled as numbers (Specify the value from 1 to 16. "16" is specified
when a value other than 1 to 16 is set).
Project No. of PLC device Specify the project No. of PLC ladder. (0 to 6)
Display action Specify whether to retain the message or delete it when a message to
display does not exist after the state of the PLC device has changed.
Select between "Keep the display" and "Cancel the display".
Turn back Select this to display the message in two lines when the message length
has exceeded the control's display range. Select between "None" and
"Yes".
NOTE
Set as shown below according to the PLC device types.
(1) Setting example of "Bit designation"
To display a message using the bit devices M0 to M10.
PLC device
Start bit position
Number of bits used
M0
0
11
To display a message using the word devices R0 (bit 8) to R10 (bit 7).
PLC device
Start bit position
Number of bits used
R0
8
160
(2) Setting example of "No. designation"
To display a message using the one byte between M0 and M7.
PLC device
Start bit position
Number of bits used
M0
0

8
To display a message using the two bytes between the R0's fourth bit and R1's third bit
PLC device
Starting bit position
Number of bits to use
R0
4
16
For the other properties, refer to "7.1 Common Functions of Controls".

7.3.16.2 Complements
Message Definition Text File
To use a PLC message, it is necessary to prepare the message definition text file.
This file has to be described by UNICODE text.
Up to 65535 lines of message can be included in the file, when one message is regarded as one line.
It is possible to describe messages in more than one language in the message definition text file.
Use a comma or tab to separate each item.
The following items are described in the message definition text file.
Item Setting value Description
Message No. 1 to 65535
(Omissible)
Describe the message No. when "No. designation" is selected for the PLC device method.
When the PLC device value corresponds to the message No., the message character string is displayed.
Describe the message No. in a decimal number.
When "Bit designation" is selected for the PLC device method, the message No. description is disabled.
Bit position 0 to 511
(Omissible)
Describe the bit position when "Bit designation" is selected for the PLC device method.
The bit position is searched in the ascending order within the range starting from the starting bit position and made up of the number of bits to use. When the bit position is matched, the message character string is displayed.
Describe the bit position in a decimal number.
When "No. designation" is selected for the PLC device method, the bit position description is disabled.
Character color No. *1
0 to 255
(Omissible)
Describe the character color to display a message character string.
When the description about the character color is omitted, the message is displayed in a color specified with "Default character color".
Background color No. *1
0 to 255
(Omissible)
Describe the background color to display a message character string.
When the description about the background color, the message is displayed with a background color specified with "Default background color".
Message character string
Up to 256 character (the number of characters per language)
Describe the message character string.
Enclose the message with double quotations (").
If you wish to describe a double quotation (") or back slash (\), use "\"" or "\\".
To display the message character string in two lines, describe "\n" at the line feed position (up to 20 lines).
*1: For the color Nos., refer to "Appendix 5 Default Palette Color".

Message definition text file is described as below.
(1) Description example for "Bit designation"
(Message No.), (Bit position), (Character color),
(Background color),
Message character string(English, Japanese)
, 0, 0(black), 15(white), bit type , Bit designation
, 511, 12(red), 2(green), \ bit \ \n type, \ Bit \ \n designation
(2) Description example for "No. designation"
(Message No.), (Bit position), (Character

color),
(Backgrou
nd color),
Message character string (English, Japanese)
1, , 15(white), 0(black), number type , No. designation
65535, , 9(blue), 14(yellow)
,
 \ number \ \n type , \ No. \ \n designation
NOTE
To describe messages in more than one language, the messages are described in the following order.
1: English 2: Japanese 3: German 4: French 5: Italian
6: Spanish 7: Chinese
(traditional)
8: Korean 9: Portuguese 10: Dutch
11: Swedish 12: Hungarian 13: Polish 14: Chinese
(simplified)
15: Russian
16: Turkish 17: Czech 18: Indonesian
For the unused languages, insert delimiters (commas or tabs) to the omitted languages to align the languages
and message positions.
To use the message character strings in English, Japanese, French and Portuguese, describe as follows.
(Example) 1,,0,15,English,Japanese,,French,,,,,Portuguese
The language to display messages is changed according to "#1043 lang (Select language displayed)" [base
common parameter].
When a language is switched to the one in which messages are not described, the messages are not displayed.
If a semicolon (;) is described at the top of the line, the line is handled as a comment line.

7.3.17 Menu (GNXMenu) ; Menu display part
The menu display is for displaying the menu, the monitor status, and the alarms, or the return
button and the switch button, etc.
7.3.17.1 Property Settings
The property settings for displaying the menu are divided into the followings.
Control name : Specify the control name.
Position/size : Specify the position and size of the control.
Menu type : Select the menu type.
Color : Select the color.
Callback function : Specify whether or not the callback functions are provided.
Menu Type
Item Description
MenuType Select the menu type from the following eight types.
The colors set for each property are reflected on Classic.
1StepMenu(VGA)(Classic) 1 step menu for VGA (Classic)
2StepMenu(VGA)(Classic) 2 steps menu for VGA (Classic)
1StepMenu(XGA)(Classic) 1 step menu for XGA (Classic)
2StepMenu(XGA)(Classic) 2 steps menu for XGA (Classic)
Specify the base color designated as the theme color for the following four
types.
1StepMenu(VGA) One-row menu for VGA
2StepMenu(VGA) Two-row menu for VGA
1StepMenu(XGA) One-row menu for XGA
2StepMenu(XGA) Two-row menu for XGA
DispType Specify the display type.
Menu Displays only the menu (without status display).
StatusVisibleDisplays the menu and the status.
Horizontal position Set the position to display the menu character string (Left-justifying,
Centering)
Color
Item Description
StringForeColor Set the normal character color.
StringPushedColor Set the character color when selected.
1StepForeBackColor Set the normal background color of the one-row menu. (Note)
1StepPushedBackColor Set the background color of the one-row menu when selected. (Note)
2StepUpperForeBackColor Set the normal background color of the upper row of the two-row menu.
(Note)
2StepUpperPushedBackColor Set the background color of the upper row of the two-row menu when
selected. (Note)
2StepLowerForeBackColor Set the normal background color of the lower row of the two-row menu.
(Note)
2StepLowerPushedBackColor Set the background color of the lower row of the two-row menu when
selected. (Note)
(Note) Enable only when Classic is set to display in Menu Type.
For the other properties, refer to "7.1 Common Functions of Controls".

7.3.17.2 Complements
Screen Specifications
Screen Images

7.3.18 Extension Menu (GNCExMenu); Extension Menu Display Part
With the extension menu display, the following display and operation can be executed by setting the
property without programming.
- Switching between the one-row menu and two-row menu display
- Menu display (character strings, design, and background color, etc.)

- Switching between the panel and window
- Writing or reading the PLC device
- Grouping of menu buttons

Up to ten menu groups were retained in the extension menu, and the property of the display or screen change, etc. can be set for each menu group. Switching between the menu groups enables to switch the menu display equivalent to the standard screen.

Extension menu is a control dedicated to M800/M80 series.

7.3.18.1 Property Setup Dialog

Property setup dialog of the extension menu control consists of the tabs relating to [Basic Settings]. Details of each tab will be described in the following sections.

[Basic Settings] consists of the following two tabs.

No. Tab Description

(1) Behavior Settings Set or display the switch screen, animation direction, preview, etc.

(2) Style/Text Set or display the font, design, preview, etc.

(1)

(2)

7.3.18.1.1 [Behavior Settings] Tab

No. Item Description

(1) Menu type Select the menu type from "VGA", "XGA", "VGA(Classic)", or "XGA(Classic)".

(2) Initial menu group number Specify the menu group number displayed at the first time. (1 to 10)

(3) Show operation status Check here to display the operation status.

(4) Enable touch screen gestures

Check here to enable the touch screen gestures.

(5) Menu group Select the menu group number to set the property.

Property items of the selected menu group number can be set.

(6) Menu button settings Refer to [(1) Menu Button Settings of Menu Group].

(7) Upper menu group number Specify the menu group number of the upper row in the two-row display. (0 to 10)

When "0" is specified, it switches to a one-row menu.

The property of the menu group number selected in [Menu group] can be specified.

(8) Preview display state Select the display state of the preview from "ON" and "OFF" states.

(9) Preview (Initial menu group number (n))

n: The number specified in (2) Initial menu group number

Display the preview of the extension menu control.

The preview of the settings of the menu group number specified in "Initial menu group number" is displayed.

(10) Button group(n) All OFF state

n: Number (1 to 5)

When check boxes are checked, all buttons belonging to the button group can be turned OFF.

The properties of the menu group number selected in [Menu group] can be specified.

(1)

(2)

(3)

(5) (4)

(6)

(7)

(10)

(8)

(9)

(1) Menu Button Settings of Menu Group

The property of the menu group number selected in "menu group number" can be specified.

No. Item Description

(1) Button type Select the button type from the following.

-None
-Momentary
-Alternate
-Button group1
-Button group2
-Button group3
-Button group4
-Button group5

(2) Switch screen Select the screen change operation from the following.

- None
- Switch the panel
- Display the window
- Close the window
- Display the Windows at the time of ON, close the window at the time of OFF
- End the Windows at the time of ON, display the window at the time of OFF

(3) Panel/Window number Specify the Panel/Window number of the destination screen.

(4) Destination menu group number

Specify the destination menu group.
(5) Animation direction Select the animation direction when moving the menu group from
the following.
- None
- Upward
- Downward
- Leftward
- Rightward
(6) Write PLC device Specify the address of the PLC device for the write operation.
Click on the "..." button to display the "PLC Device Setting" dialog.
(7) Write PLC device enabled Select either "Enabled" or "Disabled" as the state of write PLC
device.
(8) Write Bit position of PLC
device
Specify the bit position when a word device (D/R/ZR) is set to write
PLC device (0 to 15).
(9) Write PLC device project
No.
Specify the project No. of PLC ladder what write PLC device refers.
(0 to 6)
(10) Read PLC device Specify the address of the PLC device for the read operation.
Click on the "..." button to display the "PLC Device Setting" dialog.
(11) Read PLC device enabled Select from "Enabled", "Disabled" or "Same setting as Write PLC
device" as the valid state of read PLC device.
When "Same setting as Write PLC device" is specified, data is read
based on the settings of properties "write PLC device", "write PLC
device enabled", "write Bit position of PLC device", and "write PLC
device project No.".
(12) Read Bit position of PLC
device
Specify the bit position when a word device (D/R/ZR) is set to read
PLC device (0 to 15).
(13) Read PLC device project
No.
Specify the project No. of PLC ladder what read PLC device refers.
(0 to 6).

7.3.18.1.2 [Style/Text] Tab
No. Item Description
(1) Display type Select the display type for each menu button from "Square" or
"Image".
The property of the menu group number selected in "Menu group"
can be set.
(2) Display state Select the display state for each menu button from the following.
- Hide
- Partial display
- Whole display
- Invalid display
The property of the menu group number selected in "Menu group"
can be set.
(3) ON design Specify the image resource ID to be displayed at ON.
The property of the menu group number selected in "Menu group"
can be set.
(4) OFF design Specify the image resource ID to be displayed at OFF.
The property of the menu group number selected in "Menu group"
can be set.
For the items other than the above, refer to "7.1.16.1.1 [Style] Tab"/"7.1.16.1.2 [Text] Tab".
(1)
(2)
(3)
(4)

NOTE
"Foreground color", "Background color", "Text color", and "Pattern" cannot be specified when selecting
"VGA" or "XGA" for "Menu type".
The color settings at "ON" and "OFF" are specified by "Screen theme color (#11060)" parameter.
When specifying other than "0" for [Upper menu group number] in the [Behavior Settings] tab, the menu is a
two-row display. For a two-row display, the design is not drawn. When drawing the design, specify "0" for
[Upper menu group number].
The background color at ON cannot be checked on the preview when selecting "VGA" or "XGA" for "Menu
type".
< Background color at ON >

7.3.18.2 Property Settings
The property settings for displaying the extension menu are divided into the following.
Control name : Specify the control name.
Position/size : Specify the position and size of the control.
Show/Hide : Specify whether the control is displayed or hidden.
Input permission : Select whether the entry is accepted (permission) or rejected (prohibition).
Character attribute : Specify the character attribute of the caption.
Solid frame : Specify the solid frame of the control.
Menu display : Specify the menu type, whether to display the operation status, and the initial

display menu group number.
Menu group : Specify the following items for each menu group.
- Display type
- Color/pattern/design
- Button type
- Character strings/attribute
- Screen change
- Animation direction
- PLC device (address/enabled/bit position/project No.)
- All OFF state
Operation : Specify the operation of the control.
Callback function : Specify whether the callback functions are provided or not.

Character attribute
Item Description
Font Select the ID of the font resource for displaying the caption.
Margin left Designate the starting position of the caption in dots from the left end of
the control (0 to 2560).
Margin right Designate the starting position of the caption in dots from the right end of
the control. (0 to 2560).
Margin top *1 Designate the starting position of the caption in dots from the top of the
control (0 to 1920).
Margin bottom *1 Designate the starting position of the caption in dots from the bottom of
the control (0 to 1920).
*1: When the upper row of the menu or the button character string is displayed in two lines, the settings of
vertical position, margin top and margin bottom are not reflected. The character string is displayed on the
center in the vertical direction.
Menu display
Item Description
Menu type Select the menu type from the following four types. (Initial value:VGA)
The colors set for each property are reflected on Classic.
VGA(Classic) Menu for VGA (Classic)
XGA(Classic) Menu for XGA (Classic)
Specify the base color designated as the theme color for the following two
types.
VGA Menu for VGA
XGA Menu for XGA
Operation Status Visible Specify whether to display the operation status.
Initial menu group number Specify the menu group number displayed at the first time when the panel
or window with the extension menu is displayed. (1 to 10)
Menu group 1 to 10
Display type
Item Description
Display type Specify the display type of the menu position. Use "\t" to delimit each
display type of the menu position.
0 or no designation : Square
1 : Image

Color/pattern/design
Item Description
Lower ON pattern*1 Specify the pattern at the time of lower row menu ON.
Lower ON foreground color*1 Specify the foreground color at the time of the lower row menu ON.
Lower ON background color*1 Specify the background color at the time of the lower row menu ON.
ON design*2 Specify the image at the time of the menu ON.
(Note 1) The image cannot be specified on the property sheet. Specify it
on the property dialog.
(Note 2) On the property sheet, a character string consisting of
concatenation of the resource registration number for each
menu position with "\t" is displayed.
Lower ON character color Set the character color at the time of the lower row menu ON.
Lower OFF pattern*1 Specify the pattern at the time of the lower row menu OFF.
Lower OFF foreground color*1 Specify the foreground color at the time of the lower row menu OFF.
Lower OFF background color*1 Specify the background color at the time of the lower row menu OFF.
OFF design*2 Specify the image at the time of the menu OFF.
(Note 1) The image cannot be specified on the property sheet. Specify it
on the property dialog.
(Note 2) On the property sheet, a character string consisting of
concatenation of the resource registration number for each
menu position with "\t" is displayed.
Lower OFF character color Set the character color at the time of lower row menu OFF.
Upper ON pattern*1 Specify the pattern at the time of the upper row menu ON.
Upper ON foreground color*1 Specify the foreground color at the time of the upper row menu ON.
Upper ON background color*1 Specify the background color at the time of the upper row menu ON.
Upper ON character color Set the character color at the time of the upper row menu ON.
Upper OFF pattern*1 Specify the pattern at the time of the upper row menu OFF.
Upper OFF foreground color*1 Specify the foreground color at the time of the upper row menu OFF.
Upper OFF background color*1 Specify the background color at the time of the upper row menu OFF.
Upper OFF character color Set the character color at the time of the upper row menu OFF.
*1: This setting is valid when the [Menu type] is set to [VGA(Classic)] or [XGA(Classic)].
*2: This setting is valid when the [Display type] is set to "Image".
The setting is valid when "0" is set to [Upper menu group number].
The resource registration number is
assigned as 1,2,3,... in order from the
top of image resource data name.

"ID_IMAGE00012" is 2.
"ID_IMAGE00013" is 3.

Button type
Item Description
Button type Select the button action among the following eight types. Use "\t" to delimit each button action of the menu position.
0 or no designation : None
1 : Momentary
2 : Alternate
3 : Button group1
4 : Button group2
5 : Button group3
6 : Button group4
7 : Button group5
Momentary The button turns ON when it is pressed. It turns OFF when it is released.
Alternate The button alternates ON and OFF each time it is pressed.
None The button does not turn ON or OFF even if it is pressed.
Button group1 to 5 The button turns ON when it is pressed, and other buttons specified in the same button group turn OFF.
When only one menu button is specified in each button group, the operation is the same as Alternate.
(Note) When the property "All OFF state" is prohibited, a menu button that is ON and specified to the button group does not turn OFF if it is pressed.
When turning OFF all menu buttons specified in the button group, specify "Permission" in the property "All OFF state".
Press C. B turns OFF, and C turns ON.
Permission
Prohibition
Press B that is ON.
Press B that is ON.
All A, B, and C turn OFF.
B remains ON.

Character strings/attribute
Item Description
Character string Specify the character string to be displayed on each menu position. Use "\t" to delimit each character string of the menu position.
Up to 14 characters can be specified as the character string to be entered for each menu position.
(Note) "\t" cannot be used because it is used as the separator.
Horizontal position Select the horizontal character position among "Align left", "Center" and "Align right".
Vertical position *1 Select the vertical character position among "Align top", "Center" and "Align bottom".
*1: When the upper row of the menu or the button character string is displayed in two lines, the settings of vertical position, margin top and margin bottom are not reflected. The character string is displayed on the center in the vertical direction.
Screen change
Item Description
Screen switch operation Specify the screen change operation for each menu position. Use "\t" to delimit each screen change operation of the menu position.
0 or no designation : None
1 : Change panel
2 : Open window
3 : Close window
4*1 : ON: Open win., OFF: Close win.
5*1 : ON: Close win., OFF: Open win.
*1: This setting is valid when the [Button type] is set to [Alternate].
Panel/Window number Designate the Panel/Window number of the destination screen. Select a number from the following. Use "\t" to delimit each Panel/Window number of the menu position.
0-255 : The page number of the customized screen in the project. "0" is the top page.
1000 : The number of the standard operation screen
2000 : The number of the standard set-up screen
3000 : The number of the standard editing screen
4000 : The number of the standard diagnostic screen
5000 : The number of the standard maintenance screen
6000-9999 : The page number of the customized screen to which the offset number is added.
If the numbers other than the above (including the view frame) or some numbers of non-existent screens are set, the screen will not be switched.
Though, the other operations are applied.
Display state Specify the display status of the menu. Use "\t" to delimit each display status of the menu position.
0 : Hide
1 : Partial display
2 or no designation : Whole display
3 : Invalid display (full display and the character color is gray) display
Whole display

Hide Partial display
Invalid display
Invalid

Item Description
Upper menu group number Specify the menu group number of the upper row in the two-row display.
(0 to 10)
When "0" is specified, the menu is not displayed on the upper row.
Destination menu group
number
Specify the destination menu group. Use "\t" to delimit each destination of
the menu position. (0 to 10)
2\t3\t4\t0\t5\t6\t7\t0\t8\t9\t1\t10\t9
Menu 1 to 10 Return button (*) Switch button/Right-flick Left-flick
* This is enabled when the operation status is displayed.)
0 or no designation : No movement
1 to 10 : Display the designated group number
menu.
Animation direction Specify the animation direction when moving the menu group. Use "\t" to
delimit each animation direction of each menu position.
* When the "Destination menu group number" is not specified, the
animation is not performed.
* When the operation parameter (#8976 Menu animation OFF) is set to 1,
the menu animation is not performed.
0 : None
1 : Upward
2 : Downward
3 : Leftward
4 : Rightward

PLC device
Item Description
Write PLC device Specify the address of the PLC device for the write operation. Use "\t" to
delimit each write PLC device of the menu position.
Up to 7 characters can be specified as write PLC device to be specified for
each menu position.
Write PLC device enabled Specify enabled or not to the PLC device specified in write PLC device.
Use "\t" to delimit each write PLC device enabled of the menu position.
0: Disabled
1: Enabled
Write Bit position of PLC
device
Specify the bit position when a word device is set to write PLC device. (0
to 15)
Use "\t" to delimit each write Bit position of PLC device of the menu
position.
Write PLC device project No.*1 Specify the project No. of PLC ladder what write PLC device refers.
(0 to 6)
Use "\t" to delimit each write PLC device project No. of the menu position.
Read PLC device Specify the address of the PLC device for the read operation. Use "\t" to
delimit each read PLC device of the menu position.
Up to 7 characters can be specified as read PLC device to be specified for
each menu position.
Read PLC device enabled Select from "Enabled", "Disabled" or "Same setting as Write PLC device"
as the valid state of read PLC device.
When "Same setting as Write PLC device" is specified, data is read based
on the settings of properties "write PLC device", "write PLC device
enabled", "write Bit position of PLC device", and "write PLC device project
No.".
Read Bit position of PLC
device
Specify the bit position when a word device is set to read PLC device. (0
to 15)
Use "\t" to delimit each read Bit position of PLC device of the menu
position.
Read PLC device project No.*1 Specify the project No. of PLC ladder what read PLC device refers.
(0 to 6)
Use "\t" to delimit each read PLC device project No. of the menu position.
*1: When specifying the device not supporting multi-project and using the device which has the same device
number in multiple projects, the output to the device of the project executed last is valid.

Button group
Item Description
All OFF state Specify whether to permit all menu buttons belonging to the button group
to turn OFF or not. Use "\t" to delimit all OFF state of each button group.
0: Permission
1: Prohibition
Callback function
Item Description
OnInit Select "Yes" to add a process to be executed after the panel/window is
displayed.
OnQuit Select "Yes" to add a process to be executed before the panel/window is

hidden.
For the other properties, refer to "7.1 Common Functions of Controls".
Permission
Press B that is ON.
All A, B, and C turn OFF.
Prohibition
Press B that is ON.
B remains ON.

7.3.18.3 Complements
Screen configuration
Screen image
Menu type: VGA, theme color: gray tone
Menu type: VGA, theme color: blue tone
Menu type: VGA (Classic)
Operation specifications
(1) Flick (Quickly run your fingertip along the screen)
The menu group is moved when "Destination menu group number" is specified for the direction that you swiped your finger.

Example
Menu Design Registration (Image Registered by an User)
To display the icon image created by the user on the menu based on the standard screen, create an image whose background is transparent in PNG format. Register the image in the image resource.
The following are the procedures for specifying it to the extension menu.
(1) Arrange the extension menu on
the the panel or window.
The extension menu is displayed on the panel.
(2) Select "ON design" of the menu
group 1 displayed on the property
sheet.
[ON design] is selected.

(3) Press the [] button. The property dialog for [ON design] appears.

(4) Select the edit area of menu 1. The resouces registered in the image resource is
displayed on the pull-down list.

(5) Select the image resource which
is registered by the user.
* In this case, the data name
of the image resource which is
registered by the user is
ID_IMAGE00012.
"ID_IMAGE00012" is registered on the menu 1
of the property dialog.

(6) Press the OK button. The property dialog is closed.
The character string consisting of concatenation
of the resource registration number for each
menu position with "\t" is displayed on the
property sheet.
The design is displayed on the menu arranged
on the panel.

Property Dialog
The property of the extension menu control such as "Character sequence" or "Screenswitch operation" has the property dialog which enables to specify the data for each menu position.
The property dialog is displayed by pressing the "..." button displayed when selecting the property to edit on the property sheet.
NOTE
The data specified in the property dialog is concatenated with "\t" and additionally registered as one character string.
Example: "Test" is specified for menu 1, and "Return" is specified for menu 10. Nothing is specified for menu 2 to 9.
In this case, the following value is specified on the property sheet.
Test\t\t\t\t\t\t\t\t\t\tReturn
Menu 1 Menu 2 to 9 are empty Menu 10
The specified character string is added to the character string resource.

Property "ON design"
1. Paste the extension menu control on the panel.

2. Select [ON design], the property to edit on the property sheet.
3. The property dialog of the selected property is displayed by pressing the "..." button.
4. Select the edit area of the menu position to specify.

5. Select <Reference Library...>.
6. Image resource data name is specified in the property dialog by pressing the [OK] button on the Image List dialog.
7. Press the OK button on the property dialog.
8. The data specified in the property dialog is reflected on the property sheet.

NOTE
For the properties "ON design" and "OFF design", you cannot edit them on the property sheet.
The resource data name specified in the property dialog is concatenated with "\t" with the numbers in order of registration and additionally registered as one character string.
Example: The image is registered to the menu 1 from the parts library. (ID_IMAGE00012)
The image is not regisgtered for ID_IMAGE00001.
The image is displayed only on the menu 1.
Precautions
1. The property items for which the property dialog can be displayed can also be specified on the property sheet. However, you cannot edit "ON design", "OFF design", "write PLC device", and "read PLC device" on the property sheet. Specify them with the property dialog.
2. If a property dialog is opened with the data specified on the property sheet invalid, the initial value is set. Press the cancel button on the property dialog. Original value is displayed on the property sheet.
Restrictions
1. When importing the page on which the extension menu control is pasted, change the setting value of the imported page property "ON design" or "OFF design" after importing.
Imported resouce is registered as a data with a new resource data name in the image resource, therefore specify the design in this dialog again.
2. When the image resource is deleted, the image resource data specified to the property "ON design" or "OFF design" may not be displayed. In this case, create a new image resource again.

7.3.19 FileInOut (GNXFileTransfer) ; Input/Output Control
The input/output control part is used to input and output NC files between the NC memory and an external device.
The hard disk built in the NC unit is also handled as an external device.
7.3.19.1 Property Settings
The property settings for the input/output control are divided into the followings.
Control name : Specify the control name.
Position/size : Specify the position and size of the control.
Main part area : Specify the color attribute, solid frame and message font type of the main part area.
Bar graph area : Specify the width and color attribute of the bar graph area, and whether to enable the gradation effect on the area.
Message area : Specify the color attribute, and whether to display a message on this area.
Color type : Specify the color type.
Callback function : Specify whether or not the callback functions are provided.
Main Part Area
Item Description
MainBackColor Specify the background color of the input/output control.
FrameVisible Select whether to use the solid frame. Select between "True" and "False".
FontType Specify the message font type.
NormalNormal font
Normal BoldNormal bold font
MiddleMiddle-sized font
BigFont with double height and width
Bar Graph Area
Item Description
BarGraphForeColor Specify the color of the bar graph that is refreshed at the file transfer.
BarGraphBackColor Specify the color of the bar graph that is drawn at the initial display.
BarGraphWidth Specify the width of the bar graph area (100 to 1800).
SetBarGradation*1 Specify whether to enable gradation effect when drawing the foreground of the bar graph. Select between "True" and "False".
*1 Gradation is not supported by M700VS, M70V and E70 Series. Thus, even when "True" is selected, the bar graph is displayed in a plain color.
Message Area
Item Description
MessageVisible Switch "True (show)" and "False (hide)" of the message on the control.
NormalMessageFontColor Specify the normal message character color.
NormalMessageBackColor Specify the normal message background color.
ErrorMessageFontColor Specify the error message character color.
ErrorMessageBackColor Specify the error message background color.
Color Type
Item Description
ColorType Specify the color type.
Theme color: Specify the base color designated as the theme color.
Specified color: The colors set for each property are reflected.

Callback Function
Item Description
OnInit Select "Yes" to add a process to be executed after the panel/window is displayed.
OnQuit Select "Yes" to add a process to be executed before the panel/window is hidden.
For the other properties, refer to "7.1 Common Functions of Controls".

7.3.19.2 Complements
Screen Specifications
Screen Images
Change the size of the control.
No change is made for the positions of the message area
and bar graph area relative to the upper left corner of the
control.
List of Available File Paths
A GCS function has to be described to input/output NC files using the input/output control. The file path information is given to the GCS function argument. The list below shows the available file path information.
Device Device name Data type Directory File name
NC memory M01: Machining program /PRG/USER/ (Program No.)
Parameter /PRM/ ALL.PRM
NC data /DAT/
TOOL.OFS
TLIFE.TLF
COMMON.VAR
Tool compensation data
Tool life management data
Common variable data
External device To specify a file in the HD device, specify the file under D:/NCFILE.
Example)
For HD:/ABC/100.PRG: Specify the path D:/NCFILE/ABC/100.PRG.
For DS and USB, set "M01:IC1/" or "USB:/" to specify the root directory.
"USB:" is available only for M700VS/M70V/E70.
- HD HD:
- FD FD1:
- Memory card MEM:
- DS M01:/IC1
- USB memory USB:
External device
(Direct
designation)
C:
D:
A direct path designation is possible only for the files in HD (Drive C or D).
Example)
For C:/WINDOWS/ABC.TXT: Specify the path C:/WINDOWS/ABC.TXT.
NC Designer2 Instruction Manual
7. Creating Controls
308 IB-1501250-J
[Precautions relating to file transfer]
(1) If the transfer destination becomes full during the file transfer, the data transferred up to the point is registered and then an error occurs.
(2) Up to 223 files can be registered to the root directory of an FD (including the directory).
(3) Designation of multiple files using a wild card "*" is not possible. Therefore, if "*" is included in the file name, an error occurs.
(4) If the same file name is specified for the transfer source and destination, the file transfer is not carried out, and an error code is returned as the return value.
(5) If you wish to save a file under the same name as the transfer source file, it is not necessary to give the file name to the transfer destination file path.
[File path setting example] When common variables in NC memory is saved in HD
Transfer source file path: M01:/DAT/COMMON.VAR
Transfer destination file path: D:/NCFILE/
To specify a directory as the file information, "/" has to be added at the end of the directory name.
(6) "/" is used for the paths in the table, but it is also possible to use "\" to specify the path.
(7) When the file information is specified, the case (uppercase and lowercase) is ignored.
(8) If the input/output control part is set to "hidden" during transferring, the transfer is interrupted, and when the control part is displayed, the transfer is resumed.
(9) If the input/output control part is deleted during transferring, the transfer is interrupted. Therefore, do not delete the part during the transfer.
(10) Do not use two-byte characters in specifying a file path.
Restrictions
Restrictions for creating a control object are shown below.
(1) Unsupported device
RS232C and Ethernet are not supported.
(2) All file input/output function
All file input/output function is not supported
(3) Deletion of directory
When a file is included in a directory to delete, it is not possible to delete the directory.
(4) Program name
There are the following restrictions for the name of the files to be created or transferred in or from NC memory.
(a) Up to 32 characters including the extension
(b) The characters available in file name and directory name are one-byte numerals, one-byte uppercase alphabets and the one-byte symbols that can be recognized by Windows.
Unavailable characters: \ / : , * ? " < > | lowercase letters (a to z) and a space
(c) Edit lock B and C and Program display lock are effective only on the files in NC memory whose names are made up of one-byte numerals.
ex) When Edit lock B (8000 to 9999) is active
File name Characteristics Change
8000 One-byte numerals only Disable
8000.PRG With an extension Enable
08000 One-byte numerals only. Zero at the head. Disable
8000A Characters other than numerals Enable
(d) The following files can not be handled as a file name.

- The extension is "$$$", "$$0", "$$1", "$$2", "$$3", "$$4", "$$5", "$$6", "$$7", "$$8" or "$$9".
- "0" (the file name is made up of a one-byte zero)
(5) Up to one input/output control part should be located per screen. Set the screen on which the input/output control part is located so that the instance is not held. Not doing so may cause a memory shortage.

7.3.20 AlarmMessage (GNXAlarmMessage) ; Alarm Display Part
The alarm display part is used to display the alarm No. and alarm message character string when an alarm occurs.
This part displays NC alarms and PLC alarms, but does not display the stop code.
When more than one alarm occurs at a time, the messages are alternately displayed in a two-second cycle. Up to 60 characters can be included in a message.
7.3.20.1 Property Settings
The property settings for the alarm display are divided into the followings.
Control name : Specify the control name.
Position/size : Specify the position and size of the control.
Color : Specify the display color of the control.
Character attribute : Specify the character attribute of captions.
Character string display
form : Specify the part system to be displayed on the control.
Update cycle : Specify the update cycle of the alarm display.
Color type : Specify the color type.
Character Attribute
Item Description
FontType Specify the font size and thickness.
NormalNormal font
Normal BoldNormal bold font
MiddleMiddle-sized font
BigFont with double height and width
Character String Display Form
Item Description
DisplayMessage Specify how to display the character string (0 to 2).
0: Not display the residual when the message is split.
1: Display the residual when the message is split.
2: Dependent on the parameter setting (#11021 PLC mesg disp type)
When #11021 is 0: Not display the residual when the message is split.
When #11021 is 1: Display the residual when the message is split.
Update cycle
Item Description
UpdateCycle Specify the time to update the alarm display(0~2000).
(Note) Numbers between 0 and 299 are handled as 2000.
Color Type
Item Description
ColorType Specify the color type.
Theme color: Specify the base color designated as the theme color.
Specified color: The colors set for each property are reflected.
For the other properties, refer to "7.1 Common Functions of Controls".

7.3.20.2 Complements
Screen Specifications
Screen Images
It is possible to change the part size.
If a part drawing area is changed, the character string is displayed at the top left.
[Message split display (When "1" or "2" is selected for the property "Character string display form")]
Up to 60 characters can be included in a message. If the specified part size is too small to display 60 characters at a time, the message to display is split. If the message is split (up to four splits), they are displayed in a two-second cycle, and "... (three characters)" is displayed at the split position.
[Example of split message display] When a part of a specified size can display up to 20 characters
(A display in the first cycle)
[After two seconds has passed]
(A display in the second cycle)
[After two seconds has passed]
(A display in the third cycle)
(Note1) The height of the cell is the same as the height of the font.
(Note2) Even when the height of the part is extended, the message is displayed in one line. If the specified height of the part is smaller than the font height, the message is not displayed.
(Note3) The drawing area in a cell (the number of characters to display) is determined depending on the part width. However, if the specified width cannot display the character string of 20 or more characters, the message is not displayed.
(Note4) For a PLC alarm with a classification No., the message and the classification No. are displayed. When "Not display the residual when the message is split" is selected, only the message is split.
(Note5) When "2: Dependent on the parameter setting" is selected, up to 40 characters are displayed for a PLC alarm and operator message at a time, even if the control width is extended enough.
[Alarm display for multiple part system control]
The part system name is displayed at the top of the message. The message is displayed in order from $1.
Part system name
When the message is split, "..." is displayed at the split position.
When the residual message is drawn, the

residual text is displayed after "...".
The residual text is displayed in the same way.
Up to four splits can be carried out.

List of Alarms
Type Character Background Description Priority
NC alarm message White Red An operation alarm, program error, MCP alarm,
servo alarm or system alarm is displayed.
Higher
NC warning message Black Yellow
PLC alarm message White Red A message such as the details of machine error
is displayed by use of user PLC.
Operator message Black Yellow The operator message is displayed by use of
user PLC.
NC alarm message
during background
check
White Orange When a program error occurs during the check,
or when the macro alarm message (a message
displayed with #3000 variable command) is
displayed, the message is displayed.
Lower
(Note 1) When multiple alarms occur simultaneously, up to 10 alarm messages are displayed at
2-second intervals in order of descending priorities (if message text needs to be shortened,
the entire text is displayed first, then truncated, before the next message is displayed).
(Note 2) The character color and background color of the messages are fixed to the above, and
cannot be changed.
[NC alarm message]
[NC warning message]
[PLC alarm message]
[Operator message]
[NC alarm message during background check]

7.3.21 MonitorStatus (GNXMonitorStatus) ; Operation Status Display Part
Operation status is a control that displays the NC operation status. This can display the operation
status separately for each part system when multiple part system control is performed.
7.3.21.1 Property Settings
The property settings for the operation status display are divided into the followings.
Control name : Specify the control name.
Position/size : Specify the position and size of the control.
Color : Specify the display color of the control.
Solid frame : Specify the solid frame of the control.
Character attribute : Specify the character attribute of captions.
Part system
designation
: Specify the part system to be displayed on the control.
Update cycle : Specify the update cycle of the operation status display.
Color type : Specify the color type.
Callback function : Specify whether or not the callback functions are provided.
Display type
Item Description
DispType Specify the display type.
Type1Part system is displayed after "$". (Note)
Type2Part system number is displayed without "$".
(Note) If the number of valid part systems is 1, "$1" is not indicated.
Character attribute
Item Description
FontType Specify the font size and thickness.
NormalNormal font
Normal BoldNormal bold font
MiddleMiddle-sized font
BigFont with double height and width
SystemNameColor Specify the character color of the part system displayed on the control.
(Note) When Type 2 is selected to the display type, the character color is
fixed to black.
Part system designation
Item Description
SystemNumber Specify the No. of the part system to be displayed (0 to 8).
When "0" is set, valid part systems are displayed.
If the setting is greater than the number of valid part systems, the state of
the 1st part system is displayed.
Update Cycle
Item Description
RefreshFrequency Specify the number of times to thin out the timer event processes (1 to
100).
RefreshTiming The display is refreshed when the counted number of "RefreshFrequency"
reaches the number of counts specified with "RefreshTiming" (0 to 99).

Color Type
Item Description
ColorType Specify the color type.
Theme color: Specify the base color designated as the theme color.

Specified color: The colors set for each property are reflected.
Callback Function
Item Description
OnInit Select "Yes" to add a process to be executed after the panel/window is
displayed.
OnQuit Select "Yes" to add a process to be executed before the panel/window is
hidden.
For the other properties, refer to "7.1 Common Functions of Controls".
7.3.21.2 Complements
List of Operation Status
The operation status symbol displayed on the control changes as shown below according to the NC
operation state.
Symbol Operation status Character color
Display type 1 Display type 2
EMG In emergency stop Red White (text)
Red (BG)
RST Resetting NC White White
BST In block stop White White
HLD Operation halted White White
SYN Synchronizing White White
CRS Waiting for cross conversion White White
AUT In automatic operation White White
RDY Operation completed state Green Black (text)
Green (BG)
(Note 1) The character colors for the operation status symbol are fixed as shown above.

7.3.22 Time (GNXTime) ; Time Display Part
The time display part is used to display the current time.
7.3.22.1 Property Settings
The property settings for the time display part are divided into the followings.
Control name : Specify the control name.
Position/size : Specify the position and size of the control.
Color : Specify the display color of the control.
Solid frame : Specify the solid frame of the control.
Character attribute : Specify the character attribute of captions.
Color type : Specify the color type.
Character Attribute
Item Description
FontType Specify the font size and thickness.
NormalNormal font
Normal BoldNormal bold font
MiddleMiddle-sized font
BigFont with double height and width
ForeColor Specify the character color.
Color Type
Item Description
ColorType Specify the color type.
Theme color: Specify the base color designated as the theme color.
Specified color: The colors set for each property are reflected.
For the other properties, refer to "7.1 Common Functions of Controls".
7.3.22.2 Complements
Screen Specifications
Screen Images

7.3.23 Page Change Button (GNCPageChangeButton)
The page change button control is a control to switch screens with key inputs such as menu key,
page switch key, etc., or PLC device turned ON.
7.3.23.1 Property Setup Dialog
Property setup dialog of the page change button control consists of the tabs relating to [Basic
Settings] and [Advanced Settings]. Details of each tab will be described in the following sections.
[Basic Settings] mainly consists of the following three tabs.
No. Tab Description
(1) Behavior Settings Specify the switching destination screen and the action.
(2) Style Set or display the background color, solid frame, blink and preview.
(3) Text Set or display the font, text, scroll and preview.
[Advanced Settings] consists of one tab.
No. Tab Description
(4) Extended Set the item relating to the extended condition for the style or text.
(1)
(2)
(3)
(4)

7.3.23.1.1 [Behavior Settings] Tab
In [Behavior Settings] tab, specify the switching destination screen and the screen switching action,
etc.
No. Item Description
(1) Destination screen Select the switching destination screen among "Fixed screen",
"Standard screen", or "Another project".
(2) Screen No. Specify the screen number of the switching destination.
(3) Touch the screen to switch
screens

Check here to switch the screen by touch gestures.
(4) Enter a key to switch screens Check here to switch the screen by the key operaton.
(5) Key Select a key for switching the screen.
(6) Switch screens at rising edge
of device
Check here to switch the screen by starting the device value.
(7) Device Specify the address of the PLC device for the screen switching.
Click on the "..." button to display the "PLC Device Setting" dialog.
(8) Bit positon Specify the bit position of the word device when the word device
(D/R) is set to the device.
(9) PLC project no. Specify the project number of PLC ladder what PLC device refers.
(8)
(1)
(7)
(2)
(9)
(5)
(4)
(3)
(6)

NOTE
The address of the PLC device can be specified on the "PLC Device Setting".
The method to input [Screen No.] differs depending on the item selected for [Destination screen].
When "Fixed screen" is selected for [Destination screen], specify the screen number of the editing project (0
to 255).
Click on the [Reference] button to display the panel/window list dialog.
When "Standard screen" is selected for [Destination screen], select the screen among MONITOR screen,
SETUP screen, EDIT screen, DIAGN screen, and MAINTE screen.
When "Another project" is selected for [Destination screen], specify the screen number of the other project
(6000 to 9999).

7.3.23.1.2 [Style] Tab
In [Style] tab, specify the style, solid frame, and blink.
No. Item Description
(1) Display type Select the display type among "Square", "Circle", and "Image".
For the items other than the above, refer to "7.1.16.1.1 [Style] Tab".
(1)

7.3.23.1.3 [Text] Tab
In [Text] tab, specify the font, text, and scroll setting.
No. Item Description
(1) OFF=ON When [OFF=ON] is checked, the contents specified in [Text] are
specified to all statuses. When [OFF=ON] is not checked, only the
[Text] of the status selected in [Control state preview] is specified.
(2) Text Specify the display character string. (Note)
(Note) When specifying "Set the style / text to be applied when the focus is on the button" of "7.3.23.1.4
[Extended] Tab", this is disabled. When specifying "Control ON/OFF of button", this is disabled also.
For the items other than the above, refer to "7.1.16.1.2 [Text] Tab".

(2)
(1)

7.3.23.1.4 [Extended] Tab
In [Extended] tab, set whether to set the style or character when the button is selected, controlling
ON/OFF of button, and the interlock device, etc.
No. Item Description
(1) Set the style / text to be
applied when the focus is on
the button
When this is checked, the pattern, foreground color, background
color, and design for when the button is selected (Focus) can be
specified on the [Style] tab and [Text] tab.
(2) Control ON/OFF of button When this is checked, the pattern, foreground color, background
color, design, and solid frame for when the button does not work
(Disable) can be specified on the [Style] tab and [Text] tab.
(3) Device (at the time of
disable)
Specify the address of the PLC device for disabling the button
action.
Click on the "..." button to display the "PLC Device Setting" dialog.
(4) Bit position (at the time of
disable)
Specify the bit position of the word device when the word device is
set to PLC device (at the time of disable).
(5) PLC project No.
(at the time of disable)
Specify the project No. of PLC ladder what PLC device (at the time
of disable) refers.
(6) Control interlock (device1) Check here to specify the operation and the device of the interlock

device 1.
When this is checked, the pattern, foreground color, background
color, design, character strings, character colors, and solid frame at
the interlock can be specified on the [Style] tab and [Text] tab.
(7) Action of interlock device1 Select the operation of interlock device 1 between "ON" and "OFF".
(8) Device (interlock 1) Specify the address of the PLC device for the interlock operation.
Click on the "..." button to display the "PLC Device Setting" dialog.
(9) Bit position (interlock 1) Specify the bit position of the word device when the word device is
set to PLC device (interlock 1).
(10) PLC project No.
(interlock 1)
Specify the project number of PLC ladder what PLC device
(interlock 1) refers.
(11) Control interlock (device2) Check here to specify the operation and the device of the interlock
device 2.
When this is checked, the pattern, foreground color, background
color, design, character strings, character colors, and solid frame at
the interlock can be specified on the [Style] tab and [Text] tab.
(1)
(6)
(2)
(3)
(7)
(8)
(11)
(12)
(13)
(5)
(4)
(10)
(9)
(15)
(14)

No. Item Description
(12) Action of interlock device2 Select the operation of interlock device 2 between "ON" and "OFF".
(13) Device (interlock 2) Specify the address of the PLC device for the interlock operation.
Click on the "..." button to display the "PLC Device Setting" dialog.
(14) Bit position (interlock 2) Specify the bit position of the word device when the word device is
set to PLC device (interlock 2).
(15) PLC project No.
(interlock 2)
Specify the project number of PLC ladder what PLC device
(interlock 2) refers.

7.3.23.1.5 [Open] Tab
In [Open] tab, specify the screen numbers of multiple windows to simultaneously open.
No. Item Description
(1) Number of windows Specify the number of screens enabled to open.
(2) Open window switches between enabled and disabled depending on
the set number of screens.
(2) Open window 1 to 5 Specify the windows to open. Windows open in order from Open window
1.
Target Select Fixed screen or Another project.
Screen No. Specify a screen number.
(1)
(2)

7.3.23.1.6 [Close] Tab
In [Close] tab, specify the screen numbers of multiple windows to simultaneously close.
No. Item Description
(1) Number of windows Specify the number of screens enabled to close.
(2) Close window switches between enabled and disabled depending
on the set number of screens.
(2) Close window 1 to 5 Specify the windows to close. Windows close in order from Close
window 1.
Target Select Fixed screen or Another project.
Screen No. Specify a screen number.
(1)
(2)

7.3.23.2 Property Settings
The property settings of the page change button are divided into the followings.
ID : Specify the control name.
Position/size : Specify the position and size of the control.
Show/Hide : Specify whether the control is displayed or hidden.
Input permission : Select whether the entry is accepted (permission) or rejected (prohibition).
Button type : Select the button action.
Display type : Select the display type of the button.
Page change : Specify items regarding the screen switching.

PLC device : Specify the target PLC device.
Color/pattern : Specify the color and pattern of the control.
Image : Specify the image of the control.
Caption : Specify the caption (character string) displayed on the control.
Character attribute : Specify the character attribute of the caption.
Solid frame : Specify the solid frame of the control.
Caption character
sequence
: Specify the scroll of the caption character string.
Blink
Open/Close
:
:
Specify the blink of the caption character string.
Specify the screen numbers of the windows to simultaneously open/close.
Callback function : Specify whether or not the callback functions are provided.
Item Description
Button type Select the button action between the following two types.
Momentary The button turns ON when it is pressed. It turns OFF when it is released.
None*1 The button does not turn ON or OFF even if it is pressed.
*1: The screen is not switched by turning the button ON/OFF (touching the display or pressing the key). It will be switched when the screen switching by the PLC device met the requirement.
Button Type

Item Description
PageChangeNo (Note 1) Designate the screen number of the destination screen. Select a number from the following.
0-255 : The page number of the customized screen in the
project. "0" is the top page.
1000 : The number of the standard operation screen
2000 : The number of the standard set-up screen
3000 : The number of the standard editing screen
4000 : The number of the standard diagnostic screen
5000 : The number of the standard maintenance screen
6000-9999 : The page number of the customized screen to which
the offset number is added.
If the numbers other than the above (including the view frame) or some
numbers of non-existent screens are set, the screen will not be switched.
Though, the other operations are applied.
FocusMoveToWindow
(Note 2)
Specify whether to move the focus on the window when opening the
window by the screen switching.
WindowClose (Note 3) Specify whether to close the window of the original screen by the screen switching.
InputKeyID (Note 4) Select a key for switching the screen.
When a key selected with this item is pressed, the screen designated with
the destination screen number will be displayed.
* The screen switching with key input will not be performed when "none" is
specified.
(Note 1) For the switching to the standard screen, the operation is the same as when the following is pressed on the standard screen: [MONITOR], [SETUP], [EDIT], [DIAGN], or [MAINTE].
(Note 2) When "Close" is specified for the property "WindowClose", the "FocusMoveToWindow" is disabled and the focus is surely moved onto the window. If the panel is the screen
switching destination, the focus moves onto the panel regardless the property value.
(Note 3) To change to the standard screen from the registered screen for the menu release,
write the process to close the custom screen (the function "GCSMenuSendProcessID"/
GESetEvent, and the user event of the function "GECreateEventMessage"). Do not use
the property "WindowClose" to close the custom screen.
(Note 4) Even if you set MONITOR, SETUP, EDIT, DIAGN, or MAINTE, you still need to specify the destination screen No. in the property "PageChangeNo".
Page Change

PLC Device
Item Description
PageChange device *1 Specify the address of the PLC device for the screen switching.
Switch the screen with starting the designated PLC device.
Action of PageChange device Specify the operation the PLC device specified in the page change device. Set the value from the following.
Read : Read the page change device value turned ON, and
switch the screen.
None : The screen switching using the PLC device will not be
performed.
Bit position of PageChange
device
Specify the bit position of the word device when the word device (D/R) is
set to the page change device. (0 to 15)
Page change device project
No.
Specify the project number of PLC ladder to which the page change
device refers. (0 to 6)
*1: When switching the screen using the page change device, create a ladder that keeps the page change device ON until the page change device turned ON is confirmed by Timer.
The page change device can be performed only when the button is indicated.

Open/Close
Item Description
Number of open windows Specify the number of screens enabled to open. (0-5)
Open window 1 to 5 (*) Specify the windows to open. Windows open in order from Open window
1.
Number of close windows Specify the number of screens enabled to close. (0-5)
Close window 1 to 5 (*) Specify the windows to close. Windows open in order from Close window
1.
(*) The following numbers can be set for screen numbers.
0-255 : The page number of the customized screen in the project. "0" is the top page.
6000-9999 : The page number of the customized screen to which the offset number is added.
If the numbers other than the above (including the view frame), numbers of panel screens, or some
numbers of non-existent screens are set, this function will not be executed.
Refer to "7.3.15 PLC extension button (GNCPLCExButton)" for other properties.

7.3.23.3 Complements
The screen change is carried out by the page change button even when the focus is not on it,
depending on the status of key input, touch screen, and the page change device (at turning ON).
The following table shows the relations between the page change operation and the status of the
page where the page change button is placed.
Screen switching
Page and status
Touch screen Key input
Page change
device
(Note)
Panel Active
Not active
Window Active
Not active
(Note) If the page change button is not displayed or placed outside of the panel, pages are not changed by the
PageChange device. When the button is displayed even if only partially, the page change will be carried
out.
The page change buttons operation can be limited depending on the state of several PLC devices.
Each PLC device has a priority level; therefore the state of a PLC device with a lower priority is not
referred to when a PLC device with a higher priority is active.
The priority order of the PLC devices is determined as shown below.
Priority PLC device
High

Low
Disable device
Interlock device 1/Interlock device 2
Page change device
Operation Condition
Priority of PLC Devices

When the disable device or the interlock device 1/2 is used, the screen switching will be refused
without screen switching operation such as key input, touch, or the status of page change device.

Refusing the screen switching by setting of Disable device (: screen switching activated
: screen switching deactivated)
Disable functions
Enable Disable
Disable device ON Disable device OFF -
Input
Enabled
Disabled
Refusing the screen switching by setting of the interlock device (: screen switching activated
: screen switching deactivated)
Interlock device operations
No operation When ON When OFF
Device
ON
OFF
Refusing the Screen Switching

Multiple windows specified as close window or open window can open or close in a batch.
Execution order
The windows specified as close window close, and then the windows specified as open window
open.
(1) Windows close in the order of Close window 1, Close window 2, Close window 3, Close
window 4, Close window 5.
(2) Windows open in the order of Open window 1, Open window 2, Open window 3, Open
window 4, Open window 5.
(Note 1) When a closed window is specified, the function will not be executed.
(Note 2) When an open window is specified, the function will be executed and the open window
will be displayed at the front.
Layout (display order)
Open window 1 is displayed at the back, and Open window 5 is displayed at the front.
Open window no.1
Open window no.4

Open window no.3
Open window no.2
Open window no.5
Displaying multiple windows in a batch

Settings of windows to open
(1) Set the number of windows to open for Number of open windows.
(2) Set the screen numbers of the windows to open for Open window no.1 to 5.
The number of screens specified for "Number of
open windows" will be enabled.
Example: When "3" is set for "Number of open
windows", Open window no.1 to 3 will be enabled.
Set the screen number of the window to open.
When numbers of panel screens or numbers of non-existent screens
are set, this function will not be executed.
Specified windows open in order from "Open window no.1".
Available screen numbers are as follows.
- Fixed screen: 0 to 255
- Another project: 6000 to 9999

After setting each property, pressing the page change button will open the windows of the
specified screen numbers.
The windows specified for "Open window no. "
open simultaneously. The number of windows
opened is specified in "Number of open
windows".

Settings of windows to close
(1) Set the number of windows (screen numbers) to close for Number of close windows.
(2) Set the screen numbers of the windows to close for Close window no. 1 to 5.
The number of screens specified for Number of
close windows will be enabled.
Example: When 3 is set for Number of close
windows, Close window no. 1 to 3 will be enabled.
Set the screen number of the window to close.
When numbers of panel screens or numbers of non-existent screens
are set, this function will not be executed.
Specified windows close in order from Close window no. 1.
Available screen numbers are as follows.
- Fixed screen: 0 to 255
- Another project: 6000 to 9999

After setting each property, pressing the page change button will close the windows of the
specified screen numbers.
The windows specified for " Close window no."
close simultaneously. The number of windows
closed is specified in " Number of close
windows".

Example of page change/open/close combination
The following table shows the properties of the page change button.
Panel Item Property Value
Panel 1 Page change
button 1
PageChangeNo Screen number of panel 2
WindowClose Close
Open window no.1 Screen number of window 6
Open window no.2 Screen number of window 7
Open window no.3 Screen number of window 8
Open window no.4 Screen number of window 9
Open window no.5 Screen number of window 10
Close window no.1 Screen number of window 1
Close window no.2 Screen number of window 2
Close window no.3 Screen number of window 3
Close window no.4 Screen number of window 4
Close window no.5 Screen number of window 5
Panel 2 Page change
button 2
PageChangeNo Screen number of panel 1
WindowClose Close
Open window no.1 Screen number of window 1
Open window no.2 Screen number of window 2
Open window no.3 Screen number of window 3
Open window no.4 Screen number of window 4
Open window no.5 Screen number of window 5
Close window no.1 Screen number of window 6
Close window no.2 Screen number of window 7
Close window no.3 Screen number of window 8

Close window no.4 Screen number of window 9
Close window no.5 Screen number of window 10
Operation example
(1) Press the page change button 1
in panel 1.
Panel 1 closes, and panel 2 opens.
Windows 1 to 5 close, and windows 6 to 10
open.
(2) Press the page change button 2
in panel 2.
Panel 2 closes, and panel 1 opens.
Windows 6 to 10 close, and windows 1 to 5
open.
Examples of other combinations are shown below.
(1) When placing the page change button in a window and setting the screen number of that
window for Close window no.
All the windows specified for Close window no. including the window that the page change
button is placed close.
(2) When setting the same screen number for "Open window no. " and "Close window no. "
(1) The windows set for Close window no. close.
(2) The windows set for Open window no. open. * When an open window is set, the window will close and reopen.

Dynamically executing the multiple window batch display function
(1) Set Read for the property Action of PageChange device.
(2) The device specified for the property PageChange device switches from OFF to ON.
When PageChange device turns ON while a panel is displayed, the displayed windows will be
switched in a batch.
The device specified for
PageChange device turns ON.
The multiple window batch display
function is executed and the
screens switch.
In the case where the specified device is ON when the screen opens, multiple windows will be
displayed in a batch.
When the device specified for
PageChange device is ON, the
multiple window batch display function
is executed and the screens switch.
Disabling the existing page change function
By setting the values in the table below for properties, the existing page change function will be
disabled.
To use only the multiple window batch display function, set the values in the table below for each
property.
Property Setting value
PageChangeNo
999
(Note) Set the numbers other than the following (including the view
frame) or some numbers of non-existent screens.
- The page number of the customized screen in the project
(0-255)
- The number of the operation screen (1000), set-up screen
(2000), editing screen (3000), diagnostic screen (4000),
maintenance screen (5000)
- The page number of the customized screen to which the
offset number is added (6000-9999)
InputKeyID None
FocusMoveToWindow Not move
WindowClose Not close

(1) In the macro editing, if the OnTimer/OnPress event of the page change button is created, the
screen switching is not operated. To execute the screen switching, write the NormalMethod
function in the OnTimer/OnPress event of the page change button.
(2) In the macro editing, if the OnKeyPress event except the page change button is created, the
screen switching is operated. When the screen is not to be switched, call the NormalMethod
function and return the (1).
(3) In the compilation method, if the OnKeyPress event is implemented on controls except the
page change button, switch "FALSE": passing a key to the page change button or "TRUE": not
passing depending on the return value of OnKeyPress. To apply the screen switching after the
OnKeyPress event process, set "FALSE" to the return value of the OnKeyPress event.
<Example of the basic control: "Menu 1" is set to "Input key" on the property of the page change
button. >
Restrictions

```
long GCPanel00000::GBASICCONTROL00001OnKeyPress(unsigned short usMessage,
long lLParam,long lUParam)
{
// Input judgement of menu 1 key (F1)
if (lLParam == GK_F1)
{
// Designate "FALSE" to the return value and apply the screen switch
return FALSE;
}
 // The screen switch is not applied when it is other keys
return TRUE;
}
```

(4) If the focus is on the Edit control object, the screen switching by key input is not operated.
Put down the process below to apply the screen switching.
The following are examples of the screen switching when F1 key is input.
<Interpreter method>
<Compilation method>
(5) When closing the self screen (window) by operating the page change button allocated on the window, designate a screen number other than that of the self screen (window) for the property "PageChangeNo".
(6) When you click on the screen group display [MONITOR], [SETUP], [EDIT], [DIAGN] or [MAINTE] on the standard screen while focus is on the page change button for which MONITOR, SETUP, EDIT, DIAGN or MAINTE is set in the property "InputKeyID", the click is handled as the key input of the page change button. The display is switched to the destination screen designated in the property "PageChangeNo".

```
$GEdit00000-OnKeyPress
long _lShiftKey; 'SHIFT key input status
long _lMainKey; 'key input
_lMainKey = LLPARAM;
_lShiftKey = LUPARAM & H1;
if((_lMainKey == 112) && (_lShiftKey == 0))  F1 for the operation of the screen switch
button
Normalmethod();  Executes normal method to apply the screen switch
return(0); F1 key is not performed by Edit control but the page change button
Endif
$End
long GCPanel00000::GEDIT00000PreKeyPress (unsigned short usMessage, long
lLParam,long lUParam){
// F1 for switch process of the page change button
if(lLParam == GK_F1) {
// Do not consume the key by Edit control key (implement the page change
button)
return KEYPRESS_BREAK_FALSE;
}
return TRUE;
}
```


7.3.24 Stacked Graph (GNCStackedGraph)

The stacked graph is a control to read NC data in a determined frequency and stack them to show in the bar graph.

7.3.24.1 Property Settings

Property settings for the stacked graph can be categorized as follows:
Control name : Specify the control name.
Position/Size : Specify the displaying position and size of the control
Show/Hide : Specify whether to display the control or not.
Color/Image : Specify the color and image of the control.
NC data : Specify the items related to reading the target NC data.
Graph attribute : Specify the display items: scale (upper limit/lower limit), etc.
Update : Specify the refresh frequency of the NC data display.
Callback function : Specify whether the callback functions are provided or not.

NC Data

Item Description
Number of items Specify the number of items to show in graph.
(1 to 8)
Number of Section Specify the section number of NC data to read.
(0 to 999)
Number of Sub-section Specify the sub-section number (top number) of NC data to read.
(0 to 1000000000)
NumberOfSystems Specify the part system number (top number) of NC data to read.
(1 to 10)
NumberOfAxis Specify the axis number (top number) of NC data to read.
(0 to 32)
Reading method Specify the method to read NC data.
NumberOfAxis/Number of Sub-section/NumberOfSystems
Read offset Specify the offset. (1 to 1000)
Considering the number specified in the reading method as the top number, and designate with the number to be read in the next one.
Data Type Specify the data type of NC data to read.
signed char/unsigned char/signed short/unsigned short/signed long/unsigned long/double

Update

Item Description
RefreshFrequency Specify the number of times to thin out the timer event processes.
(0 to 100)
*The reading is executed only first time when 0 is set.
RefreshTiming The display is refreshed at the moment the counted number of "RefreshFrequency" reached the number of counts specified with "RefreshTiming".
(0 to 99)

Color/Image

Item Description
Display Type Select the background type between the following two types.

Painting
out
Display the background in designated pattern.
Image Display the background in designated image resource.
Design *1 Specify the image.
Pattern *2 Specify the painting pattern.
Foreground color *2 Specify the foreground color.
Background color *2 Specify the background color.
Scale color Specify the scale color.
Graph pattern 1 to 8 *3 Specify the graph pattern for each item.
Graph Foreground color 1 to 8
*3
Specify the foreground color of graph for each item.
Graph Background color
1 to 8 *3
Specify the background color of graph for each item.
Graph frame color Specify the frame color of each item of graph.
*1: This is enabled when [Image] is set in the display type.
*2: This is enabled when [Painting out] is set in the display type.
*3: Graph 1 to 8 are enabled in the range of the number specified in the [Number of items] of NC data property.
Graph Attribute
Item Description
Display direction Specify the bar graph direction; vertical or horizontal.
Scale number Specify the number of scale line. (0 to 101)
Set 0 for the setting without scale line. The interval between scales is
automatically set depending on the number of scales.
Scale width Specify the width of scale. (0 to 1000)
Graph frame Specify the frame enclosing each graph item. (enable/disable)
Scale Min Specify the minimum value of the graph area.
(7999999999.0 to -7999999999.0)
Scale Max Specify the maximum value of the graph area.
(7999999999.0 to -7999999999.0)
Lower Limit Specify the desired value. When the result of accumulation of the graph is
less than the set value, OnLowerLimitOver() is called.
(7999999999.0 to -7999999999.0)
Upper Limit Specify the desired value. When the result of accumulation of the graph is
more than the set value, OnLowerLimitOver() is called.
(7999999999.0 to -7999999999.0)
Sort type Specify the display order of NC data; ascending or descending. If None is
selected, displaying in NC designation order.
Callback Function
Item Description
OnInit Select "Yes" to add the process executing after the panel/window is
displayed.
OnQuit Select "Yes" to add the process executing before the panel/window is
non-displayed.
OnUpperLimitOver (Note) Select "Yes" to add the process executing when the result of accumulation
is greater than the upper limit.
OnLowerLimitOver (Note) Select "Yes" to add the process executing when the result of accumulation
is less than the lower limit.
(Note) If an event occurred and its occurrence condition continues, other events do not occur.
Note that if the setting of "Upper Limit" or "Lower Limit" is changed, the other continuous conditions
are released.
Refer to "7.1 Common Functions of Controls" for other properties.

7.3.24.2 Complements
Examples of Graphs

The following are NC data, set values of graph attribute, and readout NC data. (The value of NC
data read includes minus values.)
Data
number
Reading
value
Back/foreground
color of graph
Patterns
supported for
the following
Sub-section
1 50 Violet 90000
2 10 Deep blue 90001
3 -30 Blue 90002
4 20 Green 90003
Setting items Value
Number of items 4
Scale Min -100
Scale Max 100
Number of
Section
55
Number of
Sub-section (top)
90000
Read offset 1
Reading method 1

In order of the readout items, the bar is cumulated up from 0 for a positive value, and cumulated downward from 0 for a negative value.
(Horizontal type: left side for the negative value and right side for the positive value)
Data 4: area of 20
Data 2: area of 10
Data 1: area of 50
Data 3: area of -30
Scale Min: 100
Middle value: 0
Scale Max : -100

Restrictions
(1) If a program of which the OnTimer() event created in macro editing is executed, the callback function (OnLowerLimitOver/OnUpperLimitOver) is not executed. To create OnTimer() event and read NC data in designated frequency, write the "NormalMethod()" function in the OnTimer() event of macro program.
NOTE
Graph is drawn in the range of the "Scale Max" and "Scale Min". Modify the setting of the "Scale Max" and the "Scale Min" to draw a graph over their ranges.

7.3.25 Statistics Graph (GNCStatisticsGraph)
The statistics graph is a control to read NC data in a determined frequency and show them by pie chart or band chart in the ratio to the entirety.
7.3.25.1 Property Settings
Property settings for the statistics graph can be categorized as follows:
Control name : Specify the control name.
Position/Size : Specify the displaying position and size of the control
Show/Hide : Specify whether to display the control or not.
Color/Image : Specify the color and image of the control.
NC data : Specify the items related to reading the target NC data.
Graph attribute : Specify the display items: scale (upper limit/lower limit), etc.
Update : Specify the refresh frequency of the NC data display.
Callback function : Specify whether the callback functions are provided or not.
Graph Attribute
Items Descriptions
Graph type Select "Pie chart" or "Band chart".
Display direction Specify the band chart direction; vertical or horizontal.
This is enabled when "Band chart" is selected for "Graph type" in the properties.
Refer to "7.3.24 Stacked Graph" for other properties.

7.3.25.2 Complements
Examples of Graphs
The following are NC data, set values of graph attribute, and NC data read. (The value of NC data read includes minus values.)
The read NC data items are shown in the absolute value.
<Statistics pie chart>
Statistics pie chart is drawn clockwise from 0 in order of the items read.
Data 1: area of 50
Data 2: area of 10
Data 3: area of -30
Data 4: area of 20
<Statistics band chart>
Statistics band chart is drawn upward from the bottom in order of the items read.
(Horizontal type: drawn from left side to right side.)
100
0
Data 4: area of 20
Data3: area of -30
Data 2: area of 10
Data 1: area of 50
Data
number
Reading
value
Back/foreground
color of graph
Patterns
supported for
the following
Sub-section
1 50 Violet 90000
2 10 Deep blue 90001
3 -30 Blue 90002
4 20 Green 90003
Setting items Value
Number of items 4
Scale Min -100
Scale Max 100
Number of
Section
55

Number of
Sub-section (top)
90000
Read offset 1
Reading method 1

Restrictions
(1)To create the OnTimer() event using macro edit and read NC data in designated frequency, write the "NormalMethod()" function in the OnTimer() event.
NOTE
The graph can contain maximum 32 items using functions.
Set the items using related functions and modify the number of items using the function GCSNCGraphSetItemNum().
If the number of items is modified to nine or more, specify the background color using the function "GCSNCGraphSetGraphBackColor()" and the foreground color using the function "GCSNCGraphSetGraphForeColor()" for the ninth item or later.
This method of modification is enabled while the screen is displayed.

7.3.26 Alarm List (GNCAlarmList)
The alarm list control can display a list of currently occurring alarms on the custom screen.
The displayed messages include the NC messages, stop codes, alarm messages, operator messages, etc.
A history of alarm information (NC messages and alarm messages) can be displayed also.
7.3.26.1 Property Setup Dialog
Property setup dialog of alarm list control consists of the tabs relating to [Basic Settings] and [Advanced Settings]. Details of each tab will be described in the following sections.

[Basic Settings] consists of three tabs.
No. Tab Description
(1) Alarm Settings Set the item relating to the alarm display.
(2) Style Set the background color;
(3) Text Set the font, and text.
[Advanced Settings] consists of one tab.
No. Tab Description
(4) Extended Set the item relating to the message conversion, and operation.
(1)
(2)
(3)
(4)

7.3.26.1.1 [Alarm Settings] Tab
In [Alarm Settings] tab, specify the display target of the alarm, the number of the display lines etc.
No. Item Description
(1) Display target Select the display target between "Alarm list" and "Alarm history".
(2) Alarm to display Select the alarm type to display among "NC message", "Stop code", "Alarm message" and "Operator message".
(Note) This item cannot be set if "Alarm history" is selected for the display target. In this case, the history of NC message and alarm message is displayed.
(3) Number of display lines Specify the number of lines to display in one page.
(4) Display spacing Specify the spacing between the alarm message and the boundaryline.
(5) Divide NC message into 2 lines
Place a check mark here to divide the NC message into 2 lines.
(6) Show title Place a check mark here to show the title part.
(7) Preview Display the window to check the specified property design.
NOTE
The alarm to display and the page no. are displayed on the title part.

(1)
(2)
(3)
(4)
(5)
(6)
(7)
Alarm to display Page No.

7.3.26.1.2 [Style] Tab
In [Style] tab, specify the background color.
No. Item Description
(1) Title Specify the background color of the title.
(2) Page number Specify the background color of the page number.
(3) Message area Specify the background color of the message area.
(4) Message area boundary Specify the background color of the message area boundary.
(5) NC Alarm Specify the background color of the NC alarm message.
(6) NC Warning Specify the background color of the NC warning message.
(7) Stop code Specify the background color of the stop code message.
(8) Alarm message Specify the background color of the alarm message.

(9) Operator message Specify the background color of the operator message.
(10) NC alarm at background
check
Specify the background color of the NC alarm message during the
background check.
(9)
(1)
(2)
(3)
(4)
(5)
(6)
(7)
(8)
(10)

7.3.26.1.3 [Text] Tab
In [Text] tab, specify the font and the character color.
No. Item Description
(1) Title Specify the character color of the title.
(2) Page number Specify the character color of the page number.
(3) NC Alarm Specify the character color of the NC alarm message.
(4) NC Warning Specify the character color of the NC warning message.
(5) Stop code Specify the character color of the stop code message.
(6) Alarm message Specify the character color of the alarm message.
(7) Operator message Specify the character color of the operator message.
(8) NC alarm at background
check
Specify the character color of the NC alarm message during the
background check.
For the items other than the above, refer to "7.1.16.1.2 [Text] Tab".
(1)
(2)
(3)
(4)
(5)
(6)
(7)
(8)

7.3.26.1.4 [Extended] Tab
In [Extended] tab, specify the message conversion and operation.
No. Item Description
(1) Convert macro alarm
message
Place a check mark here to convert the macro alarm message (NC
message of P277).
Refer to "7.3.26.3. Complements Message Conversion" for the
method of converting macro alarm message.
(Note) Macro alarm message cannot be converted when there is
no message definition file. Create a message definition file.
Refer to "7.3.26.3. Complements Message Definition File
Description Method" for the description method.
(2) Folder to store message file Select the folder that stores the message definition file. Select from
MESSDATA0 to MESSDATA7.
(3) Enable touch gestures Place a check mark here to accept a touch gesture operation.
(1)
(2)
(3)

7.3.26.2 Property Settings
Property settings for the alarm list can be categorized as follows:
Control name : Specify the control name.
Position/Size : Specify the position and size of the control.
Show/Hide : Specify whether to display the control or not.
Font : Specify the font for the character string displayed in the control.
Display type : Specify the alarm to be displayed on the control.
Title : Specify items regarding the title.
Message area : Specify items regarding the message area.
Operation : Specify the operation of the control.
Callback function : Specify whether the callback functions are provided or not.
Message File
Item Descriptions
Message folder Select the folder in which the message definition file is stored among
MESSDATA0 to MESSDATA7.
(Initial value: MESSDATA0)
* For details of the message file, refer to 7.3.26.3 Complements.
Display Type
Item Descriptions
Display target Select the display target between Alarm list and Alarm history.
(Initial value: Alarm list)
Display type *1 Select the display type among NC message, Stop code, Alarm message, or

Operator message.
(Initial value: NC message)
*1 Enabled when Alarm list is selected for the display target.
NOTE
When Alarm history is selected for the display target, the history of NC messages and alarm messages is displayed regardless of the display type setting.
Font
Item Descriptions
Font *1 Select the font resource ID for the character string displayed in the control.
*1 Row heights of the title, list area, and history area are displayed according to the font size.
The display width of the massage is also displayed according to the font size.
When adopting XGA/VGA size, adjust the display by specifying the font size.

Title
Item Descriptions
Title *1 Select the display of the title between "Yes" and "No". (Initial value: Yes)
Title character color Specify the title character color to be displayed in title.
Title background color Specify the title background color.
Page number character color
Specify the page number character color.
Page number background color
Specify the page number background color.
*1 Title will be displayed as follows depending on the "Title" setting.
Setting value: Yes (with title)
Setting value: No (without title)
Message Area
Item Descriptions
Number of display lines *1 Specify the number of display message lines in one page. (0 to 30)
Display spacing *2 Specify the spacing between displayed character string and boundary. (0 to 36)
2-line display Select whether to display the NC message in two lines. (Initial value: No)
Message conversion Select either Yes/No the macro alarm message (P277 NC message).(Initial value: No)
*1 Number of display lines may be less than the setting value depending on the "HEIGHT" setting.
*2 Display spacing is applied to the lines of message area, but is not applied to title.
Macro alarm message Display spacing is applied to the space on the upper side and lower side.
Boundary
Boundary
Title
Page number

Color
Item Descriptions
Background color in message area
Select the background color for lines without alarm display in message area.
Boundary color in message area
Specify the color for ruler between the rows.
NC alarm character color Select the character color for NC message (alarm).
NC alarm background color Select the background color for NC message (alarm).
NC warning character color Select the character color for NC message (warning).
NC warning background color
Select the background color for NC message (warning).
Stop code character color Select the character color for stop code.
Stop code background color
Select the background color for stop code.
Alarm message character color
Select the character color for alarm message.
Alarm message background color
Select the background color for alarm message.
Operator message character color
Select the character color for operator message.
Operator message background color
Select the background color for operator message.
NC alarm character color during background check
Select the character color for NC alarm during background check.
NC alarm background color during background check
Select the background color for NC alarm during background check.
Operation
Item Descriptions
Touch gesture Select whether to accept (permit) or reject (prohibit) a touch gesture operation. (Initial value: Prohibition)

NOTE

When accepting (permitting) a touch gesture operation, display contents can be scrolled by the following operations.

- Pan (Run your fingertip along the screen)

The touched line is scrolled along your finger motion (Vertical direction).

- Flick (Quickly run your fingertip along the screen)

The screen is scrolled with inertia in the direction of your finger sweep (Vertical direction).

Callback Function

Item Descriptions

OnInit Select "Yes" to add a process to be executed after the panel/window is displayed.

OnQuit Select "Yes" to add a process to be executed before the panel/window is hidden.

For the other properties, refer to "7.1 Common Functions of Controls".

7.3.26.3 Complements

Alarm List

Information displayed in the alarm list is as follows.

(1) NC Message

No. Item Description

(a) Alarm class Alarm class is displayed. 4 one-byte characters

(b) Alarm message Alarm message is displayed. 30 one-byte characters (15 two-byte characters)

(c) Parameter 1 Alarm number, alarm class, and axis name or axis number are displayed.

(d) Parameter 2 12 one-byte characters for each item

(e) Part system The part system name is displayed. 4 one-byte digits

* One-byte space is inserted between the items.

(2) Stop code

No. Item Description

(a) Alarm class Alarm class is displayed. 4 one-byte characters

(b) Alarm message Alarm message is displayed. 30 one-byte characters (15 two-byte characters)

(c) Parameter 1 Alarm number, alarm class, and axis name or axis number are displayed.

(d) Parameter 2 12 one-byte characters for each item

(e) Part system The part system name is displayed. 4 one-byte digits

* One-byte space is inserted between the items.

Display target Display type Displayed contents Number of display

Alarm list

NC message

An operation alarm, program error, MCP alarm, servo alarm or system alarm is displayed. Messages are displayed in order of priority.

Max. 10

Stop code

The automatic operation status or stop status during automatic operation are displayed.

Messages are displayed in order of priority.

Max. 4

Alarm message

A message such as the details of machine error is displayed by use of user PLC. Max. 4

Operator message

The operator message is displayed by use of user PLC.

Macro alarm messages are also displayed in this field. Max. 4

Title

Message area

Title Page number

(a) (b) (c) (d) (e)

Alarm

(a) (b) (c) (d) (e)

Warning

(3) Alarm message

- With alarm class display (When #1263 bit2 is OFF)
- Without alarm class display (When #1263 bit2 is ON)

No. Item Description

(a) Alarm class Alarm class is displayed. 5 one-byte characters

(b) Alarm message PLC alarm message is displayed.

46 one-byte characters (23 two-byte characters)

(c) Parameter Parameter is displayed. 12 one-byte characters

(d) Blank

* One-byte space is inserted between the items.

(4) Operator message

- With alarm class display (When #1263 bit2 is OFF)
- Without alarm class display (When #1263 bit2 is ON)

No. Item Description

(a) Alarm class Alarm class is displayed. 5 one-byte characters

(b) Alarm message Operator message is displayed.

60 one-byte characters (30 two-byte characters)

(c) Parameter Parameter is displayed. 12 one-byte characters

(d) Blank

* One-byte space is inserted between the items.

(b) (c) (d)
(a) (b) (c)
(b) (c) (d)
(a) (b) (c)

Alarm History
Information displayed in the alarm history is as follows.
(1) NC Message
No. Item Description
(a) Date Date of the alarm occurrence is displayed.
2 one-byte characters for month and date (MMDD)
(b) Time Time of the alarm occurrence is displayed.
2 one-byte characters for time:minute:second (HH:NN:SS)
(c) Alarm class Alarm class is displayed. 4 one-byte characters
(d) Alarm message Alarm message is displayed. 30 one-byte characters (15 two-byte characters)
(e) Alarm data 1 Alarm number, alarm class, and axis name or axis number are displayed.
(f) Alarm data 2 12 one-byte characters for each item
(g) Part system The part system name is displayed. 4 one-byte digits
* One-byte space is inserted between the items.
(2) Alarm message
No. Item Description
(a) Date Date of the alarm occurrence is displayed.
2 one-byte characters for month and date (MMDD)
(b) Time Time of the alarm occurrence is displayed.
2 one-byte characters for time:minute:second (HH:NN:SS)
(c) Fixed character
string
Fixed to "PLC". 3 digits
(d) Alarm message Alarm message is displayed.
Up to 30 one-byte characters (15 two-byte characters)
(e) Message
number
0 to 1023, 12 one-byte characters (and space after the character)
(f) Classification
number
-32768 to 32767, 0 is not displayed.
12 one-byte characters (and space after the character)
(g) (Blank) 4 one-byte digits
* One-byte space is inserted between the items.
Display target Displayed contents Number of
display
Alarm history Alarm information (NC message and alarm message) that occurred
is displayed. Max. 512
Alarm
Warning
(a) (b) (c) (d) (e) (f) (g)
(a) (b) (c) (d) (e) (f) (g)
Title Page number
Title
Message area

The alarm message for the macro alarm displayed on the alarm list or alarm history (the NC message of alarm class P277) can be changed to the message for each arbitrary parameter 1 (alarm number) *1. To convert the message with an alarm list part, prepare a message definition file. For the format, refer to Message Definition File Description Method.
*1 In the alarm history, alarm data 1 (alarm number)
The following is a conversion example of the macro alarm message occurred while displaying the alarm list.
(Before conversion)
(Description example of message definition file)
(After conversion)
Message Conversion
30,"","Bit number out of range"
The NC message P277 is
targeted.
Acquire the message defined by the
displayed alarm number (30)
Convert Read

The message definition file to be used in the alarm list part (MACRO_ALMSG.TXT) must be described by Unicode (UTF-16: little-endian with BOM) text.
Up to 1000 of message can be included in the file, when one message is regarded as one line.
It is possible to describe messages in more than one language in the message definition text file.
Use a comma (,) to separate each item.
The following items are described in the message definition file.
Item Setting value Description
Alarm number 1 to 9999 Describe the alarm number of the macro alarm message
(parameter 1 of the NC message) in a decimal number.
When the value exceeds the setting range, the message is
not converted.
Message
character
string

30 one-byte characters
per one language
(15 two-byte
characters)
Describe the message character string.
Enclose the message with double quotations (").
If you wish to describe a double quotation (") or back slash
(\), use "\"" or "\\".
For the unused languages, insert delimiters (commas (,)) to the omitted languages to align the languages and message positions.
To use the message character strings in English, Japanese, French and Portuguese, describe as follows.
(Example) 1,"english","japanese",,"franais",,,,,"portugus"
NOTE

To describe messages in more than one language, the messages are described in the following order.
1: English 2: Japanese 3: German 4: French 5: Italian
6: Spanish 7: Chinese
(traditional)
8: Korean 9: Portuguese 10: Dutch
11: Swedish 12: Hungarian 13: Polish 14: Chinese
(simplified)
15: Russian
16: Turkish 17: Czech 18: Indonesian
The language to display messages is changed according to "#1043 lang (Select language displayed)" [base common parameter].
When a language is switched to the one in which messages are not described, the messages are not converted.
If a semicolon (;) is described at the top of the line, the line is handled as a comment line.
When the message conversion is used for multiple controls, select the same message folder.
When the registration exceeds 1000, the messages are not converted.
The size of the message definition file should be 100K byte or less.
When using the custom release file setting function, store the created message definition file (MACRO_ALMSG.TXT) in the project folder of the project being edited.
Message Definition File Description Method

When the macro process is added, the displayed alarm information is acquired and the related information can be displayed with an HTML browser part, etc.
The following is the example of displaying the HTML file (P277_120.htm) information with the HTML browser part by acquiring the alarm information and displaying the window while a macro alarm of the NC message (the alarm class is "P277" and the parameter 1 (alarm number) is "120") occurs.
< Interpreter method >
Detailed Display of the Alarm
(Panel00000)

```
$GNCAlarmList00000-OnCreate
 GMEM mem;
 'Create the global memory
 mem = GMEMCreate("ALINFO", 256);
$End
$GNCAlarmList00000-OnPress
 GMEM mem;
 LONG lSel;
 LONG lReturn;
 STRING strFile;
 STRING strAlInfo(2);
 ' Execute the normal process
 NormalMethod();
 ' Acquire the selected line number
 lSel = GCSNCAlarmListGetSelectLine(-1, "GNCAlarmList00000");
 ' Acquire the alarm information of the selected line (alarm class and parameter 1)
 lReturn = GCSNCAlarmListGetAlarmInfo(-1, "GNCAlarmList00000", lSel, H5, strAlInfo);
 ' Create HTML file name ("P277_120.htm")
 strcpy(strFile, strAlInfo(0));
 strcat(strFile, "_");
 strcat(strFile, strAlInfo(1));
 strcat(strFile, ".htm");
 ' Select the global memory and specify the HTML file name
 mem = GMEMSelect("ALINFO");
 GMEMSetString(mem, 0, strFile);
$End
```

(Panel00000) (Panel00000)
(1) Select the line. (OnPress)
(2) Press the button. (OnClick)
(3) The window appears.
The contents of
"P277_120.htm" is displayed
with the HTML browser
(Window00001)

NOTE

To acquire the selected line number at the execution of the OnPress event of the alarm list part, describe "NormalMethod()" function beforehand in the OnPress event of the the macro editing.

```
(Window00001)
$GBasicControl00002-OnTimer
 STRING strFile;
 GMEM mem;
 if (@100 == 0)
 ' Acquire the HTML file name created from the alarm information
 mem = GMEMSelect("ALINFO");
 strFile = GMEMGetString(mem, 0);
 ' Specify the HTML file name to display on the HTML browser
 GCSHtmlbrowserSetHtmlFileName(-1, "GHtmlBrowser00000", strFile);
 @100 = 1;
 endif
$End
$GButton00001-OnClick
 GCSCloseGWindow(1);
$End
$GButton00001-OnClick
 @100 = 0;
 ' Display Window00001
 GCSCreateGWindow(1);
$End
$GNCAlarmList00000-OnDelete
 GMEM mem;
 ' Delete the global memory
 mem = GMEMSelect("ALINFO");
 GMEMDelete(mem);
$End
(Panel00000)
```


< Compilation method >

```
(Window00001)
(Window00001)
(Panel00000)
GTCHAR gstrFile[20] = {0};
long GCPanel00000::GNCALARMLIST00000OnPress(unsigned short usMessage, long lLParam, long
lUParam)
{
 short nIndex;
long lSel;
long lResult;
GTCHAR gstrAlInfo[2][20] = {0};
WSTRINGTYPE wStr[2] = {0};
GBaseObject *pPanel = GetGBaseObject();
GBaseObject *pAlList = GCSGetChild(pPanel, GNCALARMLIST00000);
 // Setting of the structure for acquiring the alarm information (setting of the size and the alarm
information storage area)
for (nIndex = 0; nIndex < 2; nIndex++)
 {
 wStr[nIndex].lBuffSize = 20;
 wStr[nIndex]. lpszBuff = &gstrAlInfo[nIndex][0];
}
// Acquire the selected line number
lSel = GCSNCAlarmListGetSelectLine(pAlList);
// Acquire the alarm information of the selected line (alarm class and parameter 1)
lResult = GCSNCAlarmListGetAlarmInfo(pAlList, lSel, 0x00000005, wStr);
// Create HTML file name ("P277_120.htm")
_sgtprintf(gstrFile, TEXT("%s_%s.htm"), &gstrAlInfo[0][0], &gstrAlInfo[1][0]);
return TRUE;
}
long GCPanel00000::GBUTTON00001OnClick(unsigned short usMessage, long lLParam, long lUParam)
{
// Display Window00001
GCSCreateGWindow(GCSGetScreen(GetGBaseObject()), 1);
return TRUE;
}
extern GTCHAR gstrFile[20];
long GCWindow00001::GHTMLBROWSER00000OnInit(unsigned short usMessage, long lLParam, long
lUParam)
{
 GBaseObject *pPanel = GetGBaseObject();
GBaseObject *pHtml = GCSGetChild(pPanel, GHTMLBROWSER00000);
// Specify the HTML file name to be displayed on the HTML browser
GCSHtmlbrowserSetHtmlFileName(pHtml, gstrFile);
return TRUE;
}
```



```
(Window00001)
long GCWindow00001::GHTMLBROWSER00000OnInit(unsigned short usMessage, long lLParam, long
lUParam)
{
GBaseObject *pPanel = GetGBaseObject();
GBaseObject *pHtml = GCSGetChild(pPanel, GHTMLBROWSER00000);
```

// Specify the HTML file name to be displayed on the HTML browser
GCSHtmlbrowserSetHtmlFileName(pHtml, gstrFile);
return TRUE;
}

7.3.26.4 Restrictions
NC alarms (alarms and warnings) and alarm messages recorded on the history are displayed in the alarm history. The following messages are not recorded in the history.
- Operation alarm
External interlock axis exists (M01 0004)
Cutting override zero (M01 0102)
External feed rate zero (M01 0103)
Block start interlock (M01 0109)
Cutting block start interlock (M01 0110)
Rapid traverse override zero (M01 0125)
Sp-Sp polygon (G51.2) cut interlock (M01 1033)
- "U50 PLC stopped" before the HMI screen starts up
- Stop code
- Operator message

7.3.27 Meter (GNCMeter)
The meter part enables the reading of NC data such as spindle information etc. at specified cycle, and displays it as a meter on the custom screen. This part also gives a visual confirmation of the changes and the status of the values.
"Bar(horizontal)", "Bar(vertical)" or "Sector" can be selected for the shape by property setting.
Meter is the control dedicated to M800/M80 Series.
< Image >
- Bar(horizontal) - Bar(vertical) - Sector

7.3.27.1 Property Setup Dialog
Property setup dialog of the meter part consists of the tabs relating to [Basic Settings] and [Advanced Settings]. Details of each tab will be described in the following sections.
[Basic Settings] consists of one tab.
No. Tab Description
(1) Device/Style Set or display the NC data, display design and preview.
[Advanced Settings] consists of one tab.
No. Tab Description
(2) Extended Specify the refresh cycle and refresh timing of the data.
(1)
(2)

7.3.27.1.1 [Device/Style] Tab
In [Device/Style] tab, specify the target NC data, monitoring range, and style etc.
No. Item Description
(1) NC Data Specify the sec/sub-sec number of the NC data to read.
(Section No.: 0 to 999, sub-section No.: 0 to 1000000000)
(2) Description Display the description of the sec/sub-sec data corresponding to the NC data candidate.
(3) Part System Number Specify the No. of the part system to which the NC data to read belongs.
(1 to 10)
(4) Axis Number Specify the No. of the axis to which the NC data to read belongs.
(0 to 32)
(5) Data Type Specify the type of the NC data to read.
(signed char, unsigned char, signed short, unsigned short, signed long, unsigned long, double)
(6) Upper Limit Specify the upper limit of the data range.
(-7999999999.0 to 7999999999.0)
(7) Boundary Value 1 Place a check mark here to display the upper data area.
When this item is checked, the color of the boundary value and the upper area can be set. (-7999999999.0 to 7999999999.0)
(8) Boundary Value 2 Place a check mark here to display the middle data area.
When this item is checked, the color of the boundary value and the middle area can be set. (-7999999999.0 to 7999999999.0)
(9) Lower Limit Specify the lower limit of the data area and the color of the lower area.
(-7999999999.0 to 7999999999.0)
(10) Scale Display Place a check mark here to display the scale.
When this item is checked, the color of the scale can be set.
(11) Scale Points Specify the number of scale points. (2 to 101)
(1)
(3)
(6)
(7)
(8)
(9)
(16)
(17)
(19)
(20)

(21)
(22)
(23)
(24)
(2)
(11)
(4)
(5)
(13)
(14)
(15)
(25)
(26)
(10)
(12)
(18)

No. Item Description
(12) Scale Numeric Display Place a check mark here to display the scale numeric value.
When this item is checked, the color of the scale numeric value can
be set.
(13) Numerical Value Specify the number of numerical values displayed on the scale. (2
to 101)
(14) Lower Limit (scale value) Specify the lower limit value of the scale numeric value.
(-7999999999.0 to 7999999999.0)
(15) Upper Limit (scale value) Specify the upper limit value of the scale numeric value.
(-7999999999.0 to 7999999999.0)
(16) Meter Shape Select the meter shape among "bar(horizontal)"/"bar(vertical)"/
"Sector"/"Image".
(17) Beginning Angle Specify the beginning angle only when the "Sector" in "Meter
Shape" is selected. (0 to 359)
(18) End Angle Specify the end angle only when the "Sector" in "Meter Shape" is
selected. (0 to 359)
(19) Range Width Specify the meter range width only when the "Sector" in "Meter
Shape" is selected. (0 to 100)
(20) Meter Frame Place a check mark here to display the meter frame.
When this item is checked, the color of the meter frame can be set.
(21) Bar Background Color Specify the background color of the bar.
(22) Background Color Place a check mark here to paint out the background.
When this item is checked, the color of the background can be set.
(23) Data Display Place a check mark here to display the NC data on the meter.
When this item is checked, the data display unit and the color of the
data character can be set.
(24) Data Display Unit When the data display is checked, the data unit to display can be
set.
(25) Preview Check the design of the specified property.
(26) Sample Value Display an arbitrary NC data value while designing.
(-7999999999.0 to 7999999999.0)

NOTE
Press the "" button beside the NC data field for advanced settings.
No. Item Description
(1) Section Number Specify the section number of the NC data to read. (0 to 999)
(2) Sub-Section Number Specify the sub-section number of the NC data to read. (0 to
1000000000)
This can also be set with input assist function.
Refer to "7.1.16.4 Input Assist Function" for details.
The following can be set on the monitoring range settings
- Bar(horizontal) - Sector
The following can be set on the style settings.
- Bar(horizontal) - Sector
Boundary value 1
Boundary value 2
Lower data area color
Middle data area color
0 10
0
Boundary value 1
Lower data area color Upper data area color
Middle data area color
Boundary value 2
Upper data area color
Meter frame
Bar
background
0 100 color
1000.0 r/min
Data value, data display unit
Background color
End angle
Bar
background
color
Meter

frame
Background
color
Range width
1000.0
r/min
Beginning angle
0
Data value, data display unit

The following can be set on the scale settings.
"Design" and "Data display position" can be selected when "Image" is selected on "Meter Shape".
0
Lower limit of the scale numeric value
100
Upper limit of the scale numeric value
Scale
0
100
Lower limit of the scale numeric value
Upper limit of the scale numeric value
Scale

7.3.27.1.2 [Extended] Tab
In [Extended] tab, specify the refresh cycle and refresh timing of the data.
No. Item Description
(1) Refresh Cycle Specify the number of times to thin out the timer event processes
(0 to 100).
* The reading is executed only first time when 0 is set.
(2) Refresh Timing The display is refreshed at the moment when the counted number
of "RefreshFrequency" reaches the number of counts specified
with "RefreshTiming" (0 to 99)
(1)
(2)

7.3.27.2 Property Settings
Property settings for the meter part can be categorized as follows.
Control name : Specify the control name.
Position/Size : Specify the displaying position and size of the control.
Address/NC data : Specify the setting relating to the NC data reading.
Monitoring Range : Specify the input range of NC data, and boundary values.
Style : Specify items regarding the meter shape and color.
Scale : Specify items regarding the scale display.
Data Display : Specify items regarding the display of the NC Data values.
Refresh : Specify items regarding the refresh cycle of the NC data.
Callback function : Specify whether the callback functions are provided or not.
Address/NC data
Item Description
Number of systems Specify the No. of the part system to which the NC data to read belongs.
(1 to 10/initial value: 1)
Number of axis Specify the No. of the axis to which the NC data to read belongs.
(0 to 32/initial value: 0)
Number of section Specify the section number of the NC data to read.
(0 to 999/initial value: 0)
Number of sub-section Specify the sub-section number of the NC data to read.
(0 to 1000000000/initial value: 0)
Data type Specify the data type of the NC data to read.
(signed char, unsigned char, signed short, unsigned short, signed long,
unsigned long, double)

Monitoring Range
Item Description
Presence or absence of
boundary value 1
Select the presence of the boundary value of the upper data area.
Select from "Yes" and "None".
(Initial value: "None")
Boundary value 1 Specify the boundary value of the upper data area.
(-7999999999.0 to 7999999999.0/initial value: 70.0)
Presence or absence of
boundary value 2
Select the presence of the boundary value of the middle data area.
Select from "Yes" and "None".
(Initial value: "None")
Boundary value 2 Specify the boundary value of the middle data area.
(-7999999999.0 to 7999999999.0/initial value: 60.0)
Lower limit Specify the lower limit of the data area.
(-7999999999.0 to 7999999999.0/initial value: 0.0)
Upper limit Specify the upper limit of the data area.
(-7999999999.0 to 7999999999.0/initial value: 100.0)

- Bar(horizontal) - Sector
Middle data area
0
Boundary value 2
10
Upper data area
Boundary value 1
Lower data area
Boundary value 1
Lower data area
Boundary value 2
Middle data area Upper data area

Style
Item Description
Meter shape Specify the meter shape.
(bar(horizontal), bar(vertical), sector, image/initial value: Sector)
Display type Select the display type.
(Painting out, no painting out/initial value: No painting out)
Presence or absence of meter
frame
Select the presence of the meter frame display. Select from "Yes" and
"None".(Initial value: "None")
Meter frame color Specify the meter frame color.
Background color Specify the background color of the control.
Bar background color Specify the background color of the bar.
Upper area color Specify the color of the upper data area.
Middle area color Specify the color of the middle data area.
Lower area color Specify the color of the lower data area.
Beginning angle*1 Specify the beginning angle of the meter. (0 to 359/initial value: 45)
End angle*1 Specify the end angle of the meter. (0 to 359/initial value: 315)
Range width*1 Specify the range width of the meter. (0 to 100/initial value: 10)
Design(Animation)*2 Specify the image to display on the control.
*1 This applies when "Meter Shape" is "Sector". If the "End Angle" is equal or smaller than the "Beginning
Angle", an initial value is applied.
*2 This applies when "Meter Shape" is "Image". Property items (except for "Display Type" and "Background
Color") of the style group and the scale/scale numeric value group are not used.
- Bar(horizontal) - Sector
- When meter shape is Image
Background color
Middle area color
0
Upper area color
10
Lower area color Bar
background
color
Meter frame
Background color
Beginning angle
Meter frame
End angle
0
Middle
area color
Lower
area color
Background
color
Bar
background
color
Range width
Design(Animation)
Upper area color

Scale/scale numeric value
Item Description
Scale display Select the presence of the scale display. Select from "Yes" and "None".
(initial value: "None")
Scale color Specify the scale color.
Scale points Specify the number of the scale points. (2 to 101/initial value: 11)
Scale numeric display Select the presence of the scale numeric display. Select from "Yes" and
"None". (initial value: "None")
Numerical color Specify the numerical value color.
Numerical value Specify the number of the numerical values displayed on the scale (2 to
101/initial value: 11)
Lower limit Specify the lower limit value of the scale numeric value.
(-7999999999.0 to 7999999999.0/initial value: 0.0)
Upper limit Specify the upper limit value of the scale numeric value.
(-7999999999.0 to 7999999999.0/initial value: 100.0)
- Bar(horizontal) - Sector
0 10
Scale numerical value Scale Scale numerical value

0
100
Scale
Scale numerical value

Data Display
Item Description
Data display*1 Select the presence of the data value display. Select from "Yes" and
"None". (initial value: "None")
Data display unit Specify the data value unit.
Data text color Specify the color of the data value and unit.
Data display position*2 Select the position to display the data value if "Meter Shape" in the style
group is "Image" (Center, Right, Left, Top, Bottom/initial value: Center)
Sample value*3 Display an arbitrary NC data value while designing.
(-7999999999.0 to 7999999999.0/initial value: 80.0)
*1 If "Data Type" is "double", the value is displayed with one decimal place. If "Data Type" is not "double", the
value is displayed as an integer. If the NC data value is outside the monitoring range, or if the aquisition of
the NC data fails, the data value will be displayed with the number of "*" equivalent to the digits.
(Example "Data Type" is "double", and upper limit is 100.0: "***.*")
*2 This applies when "Meter Shape" is "Image".
*3 This value is valid only when designing in NC Designer2.
- Bar(horizontal) - Sector
Update
Item Description
RefreshFrequency Specify the number of times to thin out the timer event processes.
(0 to 100/initial value: 20)
*The reading is executed only first time when 0 is set.
RefreshTiming The display is refreshed at the moment when the counted number of
"RefreshFrequency" reaches the number of counts specified with
"RefreshTiming".
(0 to 99/initial value: 0)
0
100
1000.0
r/min
Data value/data display unit
0.0 100.0
1000.0
r/min

Callback Function
Item Description
OnInit *1 Select "Yes" to add the process executing after the panel/window is
displayed.
OnQuit *1 Select "Yes" to add the process executing before the panel/window is
hidden.
*1 OnInit()/OnQuit() are created only by compilation method.
Refer to "7.1 Common Functions of Controls" for other properties.
7.3.27.3 Complements
Example
Set as shown below to display the spindle speed (spindle information) with the meter parts (Sector)
< Example > < Image when the spindle rotation speed
is 700 rev/min >
Item Setting value
Number of axis 1
Number of section 34
Number of sub-section 1
Data type Signed long
Presence of absence of boundary
value 1
Yes
Boundary Value 1 500
Presence of absence of boundary
value 2
Yes
Boundary value 2 300
Lower limit 0
Upper limit 1000
Meter shape Sector
Presence of absence of meter
frame
None
Scale display None
Scale numeric display Yes
Lower limit (Scale numeric value) 0
Upper limit (Scale numeric value) 1000
Data display Yes
Data display unit rev/min
0
1000
700
rev/min

To change the display according to the value read from the NC, select the image for "Meter Shape" and select the animation file (the file with more than one frame (static image): vgf file) for design(animation).
< Example >
Item Setting value
Lower limit 0
Upper limit 1000
Meter shape Image
Design(Animation) METERBAR020_B
< Example of the display when the data value changes from 0 to 500, and to 1000. >
Data value=0 Data value=500 Data value=1000
7.3.27.4 Precautions
- Allocating a lot of meter parts may cause a delay of the events such as data acquiring interval, refresh, and the timer of the other controls etc. (Ten is standard about number of meter parts which can be allocated.)
- Meter parts does not display the absolute value. To display the absolute value, change the NC data to absolute values by a ladder etc. before referencing the values.
7.3.27.5 Restrictions
- When executing the interpreter method OnTimer() event, the NC data is not read at the frequency specified on refresh. To read the NC data, write the "NormalMethod()" function in the OnTimer() event of macro program.
Animation File Display
NOTE
If the data value is lower than the lower limit, the display shows the image of the lower limit. If the data value exceeds the upper limit, the display shows the image of the upper limit.

7.3.28 Trend Graph (GNCTrendGraph)
The trend graph part is used to read the NC data such as the spindle information at the designated frequency and display it as a graph.
Aging can be checked by collecting the NC data continuously.
Trend graph is the control dedicated to M800/M80 Series.
< Image >

7.3.28.1 Property Setup Dialog
Property setup dialog of trend graph part consists of the tabs relating to [Basic Settings] and [Advanced Settings]. Details of each tab will be described in the following sections.
[Basic Settings] consists of the following two tabs.
No. Tab Description
(1) Data Specify the number of pens, points, and the target NC data.
(2) Style Specify if the scale is provided or not, the number of scale points, and scale color.
[Advanced Settings] consists of one tab.
No. Tab Description
(3) Extended Specify the refresh cycle of the data.
(1)
(2)
(3)

7.3.28.1.1 [Data] Tab
In [Data] Tab, specify the number of pens, points, and the target NC data, etc.
No. Item Description
(1) Number of Pens Specify the number of pens for the trend graph to display.
(1 to 32)
(2) Points Specify the number of points to display for one pen of trend graph.
(2 to 1024)
(3) Direction Select the display direction of the graph.
(Right, Left, Top, Bottom)
(4) Point Type Select the point type.
(Line, Point, Line + Point)
(5) Sys# Specify the part system number of NC data to read.
When the part system is not specified in the NC data, the part system number cannot be specified.
(1 to 10)
(6) Axis Specify the axis number of NC data to read.
When the axis is not specified in the NC data, the axis number cannot be specified.
(0 to 32)
(7) NC Data Set the section number/sub-section number of the NC data to read.
(Section: 0 to 999, Sub-section: 0 to 1000000000)
*Supported by input assist function
(1)
(2)
(3)
(4)
(5)
(6)
(7)
(8)
(9)
(10)
(11)

(12)
(13)

No. Item Description
(8) Data Type Specify the type of the NC data to read.
(signed char, unsigned char, signed short, unsigned short, signed
long, unsigned long, double)
(9) Line Attribute Specify the graph line attribute.
(10) Point Attribute Specify the graph point attribute.
(11) Lower Limit Specify the lower limit of the data.
(-7999999999.0 to 7999999999.0)
(12) Upper Limit Specify the upper limit of the data.
(-7999999999.0 to 7999999999.0)
(13) Preview Display the window which the specified property design can be
checked.

NOTE
Section/sub-section of the NC data can be specified by input assist function.
Refer to "7.1.16.4 Input Assist Function" for details of input assist function.
When the [...] button next to the NC data is pressed, section/sub-section of the NC data can be specified on
the dialog.
No. Item Description
(1) Section Number Set the section number of the NC data to read. (0 to 999)
(2) Sub-Section Number Set the sub-section number of the NC data to read. (0 to
1000000000)
When selecting Line Attribute, details of the line can be specified.
No. Item Description
(1) Line Style Select the line style. (Solid line, Pattern 1 to 8)
(2) Line Width Select the line width. (1 to 7)
(3) Line Color Select the line color.
When selecting Point Attribute, details of the point can be specified.
No. Item Description
(1) Point Type Select the point type. (, ,)
(2) Point Width Select the point width. (1 to 7)
(3) Point Color Select the point color.

7.3.28.1.2 [Style] Tab
In [Style] tab, specify the number of scale points, scale color, background color, etc.
No. Item Description
(1) Axis Position Select the position to set the scale and the scale numeric value.
(2) Main Scale Check here to display the scale.
When [Main Scale] is checked, "Scale Color" and "Scale Points"
can be specified.
(3) Scale Color Specify the scale line color.
(4) Scale Points Specify the number of scale points.
(2 to 101)
(5) Scale Value Check here to display the scale value.
When [Scale Value] is checked, "Numerical Color", "Value", "Lower
Limit", and "Upper Limit" can be specified.
(6) Numerical Color Specify the scale value color.
(7) Value Specify the number of scale values.
(2 to 11)
(8) Upper Limit Specify the upper limit of the scale value.
(-7999999999.0 to 7999999999.0)
(9) Lower Limit Specify the lower limit of the scale value.
(-7999999999.0 to 7999999999.0)
(10) Vertical Grid Check here to display the vertical grid.
When [Vertical Grid] is checked, the "vertical grid color" can be
specified.
(1)
(2)
(3)
(4)
(6)
(7)
(5)
(8)
(10) (9)
(11)
(12)
(13)
(14)

No. Item Description
(11) Horizontal Grid Check here to display the horizontal grid.
When [Horizontal Grid] is checked, the "horizontal grid color" can
be specified.
(12) Display the graph frame Check here to display the graph frame.
When [Display the graph frame] is checked, the "graph frame color"
can be specified.

(13) Background Color Specify the background color of the graph.
(14) Auto Scale Check here to enable the automatic scale.
For the automatic scale, refer to "7.3.28.3. Complements".

7.3.28.1.3 [Extended] Tab
In [Extended] tab, specify the refresh cycle of the data.
No. Item Description
(1) Refresh Cycle Specify the refresh cycle.
Specify the value in increments of 10 ms.
When the ones digit of the value is specified, it is rounded down.
Example: When "123" is input, the value is 120.
When pressing the spin control, the value increases/decreases by
10.
(1)

7.3.28.2 Property Settings
The property settings for the trend graph are divided into the following.
Control name : Specify the control name.
Position/Size : Specify the displaying position and size of the control.
Graph : Specify the items relating to the number of NC data to read and the range.
Address/NC data : Specify the items relating to the NC data to read.
Line attribute : Specify the items relating to the graph line.
Point attribute : Specify the items relating to the graph point.
Scale : Specify items regarding the scale display.
Style : Specify the items relating to the graph style.
Refresh : Specify items relating to the refresh cycle of the NC data.
Callback function : Specify whether the callback functions are provided or not.
Graph
Item Description
Number of pens Specify the number of graphs to display on the trend graph (the NC data
to read). (1 to 32/Initial value: 2)
Points Specify the number of points to display on the trend graph (holding points
of the NC data to read). (2 to 1024/Initial value: 10)
Point type Select the type of the line to display on the trend graph.
(Line, Point, Line + Point/Initial value: Line + Point)
Display direction Select the direction of the trend graph.
(Right, Left, Top, Bottom/Initial value: Right)
Lower limit Specify the lower limit of the data which can be displayed on the trend
graph.
(-7999999999.0 to 7999999999.0/Initial value: 0.0)
Upper limit Specify the upper limit of the data which can be displayed on the trend
graph.
(-7999999999.0 to 7999999999.0/Initial value: 100.0)
Address/NC data
Item Description
Number of systems Specify the No. of the part system to which the NC data to read belongs.
(1 to 10/initial value: 1)
Number of axis Specify the No. of the axis to which the NC data to read belongs.
(0 to 32/initial value: 0)
Number of section Specify the section number of the NC data to read.
(0 to 999/initial value: 0)
Number of sub-section Specify the sub-section number of the NC data to read.
(0 to 1000000000/initial value: 0)
Data type Specify the data type of the NC data to read.
(signed char, unsigned char, signed short, unsigned short, signed long,
unsigned long, double)
* Specify the Address/NC data for each graph line.

Line - Point Attribute
Item Description
Line color Specify the graph line color.
Line width Specify the graph line width. (1 to 7/Initial value: 2)
Line type Specify the graph line type. (Solid line, Pattern 1 to 8/Initial value: Solid
line)
Point color Specify the graph point color.
Point width Specify the graph point width. (1 to 7/Initial value: 2)
Point type Specify the graph point type. (, , /Initial value:)
* Specify the line and point attribute for each graph line.

Scale
Item Description
Scale display * 1 Select the display of the scale between "Yes"/"None". (Initial value: None)
Scale color *1 Specify the scale color.
Scale points *1 Specify the number of scales. (2 to 101/Initial value: 11)
Scale numeric display *2 Select the display of the scale value between "Yes"/"None". (Initial value:
None)
Numerical color *2 Specify the color of the scale value.
Numerical value *2 Specify the number of the scale values to display. (2 to 11/Initial value: 11)
Lower limit *2 Specify the lower limit of the scale value.
(-7999999999.0 to 7999999999.0/Initial value: 0.0)

Upper limit *2 Specify the upper limit of the scale value.
(-7999999999.0 to 7999999999.0/Initial value: 100.0)
*1 The scale is displayed on the top, bottom, left, or right. Specify the scale for each side separately.
*2 The scale value is displayed on the top, bottom, left, or right. Specify the scale value for each side separately.
* The upper limit and the lower limit drawn on the graph do not correspond to the scale value.
Scale (left)
Upper limit (left)
Scale value (left)
Scale (bottom)
Lower limit (left)
Scale value (right)
Upper limit (bottom)
Scale (right)
Upper limit (right)
Lower limit (right)
Scale value (bottom)
Lower limit (bottom)
Scale (top) Upper limit (top) Lower limit (top) Scale value (top)

Style
Item Description
Auto scale Select the automatic scale between "Yes"/"None". (Initial value: None)
Vertical grid line display *1 Select the display of the vertical grid between "Yes"/"None". (Initial value: None)
Vertical grid Specify the vertical grid color.
Horizontal grid line display *2 Select the display of the horizontal grid between "Yes"/"None". (Initial value: None)
Horizontal grid Specify the horizontal grid color.
Graph frame Select the display of the graph frame between "Yes"/"None". (Initial value: None)
Graph frame color Specify the graph frame color.
Background color Specify the background color of the graph.
*1 Broken lines are displayed along the scales of the top or the bottom.
When the scales are displayed on both the top and the bottom, the broken lines are displayed in line with the scales on the bottom.
When the scales are not displayed, grid lines are not displayed even if "Yes" is selected.
*2 Broken lines are displayed along the scales of the left or the right.
When the scales are displayed on both the left and the right, the broken lines are displayed in line with the scales on the left.
When the scales are not displayed, grid lines are not displayed even if "Yes" is selected.
Update
Item Description
RefreshFrequency Specify the refresh cycle in 10 ms increments. (0 to 360000/Initial value: 2)
When 0 is specified, the graph is not refreshed.
(Example: For 10, the graph is refreshed approximately every 100 ms)
Frame
Background color
Vertical grid
Horizontal grid

Callback Function
Item Description
OnInit * 1 Select "Yes" to add a process to be executed after the panel/window is displayed.
OnQuit * 1 Select "Yes" to add a process to be executed before the panel/window is hidden.
*1 OnInit()/OnQuit() are created only by compilation method.
Refer to "7.1 Common Functions of Controls" for other properties.

7.3.28.3 Complements
Example
Set as shown below to display the spindle speed with trend graph.
< Example > < Image when executed >
Item Setting value
Number of pens 1
Points 100
Display direction Right
Point type Line + Point
Number of systems 1
Axis 1
Number of section 34
Number sub-section 1
Data type Signed long
Line color Red
Point color Red
Scale display (left) Yes
Scale numeric display (left) Yes

Lower limit (scale
value)
0.0
Upper limit (scale
value)
1000.0
Graph frame Yes

Auto scale
When the data vaues obtained from the NC exceed the upper and lower limit ranges, they cannot be displayed on the graph.
Auto scale adjusts the upper and lower limit values when such data exists so the data can be displayed on the graph.
Auto scale is enabled by selecting "Yes" for the "Auto scale" property.
< Image >
The point outside of the range
is displayed on the graph.
(The upper limit was adjusted
from 100 to 200)
Adjust
When data outside of the range
no longer exists, auto scale is
cancelled.
(The upper limit returns to 100
from 200)
This part is not
displayed without
adjusting the scale.
(Value=199)
50
0
100
10
0
200
0
Cancel
50
0
100
Obtain
data
When data outside the range
is obtained again, auto scale
is executed to fit the data.

7.3.28.4 Precautions
- The data collected from NC is kept while the screen with the part arranged on it is displayed. When the screen is closed, data collection starts over.
- When arranging multiple trend graph parts on one screen, make sure the number of pens is a maximum of 32.
7.3.28.5 Limitations
- When the interpreter method OnTimer() event is executed, NC data is not read at the frequency set in refresh cycle. In this case, when reading NC data, a "NormalMethod()" function needs to be written in the OnTimer() event of the macroprogram.

8. Parts Library
In the parts library, the image data which can be set to the design such as the button is registered. To create the screen with excellent design easily, specify the registered data in the parts library to the control.
Parts library is the function dedicated to M800/M80 Series.
Arrange the target control on the screen, and then open the Image List dialogue from "Design" property, etc. Select the image and press the [OK] button. The selected image is set to the control design.

Select <Reference Library...>
from the "Design" property
Control
Set the library image

8.1 Operation Screen
8.1.1 Image List Dialogue
In the Image List dialogue, the design for the control can be set from the image list. In the image list, the images registered in the parts library are displayed.
Dialogue Image
No. Displayed item Details
(1) Display Design Display the design image in the control.
(2) Image category Display the types of the images registered in the library.
(3) Color pattern
selection Specify the color pattern displayed on the image list.

(4) Set every state at the
same time
When the check box is checked, the selected images are set to the display
design of every state.
(5) Image list Select the image to set to each state.
The selected image is displayed on each state of the item "Display Design".
(1)
(2)
(3)
(4)
(5)

NOTE
The display design varies depending on the number of the designs of the state that can be set in the target
control.
The following are the selectable controls in the parts library.
Type Control name
Standard control Button
List
Picture
HTML browser
Horizontal scroll bar
Vertical scroll bar
Edit control
NC control PLC button
PLC extension button
Page change button
Stacked graph
Statistics graph
Extension menu
Meter
8.2 Operation Procedure
To display the Image List dialogue and select the parts library, perform one of the following
operations to the control which is compatible with the parts library.
- Select <Reference Library...> from [Design] on the property sheet.
- Select [Change Design] from the popup menu which is displayed by right-clicking the control.
- Press the [Design] button in property setup dialog.
1. Create a control supported by the parts library on the panel or the window.
2. Select the control and then select <Reference Library...> from [Design] on property sheet.

3. Image List dialogue appears.
4. When "Red" is selected, the images on the image list are filtered in red tone.
5. Select the design for each state from the image list and press the [OK] button. The images selected to each
state are set.
NOTE
The image set in the parts library is registered in the image resource. The image cannot be set when exceeding
the maximum number 5000 that can be registered in the image resource.
Color pattern selection can be selected from the following 13 patterns or "All". The images are filtered in the
selected color tone on the image list.
Blue / Red / Yellow / Green / Orange / Cyan / Purple / Pink / Gray / Gold / Silver / Black / White
When each state design is changed from the Image List dialogue, the following setting values in the properties
are also changed.
Type Control name
Property
Display type Pattern Use of solid
frame
Shape of
meter
Standard
control
Button
Picture
Horizontal scroll bar
Vertical scroll bar
List
HTML browser
Edit control
NC control PLC button
PLC extension
Page change
Stacked graph
Statistics graph
Extension menu
Meter
(: Changed / : Not changed / : No function)

8.3 Precautions
1. If the editing state of the project common data is set to [Refer], parts library cannot be selected.
Set the project [Edit] and open it again.
Refer to the following catalogue for the selectable images on the Image List dialogue.
(Some images are not supported by NC Designer2 because they are dedicated to GOT2000
Series.)

GOT2000 Series Parts Library Book L(NA) 08341
Refer to MITSUBISHI ELECTRIC FA Global Website for this book.
MITSUBISHI ELECTRIC FA Global Website: http://www.mitsubishielectric.com/fa/index.html

9. Figure

This section describes each figure and property settings.

9.1 What Is Figure?

Figure is graphic data displayed as a fixed matter. The figure includes the following seven variations.

Line Rectangle Circle and oval
Connected lines Sector Polygon
Arc

Name	Description
Rectangle	A rectangle is drawn.
Circle&Oval	The inscribed circle of the designated rectangle is drawn.
Straight Line	A line is drawn.
Poryline	Connected lines are drawn.
Polygon	Lines are connected to draw a polygon.
Sector	After a circle is drawn, the angle is designated to draw a sector.
Arc	An arc is drawn.

9.2 Figure Creation Method

The method for arranging the figure in the screen and specifying properties is described.

9.2.1 Drawing a New Figure

To draw a new figure, open the [Figure] menu, or select the figure tool bar icon.

Rectangle, Circle, Oval and Line

1. Move the cursor to the starting point of the rectangle, circle, oval or line.
2. The cursor changes to the shape shown below.
3. Drag the cursor to the end point of the rectangle, circle, oval or line.

Drag

Polygon and Connected Lines

1. Move the cursor to the starting point of the polygon or connected lines and click the left mouse button.
2. Move the cursor to the next point and click the left mouse button. Repeat the operation to draw all vertexes of the polygon or connected lines.

Click the left
mouse button. Click the left
mouse button.

3. Click the right mouse button at the last vertex to exit from the polygon or connected line drawing mode.

Click the right mouse button.

Sector and Arc

1. Move the cursor to the starting point of the sector or arc, and click the left mouse button.
2. Drag to draw a circle or oval.
3. A black box is placed at the 3 o'clock position on the perimeter of the drawn circle or oval.
4. Place the cursor at the black box and, after the cursor changes to "+", drag the mouse to the desired position. Dragging should be done within the range of 360.
5. Click the right mouse button to exit from the sector or arc drawing mode.

NOTE

- Drag while holding down the [Shift] key to create a figure having an equal vertical and horizontal ratio.
- Drag up/down or left/right while holding down the [Ctrl] key to change the size of the figure evenly up/down or to the left/right.
- The sector or arc can be set from "Starting point angleTerminal point angle" in "Property".

Display example)

When setting start point angle 180/
end point angle 90

When setting start point angle 90/
end point angle 180

- Press [Esc] button to exit from the drawing mode.

End point angle
Start point angle
End point angle
Start point angle
Start point angle (0)
Start point angle (0)
Start point angle
End point angle
Start point angle
End point angle
Start point angle (0)
Start point angle (0)

9.3 Common Functions of Figure

9.3.1 Position/Size

Specify the position and size of the control.

Item	Description
Perimeter rectangle X	Specify the horizontal position from the upper left of the page/view frame of the figure (X coordinate) in dots (0 to 2559).
Perimeter rectangle Y	Specify the vertical position from the upper left of the page/view frame of the figure (Y coordinate) in dots (0 to 1919).
Perimeter rectangle WIDTH	Specify the width of the figure in dots (0 to 2560).

Perimeter rectangle HEIGHT Specify the height of the figure in dots (0 to 1920).
Perimeter
rectangle X
Perimeter rectangle Y
Figure
Page/view frame
Perimeter
rectangle
WIDTH
Perimeter
rectangle
HEIGHT
NOTE
Note that the figure may be arranged outside the page/view frame according to some position and size
settings.
The size changes, serving the upper left point of the figure as the origin, when the size is changed.
For the line, designate the coordinates of the starting and end points.
9.3.2 Perimeter Line
Specify the presence, color and other particulars of the perimeter line.
Item Description
Perimeter line Select whether the line is given around the figure or not ("Yes" or "None").
Perimeter line color Specify the color of the perimeter line.
Perimeter line width Specify the width of the perimeter line (1 to 20).
The kind of perimeter line Select the line pattern of the perimeter line among "Solid line", "Pattern
1", ... and "Pattern 8".
The line type is valid if the "perimeter line width" is "1".
No perimeter line With line pattern "2" or thicker line size
NOTE
The perimeter line is expressed inside and outside the perimeter. For perimeter line width "2", a single-dot line
is drawn both inside and on the perimeter line. For "3", a single-dot line is drawn inside and outside the
perimeter line. For "4", a two-dot line is drawn inside the perimeter line and a single-dot line is drawn outside.

9.3.3 Color/Pattern
Specify the color and pattern of the figure.
Item Figure
Painting out foreground color Specify the background color of the figure.
Painting out background color Specify the foreground color (pattern color) of the figure.
Painting out pattern Select the filling pattern among "Background painting out", "Foreground
painting out", "Pattern 0" to "Pattern 37", and "With no painting out".
The relationship among the background color, foreground color and pattern is shown in the figure
below.
Background color
Pattern Foreground color (pattern color)
NOTE
For the displayed patterns, refer to Appendix.

9.4 Figure Settings
9.4.1 Rectangle
Item Description
Perimeter rectangle X Specify the horizontal position of the figure (X coordinate) in dots
(0 to 2559).
Perimeter rectangle Y Specify the vertical position of the figure (Y coordinate) in dots
(0 to 1919).
Perimeter rectangle WIDTH Specify the width of the figure in dots (1 to 2560).
Perimeter rectangle HEIGHT Specify the height of the figure in dots (1 to 1920).
Perimeter line Select whether or not to draw the line around the rectangle.
Perimeter line color Specify the color of the perimeter line.
Perimeter line width Specify the width of the perimeter line (1 to 20).
The kind of perimeter line Select the line pattern of the perimeter line among the "Solid line" and
"Pattern 1" to "Pattern 8".
Painting out foreground color Specify the color of the pattern.
Painting out background color Specify the background color.
Painting out pattern Select the filling pattern among "Background painting out", "Foreground
painting out", "Pattern 0" to "Pattern 37", and "With no painting out".
9.4.2 Circle and Oval
Item Description
Perimeter rectangle X Specify the horizontal position of the figure (X coordinate) in dots
(0 to 2559).
Perimeter rectangle Y Specify the vertical position of the figure (Y coordinate) in dots
(0 to 1919).
Perimeter rectangle WIDTH Specify the width of the figure in dots (1 to 2560).
Perimeter rectangle HEIGHT Specify the height of the figure in dots (1 to 1920).
Perimeter line Select whether or not to give a line around the circle or oval.
Perimeter line color Specify the color of the perimeter line.
Perimeter line width Specify the width of the perimeter line (1 to 20).
The kind of perimeter line Select the line pattern of the perimeter line among the "Solid line" and
"Pattern 1" to "Pattern 8".
Painting out foreground color Specify the color of the pattern.
Painting out background color Specify the background color.
Painting out pattern Select the filling pattern among "Background painting out", "Foreground
painting out", "Pattern 0" to "Pattern 37", and "With no painting out".
9.4.3 Line
Item Description
Starting point X coordinates Specify the X coordinate of the starting point in dots (0 to 2559).

Starting point Y coordinates Specify the Y coordinate of the starting point in dots (0 to 1919).
Terminal point X coordinates Specify the X coordinate of the end point in dots (0 to 2559).
Terminal point Y coordinates Specify the Y coordinate of the end point in dots (0 to 1919).
Line color Specify the line color.
Line width Specify the width of the line in dots (1 to 20).
The kind of perimeter line Select the line pattern among the "Solid line" and "Pattern 1" to "Pattern 8".

9.4.4 Connected Line
Item Description
Perimeter rectangle X Specify the horizontal position of the figure (X coordinate) in dots
(0 to 2559).
Perimeter rectangle Y Specify the vertical position of the figure (Y coordinate) in dots
(0 to 1919).
Perimeter rectangle WIDTH Specify the width of the figure in dots (1 to 2560).
Perimeter rectangle HEIGHT Specify the height of the figure in dots (1 to 1920).
Line color Specify the color of the connected lines.
Line width Specify the width of the connected lines (1 to 20).
The kind of perimeter line Select the line pattern of connected lines among the "Solid line" and
"Pattern 1" to "Pattern 8".
9.4.5 Sector
Item Description
Perimeter rectangle X Specify the horizontal position (X coordinate) of the figure in dots
(0 to 2559).
Perimeter rectangle Y Specify the vertical position (Y coordinate) of the figure in dots
(0 to 1919).
Perimeter rectangle WIDTH Specify the width of the figure in dots (1 to 2560).
Perimeter rectangle HEIGHT Specify the height of the figure in dots (1 to 1920).
Starting point angle Specify the starting angle of the sector in degrees () (0 to 359).
Terminal point angle Specify the end angle of the sector in degrees () (0 to 359).
Perimeter line Select whether or not to give a line around the sector.
Perimeter line color Specify the color of the perimeter line.
Perimeter line width Specify the width of the perimeter line (1 to 20).
The kind of perimeter line Select the line pattern of the perimeter line among "Solid line" and "Pattern
1" to "Pattern 8".
Painting out foreground color Specify the color of the pattern.
Painting out background color Specify the background color.
Painting out pattern Select the filling pattern among the "Background painting out", "Foreground
painting out", "Pattern 0" to "Pattern 37" and "With no painting out".
9.4.6 Polygon
Item Description
Perimeter rectangle X Specify the horizontal position of the figure (X coordinate) in dots (0 to
2559).
Perimeter rectangle Y Specify the vertical position of the figure (Y coordinate) in dots (0 to 1919).
Perimeter rectangle WIDTH Specify the width of the figure in dots (1 to 2560).
Perimeter rectangle HEIGHT Specify the height of the figure in dots (1 to 1920).
Perimeter line Select whether or not to give a line around the polygon.
Perimeter line color Specify the color of the perimeter line.
Perimeter line width Specify the width of the perimeter line (1 to 20).
The kind of perimeter line Select the line pattern of the perimeter line among the "Solid line" and
"Pattern 1" to "Pattern 8".
Painting out foreground color Specify the color of the pattern.
Painting out background color Specify the background color.
Painting out pattern Select the filling pattern among "Background painting out", "Foreground
painting out", "Pattern 0" to "Pattern 37" and "With no painting out".

9.4.7 Arc
Item Description
Perimeter rectangle X Specify the horizontal position of the figure (X coordinate) in dots
(0 to 2559).
Perimeter rectangle Y Specify the vertical position of the figure (Y coordinate) in dots
(0 to 1919).
Perimeter rectangle WIDTH Specify the width of the figure in dots (1 to 2560).
Perimeter rectangle HEIGHT Specify the height of the figure in dots (1 to 1920).
Starting point angle Specify the starting angle of the arc in degrees () (0 to 359).
Terminal point angle Specify the end angle of the arc in degrees () (0 to 359).
Line color Specify the color of the arc.
Line width Specify the width of the arc (1 to 20).
The kind of perimeter line Select the line pattern of the arc among the "Solid line" and "Pattern 1" to
"Pattern 8".

10. Screen Editing
This section describes the screen editing operations of NC Designer2.
10.1 Editing Operation
The editing methods of the object arranged in the screen are described.
The object indicates controls and figures arranged in the panel, window or screen.
10.1.1 Undo
Abandon a change and restore the original state before the change. Up to 10 operations can be
undone. To undo, there are the following two methods.
Select [Undo] from the [Edit] menu.
Select the [Undo] button in the tool bar.
NOTE
The shortcut key corresponding to [Undo] is [Ctrl] + [Z].

Note that the following operations cannot be undone with [Undo].
Entry of various properties of project, control, etc.
Registration, deletion and editing of resource
10.1.2 Redo
Redo the operation undone with the "undo" function.
Up to 10 operations can be redone. (Operations executed earlier than the "undo" record may not be executed.)
1. Select [Redo] from the [Edit] menu, or select the [Redo] button in the tool bar.
To redo further, execute [Redo] again.
NOTE
The shortcut key corresponding to [Redo] is [Ctrl] + [Y].
Note that the following operation may not be repeated with [redo].
Entry of various properties of project, control, etc.
Registration, deletion and editing of resource

10.1.3 Cut
Delete the selected object and store it in the clipboard.
1. Select an object.
To cut multiple objects simultaneously, select all the desired objects to be cut.
2. Select [Cut] from the [Edit] menu, or select the [Cut] button in the tool bar.
3. A confirmation dialog box is displayed. To continue, click on the [Yes] button.
NOTE
The shortcut key corresponding to [Cut] is [Ctrl] + [X].
How to select multiple objects
(1) While holding down the [Shift] key, click the object with the mouse button.

(2) Enclose the desired objects, using the cursor.

10.1.4 Copy
Copy the selected object and save it in the clipboard.
1. Select an object.
To copy multiple objects simultaneously, select all the desired objects to be copied.
2. Select [Copy] from the [Edit] menu, or select the [Copy] button in the tool bar.
NOTE
The shortcut key corresponding to [Copy] is [Ctrl] + [C].
Click while holding
down the [Shift] key.

10.1.5 Paste
Paste the object(s) having been copied or cut and saved in the clipboard. The object is pasted with the same properties as those of the original object.
1. Display the destination screen.
2. Select [Paste] from the [Edit] menu, or select the [Paste] button in the tool bar.
NOTE
The regular shortcut key corresponding to [Paste] is [Ctrl] + [V].
When the control is pasted, the control names are automatically specified.
The automatically assigned control name can be changed later.
10.1.6 Delete
Delete the selected object.
1. Select the object to be deleted.
To delete multiple objects simultaneously, select all the desired objects to be deleted.
2. Select [Delete] from the [Edit] menu.
3. A confirmation dialog box is displayed. To continue deletion, click on the [Yes] button.
NOTE
The shortcut key corresponding to [Delete] is [Delete].
To delete all controls and figures from the screen, use [Select All] in the [Edit] menu.
IMPORTANT
Different from cutting, deleted controls or figures are not pasted.

10.1.7 Find
Search for a control with a specific control name or caption having been set.
1. Select [Find] from the [Edit] menu, or select the [Find] button in the tool bar.
2. The Find dialog box is displayed.
(1)
(2)
(3)
No. Item Description
(1) Search string Designate the desired control name or caption.
(2) Target of search Select either the control name or caption to be searched. Place a check mark at "match case" to search the exact match with the search string.
(3) Range Select the search range from the following options.
Current screen The current foreground screen is searched.
Whole project The whole project is searched.
Screens Pages in the designated range are searched.
3. Click on the [Find] button to start to search.
4. When the search is finished, a [Search result list] dialog box is displayed.

5. Select the control in the search result list and click on the [Jump] button, or double click on the selected line.
The screen including the selected control is displayed, and the control blinks in the selected state.
Select and click on the

[Jump] button. Or double
click on the selected line.
(handle) blinks.
NOTE
The shortcut key corresponding to [Find] is [Ctrl] + [F].
10.1.8 Select All
Use this function to select all objects on the screen or select objects belonging to the same type.
All Objects
Select all objects arranged on the screen.
1. From the [Edit] menu, select [Select All] - [All Objects].
Objects Belonging to Same Type
Select all the objects belonging to the same type as that of the selected object.
1. Select a desired object. From the [Edit] menu, select [Select All] - [Same Object Type.]
Select one button. All buttons are selected.

10.1.9 Continuous copy
Specify the all objects after copy, margin, and copy direction to duplicate the selected object.
When any of the following properties exists in the selected control, the object is shifted by the
number of increments specified by the property values and duplicated.
- Number of systems
- Number of axis
- Number of section
- Number of sub-section
- Number of device
No. Item Description
(1) Total number of
objects after copy
Specify the total number of object after copy.
Vertical Specify the number of objects after duplication in the vertical direction. (1 to
32)
Horizontal Specify the number of objects after duplication in the horizontal direction. (1 to
32)
(2) Spacing Designate the margin placed between the duplicated objects.
Spacing Select when specifying the margin between the duplicate source object and
the duplicate destination object. (Note 1)
Include the size of
Shape/Control
Select when specifying the margin including the duplicate source object. (Note
1)
Vertical Specify the vertical margin for the object duplication. (0 to 999)
Horizontal Specify the horizontal margin for the object duplication. (0 to 999)
(3) Help figure A figure showing the selected margin and copy direction is displayed.
(4) Copy direction Select the copy direction.
A total of eight directions can be specified. (Note 2)
(1)
(2)
(4)
(5)
(6)
(3)
(7)

No. Item Description
(5) Vertical Specify the number of increments in the vertical direction.
Increment of Part
system No. (decimal)
Specify the number of increments of number of systems. (-7 to 7)
Increment of Axis No.
(decimal)
Specify the number of increments of number of axis. (-31 to 31)
Increment of Section
No. (decimal)
Specify the number of increments of number of section. (-999 to 999)
Increment of
Sub-section No.
(decimal)
Specify the number of increments of number of sub-section. (-1000000000
to 1000000000)
Increment of Device
No. (decimal)
Specify the number of increments of number of device. (-10000 to 10000)
(6) Horizontal Specify the number of increments in the horizontal direction.
Increment of Part
system No. (decimal)
Specify the number of increments of number of systems. (-7 to 7)
Increment of Axis No.
(decimal)
Specify the number of increments of number of axis. (-31 to 31)
Increment of Section
No. (decimal)
Specify the number of increments of number of section. (-999 to 999)
Increment of
Sub-section No.

(decimal)
Specify the number of increments of number of sub-section. (-1000000000
to 1000000000)
Increment of Device
No. (decimal)
Specify the number of increments of number of device. (-10000 to 10000)
(7) Reset Specifies the initial values to the data of all items.
(Note 1)
When selecting [Spacing], and duplicating at 8-dot intervals in the horizontal direction:
When selecting [Include the size of Shape/Control], and duplicating at 8-dot intervals including the
shape/control:
8
8 dots 8 dots
8 dots 8 dots

(Note 2)
The following shows the types of copy directions and combo box sequences.
Replace the help figure according to the selected margin and copy direction.
The following are the combinations for "A: Spacing" and "B: Include the size of Shape/Control".
NOTE
When the all objects after copy for vertical or horizontal is 1, nothing is copied in either direction.
When there are no number of systems, number of axis, number of section, number of sub-section, and number
of device properties in the control to be duplicated, continuous copy is not affected even if the number of
increments for vertical or horizontal are set to 1 or more.
Duplication is also possible when figures/controls are grouped or multiple figures/controls are selected.
((1) or (2))+A ((1) or (2))+B ((3) or (4))+A ((3) or (4))+B
((5) or (6))+A ((5) or (6))+B ((7) or (8))+A ((7) or (8))+B
(1) (2) (3) (4) (5) (6) (7) (8)

10.1.9.1 Operation Specifications
1. Select the object in the panel/window, and from the [Edit] menu, select [Continuous copy], or click
[Continuous copy] from the context menu.
2. The continuous copy dialog box is displayed.
3. Press the [OK] button after setting.
The selected object is copied.

10.1.9.2 Limitations
(1) When the maximum number of objects for one panel/window (not including in the view frame)
is exceeded, up to the maximum number is copied.
(2) When the objects for one frame exceed 256, up to 256 are copied.
(3) When the view frames for one panel/window exceed 10, up to 10 are copied.
(4) When the value of number of systems, number of axis, number of section, number of
sub-section, or number of device after incrementing is outside the range, it is copied until the
valid range.
Example: When the number of device of the control to be copied is SM2000 (SM: 0 to 2047),
and the number of increments is 100, when copying it exceeds SM2047 and thus the
control is not copied.
(5) The maximum copy range is 2560 dots in width, and 1920 dots in height. When copying
outside of the maximum copy range, the message "Copy cannot be executed because Object
extends out of the view area." is displayed, and the object is not copied.
Example: When a button (A:0, Y:0, WIDTH:100, HEIGHT:100) placed in a panel/window is
selected, and the following settings are made in the continuous copy dialog box, the
button is copied until the 5th time, then the message "Copy cannot be executed
because Object extends out of the view area." is displayed and copying is
interrupted.
Spacing Vertical: 500
Horizontal: 500
Total number of objects after copy Vertical: 5
Horizontal: 6
Copy direction

10.2 Layout Function
The layout function for changing the size and position of the object arranged on the screen is
described.
10.2.1 Size Change
1. Select the desired object.
2. Move the cursor to the solid box mark at four corners. The cursor shape changes as shown below.
3. Drag in the arrow direction until the object is deformed to the target size.
NOTE
Drag while holding down the [Shift] key to change the size while keeping the original aspect ratio.
Drag up/down or left/right while holding down the [Ctrl] key to change the size evenly up/down or to left/right.
Drag

10.2.2 Move
1. Move the cursor to the desired object.
To move multiple objects simultaneously, select all the desired objects to be moved.
2. After the cursor shape changes to the one shown below, drag to the desired position.
Drag

10.2.3 Arrangement and Alignment

Align multiple objects up, down, left or right, or at even intervals between up/down/left/right.

Example: Aligning to the highest object

1. Select the objects to be aligned.
2. From the [Layout] menu, select [Align/Distribution] - [Align Top].
3. Align the selected objects along the upper coordinate of the object placed the highest.

Each function is described below.

Function Description

Align Left

Arrange to
the left end.

Center in a Column

Arrange to the center in the left/right direction.

Align Right

Arrange to the right end.

Align Top

Arrange to the top.

Center in a Row

Arrange to the center in the vertical direction.

Align Bottom

Arrange to the bottom.

Distribute Horizontally

Arrange so that the center points are equally distributed.

Distribute Vertically

Arrange so that the center points are equally distributed.

10.2.4 Arrange to Uniform Size

Arrange the width or height of selected multiple objects.

Example: Arranging the size of objects to the narrowest object

1. Select all the desired objects whose width is to be arranged
2. From the [Layout] menu, select [Make Same Size] - [Smallest Width].

Each function is described below.

Function Description

Smallest Width

Arrange to
the smallest width.

Largest Width

Smallest Height

Largest Height

Arrange to the largest width.

Arrange to the smallest height.

Arrange to the largest height.

10.2.5 Order

Change the order in which overlapped objects are displayed.

[Bring to front]

[Send to back]

1. Select the desired objects for order change.
2. From the [Layout] menu, select [Order] - [Bring to Front]/[Send to Back] or select [Bring to Front] or [Send to Back] in the tool bar.

10.2.6 Fine Adjustment

Move the selected object up/down or left/right by increments of one dot.

If the grid is valid, the object moves by the set grids.

1. Select the desired object for fine adjustment.
2. From the [Layout] menu, select [Fine Adjustment], and select the desired direction of move.

NOTE

Press the arrow key (, , or) to obtain the same result.

10.2.7 Rotation/Flip

Rotate or flip the object vertically or horizontally. Grouped multiple objects can be rotated or flipped,
too.

Rotate/Flip Around the Rectangle of the Object

Rotate or flip the object around the rectangles center coordinate of the object.

1. Select the object to be rotated or flipped.
2. From the [Layout] menu, select [Rotate/Flip] and the direction of rotation or flip.

Function Description

Rotate Right 90 Degrees

Rotate Left 90 Degrees

Flip Horizontal

Flip Vertical

NOTE

When grouped objects are rotated or flipped, they rotate or flip around the center of the grouped rectangle.

The caption character string does not rotate or flip.

Rotate or Flip Around the Center of the Page/View Frame

Rotate or flip the object around the coordinates of the center of the editing page or view frame.

1. Select the object to be rotated or flipped.

2. From the [Layout] menu, select [Rotate/Flip] and select the direction of rotation or flip.
Function Description
Rotate Right 90 Degrees Around
Center of Screen/Frame
Rotate Left 90 Degrees Around
Center of Screen/Frame
Flip Horizontal Around Center of
Screen/Frame
Flip Vertical Around Center of
Screen/Frame

10.2.8 Deformation
Change the position of the vertex of connected lines, polygon, sector or arc, to change its shape. Or
some vertexes can be deleted from or added to the connected lines or polygon.
Editing the Vertex
1. Select the desired figure.
2. From the [Layout] menu, select [Modify] - [Edit Node].
3. The vertexes of the figure appear.
4. Move the cursor to the desired vertex and, after the cursor shape has changed to "+", drag the cursor to the
new position.
5. Click the right mouse button to exit from the vertex editing mode.

Adding a Vertex
1. Select the desired figure.
2. From the [Layout] menu, select [Modify] - [Add Node].
3. The vertexes of the figure appear.
4. Place the cursor on the contour line. The cursor shape changes as shown below.
5. Click the mouse button at the position of the new vertex on the contour line.
6. Click the right mouse button to exit from the vertex addition mode.
Deleting a Vertex
1. Select the desired figure.
2. From the [Layout] menu, select [Modify] - [Delete Node].
3. The vertexes of the figure appear.
4. Move the cursor to the desired vertex. The cursor shape changes as shown below.
5. Click on the desired vertex.
6. Click the right mouse button to exit from the vertex deletion mode.

10.2.9 Grouping and Ungrouping
Grouped multiple controls or figures can be edited or operated as if they are a single object.
Grouped controls or figures can be grouped with another group or other controls or figures.
Grouping
1. Select the desired controls or figures to be grouped.
2. From the [Layout] menu, select [Group] - [Group].
NOTE
The shortcut key corresponding to [Group] is [Ctrl] + [G].
The view frame cannot be grouped.
Ungrouping
Ungroup to release grouped controls and figures into original objects.
1. Select the desired group to be ungrouped.
2. From the [Layout] menu, select [Group] - [Ungroup].
NOTE
The shortcut key corresponding to [Ungroup] is [Ctrl] + [U].
Only one group of objects can be ungrouped at a time.

Property Settings of Grouped Objects
Enter the property settings of each object while they are grouped together.
1. Move the mouse cursor to a grouped object, and select [Property Setting] from the popup menu displayed
upon a click of the right mouse button.
2. The [Object Selection] dialog box is displayed. Select the desired object and click on the [OK] button.
Properties of the selected object are displayed in the property sheet.
NOTE
Double click on a desired object in the group while the group is selected, then the properties of the object is
displayed in the property sheet.

10.2.10 Grid
Specify a grid to be displayed on the panel/window.
1. Select [Grid] in the [Layout] menu.
2. The [Specify Grid] dialog box appears.
No. Item Details
(1) Display Grid Check here to view a grid on the panel/window that is displayed at grid
width intervals.
(2) Snap to Grid Check here to move an object at grid width intervals or change its size.
(3) Grid Size Specify the grid interval.
Width (X) Specify the horizontal interval (1 to 2560).
If necessary, you can click the "" or "" button on the right of the entry
field to increase or decrease the numeric value.
Height (Y) Specify the vertical interval (1 to 1920).
If necessary, you can click the "" or "" button on the right of the entry

field to increase or decrease the numeric value.
(4) Check when grid is not
clear.
If this item is checked while Display Grid is enabled, the grid is displayed in
black or white depending on the tone specified for the "Background Color"
property, on the panel/window.
(5) OK button Click this button to save settings and close the dialog box.
(6) Cancel button Click this button to cancel settings and close the dialog box.
3. When the setting process is finished, click the [OK] button.
NOTE
When an image is specified on the background of the panel/window, the grid may not be clearly visible even if
the [Check when grid is not clear.] is checked.
(2)
(6)
(1)
(3)
(4)
(5)

10.3 Control List
Control information (such as page, ID, type, X, Y, CX, CY, section number, sub-section number,
and device) located in the project being edited can be displayed in a list with the control list function.
Property data of the device and NC data (section and sub-section) can also be edited on the list.
For other control information, the property data can be edited easily by double-clicking on the
information on the list and opening the property setup dialog.

10.3.1 Operation Screen
In the control list dialog, the list of controls located in the specified display range and control
information are displayed.
The following items are displayed in this dialog.
No. Item Description
(1) Number of Controls Display the number of all controls located in the display range
specified in [(3) Panel/Window].
(2) (After being filtered) Display the number of controls after being filtered with the
conditions specified in [(4) Control Name] to [(6) Device].
(3) Panel/Window Select the range to display on the list from "Current Screen",
"Whole Project", and "Screens".
When selecting "Screens", the setting field of the page number is
enabled.
(4) Control Name Specify the control name for filtering.
(5) Case sensitive When the check box is checked, filtering of the character
sequence entered in [(4) Control Name] is case sensitive. When
not performing a case sensitive filter, uncheck the check box.
(6) Device Specify the device name for filtering.
Click on the "..." button to display the "PLC Device Setting"
dialog.
(7) Update Update the display of the list.
(8) Cancel filtering Release the conditions specified in filtering ([(4) Control Name]
and [(6) Device]).
(Note) The check in [(5) Case sensitive] is not cleared.
(9) List Display the list of control information.
Regarding the content, refer to "10.3.1.1 The List".
(10) Export Save the control information displayed in [(9) List] in the CSV file
format.
(6)
(1) (7)
(8)
(4)
(3)
(2)
(5)
(9)
(10)
(11) (12) (13)

No. Item Description
(11) Import Specify the control information of the CSV file format.
Click on the [Import] button to display the file selection dialog.
Specify the CSV file and click on the [OK] button to reflect the
content of the file to the control information.
(12) Jump Jump to the control selected in the list.
(13) Minimize when jump When checked, the control list dialog is minimized when jumping
to the control.
NOTE
When deleting/adding a control, changing property information, etc., click the [Update] button to update the list.
Click the [Update] button after filtering with the conditions specified in [(4) Control Name] to [(6) Device] to
update the list.
When the following description is in a CSV file, an error message is displayed and importation is interrupted.
The control information imported before the importation was interrupted is specified.
A description containing at least one different page, ID, inside frame, or type
A description with a page that does not exist
A description with a section number or sub-section number outside the range

A description with a device that cannot be specified
The first row in a CSV file is a comment.
The row number in an error message displayed during an import error includes the comment row.
When the control selected in the list has been deleted or the ID has been changed, the error message "Not found" is displayed when clicking on the [Jump] button.
With Panel/Window having 16 pages open, if clicking on the [Jump] button, or selecting and double clicking page, ID, inside frame, and type when the Panel/Window selected in the list is not open, the error message "Cannot open any more screens. Close some active screens and try again." is displayed.

10.3.1.1 The list
The control information is displayed in the list. The disabled items (grayout) cannot be edited.
Click on the top line (item names) to sort.
The following items are displayed in the list from the left.
No. Item Description
(1) Page Display the panel/window name of the pages where controls are located.
(2) ID Display the control name.
(3) Inside Frame Displayed when controls are located in the view frame. Displayed in the format of "inside frame (page number where it is located)".
(4) Type Display the types of controls.
(5) X Display the horizontal position from the upper left of the page/view frame of the control (X coordinate) in dots.
(6) Y Display the vertical position from the upper left of the page/view frame of the control (Y coordinate) in dots.
(7) CX Display the width of the control in dots.
(8) CY Display the height of the control in dots.
(9) Section Number Display the value of the section number property.
(Note) For controls with no section number property, the entry is disabled (grayout).
(10) Sub-Section Number Display the value of the sub-section number property.
(Note) For controls with no sub-section number property, the entry is disabled (grayout).
(11) Device Display the address of the PLC device.
(Note) For controls with no device property, the entry is disabled (grayout).

NOTE
For controls displayed in the list that have multiple "section number", "sub-section number", and "device" properties, the maximum number of existing properties are added to the "section number", "sub-section number", and "device" columns.
Double-clicking on the page, ID, inside frame, and type opens the property setup dialog for the corresponding control.
Also, double-clicking X, Y, CX, and CY opens the panel/window that the control is located in front of all other screens, and the control becomes selected. This enables the editing of properties in the property sheet.
After editing in the property setup dialog and property sheet, click on the [Update] button to update the list.
The section number, sub-section number, and device can be edited directly on the list by double-clicking on them.

10.3.2 Operation Specifications
1. Click on the [Functional Objects List] button in the [Tool] menu.
2. The control list is displayed.
10.3.3 Restrictions
(1) If there are duplicate IDs on the same page, importation, jump, and editing operations etc. are not performed correctly. Use the error check function to check for duplication. For the error check function, refer to "10.5 Error Check".

10.4 Focus Setup
With NC Designer2, and the focusing order of each control can be specified.
Control where the focus is located.
The focus moves to the right.
The focus moves to the designated control.
Give the focus setting on each page/frame.
1. Open the desired page/frame.
2. From the [Settings] menu, select [Focus Setup].

3. The [Focus Setup] dialog box is displayed.
(1) ID
(2) Direction of focus move
(3) Destination of focus move
No. Item Description
(1) ID Display the names of the controls included in the page.
(2) Direction of focus move Specify six directions of focus move.
Specify the destinations of the focus move after the [GK_LEFT], [GK_UP],[GK_RIGHT], [GK_DOWN], [GK_BTAB] and [GK_TAB] key codes defined in NC Designer2 are received.
(3) Destination of focus move

Select the control name, which is the destination of the focus move, from the
list.
Select "NULL" or specify no data to refrain from moving the focus in the
direction.
To cancel the destination having been entered, select "NULL".
4. After finishing data entry, click on the [OK] button.

NOTE
While the focus setup is given, control names are displayed at the objects located in the page view.
Cells are colored in gray for the initial focus which is set from [Input permission] [Prohibition] in the property of
the control or the control with no "Input permission" in the property settings.
The destination set in the program is given priority over the destination set in [Destination of focus move].

10.5 Error Check
1. From the [Tool] menu, select [Error Check].
2. The [Error Check] dialog box is displayed.
Enter each item and click on the [OK] button.
(2)
(1)
No. Item Description
(1) Error check execution
timing
Specify the timing and execution range of the error check.
It will perform if the
OK button is pushed
Execute an error check when the [OK] button is clicked on in the [error
check] dialog box.
Select the range of execution of the error check between "Current Screen"
and "Whole Project".
It performs before
saving a screen
Execute an error check upon screen saving operation before the screen is
stored. The error check execution range is only the current screen.
The screen which had
the error after the
completion of a check
is opened
Place a check mark to display the error page after error check.
(2) Error check items Place a check mark at desired error check items.

10.5.1 Error Check Item List
Item Description
Has not object overlapped? Checks if controls/view frames overlap.
Is object arranged in a screen/
frame area?
Checks if controls outside the page and controls arranged in the view
frame are located outside the view frame.
Does the resource image
specified with the object
property exist?
Checks if files registered in the image resources specified for controls exist.
Is the caption character
sequence set up?
Checks if caption character strings are deleted from the character string
resources designated in each control.
Has not the caption character
sequence overflowed?
Checks if caption character strings of each locale overflow the character
string area of the control.
Is not there any omission in a
setting of an ID?
Checks if controls have a control/view frame name.
Does not the ID overlap? Checks if control/view frame names are duplicated among multiple
controls/view frames.
Is not there any omission in a
setting of a Title?
Checks if the panels/windows have a panel/window name.
Does not the Title overlap? Checks if panel/window names are duplicated among multiple panels/
windows.
Does object of a focus
movement place exit?
Checks if control/view frames specified as a destination of the focus exist.

10.5.2 Result of Error Check
The result of the error check is displayed in the message window.
If No Error Is Detected
1. The dialog box shown below is displayed after the error check.
If an Error Is Found
1. The result of the error check is displayed in the message view after the error check.
The panel/window/view frame name where

the control with error is located is displayed.
Description of the error is
displayed.
The control/view frame
name is displayed.
NOTE
If 100 or more errors are found, the following message is displayed and the error check is terminated.

10.6 Development by Multiple Users
To create screens by multiple users using NC Designer2, common project data such as resource data and panel names must be unified for a management purpose. During multi-user development, no screen duplication is allowed among users. (Shown is an example of creation of 30 pages by 3 users.)
The project data
is unified.
Screens are created
by multiple users.
Creation of 30 pages
Pages 0 to 9 are edited. Pages 10 to 19 are edited. Pages 20 to 29 are edited.
Common
project data
The screen development work is divided into the work that can be distributed to multiple users and the work that must be done by a single user holding the editing right.
Work by a single user
Work by multiple users
Before multi-user work is
started, one user holding the
editing right of the common
project data creates.
Enter project properties.
Create all pages.
Register resources.
Arrange controls on the screen.
Generate source codes.
Create a project.
Add user programs.
10.6.1 Option Setting
The operations and the specified values of NC Designer2 can be customized.
Item Function
Display the selection dialog for
the project when launching
Display the selection dialog for opening/creating a new project when
launching NC Designer2.
Set the editing state of the
project common information to
"refer"
If it is checked, the panel or the window can be edited, but the project
common information cannot be edited.
Display the inquiry message for
the editing state when opening
the project
If this is checked, the dialog designating the editing state is displayed as
opening the project. If other user is using the same project, a confirmation
dialog is displayed.

10.7 Sub Cursor Setting
The sub cursor setting enables to reflect the values which has been input in the input controls (input box, ten-key) to the controls where the sub cursor is located, by pressing the INPUT key. The display indicating the destination where the input data is to be reflected is called "sub cursor".
The following functions are also available by sub cursor setting.
Control with sub cursor display Input box control
(1) Displays the sub cursor (Specify the sub cursor position at default
(2) Moves the sub cursor with the arrow key/TAB key or a click
(3) Sets the key transfer control
(4) Moves the display location of the input area control
The Sub cursor setting dialogue will appear by selecting the pop-up menu [Extension setting]-[Sub cursor setting] which will appear by clicking the right mouse button on an input control.
For the details of the input box, refer to "7.2.14 Input Box Object(GInputBox)".
For the details of the ten-key, refer to "7.2.15 Ten-key object (GSoftKey)".

10.7.1 Screen Specifications
Screen Images
The Sub cursor setting screen is constructed as shown below.
(1) Input area control
(2) Key transfer control
(3) Initial select
(4) List of controls (5) Destination setting
(6) Display start
(7) Clear setting button (8) OK button (9) Cancel button
(10) button

Displayed Item
No. Displayed item Details
(1) Input area control The name of the control to make the "sub cursor setting" will be displayed.
(Note 1) Input controls include the input box and the ten-key.
(2) Key transfer control Set this when processing keys other than those which are allowed to use in input controls (alphanumeric characters/arrow keys, etc.).
When the key transfer control is set, the focus will move to the set key transfer control and key will move in the control. When "NULL" is set, key will move. Select a key transfer control from the list of controls which will appear by clicking the area.
The controls in the list are those located in the currently editing page (panel, window)/view frame.
(Note 1) Input controls (input box, ten-key) will not be included in the list.
(Note 2) For the details of the input box, refer to "7.2.14 Input Box Object(GInputBox)".
For the details of the ten-key, refer to "7.2.15 Ten-key object (GSoftKey)".
(3) Initial select Specify the control where the sub cursor will be located at first when the focus shifts to an input control.
Click a cell to display "*" and the cell will be set as the control where the sub cursor will be located at first.
If another cell without "*" is clicked, the "*" in the original cell will be cleared.
(Note 1) If the control specified as where the sub cursor is to be located at first is deleted, "*" will appear at the top control of "(4) List of controls" and will be set instead.
(Note 2) If any control specified as where the sub cursor is to be located at first is not set after pressing the [Clear setting] button, the top control of "(4) List of controls" will be set as the control.
(4) List of controls The list of controls available for sub cursor display in the page (panel, window) or the view frame where the input area control is located, will be displayed.
The target controls are the text box, PLC text box, and NC data text box.
(Note 1) For the input controls located on a view frame, only the controls located on the view frame will be listed. Also, when the view frame is included on the page and an input control located outside of the view frame is specified, the controls on the view frame will not be listed.

No. Displayed item Details
(5) Destination setting Set the destination control of sub cursor when an arrow key (, , ,), a TAB key (|, |), or the INPUT key is pressed. When unset or when "NULL" is set, the sub cursor will not move.
Select the destination control from the list of controls which appears by clicking the cell.
The listed controls are the same as "(4) List of controls".
(Note 1) The control cannot be input by copy & paste.
(Note 2) If a control is set as the destination of arrow keys (,), the cursor will not move in the input area control by arrow keys (,).
(6) Display start Set the display position of the input area control for each control where the sub cursor will be displayed. When no setting is made, it will be displayed at where it was pasted on the NC Designer2.
Set the display position (from the upper left of the page (panel/window)/view frame) of the input area control in dots.
X coordinate setting range: 0 to 2559, Y coordinate setting range: 0 to 1919
(7) Clear setting button All the settings ((2),(3),(5),(6)) will be cleared.
(8) OK button The dialogue will be closed after saving the settings.
(9) Cancel button The dialogue will be closed after discarding the settings.
(10) button The dialogue will be closed after discarding the settings.

NOTE
The column width of "List of controls", "Key transfer control", "Display start" can be changed.
If the display start position (X coordinate/Y coordinate) is out of the setting range or if either of the X/Y coordinate is not set, an error message will appear when [OK] button is clicked.
For the details of error messages, refer to "Appendix 1. Error Message List".
If an error occurs, the control name on the List of controls will be displayed in red and the character color or background color of the corresponding area will also turn red.
If a control which is set to use the sub cursor display is registered in the key transfer control and click [OK] button, the following message will appear.
The name of the control set in the key transfer control will turn red.
Click the [OK] button to save the setting and close the sub cursor setting screen.
Click the [Cancel] button to close the save confirmation message and return to the sub cursor setting screen.
If a control which is set to use the sub cursor display is registered in the key transfer control as above-mentioned, the key transfer may repeat endlessly.

10.7.2 Sub Cursor Setting Screen Displaying Method

How to Call

The sub cursor setting can be made for each input control allocated to each page (panel/window) or view frame.

1. Display the page or frame to make settings.
2. Allocate the control to make sub cursor setting and the input control (Input box).
3. Right-click the input control to display the pop-up menu and select [Extension setting] - [Sub cursor setting].

The access can also be made from the menu bar [Settings] - [Extension setting] - [Sub cursor setting].

Input control

(Input box)

Control to make sub cursor setting

(Text box/PLC text box/NC data text box)

4. [Sub cursor setting] will appear.
5. Click [OK] button when settings are completed.

NOTE

During the Sub cursor setting, the objects of page view will display the name of controls.

When the ten-key is used instead of the input box, the display will be as shown below.

10.7.3 Sub Cursor Setting Procedure

Sub cursor setting procedure does not differ between the input box control and the ten-key control.

The following explanation uses the input box control.

10.7.3.1 Move the Sub Cursor by Key Input (Arrow Key, TAB Key, Input Key)

With the focus on the input control (input box control), press , , , ,

| , | , INPUT key to move the sub cursor.

(1)

(2)

The sub cursor will also move by clicking the control to which the sub cursor setting is made.

NOTE

The background color and the character color of the control in which the sub cursor will be displayed depend on the property setting of the input box control; "Sub cursor Background color" and "Sub cursor Character color".

The sub cursor will not be displayed until the focus is placed on the input box or the ten-key control.

The sub cursor will not move when the destination is not set.

The right and left arrow keys (,) are used to move the cursor within the input destination control. But instead, when the right and left arrow keys (,) are set to move the sub cursor to the destination control, the cursor will move to the specified control.

The control with the sub cursor display is located as shown in the right figure.

Input box control

Press .

The sub cursor will move.

Click

The sub cursor will move to the clicked

Control with sub cursor display

Set the Focus of Input Control

Interpreter Method

```
$GInputBox00006-OnCreate
 'Set the macro reserved variable flag to 1.
 @100 = 1;
$End
$GInputBox00006-OnTimer
 'When the macro reserved variable flag is 1
 if (@100 == 1)
 'Set the macro reserved variable flag to 0.
 @100 = 0;
 'Set the focus at the input box control.
 GCSChangeActiveFocus(-1, "GInputBox00006");
 endif
$End
```

Compilation Method

```
long GCPanel00000::GINPUTBOX00006OnInit(unsigned short usMessage, long lLParam, long
lUParam)
{
GBaseObject *pPanel = NULL;
GBaseObject *pChild = NULL;
pPanel = GetGBaseObject();
pChild = GCSGetChild( pPanel, GINPUTBOX00006 ); // Get the input box control
if (pChild != NULL) { // When it succeeds to get the input box control
GCSChangeActiveFocus( pPanel, pChild ); // Set the focus at the input box control
}
return TRUE;
}
```

10.7.3.2 Set the Input Value to the Target Control
With the focus on the input control (input box control), press the INPUT key to set the input value to the control at which the sub cursor is displayed.
(1)
(2)
(NOTE) When the setting fails, the content of the input control (input box control) will not be cleared and (even when the destination for the INPUT key is set,) the sub cursor will not move.
10.7.3.3 Change the Display Start Position
The display position of input control can be changed for each control with sub cursor display by setting the display position of input control (input box control).
(1)
(2)
(3)
Input data keys.
1 2 3
Control at which the
sub cursor is displayed.
Input box control
The input data is displayed in the data setting area.
Press the INPUT key.
The data will be set to the control at which the sub cursor
is displayed.
The target control and input box
are located as shown in the right. Control with sub
cursor display
Input box control
Press the key.
The display position of the input control changes.
Press the key.
The display position of the input control changes.

10.7.3.4 Transfer a Key to Other Control
Set the key transfer control to use other control to handle the processing of a key other than those available for the input destination control (alphanumeric characters/arrow keys, etc.).
When the key transfer control is set, the focus will move to the transfer destination control and the input key will be transferred.
In the following example, the focus will move to the basic control and the input key will be transferred to the control.
Screen Configuration
The key which cannot be handled by the input box (function key) is transferred to the basic control where the key processing (OnKeyPress) will be carried out.
Operation
(1) The focus is placed at the basic control when the screen opens.
(2) Mouse-click the NC data text box to display the sub cursor in it and transfer the focus to the input box.
(3) Press the cursor key () to move the sub cursor.
(4) Press "MONITOR" key (Shift+F1) to go to the Monitor screen.
(5) Press "SET UP" key (Shift+F2) to go to the Setup screen.
(6) Press "EDIT" key (Shift+F3) to go to the Edit screen.
(7) Press "DIAGN" key (Shift+F4) to go to the Diagnosis screen.
(8) Press "MAINTE" key (Shift+F5) to go to the Maintenance screen.
<Sub cursor setting>
4. Input box
GInputBox0000
3.NC data text box
GNCDataTextBox0000
2.NC data text box
GNCDataTextBox0000
1. NC data text box
GNCDataTextBox0000
5. Basic control
GBasicControl00000

Source Code
Interpreter Method
```
$GBasicControl00000-OnCreate
 'Set the macro reserved variable flag to 1.
 @100 = 1;
$End
$GBasicControl00000-OnTimer
 'When the macro reserved variable flag is 1
 if (@100 == 1)
 'Set the macro reserved variable flag to 0.
 @100 = 0;
 'Set the focus at the basic control.
 GCSChangeActiveFocus(-1, "GBasicControl00000");
 endif
$End
$GBasicControl00000-OnKeyPress
long _lShiftKey; Shift key input status
_lShiftKey = LUPARAM & H1;
if((LLPARAM == 112) && (_lShiftKey == 1)) 'When Shift + F1 key code is issued.
GCSGEShowPanel(1000); 'Changing the screen to Monitor screen.
```

```
elseif((LLPARAM == 113) && (_lShiftKey == 1)) 'When Shift + F2 key code is issued.
GCSGEShowPanel(2000); 'Changing the screen to Setup screen.
elseif((LLPARAM == 114) && (_lShiftKey == 1)) 'When Shift + F3 key code is issued.
GCSGEShowPanel(3000); 'Changing the screen to Edit screen.
elseif((LLPARAM == 115) && (_lShiftKey == 1)) 'When Shift + F4 key code is issued.
GCSGEShowPanel(4000); 'Changing the screen to Diagnosis screen.
elseif((LLPARAM == 116) && (_lShiftKey == 1)) 'When Shift + F5 key code is issued.
GCSGEShowPanel(5000); 'Changing the screen to Maintenance screen.
endif;
$End
```


Compilation Method

```
#define KEY_SHIFT 0x01
#define GK_F1 112
#define GK_F2 113
#define GK_F3 114
#define GK_F4 115
#define GK_F5 116
long GCPanel00000::GBASICCONTROL00000OnInit(unsigned short usMessage, long lLParam,
long lUParam)
{
GBaseObject *pPanel = NULL;
GBaseObject *pChild = NULL;
pPanel = GetGBaseObject();
pChild = GCSGetChild( pPanel, GBASICCONTROL00000); // Get the basic control
if (pChild != NULL) { // When getting the basic control succeeds.
GCSChangeActiveFocus( pPanel, pChild ); // Set the focus at the basic control.
 }
return TRUE;
}
long GCPanel00000::GBASICCONTROL00000OnKeyPress (unsigned short usMessage, long
lLParam, long lUParam)
{
if((lUParam & KEY_SHIFT) == KEY_SHIFT)
 {
 if(lLParam == GK_F1) // When Shift + F1 key code is issued.
 {
// Changing the screen to Monitor screen.
 GESetEvent(GECreateEventMessage(GM_SHOWPANEL,
 GCSGetScreen(GetGBaseObject()), 1000, 0), FALSE);
 }
 else if(lLParam == GK_F2) // When Shift + F2 key code is issued.
 {
// Changing the screen to Setup screen.
 GESetEvent(GECreateEventMessage(GM_SHOWPANEL,
 GCSGetScreen(GetGBaseObject()), 2000, 0), FALSE);
 }
 else if(lLParam == GK_F3) // When Shift + F3 key code is issued.
 {
// Changing the screen to Edit screen.
 GESetEvent(GECreateEventMessage(GM_SHOWPANEL,
 GCSGetScreen(GetGBaseObject()), 3000, 0), FALSE);
 }
 else if(lLParam == GK_F4) // When Shift + F4 key code is issued.
 {
// Changing the screen to Diagnosis screen.
 GESetEvent(GECreateEventMessage(GM_SHOWPANEL,
 GCSGetScreen(GetGBaseObject()), 4000, 0), FALSE);
 }
 else if(lLParam == GK_F5) // When Shift + F5 key code is issued.
 {
// Changing the screen to Maintenance screen.
 GESetEvent(GECreateEventMessage(GM_SHOWPANEL,
 GCSGetScreen(GetGBaseObject()), 5000, 0), FALSE);
 }
 }
}
```


10.7.4 Limitations

(1) If the sub cursor setting is made to the control at which the focus is set, the focus will not move by the key input (cursor key, input key) and the sub cursor will move instead.

(2) After deleting the control to which the sub cursor display was set, press the [Clear setting] button on the sub cursor setting screen and set the sub cursor display again.

(3) When a control to which the sub cursor setting is made is registered as the key transfer destination control, the key transfer may be repeated endlessly.

(4) The value to be reflected is float accuracy, even if a real number (double)/double is set in the property "type" of the PLC text box set the sub-cursor/text box.

(5) Data to be entered in the input area control must be within the range specified in the range check properties ("Maximum Check", "Minimum Check", and "Type") of the control set in the sub cursor setting. If the input value exceeds this range, it may differ from the value specified for the control set in the sub cursor setting.

(6) If hexadecimal characters ("%X" or "%x") are specified in the "Display Format" property, of the text box set in the sub cursor setting, the value specified in the entry field is handled as a decimal number.

(7) If the property "Extended function (A7) enabled" of an input box is set to be enabled, the sub cursor will not move to controls of which "Prohibition" is set for the property "Input permission" even when the control is set for "Destination setting".
The control of which "Permission" is set for the property "Input permission" is searched as the next destination and the sub cursor moves to the control. If the control is not found, the sub cursor will not move.
(Example) When the first display position of the sub cursor is control (1) and the sub cursor is set as follows.
First selection Destination setting Input permission | |
Control (1) * Control (4) Control (2) Permission
Control (2) - Control (1) Control (3) Prohibition
Control (3) - Control (2) Control (4) Permission
Control (4) - Control (3) Control (1) Prohibition
Key operation Sub cursor display Explanation
| Control (3) Searches the destination setting of control (4) since Prohibition is set for control (4).
| Control (3) Searches the destination setting of control (2) since Prohibition is set for control (2).
When Extended function (A7) enabled is disabled, the sub cursor will move in the same way as a ten-key regardless of the setting of the property Input permission.

11. Simulation
The simulation method is described in this section.
11.1 Simulation Function
The simulation function is a function for testing actions of drawn data on NC Designer2.
The simulation function allows you to test the state change of controls, page switching, and execution of callback functions, and the following items can be checked.
Appearance of created panels and windows
State changes according to value change of control, focus yes/no, show/hide, input permission/prohibition
Focus move
Execution timing of callback function displayed in message window
Panel/window page switching
11.1.1 Starting Simulation
1. Before starting simulation, save the project and screens.
2. From the [Tool] menu, select [Test].
3. Simulation begins. Simulation begins from the first page of panels/windows having been created.
NOTE
If [Test] is selected from the [Tool] menu without saving the project or window, a dialog box is displayed to urge to save data. Before starting simulation, save data.
Only one panel/window can be checked during simulation. Simultaneous view of a panel and a window is impossible.
When simulation is started, the currently edited locale is displayed.
11.1.2 Simulation Screen
When simulation is executed, a simulation view and simulation tools are displayed.
The simulation screen at a startup is the first page of panels/windows having been created.
The message window
displays the callback
execution history.
Simulation tool allows you
to change the state of the
selected control.
The screen being
simulated is displayed.
Screen Selection
Select [Open Panel/Window] from the [File] menu and select and display the new screen in the [Open Panel/Window] dialog box.

11.1.3 Function List
The following menu functions can be used during simulation.
File
Item Function
Open Panel/Window Select the panel/window to be displayed.
Quit Terminate simulation.
View
Item Function
Screen tree Switch whether the screen tree is displayed or hidden.
Test tools Select whether the simulation tools are displayed or hidden.
Message Window Select whether the message window is displayed or hidden.
Switch Locale Switch the locale to be displayed.
Zoom Specify the zoom scale of the page.
Change theme color Switch the NC control display by the theme color. (Only for the project of M800/M80 series)
Help
Item Function
About NC Designer2 Display the version of NC Designer2.
NOTE
When simulation is started, the screen is displayed at the zoom specified at [Display magnification] in [Project Properties].
If the zoom is changed during simulation, the new value is reflected on the [Display magnification] setting in [Project Properties].
If [Fit] is selected as a zoom setting, the zoom changes in the range between 25 and 800% to fit the simulation screen size.
11.1.4 Quitting Simulation

The simulation screen is terminated.
1. From the [File] menu, select [Quit].

11.2 Simulation Tools
Use simulation tools to change values or appearance of controls.
1. Click on a desired control. Settings are displayed at the simulation tool. The settings vary according to the selected control.
(1)
(2)
(3)
(4)
(5)
(6)
(7)
No. Item Description
(1) Setup value The entered value or character string is reflected on the control.
(2) Focus The focus state is displayed.
(3) Input permission Input permission and prohibition are switched over. Select prohibition to change to the image of the disabled control.
(4) Show/Hide The control is displayed or hidden.
(5) Selection line The designated line is selected.
(6) Display offset The designated line is displayed at the top.
(7) Scroll position Enter a value in the range from the minimum to maximum value of the scroll. The scroll bar moves according to the entered value.
2. Changes in the setting are reflected on the control.

11.3 Message Window
The message window shoes the execution history of callback functions.
The executed callback
function is displayed.
The control name is displayed.
The time of execution of the
callback function is displayed.

12. Simulation (NC Trainer2 plus)
This section describes how to execute simulation using NC Trainer2 plus.
12.1 Simulation (NC Trainer2 plus)
This function enables you to use NC Trainer2 plus to check a custom screen you created with NC Designer2.
When you select an NC Trainer2 plus project from the menu bar or tool bar, NC Trainer2 plus starts automatically and the selected project is opened.
If you perform the key operation set in the Custom screen configuration dialog, the custom screen appears on NC Trainer2 plus.
Simulation (NC Trainer2 plus) Interpreter version Compilation version
Each control display
Action and operation with key or mouse
input (Note)
Action and operation created with a
macro program
-
Action and operation created with
VS2010 -
: Can be checked : Cannot be checked -: Not supported by NC Designer2
(Note) Key or mouse input is available in basic operations of each control.

Custom screen
GIP
Custom screen
DLL
NC Designer2
Visual Studio
M7: NC Compiler /
M8: NC Compiler2
Custom screen
o NC Trainer2 plus
project
NC Trainer2 plus

12.2 Operation Procedure
Select NC Trainer2 plus Project
1. Use the pull-down menu of the tool bar or [Open at NC Trainer2 plus] in the [Tool] menu to select an NC Trainer2 plus project for simulation.
2. NC Trainer2 plus is started.
3. When you perform the key operation set in Custom screen configuration dialog, the created custom screen appears.
NOTE
Up to four latest NC Trainer2 plus projects are displayed.
If the simulation is started during the NC Trainer2 plus startup, the message "Is it OK to reboot NC data?" will appear on NC Trainer2 plus. Press the [OK] button to restart the NC and then start the simulation.
When the NC Trainer2 plus project name exceeds 20 one-byte characters, the excess characters are replaced

with an ellipsis (...).

Select [Select project]
1. Select [Select project] from the pull-down menu of the tool bar or [Open at NC Trainer2 plus] in the [Tools] menu.
2. NC Trainer2 plus is started and "Open Project" dialog is displayed.
3. Select an NC Trainer2 plus project and then press the [OK] button.
4. The created screen is displayed by inputting the key set in Custom screen configuration dialog.

12.3 Limitations
(1) This function is unavailable when NC Trainer2 plus is not installed. The menu or the icon of the tool bar cannot be selected (grayout).
(2) NC Trainer2 plus Ver. A4 or later supports this function. Be sure to use NC Trainer2 plus Ver. A4 or later. Otherwise the simulation performance cannot be assured.
(3) Simulation (NC Trainer2 plus) cannot be executed when there is no NC Trainer2 plus project.
(4) When editing an NC Designer2 project of "M800/M80 Series", only the NC Trainer2 plus projects whose model setting is "M830", "M80 TypeA" or "M80 TypeB" are displayed on the menu. When editing an NC Designer2 project of "M700V/M70V/E70 Series", only the projects of "M730V", "M70V TypeA", "M70V TypeB" or "E70" are displayed.
(5) Operation simulation can be executed only on the interpreter method custom screen. For the compilation method, only the design can be checked.

13. Generating a Document
NC Designer2 is provided with a document creation function for outputting project settings and control properties into a rich text format file (hereinafter referred to as RTF file).
The document creation function is described in this section.
13.1 Document Generation Function
NC Designer2 can output project settings and control properties into an RTF file.
The items that can output in the file include the followings.
Data Description
Project information Project name, project macro and panel/window name list
Screen information 4 items of each panel/window specified below
Screen hard copy Hard copy of each panel/window
Object list List of controls/view frames used in each panel/window
Property setup Property settings of each control/view frame arranged on each panel/window
Macro Screen macro specified for each panel/window
13.1.1 Generating a Project Information Document
1. From the [File] menu, select [Document Generation].
2. The [Document generation] dialog box is displayed. Select the [Project information] tab.
(1)
(2)
No. Item Description
(1) Output item Place a check mark on the items to be file-output.
The output items include the followings.
Panel/window name list
Macro
(2) Output item display
field
A list of file-output data selected at (1) is displayed.
3. Place a check mark at the data to be file-output.
4. Click on the [OK] button. A [Save As] dialog box is displayed.
A file is output after entering the name of the RTF file.

13.1.2 Generating a Screen Information Document
1. From the [File] menu, select [Document Generation].
2. The [Document Generation] dialog box is displayed. Select the [Screen Information] tab.
(1)
(2)
(3)
No. Item Description
(1) Document
generation item
Place a check mark for the item included in the output file.
Click on the [Details] button and select the items to be file-output in the dialog box shown below.
The items that can be selected include the followings.
Screen hard copy
Object list
Property setup
Macro
(2) Document
generation range
Select the page range of the output file among the following options.
All Output the data about all panels/windows.
Screen
Specification
Output the data of the panels/windows in the designated page range.
(3) Output item display
field

A list of file-output data selected at (1) is displayed.
3. Place a check mark at the data to be file-output.
4. Click on the [OK] button. A [Save As] dialog box is displayed.
A file is output after entering the name of the RTF file.

13.1.3 Output Image
The output images are shown below.
Project Information

Screen Information
(1) Screen Hard Copy
Screen Hard Copy
(2) Object List

(3) Property Setup
(4) Page Macro
(5) Top of Each Page
The page number and the panel/window name are output at the top.
NOTE
If an object list or property setup is output in a file, information about the view frame is also
output in the file in addition to the objects.
For the screen hard copy and property setup, the currently displayed locale data is output in the file.
When creating a document in the state that 16 pages of the panels/windows are open, [Screen hard copy] of
some of pages may not be output.
Close the opening panel/window and then create the document in this case.

14. Project Convert
The methods for exporting the project created with NC designer2 and also converting them to ND2
are described in this section.
14.1 Export for the Project Executing the Intepreter
14.1.1 Export
Export the project to create a project for interpreter execution. Project exportation is also necessary
when the macro function is used.
1. From the [File] menu, select [Project convert] - [Export].
A confirmation message is displayed. Press the [OK] button.
2. An "export" dialog box is displayed. Specify the location and file name of the project to be
exported. Press the [Save] button.
Export has been completed when the following message appears.

NOTE
When the resource data exceeds 5Mbyte, exporting is failed and the following message appears.
When exporting is failed, delete the registered resources and export the project again.
If more than one project is used, set the resource data size less than 5Mbyte in total.

14.1.2 File Configuration
After the project created with NC Designer2 is converted to execute in the interpreter mode, a folder
of screen files, resource files and macro folder and a project data file are created. Shown below is
the file configuration of an interpreter execution project saved under "Sample".
Sample
Project folder
Macro
Macro
folder
PNLPG###.GIS :Screen file
Resource.res :Resource file
Sample.GMT :Project macro file
Sample.GMC :Project macro intermediate code file
PNLPG###.GMT :Screen macro file
PNLPG###.GMC :Screen macro intermediate code file
PNLPG###.GID :Screen control ID definition file
Sample.GIP :Project data file
(Note 1) ###: 3-digit hexadecimal value indicating the page number
(Note 2) When "M800/M80 Series" is selected in the model selection of the create new
project wizard, the screen with GIS extension is created.
When "M700V/M70V/E70 Series" is selected, the screen file with GIW
extension is created.
NOTE
When using the project macro, specify the name of project macro intermediate code file, including the path, in
config.ini.
Refer to 17.6.4.1.1 for details.
Only one project can be registered when the project macro is used.
If more than one project is specified, unintended screen may be displayed.
Use the screen macro for drawing screen such as the control operation.

14.2 Project Convert to the ND2 Format
A project information file (IPP format) for the M700V/M70V/E70 series that is created with NC

Designer2 can be converted to a project information file (ND2 format) for the M800/M80 series.
When using a project for the M700V/M70V/E70 series to create a project for the M800/M80 series,
use a project that has been converted to the appropriate format.
1. Open the IPP project file to be converted.
2. Select [File] - [Project convert] - [ND2] menu. (The [ND2] menu is enabled only when an IPP project file is
opened.)
If the file is being edited, the following save confirmation message appears.
Click the [OK] button.
3. The opened panel/window is closed, and the [Save Project As] dialog box is displayed.
Specify the location to save the converted project to and the file name of the project.
Press the [Save] button.
When conversion is completed, a message dialog box containing the words "Project convert is
completed. Do you want to open the converted project file?" is displayed.
If you press the [OK] button, the current project is closed, and the converted project is opened.
If you press the [Cancel] button, the message dialog box disappears.
The converted project retains the resource information before the conversion.

15. Source Code Generation
The method for generating source codes from the data created with NC Designer2 is described in
this section.
15.1 Generating Screen Data Source Codes
With NC Designer2, source codes are generated from the created screen data.
1. Select [Source Code Generation] from the [File] menu.
2. The [Source code generation wizard] is displayed.
(1)
(2)
No. Item Description
(1) Locale Select the locale of the source codes to be generated.
All locales are selected initially.
After generating the source codes, the locales that were selected previously
are selected when opening the source code generation wizard again.
(2) Locale at the time of
starting
Select the initial locate at the time of starting the execution module.
3. After entering the settings, click on [Next].

(1)
(2)
(3)
No. Item Description
(1) File list (A) Select the type of the file to be generated.
Select the file and click on the box to alternate between check ON/OFF.
To select all files at once, check the box on the title.
(2) Resource + property
selection (P)
Click the button to select only the resource and property files.
(3) Generation method Select "Postscript" to add only the data changed after previous source code
generation into the source file.
Select "overwrite all" to overwrite the entire source file.
(4) Destination Folder Designate the folder where the source code is generated.
4. Click on [Finish] to automatically generate source codes.
After generation is finished, a completion notice dialog box is displayed. Click on the [OK] button.
The generated source codes are saved in the folder designated.
(4)

Files created during source code generation include the followings.
File name Description User code protection
GCXXX.cxx
(XXX: project name)
Application launch-related code file.
Screen properties are entered to create
screens.
Not protected
GCSampleScreen.cxx Base screen-related code file.
Instance of the resource and the created
page are generated.
Protected
GCSampleScreen.hpp
GCSampleScreen.prc Not protected
GCXXX.cxx
(XXX: window/panel name)
Page-related code file. Controls in each
page are generated and callback
functions of each control are generated.
Protected
GCXXX.hpp
(XXX: window/panel name)
GCXXX.prc
(XXX: window/panel name)
Not protected
GCXXXYYY.cxx
(XXX: window/panel name.

YYY: view frame name)
View frame-related code file.
The view frame is controlled.
Protected
GCXXXYYY.hpp
(XXX: window/panel name.
YYY: view frame name)
GCXXXYYY.prc
(XXX: window/panel name.
YYY: view frame name)
Not protected
GCXXXYYYPanelZZZ.cxx
(XXX: window/panel name.
YYY: view frame name.
ZZZ: view frame page number)
View frame page-related code file.
Controls in each page of view frame are
generated and callback functions of each
control are generated.
Protected
GCXXXYYYPanelZZZ.hpp
(XXX: window/panel name.
YYY: view frame name.
ZZZ: view frame page number)
GCXXXYYYPanelZZZ.prc
(XXX: window/panel name.
YYY: view frame name.
ZZZ: view frame page number)
Not protected
GResource.c Resource-related code file. Not protected
GResource.h
GLoc_XXX.c
(XXX: locale name)

NOTE
"User code protection" is a function for protecting the source codes created by the user against
overwriting during next source code generation. For details, refer to Section "15.2 User Code
Protection".
The source code specified as "not protected" in the "user code protection" field is not added even if
"add" is selected with the source code generation wizard generation method; it is overwritten, instead.
If GCYYY.cxx already exists at the time of source code generation, the part related to callback
functions is not overwritten.
The screen size and display zoom settings are stored in file CONFIG.INI, that is in the same folder with
melhi.exe.
To modify the screen size or the display magnification, adjust the values in the [SCREEN].
[SCREEN]
WIDTH = 640
HEIGHT = 480
SCALE = 100
Up to 5 Mbytes of resource data can be displayed on the NC. The following message appears if the
resource data to be output to GResource.c exceeds 5 Mbytes at the time of source code generation.
When "Yes" is selected, the source code generation is continued. When "No" is selected, the source
code generation is cancelled.

15.2 User Code Protection
NC Designer2 automatically encloses the part to be overwritten by NC Designer2 in each created
file, with tag codes during source code generation.
The source codes added during the next source code generation can be protected by the users
adding source codes other than at the parts enclosed with tag codes.
Lists of tag codes used for each file are shown below.
Screen header file(GCSampleScreen.hpp)
Tag code Description
//{{OBJECT_TYPE
//}}OBJECT_TYPE
Area of definition of object type of panel/window/view frame object created
in project is described.
//{{PUBLIC_METHOD
//}}PUBLIC_METHOD
Area where the method (function) created in the screen class is described.
//{{PROTECTED_METHOD
//}}PROTECTED_METHOD
Area where the method (function) created in the screen class is described.
Screen source file(GCSampleScreen.cxx)
Tag code Description
//{{INITIAL_PANEL
//}}INITIAL_PANEL
Area where the initial panel is specified.
//{{INITIAL_LOCALE
//}}INITIAL_LOCALE
Area where the initial locale is specified.
Panel header file(GCXXX.hpp)
Tag code Description
//{{CONTROL_ID
//}}CONTROL_ID

Area where the ID of the control displayed in the panel is described.
//{{PUBLIC_METHOD
//}}PUBLIC_METHOD
Area where the definition of the method (function) created in the panel is described.
//{{CALLBACK_METHOD
//}}CALLBACK_METHOD
Area where the definition of the callback method (function) created in the panel is described.
//{{PROTECTED_METHOD
//}}PROTECTED_METHOD
Area where the definition of the method (function) created in the panel is described.

View frame header file(GCXXXYYY.hpp)
Tag code Description
//{{PANEL_ID
//}} PANEL _ID
Area where the ID of the panel displayed in the view frame is described.
//{{PUBLIC_METHOD
//}}PUBLIC_METHOD
Area where the definition of the method (function) created in the view frame is described. The definition of the method provided in the template from the initial state is described.
//{{PROTECTED_METHOD
//}}PROTECTED_METHOD
Area where the definition of the method (function) created in the view frame is described.
View frame panel header file(GCXXXYYYPanelZZZ.hpp)
Tag code Description
//{{CONTROL_ID
//}}CONTROL_ID
Area where the ID of the control displayed in the panel is described.
//{{PUBLIC_METHOD
//}}PUBLIC_METHOD
Area where the definition of the method (function) created in the panel is described.
//{{CALLBACK_METHOD
//}}CALLBACK_METHOD
Area where the definition of the callback method (function) created in the panel is described.
//{{PROTECTED_METHOD
//}}PROTECTED_METHOD
Area where the definition of the method (function) created in the panel is described.
NOTE
Do not modify the part enclosed with tag codes.
Do not delete any tag code from the file.
This function is valid if the source code generation method is set at [Postscript].

16. Features and Configuration of GUI Library
This section describes an outline of the GUI library.
Refer to "NC Designer Function Reference" (IB-1500109) for the specification details.
16.1 Features of GUI Library
The graphical user interface (GUI) library is a C++ language library and it strongly supports GUI development. The GUI library provides you with not only drawing functions but also controlling of the mouse, key and other events as well as other functions indispensable for establishment of the GUI such as the window system, so that the GUI can be created without difficulty.
It is also provided with a GPI (graphic platform interface), which is a mechanism for processes depending on hardware, to make porting to each platform easily. When the GUI library is ported to another platform, GPI processes are created according to the target platform.

16.2 Configuration of GUI Library
The basic configuration of the GUI library is shown below.
GResource
Drawing
GPI
Font OS
system
Timer
driver
Keyboard
driver
Mouse
driver
Target hardware
GEvent
GDraw
Event
operation GWin/GControl/GShape
Resource Operation
Resource

Operation
Drawing
Drawing
Send event Send event Send event
Hardware operation
Resource Operation
Font operation
Event operation Window/Control operation
User application
Timer
event
Keyboard
operation
Mouse
operation
Function name Description
GDraw Draws basic figures and characters and specifies coordinates, colors and
other drawing environment
GPI Part dependant on hardware and operating system (drawing to VRAM,
font, platform initialization, etc.)
GResource Handles character strings, solid frames, images and other resources.
GEvent Controls the mouse, keyboard, timer and other events and window system
events such as GWin, GControl and GShape.
GWin/GControl/GShape Window system

16.3 Folder Configuration for Data File
The folder configurations for data file are shown below.
NCD2
  M7
    RUNPARTS
    lang
    lib
      vc6
      Release_Unicode
    include
    include_VxW
  M8
    RUNPARTS
    CRUNPARTS
    lang
    lib
      vs2010
      Release
    include
    include_VxW
  Custom
  Projects
Each folder is described below.
Folder name Description
M7 Folder storing application window for M700V/M70V/E70 Series
M8 Folder storing application window for M800/M80 Series
lib Folder storing library files
include Folder storing GUI library header files
Projects Folder storing project files
Custom Folder storing setting files for user update

17. Application Execution Method
This section describes the execution method of applications created with NC Designer2.
17.1 Application Execution Method
17.1.1 Outline
The execution method of applications created with NC Designer2 includes two types: interpreter
and compilation. Either independent or combinational execution is possible.
Interpreter Method
With the interpreter method, the project data created with NC Designer2 is converted into an
interpreter project for execution. The feature of the interpreter method is that NC Designer2 handles
all processes from screen establishment to simple control program creation.
Therefore C++ language programming is unnecessary. While the execution speed is slower than
that of the compilation method, GUI applications are developed handily.
*** .ND2
Project for execution
with interpreter
Convert.
Project data
***.GIP
Execution in interpreter form
Create a project using NC Designer2.

Compilation Method
With the compilation method, a source program is generated from the project data created with NC
Designer and it is converted into a module (DLL) for execution. The control program is created in
the C++ language and all functions of NC Designer2 are used to realize various control methods.
While C++ language programming is necessary, the execution speed is faster than that of the

interpreter method and applications having more complex control functions can be developed.
Compiler
Linker
C standard library C++
Object file
Genifa.lib GWin.lib GPI.lib
Module
Source code generation
C++
User application source
file
GUI library
Create a project using NC Designer2.

17.1.2 Independent/Combinational Execution
You can choose the interpreter method, compilation method and combination of both for the execution of the application. Using combination, you can use the advantages of both methods during application development. For example, screens where frequent specification changes are expected are created with the interpreter method, and complex screens are created with the compilation method.
ND2

17.2 Interpreter Method
17.2.1 What Is Interpreter Method?
With the interpreter method, the project data created with NC Designer2 is converted into an interpreter project for execution. The feature of the interpreter method is that NC Designer2 handles all processes from screen establishment to simple control program creation.
Therefore C++ language programming is unnecessary. While the execution speed is slower than that of the compilation method, GUI applications are developed handily.
17.2.2 Flow of Operation
The procedure for executing the application in the interpreter method is described here.
1. Create a project with NC Designer2.
2. To add control programs to the project or controls, describe macros. From the [Settings] menu, select [Panel Macro Edit]/[Project Macro Edit]. Edit the macro in the displayed "Macro Edit" dialog box. For details of the macro editing method, refer to "NC Designer2 Macro Function Manual" (IB-1501500).
NOTE
With the interpreter method, callback events do not function. To add screen switching process to controls, use the macro function.
3. Save the project.
4. Convert the project for interpreter execution. From the [File] menu, select [Project convert] - [Export].
For the export, refer to "14.1.1 Export".

5. Enter various settings related to execution of the application such as the application execution state and project name to be launched. Use the "Config.ini" file for settings. The Config.ini file is in the Custom folder for data file. Use a text editor to open it.
6. Edit the [INTERPRETER] section in the "Config.ini" file as specified below.
Item Setting Description
RUN= 1 Specify the number of projects executed with the interpreter
method.
PROJECT= C:\MELCNC\NCD2\Projects
\Sample.GIP
Specify the name of the interpreter project including the path.
PAGE_OFFSE
T=
6000 Specify the screen No. offset value.
7. Edit the [PROJECT] section of the "Config.ini" file as specified below.
Item Setting Description
DEFAULT_PAG
E=
6000 Specify the screen No. displayed first when the project is
launched.
After editing, save and close the file.
8. Double click on "melhmi.exe" to launch it and execute the project in the interpreter mode. "melhmi.exe" is an application window for executing a project and is stored in the folder for data file.

17.3 Compilation Method
17.3.1 What Is Compilation Method?
With the compilation method, a source program is generated from the project data created with NC Designer2 and it is converted into a module for execution. The control program is created in the C++ language and all functions of NC Designer2 are used to realize various control methods. While C++ language programming is necessary, the execution speed is faster than that of the interpreter method and applications having more complex control functions can be developed.
17.3.2 Flow of Operation
The procedure for executing the application in the compilation method is described below.
1. Create a project with NC Designer2.
2. Save the project.
3. Generate source codes.
From the [File] menu, select [Source Code Generation] and follow the displayed "Source code generation wizard" to generate source codes.
For the source code generation method, refer to Section "15 Source Code Generation".

17.3.2.1 Operation Procedure with Visual Studio2010
1. Start up Visual Studio2010 (hereinafter called VS2010) to edit the source code, and compile and link.
2. Create a VS2010 project. From the [File] menu, select [New] - [Project...].
From "Installed Templates" in "New Project" dialog, select "Win32" from "Visual C++", and enter the solution name and Location. Press the [OK] button.
NOTE
For Visual Studio 2005/2008, a project can be created with the same operation procedure as mentioned above.
3. The dialog box shown below is displayed. Press the [Next] button.

4. The dialog box shown below is displayed. Select DLL from Application type and Empty project from Additional options. Press the [Finish] button.
5. Add the source file created with NC Designer2 to the project.
From the [Projects] menu, select [Add Existing Item...] and all files (*.cxx/ *.hxx/ *.prc/ *.c/ *.h/ *.def) generated with NC Designer2.
6. From the [Projects] menu, select [Properties] to display "Property Pages" dialog box.
Select "Configuration Properties" - "General ". Select "Use Unicode Character Set" from "Character Set" in "Project Defaults".

Specify each item as shown below.
Category Item Details
Configuration
Properties
- General
Project Defaults
- Character Set
Use Unicode Character set
Configuration
Properties
- C/C++
- General
Additional
Include Directories
For M700V/M70V/E70 Series:
C:\MELCNC\NCD2\M7\include
For M800/M80 Series:
C:\MELCNC\NCD2\M8\include
Configuration
Properties
-C/C++
- Preprocessor
Preprocessor Definitions Delete _MBCS.
Add _UNICODE, UNICODE and NC_TYPE_NX.
Configuration
Properties
-C/C++
-Code
Generation
Runtime Library Multi-thread (/MT)
Configuration
Properties
-C/C++
- Language
Treat WChar_t As Built in
Type
No(/Zc:wchar_t-)
Configuration
Properties
- Linker
- General
Additional
Library Directories
For M700V/M70V/E70 Series:
C:\MELCNC\NCD2\M7\lib\vc6\Release_Unicode
For M800/M80 Series:
C:\MELCNC\NCD2\M8\lib\vs2010\Release
Configuration
Properties
- Linker
- Input
Additional Dependencies gcs.lib;resmng.lib;gcwin.lib;genifa.lib;ncapi32.lib
Ignore Specific Default
Libraries
For M700V/M70V/E70 Series:
Libc.lib
For M800/M80 Series:
Libc.lib;Libcmt.lib
Module Definition File Specify the path of GPROJECT.def.
NOTE
Custom API library in NC Designer2 installer is described in "Custom API Library Correspondence List" in this manual. When using the custom API library of the corresponded version or later, change the following two path settings.

- Configuration Properties - C/C++ - General Additional Include Directories
- Configuration Properties - Linker - General Additional Library Directories
7. Compile and link.
8. Copy the created library (*.dll) to the Custom folder for data file. "melhmi.exe" is an application window for executing a project and is stored in the Custom folder for data file.

9. Enter various settings related to execution of the application such as the application execution state and project name to be launched. Use the "Config.ini" file for settings. The Config.ini file is in the Custom folder for data file. Use a text editor to open it.
10. Edit the [INTERPRETER] section of the "Config.ini" file as shown below.

Item Setting Description
RUN= 0 Specify the number of projects executed in the interpreter method. To execute in the compilation method, specify "0".

11. Edit the [MODULE] section as shown below.

Item Setting Description
NUM= 1 Specify the number of projects executed in the compilation method.
MODULE_NAM
E01=
Sample.dll Specify the generated module name.
PAGE_OFFSE
T01=
6000 Specify the screen No. offset value.

12. Edit the [PROJECT] section as shown below.

Item Setting Description
DEFAULT_PAG
E=
6000 Specify the screen No. displayed first when the project is launched.

After setting, save and close the file.
13. Double click on "melhmi.exe" to launch it. The project is executed in the compilation method.

17.3.2.2 Operation Procedure with NC Compiler/NC Compiler2

1. Place the Makefile file in the same layer where the CPP folder, in which the source code has been generated, is placed.

The Makefile file sample is included in the SAMPLE MAKEFILE folder of the NC Designer2 software package.

2. Change the Makefile file sample as shown below.

```
# Makefile - Sample programs
#
# DESCRIPTION
# This file contains rules for building
#
# Path of application
APP_PATH = .
# Module name
OUTMODL = NCD2_Test.o
# Definition of compiler option
CC = ccmips -EL -mips3 -mno-branch-likely -G 0
CC_OPTIM = -O2 -funroll-loops -fno-strict-aliasing -fforce-addr
CC_COMPILER = -std=c9x -pipe -c -fasm -fno-rtti
CC_DEFINES = -DCPU=$(CPU) -DTOOL=gnule -DMIPSEL -DGCC960 -DVXWORKS54
LOCAL_DEFINE = -D_UNICODE -DUNICODE -DNC_TYPE_NX -DNO_WINDOWS -D_NCDVxWorks -DRW_MULTI_THREAD \
 -D_REENTRANT -D_INTERPRETER_ -DGCC960 -DUNDER_VXW -DNDEBUG
# Path of NC Designer include file
LOCAL_INCLUDE = -I/MELCNC/NCD2/M8/include_VxW -I/MELCNC/NCD2/M8/include
C++_OPTION = -fno-for-scope -fno-builtin -fno-exceptions
CFLAGS = $(CC_OPTIM) \
 $(CC_COMPILER) $(CC_DEFINES) $(ADDED_CFLAGS) $(CC_INCLUDE) \
 $(LOCAL_DEFINE) $(LOCAL_INCLUDE) $(EXTRA_DEFINE) $(EXTRA_INCLUDE)
C++FLAGS = $(CFLAGS) $(C++_OPTION)



# Definition of linker option
LD = ldmips -EL
LD_PARTIAL_FLAGS = -n -X -r
# Other definitions
RM = vxrm
# Peculiar header file path to the application
EXTRA_INCLUDE = -I$(APP_PATH)/Cpp
# Peculiar constant to application
EXTRA_DEFINE = -DNCDSSample
# Definition of link object
TGT_CPP = $(APP_PATH)/Cpp
TNGSCL = $(TGT_CPP)/GCNCD2_Test.cxx\
$(TGT_CPP)/GCPanel00000.cxx \
$(TGT_CPP)/GCWindow00001.cxx \
$(TGT_CPP)/GCSampleScreen.cxx \
$(TGT_CPP)/GLoc_Locale0.c \
$(TGT_CPP)/GLoc_Locale1.c \
$(TGT_CPP)/GResource.c
```

Module name to be generated
Header definition path for NC
Designer2
Target folder
Source file name

The NC Compiler basic settings are as follows.
Item Setting value Description
OUTMODL ***.o Specify the module name to be generated.
LOCAL_INCLU
DE
-I/MELCNC/NCD2/M7/include_VxW
-I/MELCNC/NCD2/M7/include
Specify the path of the M7 header definition file.
TGT_CPP CPP Define the folder that contains the source file to
be compiled.
TNGSCL c,cxx,cpp file in CPP folder Specify the source file to be compiled.
The NC Compiler2 basic settings are as follows.
Item Setting value Description
OUTMODL ***.o Specify the module name to be generated.
LOCAL_INCLU
DE
-I/MELCNC/NCD2/M8/include_VxW
-I/MELCNC/NCD2/M8/include
Specify the path of the M8 header definition file.
TGT_CPP CPP Define the folder that contains the source file to
be compiled.
TNGSCL c,cxx,cpp file in CPP folder Specify the source file to be compiled.
3. Start the command prompt.
4. Specify the environment variables according to the procedure described in the NC Compiler/NC Compiler2
instruction manual.

5. Move to the folder that contains the Makefile file, then execute "make".
6. When "make" is finished, a module (o file) is generated in the same layer as for C.
7. Install data in the display unit using SETUP INSTALLER. For information on SETUP INSTALLER, refer to
"Appendix 10. Installing Custom Data (M700VS/M70V/E70)" and "Appendix 11. Installing Custom Data
(M800/M80 (Windows-less display unit))".

17.4 Application Window
17.4.1 What Is Application Window?
The window displaying the created project is called application window. When executing an
application, launch this application window to display panels and windows.
Menu bar
GUI screen
Title bar
Item Description
Title bar The title of the application window is displayed. Specify presence of the title
bar and the character string displayed as a title in the Config.ini file.
Menu bar The menu of the application window is displayed. Presence of the menu
bar can be specified in the Config.ini file.
GUI screen The panels and windows of the created project are displayed and moved in
this area.

17.4.2 Launching the Application Window
1. Open the folder where NC Designer2 is installed.
NC Designer2 is installed in the below folders by default by system environment.
For Windows 8.1/Windows 10
For M700V/M70V/E70 Series: C:\MELCNC\NCD2\M7
For M800/M80 Series: C:\MELCNC\NCD2\M8
2. Double click on "melhmi.exe". After it is launched, the window shown below is displayed.
Project screen is
displayed.
17.4.3 Functions of Application Window
A list of menu items of the application window and application of each item are shown below.
Item Description
File Open Project The project opens. Only the interpreter method project (***.GIP) can be
selected.
Select Screen Panels/windows open.
For details, refer to Section "17.5 Screen Switching".
Exit The application window is closed.
View Title Bar The title bar is displayed and hidden alternately.
Menu Bar The menu bar is displayed and hidden alternately.
Help About The version of NC Designer2 is displayed.

17.4.4 Screen Configuration
Screen Element
The "page" created with NC Designer2 consists of a "panel" and "windows". (Refer to Section 2.2

"Specifications of NC Designer2".) In the application window, the panel and window can be displayed.

Item Description

Panel The panel is displayed in the full screen of the application window. Only one panel is displayed at a time.

Window The window is displayed in the window state on the application window. Up to 10 windows can be displayed at a time.

Combination of Screen

The panel and window displayed on the application window can be set either in the interpreter or compilation method. Combination of both methods is allowed for the panel and windows, as well.

Window

Interpreter method Compilation method

Panel Interpreter method

Compilation method

17.4.5 Closing the Application Window

To close the application window, perform one of the following operations.

From the [File] menu, select [Close].

Click on the button in the title bar.

Double click on the icon at the left end of the title bar.

Click on the icon at the left end of the title bar and select [Close] from the displayed control menu box.

While holding down the [Ctrl] key, press the [F12] key.

17.5 Screen Switching

17.5.1 Outline

The method for switching the screen (panel and window) displayed on the application window is described here.

17.5.2 Screen Switching Method

To switch the screen, there are three methods: use the screen switching dialog box of the application window, specify a screen switch event to the control, or use a macro.

Screen Switching Dialog Box

1. Launch the application window.
2. From the [File] menu, select [Open Screen]. The "Screen Selection" dialog box is displayed.
3. Designate a screen No. and press the "OK" button to switch the screen.

Macro

Specify a macro for screen switching to a control to switch the screen.

1. Open a project with NC Designer2 and create a control for setting screen switching. From the [Settings] menu, select [Panel macro edit] to open the "Macro edit" dialog box.
2. Specify the following macro in the created event. Press the [Event creation] button in the "Macro edit" dialog box and use the displayed "Event creation" dialog box to automatically specify the header and footer.

```
$GButton00000-OnClick
 GCSGEShowPanel(XX);
$End
```

* XX: Specify the new screen No. with the offset value added.

Screen Switching Event (compilation method only)

Specify a screen switching event as a callback process of a control to switch the screen.

1. Open a project with NC Designer2 and create a control for setting screen switching event. Open properties of the control and specify "Yes" for the callback to which a screen switching event is to be specified.
2. Generate source codes and specify the following event for the callback created in step 1.

```
GESetEvent(GECreateEventMessage(GM_SHOWPANEL,
 GCSGetScreen(GetGBaseObject()), XX, 0), FALSE);
```

* XX: Specify the new screen No. with the offset value added.

17.5.2.1 Changing From the Custom Screen to the Standard Screen (F0 Release)

By mounting the following macro processes in OnKeyPress function of the arranged control part on panel, it is possible to change the custom screen to the standard screen by inputting function key.

The page offset No. and the function key No. of each standard screen are as follows.

<The page offset No. of each standard screen>

Monitor screen offset No. : 1000

Setup screen offset No. : 2000

Edit screen offset No. : 3000

Diagnosis screen offset No. : 4000

Maintenance screen offset No. : 5000

<Function key No.>

Function key code for Monitor screen : F1(112) + SHIFT

Function key code for Setup screen : F2(113) + SHIFT

Function key code for Edit screen : F3(114) + SHIFT

Function key code for Diagnosis screen : F4(115) + SHIFT

Function key code for Maintenance screen : F5(116) + SHIFT

Interpreter Method

Macro

```
long _lShiftKey; 'SHIFT key input status
'The SHIFT key input status is maintained in the 0th bit of LUPARAM.
_lShiftKey = LUPARAM & H1;
if((LLPARAM == 112) && (_lShiftKey == 1)) 'Changing the screen to Monitor screen
GCSGEShowPanel(1000);
elseif((LLPARAM == 113) && (_lShiftKey == 1)) 'Changing the screen to Setup screen
GCSGEShowPanel(2000);
elseif((LLPARAM == 114) && (_lShiftKey == 1)) 'Changing the screen to Edit screen
```

```
GCSGEShowPanel(3000);
elseif((LLPARAM == 115) && (_lShiftKey == 1)) 'Changing the screen to Diagnosis screen
GCSGEShowPanel(4000);
elseif((LLPARAM == 116) && (_lShiftKey == 1)) 'Changing the screen to Maintenance screen
GCSGEShowPanel(5000);
endif;
```


Compilation Method

Source Code

```
#define KEY_SHIFT 0x01
#define GK_F1 112
#define GK_F2 113
#define GK_F3 114
#define GK_F4 115
#define GK_F5 116
if((lUParam & KEY_SHIFT) == KEY_SHIFT)
{
if(lLParam == GK_F1) //Changing the screen to Monitor screen
 {
 GESetEvent(GECreateEventMessage(GM_SHOWPANEL,
 GCSGetScreen(GetGBaseObject()), 1000, 0), FALSE);
 }
else if(lLParam == GK_F2) //Changing the screen to Setup screen
 {
 GESetEvent(GECreateEventMessage(GM_SHOWPANEL,
 GCSGetScreen(GetGBaseObject()), 2000, 0), FALSE);
 }
else if(lLParam == GK_F3) //Changing the screen to Edit screen
 {
 GESetEvent(GECreateEventMessage(GM_SHOWPANEL,
 GCSGetScreen(GetGBaseObject()), 3000, 0), FALSE);
 }
else if(lLParam == GK_F4) //Changing the screen to Diagnosis screen
 {
 GESetEvent(GECreateEventMessage(GM_SHOWPANEL,
 GCSGetScreen(GetGBaseObject()), 4000, 0), FALSE);
 }
else if(lLParam == GK_F5) //Changing the screen to Maintenance screen
 {
 GESetEvent(GECreateEventMessage(GM_SHOWPANEL,
 GCSGetScreen(GetGBaseObject()), 5000, 0), FALSE);
 }
}
```


17.5.2.2 Changing the Menu Name While Displaying Custom Screen (Menu Release)

By using the GCSMenuSetMenuButtonLowerName_all function, the menu name when the custom window (menu registered) is displayed can be changed.

<Screen images>

Interpreter Method

<GCSMenuSetMenuButtonLowerName_all function format>

1st argument : The page offset No. added custom window

 Monitor screen : 1000

 Setup screen : 2000

 Edit screen : 3000

 Diagnostic screen : 4000

 Maintenance screen : 5000

2nd argument : 0 fixed

3rd argument : 1 fixed

4th argument : Character string displayed in menu

Macro

```
GCSMenuSetMenuButtonLowerName_all(2000,0,1,
" TEST1, TEST2, TEST3, TEST4, TEST5, TEST6, TEST7, TEST8, TEST9, CLOSE");
```

(Note 1) The menu name can be displayed by seven characters a line and two columns, and can be displayed by 14 characters in total.

(Note 2) When eight characters or more are set to the menu name, the menu name is automatically displayed by two lines.

Compilation Method

<GCSSetMenuButtonLowerName_all function format (when all menu names are changed)>

1st argument : Menu control part object pointer

It is necessary to acquire the menu control part object by GCSGetChild function beforehand.

When the menu control part object is acquire by GCSGetChild function, the following constant is specified for the 2nd argument of the GCSGetChild function according to the registered screen.

Monitor screen: 59

Setup screen: 38

Edit screen: 15

Diagnostic screen: 34

Maintenance screen: 5

2nd argument : 1 fixed

3rd argument : Character string displayed in menu pointer (10 pointers)

<GCSSetMenuButtonLowerName_one function format (when one menu name is changed)>
1st argument : Menu control part object pointer
2nd argument : 1 fixed
2nd argument : The menu No. changed menu name
3rd argument : Character string displayed in menu pointer (1 pointer)

Source Code

```
char* _psMenuString[10];
long _lParentType = 0;
GBaseObject* _pParent = GCSGetPanel(GCSGetScreen(GetGBaseObject()));
GBaseObject* _pGCNXMenuSub;
//Set the displayed character string
_psMenuString[0] = (char*)&L"TEST1";
_psMenuString[1] = (char*)&L"TEST2";
_psMenuString[2] = (char*)&L"TEST3";
_psMenuString[3] = (char*)&L"TEST4";
_psMenuString[4] = (char*)&L"TEST5";
_psMenuString[5] = (char*)&L"TEST6";
_psMenuString[6] = (char*)&L"TEST7";
_psMenuString[7] = (char*)&L"TEST8";
_psMenuString[8] = (char*)&L"TEST9";
_psMenuString[9] = (char*)&L" CLOSE ";
//Get the menu control part object
//Following XX values specify the following constant: Monitor = 59, Setup = 38, Edit = 15.
_pGCNXMenuSub = (GBaseObject*)GCSGetChild(_pParent, XX);
//Set the menu name
if( _pGCNXMenuSub != 0 )
{
GCSSetMenuButtonLowerName_all(_pGCNXMenuSub, 1, _psMenuString);
}
```

When only one menu name is changed, specifying it as follows.

```
//Set the menu name second from the left
GCSSetMenuButtonLowerName_one(_pGCNXMenuSub, 1, 2, &_psMenuString[1])
```


17.5.2.3 Closing the Custom Screen (Menu Release)

The GCSMenuSendProcessID function is used to close the custom window registered in the menu release. For the operation of an operation message, refer to "17.6.5.5 Settings of an operation message".

Interpreter Method

<GCSMenuSendProcessID function format>
1st argument : The page offset No. added custom window
Monitor screen : 1000
Setup screen : 2000
Edit screen : 3000
Diagnostic screen : 4000
Maintenance screen : 5000
2nd argument : 0 fixed
3rd argument : 0 fixed

Macro

```
GCSMenuSendProcessID(2000,0,0);
```

Compilation Method

Issuing the user event by using GESetEvent function and GECreateEventMessage function closes the custom screen displayed by the menu release.
The format of each function is as follows.
<GESetEvent function format>
1st argument : The return value of GECreateEventMessage function
2nd argument : FALSE fixed
<GECreateEventMessage function format>
1st argument : GM_USER fixed
2nd argument : Panel object pointer (The following refer to the getting method.)
3rd argument : USNX_PROCESSID fixed
4th argument : 0 fixed

Source Code

```
GBaseObject *_gbObj = GCSGetPanel(GCSGetScreen(GetGBaseObject()));
GESetEvent(GECreateEventMessage(GM_USER, _gbObj,
 USNX_PROCESSID, 0), FALSE);
```


17.5.3 Screen No. Designation Method

The screen No. designated for screen switching varies between screen switching in the same project and that across different projects.
Suppose the following two projects.
Project A Panel00000
Window00001
Panel00002
Project B Panel00000
Panel00001
Window00012
Screen offset1000 Screen offset2000
To switch the screen in the same project, designate the screen No. specified in NC Designer2.
For example, to switch the screen from "Panel00000" to "Panel00002" in project A, specify screen number "2".
Project A Panel00000

Window00001
Panel00002
Screen offset1000
Specify screen
number 2.
To switch the screen across different projects, designate the sum of the screen number and the
screen offset value for each project as a screen number.
To switch the screen from project A to "Window 00012" of project B, specify screen No. "2012".
Project A Panel00000
Window00001
Panel00002
Project B Panel00000
Panel00001
Window00012
Screen offset1000 Screen offset2000
Designate screen
number "2012."
A summary of screen No. examples designated when the screen is switched is shown below.
Project A (screen offset: 1000)
Screen No. Screen name Screen switched
in same project
Screen switched across
different projects
0000 Panel00000 0 1000
0001 Window00001 1 1001
0002 Panel00002 2 1002
Project B (screen offset: 2000)
Screen No. Screen name Screen switched
in same project
Screen switched across
different projects
0000 Panel00000 0 2000
0001 Panel00001 1 2001
0012 Window00012 12 2012

17.5.4 Panel Switching History
NC Designer2 stores the history of switched panels when screens are switched between panels.
The specifications related to panel switching history are shown below.
Item Specification
Max. records 32
Storage method Ring buffer method
After the maximum number of records (32) is exceeded, the oldest record
is deleted and the new record is saved.
NOTE
Only panel-to-panel switching is recorded. Window display or view frame switching is not recorded.
Panel Switching Using the History
The panel switching history can be used to restore the display panel or advance it. Use a function or
macro to operate.
Item Function/macro to be used
Restore Function: GCSPrevPage
Macro: GCSPrevPage
Advance Function: GCSNextPage
Macro: GCSNextPage
NOTE
For the usage of the macro, refer to "NC Designer2 Macro Function Manual" (IB-1501500).

17.5.5 Displaying Previously Displayed Custom Screen
If you wish to display a previously displayed custom screen by inputting a function key, you need to
define the offset No. (6000 to 7999) of the custom release screen to be held as the previously
displayed screen. To define this No., specify the No. using commas as a delimiter in the
"PANEL_HOLDXX" key of the [COFFSET] section in the customdef.ini file.
The examples below are not to hold and hold the screen No. using a function (F0) key.
Example)
config.ini
Example 1) Not hold the screen No.
customdef.ini
1. When the F0 key is pressed, the screen displays PANEL000.
2. Change the screen from PANEL000 to PANEL001, and then change back to the standard
screen.
3. When F0 is pressed again, the screen displays PANEL000.
[INTERPRETER]
RUN=1
PROJECT01=D:\custom\TESTPANEL01.GIP
PAGE_OFFSET01=6000
[MODULE]
NUM=1
MODULE_NAME01=D:\custom\TESTPANEL02.dll
PAGE_OFFSET01=7000
(The rest is omitted)
[COFFSET]
FUNC_ID01=1
PANEL_OFFSET01=7000
(The rest is omitted)
TESTPANEL01.GIP

PANEL000
TESTPANEL02.dll
PANEL000
PANEL001
Standard
screen
PANEL000
(7000)
PANEL001
(7001) F0 key

Example 2) Hold the screen No. within the same project
<Example 2-1>
customdef.ini
1. When the F0 key is pressed, the screen displays PANEL000.
2. Change the screen from PANEL000 to PANEL001, and then change back to the standard screen.
3. When the F0 key is pressed again, the screen displays PANEL000.
<Example 2-2>
customdef.ini
1. When the F0 key is pressed, the screen displays PANEL000.
2. Change the screen from PANEL000 to PANEL001, and then change back to the standard screen.
3. When the F0 key is pressed again, the screen displays PANEL001.
[COFFSET]
FUNC_ID01=1
PANEL_OFFSET01=7000
PANEL_HOLD01=7000
(The rest is omitted)
Standard
screen
PANEL000
(7000)
PANEL001
(7001) F0 key
[COFFSET]
FUNC_ID01=1
PANEL_OFFSET01=7000
PANEL_HOLD01=7000-7001
(The rest is omitted)
Standard
screen
PANEL000
(7000)
PANEL001
(7001) F0 key

Example 3) Hold the screen No. of other project
customdef.ini
1. When the F0 key is pressed, the screen displays PANEL000(7000).
2. Change the screen from PANEL000(7000) to PANEL001(7001), from PANEL001(7001) to PANEL000(6000), and then change back to the standard screen.
3. When the F0 key is pressed again, the screen displays PANEL000(6000).
When the following macro process is added to the screen change process, the custom screen to be displayed by inputting a function key can be the one that was previously displayed.
Interpreter Method
<GCSGetLastPanelNumber function format>
1st argument: Function key (0 to 3)
Macro
LONG _lPanelNumber = GCSGetLastPanelNumber(0)
GCSGEShowPanel(_lPanelNumber);
Compilation Method
<GCSGetLastPanelNumber function format>
1st argument: Module screen object pointer (see below for how to get)
2nd argument: Function key (0 to 3)
Source Code
GBaseObject *_pScreenObj = GCSGetModuleScreen();
long _lPanelNumber = GCSGetLastPanelNumber(_pScreenObj, 0);
GESetEvent(GECreateEventMessage(GM_SHOWPANEL, GCSGetScreen(GetGBaseObject()),
_lPanelNumber, 0), FALSE);
[COFFSET]
FUNC_ID01=1
PANEL_OFFSET01=7000
PANEL_HOLD01=7000-7001,6000
(The rest is omitted)
Standard
screen
PANEL000
(7000)
PANEL001
(7001) F0 key
PANEL000
(6000)

17.6 Custom Release

17.6.1 Outline

Custom release is a function which allows the user-original window to display as a standard screen or another screen to operation. This function is optional. (For some models such as M80 and M70V, this function is standard.)

Screen customization includes, mainly, F0 assignment, menu assignment, screen part assignment and selectable display assignment:

F0 release: Custom release screen (Note 1) can be registered to function keys (F0, SEP, window display, window selection).

When a function key is pressed, the registered custom release screen will be displayed.

This type can be registered with "NC Designer2 interpreter method", "NC Designer2 compilation method" and "Executing file registration method" (Note 3).

Menu release: Custom release window (Note 2) can be registered in the main menu of the monitor screen, setup screen, edit screen, diagnostic screen, and maintenance screen.

When the registered menu is pressed, the custom release window will be displayed.

This type can be registered with "NC Designer2 interpreter method", "NC Designer2 compilation method" and "Executing file registration method" (Note 3).

Depending on the conditions, display/non-display of the custom menu can be changed.

Main menu contents of the monitor, setup and edit screen can be rearranged.

Screen part assignment: Customized window which is created with "NC Designer2 interpreter method" or "NC Designer2 compilation method" can be displayed as a part of the standard screen.

Selectable display assignment: Customized window that is created with "NC Designer2 interpreter method" or "NC Designer2 compilation method" can be displayed on the selectable display area of the monitor screen. In the same way as the selectable display of the standard screen, designated customized window (menu assignment) opens by pressing the input key.

(Note 1) An HMI screen originally created with NC Designer2 by the user or an execution file prepared by the user.
(Note that an execution file prepared by the user cannot be used in M800/M80 (Windows-less display unit) and M700VS/M70V/E70.)

(Note 2) An HMI window originally created with NC Designer2 by the user or an execution file prepared by the user.
(Note that an execution file prepared by the user cannot be used in M800/M80 (Windows-less display unit) and M700VS/M70V/E70.)

(Note 3) "Executing file registration method" cannot be used in M800/M80 (Windows-less display unit) and M700VS/M70V/E70.

Macro
Project Data
file
(*GIP)
Original
source code
(C++)
Source
code
(C++)
Original
source code
Source
code Compilation link
Automatic
generation of
interpretation data
(1) NC Designer2 Interpreter method
(2) NC Designer2 Compilation method
(3) EXE file registration method
Compilation link
Commercially
available
application
Commercially
available application
development tool
(VB, VC, etc.)
Automatic
generation of
source code
NC Designer2

(1) NC Designer2 interpreter method (GIP method)

The interpreter data automatically generated with NC Designer2 can be displayed as an operation screen.

When a simple screen is displayed by using the control that NC Designer2 provides with, this method is suitable.

(2) NC Designer2 compilation method (DLL method)

The DLL is created by editing the source code automatically generated by NC Designer2 and compilation/linking.
The created DLL can be displayed as an operation screen.
When complex processing is executed by using the control that NC Designer2 provides with, this method is suitable.
(3) Executing file registration method (EXE method)
The execution file (EXE file) originally developed can be displayed as an operation screen.
When an original operation screen is created without using the control that NC Designer2 provides with, this method is suitable.
(Note that the executing file registration method cannot be used in M800/M80 (Windows-less display unit) and M700VS/M70V/E70.)
Each feature is shown below.

NC Designer2 interpreter method	NC Designer2 compilation method	Executing file registration method
Creation		
Process speed		
Flexibility		
Functions		

17.6.2 S/W Configuration

17.6.2.1 Necessary Applications

The following applications are needed for custom release according to the method.

Release method	NC Designer2 Application
Interpreter method	-
Compilation method *1	Visual Studio 2010
Executing file registration method (M800/M80 (Windows-less display unit))	NC Compiler2
- (Only when the application is developed by using VC++.)	NC Compiler
Changed the arrangement of the main menu	- -

Necessary -Not necessary Necessary according to the usage
*1 The following application is needed by the display unit used.
<When using M800/M80 (Windows-based display unit) and M700VW>
Visual Studio 2010
<When using the M800/M80 (Windows-less display unit)>
NC Compiler2
<When using M700VS/M70V/E70>
NC Compiler

17.6.2.2 Necessary Files

The necessary files are as follows for custom release.

File name	Usage	Storage folder (Note1)
Config.ini	This is used when the DLL file and the GIP file are registered as an operation screen.	- When using M800/M80 (Windows-based display unit) and M700VW D:\Custom\ - When using M800/M80 (Windows-less display unit) and M700VS/M70V/E70 /custom/
melAppCtrl.ini	This is used when the execution file is registered as an arbitrary key.	- When using M800/M80 (Windows-based display unit) and M700VW D:\Custom\ - When using M800/M80 (Windows-less display unit) and M700VS/M70V/E70 /custom/
customdef.ini	This is used when the following cases. - When the custom release window is added by menu release. - When the custom release window is added by F0 release (Excluding executing file registration method). (Note) Describe it by UNICODE text.	- When using M800/M80 (Windows-based display unit) and M700VW D:\Custom\ - When using M800/M80 (Windows-less display unit) and M700VS/M70V/E70 /custom/
*.jpg	This is a picture file of the icon displayed in the main menu at the menu release.	

- When using M800/M80 (Windows-based
display unit) and M700VW
D:\Custom\img\
- When using M800/M80 (Windows-less display
unit) and M700VS/M70V/E70
/custom/
*.DLL This is custom screen data file
created by compilation method.
- When using M800/M80 (Windows-based
display unit) and M700VW
D:\Custom\
- When using M800/M80 (Windows-less display
unit) and M700VS/M70V/E70
/custom/
*.GIP
and same name
folder
This is custom screen data file
created by interpreter method.
- When using M800/M80 (Windows-based
display unit) and M700VW
D:\Custom\
- When using M800/M80 (Windows-less display
unit) and M700VS/M70V/E70
/custom/
*.EXE This is an execution file registered
by the executing file registration
method.
- When using M800/M80 (Windows-based
display unit) and M700VW
D:\Custom\
- When using M800/M80 (Windows-less display
unit) and M700VS/M70V/E70
/custom/
(Note 1) The storage folder is different according to the display unit used.
(Note 2) When M800/M80 (Windows-less display unit) and M700VS/M70V/E70 is used as a display
unit, this is stored in a folder by using SETUP INSTALLER. For information on SETUP
INSTALLER, refer to "Appendix 10. Installing Custom Data (M700VS/M70V/E70)" and
"Appendix 11. Installing Custom Data (M800/M80 (Windows-less display unit))".

The necessary file of each method is as follows.
Release method Config.ini melAppCtrl.ini customdef.ini *.jpg *.DLL *.GIP *.EXE
Interpreter method
(F0 release) - - - -
Compilation method
(F0 release) - - - -
Executing file
registration method
(F0 release)
- - - - -
Interpreter method
(Menu release) - - -
Compilation method
(Menu release) - -
Executing file
registration method
(Menu release)
- - - -
Changed the
arrangement of the
main menu
- - - - -
Necessary to prepare or edit -Not necessary to prepare or edit

17.6.3 Development Procedure of Custom Release S/W
F0 release Menu release
Interpreter
method
Prepare the
GIP file created
by NC
Designer2.
Edit Config.ini.
Edit
customdef.ini.
Menu position
change
Edit
customdef.ini.
Compilation
method
Prepare the
DLL file
created by NC

Designer2.
Edit Config.ini.
Edit
customdef.ini.
EXE method
Prepare an
arbitrary
executing file.
Edit
melAppCtrl.ini.
Interpreter
method
Prepare the
GIP file created
by NC
Designer2.
Edit Config.ini.
Edit
customdef.ini.
Prepare an
icon image file.
Compilation
method
Prepare the
DLL file
created by NC
Designer2.
Edit Config.ini.
Edit
customdef.ini.
Prepare an
icon image file.
EXE method
Prepare an
arbitrary
executing file.
Edit
customdef.ini.
Prepare an
icon image file.
The custom release screen is registered.
Customized screen is registered
Screen part assignment Selectable display assignment
Compilation method
Prepare DLL file created
by NC Designer 2
Edit Config.ini.
Edit customdef.ini.
Interpreter method
Prepare GIP file created
by NC Designer 2
Edit Config.ini.
Edit customdef.ini.
Compilation method
Prepare DLL file created
by NC Designer 2
Edit Config.ini.
Edit customdef.ini.
Interpreter method
Prepare GIP file created
by NC Designer 2
Edit Config.ini.
Edit customdef.ini.

17.6.4 F0 Release
In the F0 release, the screen of the custom release created with NC Designer2 or the execution file originally prepared can be registered to the function key.
17.6.4.1 Interpreter Method
To register the interpreter method data to the function key, it is necessary to edit Config.ini and customdef.ini. Use "17.7 Custom Release File Setting" to create them easily. The customdef.ini has to be described by UNICODE text.
17.6.4.1.1 Config.ini
Example of setting
[INTERPRETER]
RUN=2
PROJECT01=PANEL.GIP
PAGE_OFFSET01=6500
PROJECT02=WINDOW.GIP
PAGE_OFFSET02=8000
;<- Set 2 because PROJECT is registered up to 02.
;<- When registering the custom release screen
;<- The offset No. is from 6000 to 7000.
;<- When registering the custom release window
;<- The setting range of offset No. is from 8000 to 9700.

Edit the following item of the [INTERPRETER] section.
Key name Details
RUN This sets the number of projects executed by the interpreter method.
 The number of projects which can be registered is up to ten.
 Only one project can be registered when the project macro is used.
 Up to 256 screens and windows can be created for one project.
Setting range : 0 to 10
PROJECTXX
(XX = 01 to 10)
 This sets the GIP file of the startup project by full path.
Ex.) <When using M800/M80 (Windows-based display unit) and M700VW>
PROJECT01=D:\custom\Test.GIP
<When using M800/M80 (Windows-less display unit) and
M700VS/M70V/E70>
PROJECT01=/custom/Test.GIP
(Note 1) Number the end of the key name from 01 sequentially.
(Note 2) If the GIP file which does not exist in PROJECT is set, the screen and
the window included in the GIP file registered after set cannot be
displayed.
PAGE_OFFSETXX
(XX = 01 to 10)
 This is an offset value added to the screen No. in each project.
"Screen No. in the project + Offset value" is a screen No. specified when the
screen is changed between different projects.
 Use the offset No. within the following ranges when the custom screen is
registered to the function key.
Setting range : 6000 to 7700
 The number of function key which can be registered is four as follows.
 SFP F0
 Window display Window selection
 In assigning customized window to a main menu key as screen part
assignment and selectable display assignment, set the offset No. in the
following range.
Setting range : 8000 to 9700
(Note 1) When the screen (window) is created by NC Designer2, number it in
order of creation.
(Note 2) Do not set the offset No. outside the above-mentioned setting range.
(Note 3) Match the No. of the PROJECT key end and the No. of the
PAGE_OFFSET key end.
(Note 4) Leave space about 256 or more about the first offset No. and the
second offset No. when two or more offset Nos. are registered.
(Example: The first project : 7000, The second project : 7256, and The
third project : 7512.)
Edit the following item of the [PROJECT] section when the project macro is used.
Key name Details
CYCLIC_MACRO Set the GMC file of the startup project macro by full path.
 One project macro can be registered.
Ex.) < When using M800/M80 (Windows-based display unit) and M700VW>
CYCLIC_MACRO=D:\custom\Test\Macro\Test.GMC
< When using M800/M80 (Windows-less display unit) and
M700VS/M70V/E70 >
CYCLIC_MACRO=/custom/Test/Macro/Test.GMC

17.6.4.1.2 customdef.ini
Example of setting
; When registering the screen (PANEL on NCDesigner2) to the function key
; Set 6500 to the offset No. of F0 key
; The previously displayed screen displays screens that the offset No. is from 6500 to 6999.
[COFFSET]
NUM=1
FUNC_ID01=1
PANEL_OFFSET01=6500
PANEL_HOLD01=6500-6999
Edit the following item of the [COFFSET] section.
Key name Details
NUM This sets the number of registration of F0 release (excluding the executing file
registration method).
Setting range : 0 to 4
Default : 0
FUNC_IDXX
(XX = 01 to 04)
This designates the function key registering the custom release screen.
Setting range : 0 to 3
0 : SFP key
1 : F0 key
2 : Window display key
3 : Window selection key
PANEL_OFFSETXX
(XX = 01 to 04)
This designates the offset No. of the custom release screen registered to the
function key.
Designate the offset No. registered in Config.ini.
Setting range : 6000 to 7999
PANEL_HOLDXX
(XX=01 to 04)

Specify the previously displayed custom screen, if you wish to display it again
by inputting a function key.
Use this key when a custom release screen is made up of more than one
screen (panel), and you wish to display the previously displayed screen again.
(Note 1) This key is enabled for NC Designer2 interpreter method or NC
Designer2 compilation method.
(Note 2) A window can not be held.
(Note 3) Do not include an unnecessary character such as a space in the
setting value.
Setting range : Maximum number of characters = 64 (Specify the offset No.
between 6000 and 7999)
Specify the offset No. of the custom screen to be held as a previously displayed
screen, using commas as a delimiter. There are two types of methods to
specify the offset No., individual designation and range designation. The
formats are as follows.
Individual designation = (Offset No.),(Offset No.),(Offset No.),
Range designation = (Offset No. Offset No.),
Default: Not hold
Setting example : PANEL_HOLD01=6001,6003,6004-6008,6010,6050
(Note 1) When the NUM key is 1 or more, always set to keys without setting default value.
(Note 2) When a symbol ";" is at the head of the line, the character string is judged to be a
comment.
(Note 3) Do not insert the spaces before and behind " = " between the key and the setting value.

17.6.4.2 Compilation Method
To register the compilation method data in the function key, it is necessary to edit Config.ini and
customdef.ini. Use "17.7 Custom Release File Setting" to create them easily.
The customdef.ini has to be described by UNICODE text.
17.6.4.2.1 Config.ini
Example of setting
[MODULE]
NUM =2
MODULE_NAME01=WINDOWDLL.DLL
PAGE_OFFSET01=7000
MODULE_NAME02=PANELDLL.DLL
PAGE_OFFSET02=9000
;<- Set 2 because MODULE_NAME is registered up to 02.
;<- When registering the custom release screen
;<- The setting range of offset No. is from 6000 to 7700.
;<- When registering the custom release window
;<- The setting range of offset No. is from 8000 to 9700.

Edit the following item of the [MODULE] section.
Key name Details
NUM This sets the number of projects executed by the compilation method.
 The number of projects which can be registered is up to three.
 Up to 256 screens and windows can be created for one project.
Setting range : 0 to 3
MODULE_NAMEXX
(XX = 01 to 03)
 For M800/M80 (Windows-based display unit) and M700VW, this sets the DLL
file of the startup project by full path.
Ex.) MODULE_NAME01=D:\custom\Test.DLL
 For M800/M80 (Windows-less display unit) and M700VS/M70V/E70, this sets
the project name of
NC Designer2.
Ex.) MODULE_NAME01=/custom/Test.DLL
(Note 1) Number the end of the key name from 01 sequentially.
(Note 2) If the file which does not exist in MODULE_NAME is set, the screen
and the window included in the file registered after set cannot be
displayed.
PAGE_OFFSETXX
(XX = 01 to 03)
 This is an offset value added to the screen No. in each project.
"Screen No. in the project + Offset value" is a screen No. specified when the
screen is changed between different projects.
 Use the offset No. within the following ranges when the custom screen is
registered to the function key.
Setting range : 6000 to 7700
 The number of function key which can be registered is four as follows.
 SFP F0
 Window display Window selection
 In assigning customized window to a main menu key as screen part
assignment and selectable display assignment, set the offset No. in the
following range.
Setting range : 8000 to 9700
(Note 1) When the screen (window) is created by NC Designer2, number it in
order of creation.
(Note 2) Do not set the offset No. outside the above-mentioned setting range.
(Note 3) Match the No. of the MODULE_NAME key end and the No. of the
PAGE_OFFSET key end.
(Note 4) Leave space about 256 or more about the first offset No. and the
second offset No. when two or more offset Nos. are registered.
(Example: The first project : 7000, The second project : 7256, etc.)

17.6.4.2.2 customdef.ini
Refer to 17.6.4.1.2.

17.6.4.3 Switching of "Onboard" and "Execution File by F0 Release" by Bit Selection Parameter (#6451 bit0)
By the bit selection parameter "#6451 bit0 (Onboard ON)", whether to start the onboard or the execution file by the F0 release can be selected with the F0 key. When #6451 bit0 (Onboard ON) is 1, the onboard starts. When #6451 bit0 is 0, the executing file by F0 release starts. However, when the executing file is not registered even if #6451 bit0 (Onboard ON) is 0, the input of F0 key is ignored.
(Note 1) Refer to 17.6.4.1 and 17.6.4.2 for registration of the executing file to F0 key.
(Note 2) The setting of the executing file registration method is given to priority when both the interpreter/compilation method and the executing file registration method are registered.
(Note 3) For M800/M80 (Windows-less display unit) and M700VS/M70V/E70, this function is enabled only when the standard screen is displayed.
Refer to Appendix 8. for the executing file registration method.

17.6.5 Menu Release
In the menu release, the window of the custom release created with NC Designer2 or the execution file originally prepared can be registered in the main menu of the monitor screen, setup screen, edit screen, diagnostic screen, and maintenance screen.
Main menu contents of the monitor, setup, edit, diagnostic, and maintenance screen can be rearranged.
17.6.5.1 Interpreter Method
To register the interpreter method data to the function key, it is necessary to edit Config.ini and customdef.ini and to prepare the image displayed as the icon. Use "17.7 Custom Release File Setting" to create them easily.
The customdef.ini has to be described by UNICODE text.
17.6.5.1.1 Config.ini
Refer to 17.6.4.1.1.
17.6.5.1.2 customdef.ini
Example of setting

```
;  When adding the custom release window
;  Set the custom release window "TEST" to the fourth menu from the left on the first page of the monitor screen.
;  The panel update processing displaying the window of the custom open is set once every 200ms.
;  When the window is shut, the instance is held.
;  The display existence of the menu is acquired from TESTWIN.DLL.
[CMENU]
NUM=2
SCREEN_TYPE01=0
MENU_POS01=3
WINDOW_OFFSET01=8000
MENU_ENG01=TEST
SUMMARY_ENG01=TEST
MENU_JPN01=SHIKEN
SUMMARY_JPN01=SHIKEN
BG_REFRESH_TIME01=200
INSTANCE_HOLD01=1
MENU_STATE_DLL01=TESTWIN.DLL
;  When adding the executing file
;  Add the menu "calc" to the fifth menu from the left on the first page of the monitor screen,
; When the menu is pressed, "C:\WINDOWS\SYSTEM32\calc.exe" is executed.
; When the execution file starts, the update cycle of a standard screen is set once every 200ms.
SCREEN_TYPE02=0
MENU_POS02=4
WINDOW_OFFSET02=20000
EXECUTE02=C:\WINDOWS\SYSTEM32\calc.exe,calc,
MENU_ENG02=calc
SUMMARY_ENG02=calc
MENU_JPN02=dentaku
BG_REFRESH_TIME01=200
SUMMARY_JPN02=dentaku
```


Edit the following item of the [CMENU] section.
Key name Details
NUM Specify the number of custom release registration.
Setting range : 0 to 50
Default : 0
SCREEN_TYPEXX
(XX = 01 to 50)
Specify the screen where the menu is added.
Setting range : 0 to 4
0: Monitor
1: Setup
2: Edit
3: Diagnosis
4: Maintenance
MENU_POSXX
(XX = 01 to 50)
Specify the menu position to register.
Setting range : 0 to 29

0 to 9 : First page
10 to 19 : Second page
20 to 29 : Third page
When other menu is registered at the specified menu position, an existing menu becomes invalid.
However, when adding a new menu to diagnosis and maintenance, the existing menu can be moved to a vacant position by setting MENU_MOVE to 1.
The "maintenance" and "parameter" menus in maintenance are fixed and can not be customized. They cannot be overwritten or moved by MENU_MOVE.
WINDOW_OFFSETXX
(XX = 01 to 50)
For the interpreter method and the compilation method
Specify the displayed window No.
The setting value is "the offset No. designated for PAGE_OFFSET of Config.ini + the window No. in the project (0 to 255)".
Setting range : 8000 to 9999
For executing file registration method
Specify the No. corresponding to the image file name displayed as the icon.
Setting range : 20000 to 20099

Key name Details
EXECUTEXX
(XX = 01 to 50)
Designate the started executing file.
The starting status of the executing file can be judged by setting the title bar character string and the class name of the window. As a result, a multiple start of the execution file can be controlled.
If both the title bar character string and the class names of the window are set, it is judged "The execution file is starting" when each requirement is met at the same time.
When the executing file has already started, the focus is set to the corresponding executing file.
The details of arguments are as shown below.
Argument Details
1st
argument
The file name of the starting executing file (including the folder name)
Default : Null character
2nd
argument
The title bar character string of window referred to confirm the starting status of the executing file
Default : Nothing
3rd
argument
The class name of window referred to confirm the starting status of the executing file
Default : Nothing
Setting range
All : Within 200 characters
File name : Within 100 characters
Window name, class name : Within 50 characters for each
* When two or more executing files corresponding to the condition exist, the executing file found first is operated.
* It is valid only for the executing file registration method.
The method is distinguished with the WINDOW_OFFSET key.

Key name Details
MENU_YYYXX
(XX = 01 to 50)
Specify character strings for the menu.
Describe them within 7 one-byte characters.
Set the division of the language to YYY referring to the following.
ENG : English
DEU : German
ITA : Italian
CHT : Chinese (traditional)
POR : Portuguese
SWE : Swedish
POL : Polish
RUS : Russian
CZE : Czech
JPN : Japanese
FRA : French
SPA : Spanish
KOR : Korean
DUT : Dutch
HUN : Hungarian
CHS : Chinese (simplified)
TUR : Turkish
IND : Indonesian
When switched to a language to which character strings are not registered, English character strings is displayed by default.

Setting range : Within 7 one-byte characters
Default : Null character
(Note) Adjust the character string display position with space.
SUMMARY_YYYXX
(XX = 01 to 50)
Specify character strings for the outline column of the menu list.
Describe them within 70 one-byte characters.
The setting of YYY is similar to "MENU_YYYXX".
When switched to a language to which character strings are not registered,
English character strings is displayed by default.
Setting range : Within 70 one-byte characters
Default : Null character
(Note) Adjust the character string display position with space.

Key name Details
BG_REFRESH_TIMEXX
(XX = 01 to 50)
For the interpreter method and the compilation method
Specify the update cycle of the panel displayed on the background is set
while displaying the window of the custom release.
When the custom release window is displayed, the update cycle of the panel
is changed to the setting value. When closing, it returns to the origin.
It is possible to set "Do not update" or until 0 to 10 seconds by each
millisecond unit.
Setting range : -1 to 10000
Default : 0
-1 : Do not update drawing
0 to 100 : Update at the highest cycle of the panel
100 to 10000 : Update with setting cycle
For executing file registration method
Specify the update cycle of a standard screen when the registered execution
file starts.
When the executing file is started, the update cycle of a standard screen is
changed.
When a standard screen moves from the background screen to an active
screen, the setting of the update cycle (sleep time) is released.
It is possible to set "Do not update", "Do not change" or until 0 to 1 second by
each millisecond unit.
Setting range : -1 to 1000
Default : 0
-1 : Do not update
0 : Do not change the update cycle
1 to 1000 : Changes to the set update cycle
Out of range : Do not change the update cycle
INSTANCE_HOLDXX
(XX = 01 to 50)
Specify whether to hold the instance when the window closes.
If the instance is held, the window can be displayed with the closing status
when the window will be opened next time. Even if the window is displayed on
another screen, the window is displayed with the closing status last time.
When the window is opened next time, the focus is placed on the focused
control before the window was closed or the window.
Setting range : 0 to 1
Default : 0
0: Do not hold at window close
1: Hold at window close
* It is valid only for the interpreter method and the compilation method.
The method is distinguished with the WINDOW_OFFSET key.

Key name Details
MENU_STATE_DLLXX
(XX = 01 to 50)
For M800/M80 (Windows-based display unit) and M700VW, specify the DLL
file defined the function (MCAppGetMenuState()) which checks whether to
display the menu by full path.
Ex.) <When using M800/M80 (Windows-based display unit) and M700VW >
MENU_STATE_DLL01=D:\custom\Test_MenuState.DLL
Setting range : Number of capital letters of file path = 63byte
When the DLL file is set, display (TRUE)/non-display (Excluding TRUE) of the
menu is switched by the return value of MCAppGetMenuState() in the DLL.
When this item is not set, the menu is unconditionally displayed.
Default : Display the menu unconditionally
* When the set DLL file does not exist or the MCAppGetMenuState() function is
not defined in the set DLL file, the menu is not displayed. When the DLL file
path of 63 bytes or more is set, it is judged that the key is invalid, and the
menu is displayed.
For M800/M80 (Windows-less display unit) and M700VS/M70V/E70, specify
the name with project name of NC Designer2 following the function
(MCAppGetMenuState()) which checks whether to display the menu.
Ex.) MENU_STATE_DLL01=MCAppGetMenuStateTest
MENU_MOVE Specify this to automatically move Mitsubishis standard menus to vacant
space when MTB's menus are added to the position of Mitsubishi's standard
menus. (Note 4)
This setting is valid only on the diagnostic/maintenance screen.

Setting range : 0 to 1
Default : 0
0: When MTB's menus are registered in the position of Mitsubishi's standard menus, Mitsubishi's standard menus are not displayed.
1: When MTB's menus are registered in the position of Mitsubishi's standard menus, Mitsubishi's standard menus are automatically moved to vacant space.
(Note 1) When the NUM key is 1 or more, always set to keys without setting default value.
(Note 2) When a symbol ";" is at the head of the line, the character string is judged to be a comment.
(Note 3) Do not insert the spaces before and behind " = " between the key and the setting value.
(For the menu character string and the outline character string, a space can be inserted by the right side of "=" to adjust the position.)
(Note 4) Menu positions where menus are not displayed because the option is disabled are treated as vacant spaces. When an option setting is changed from disabled to enabled, and the menu is displayed, the Mitsubishi standard menu allocated to that space moves to another vacant space.

17.6.5.1.3 Icon Image
File name and size are shown below.
File name : "The values of WINDOW_OFFSETXX_OFF.jpg"
Size : 62 x 40
File format : JPEG
Store the created image file in the following folder.
Storage folder may differ according to the unit being used.
<When using M800/M80 (Windows-based display unit) and M700VW >
D:\Custom\img\
<When using M800/M80 (Windows-less display unit) and M700VS/M70V/E70 >
/custom/
(Note 1) The image might not be correctly displayed when there is defect in the file name, the size, and the file format.
(Note 2) When M800/M80 (Windows-less display unit) and M700VS/M70V/E70 is used as a display unit, the image file is stored in a folder by using SETUP INSTALLER. For information on SETUP INSTALLER, refer to "Appendix 10. Installing Custom Data (M700VS/M70V/E70)" and "Appendix 11. Installing Custom Data (M800/M80 (Windows-less display unit))".

17.6.5.2 Compilation Method
To register the compilation method data to the main key, it is necessary to edit Config.ini and customdef.ini and to prepare the image displayed as the icon. Use "17.7 Custom Release File Setting" to create them easily.
The customdef.ini has to be described by UNICODE text.
17.6.5.2.1 Config.ini
Refer to 17.6.4.2.1.
17.6.5.2.2 customdef.ini
Refer to 17.6.5.1.2.
17.6.5.2.3 Icon Image
Refer to 17.6.5.1.3.

17.6.5.3 Changing the Arrangement of the Main Menu
The main menu of the monitor, setup, edit, diagnostic, and maintenance screen can be permuted in easy-to-use the order.
To change the arrangement of the main menu, the customdef.ini must be edited.
The customdef.ini has to be described by UNICODE text.
17.6.5.3.1 customdef.ini
Example of setting
```
;  When changing the position where an existing menu is displayed
[MENU_CHANGE]
NUM=2
; "Edit" is set to the fifth menu of the edit screen.
SCREEN_TYPE01=2
MENU_POS01=4
CHG_SCREEN_ID01=301
; Delete the first menu of the edit screen.
SCREEN_TYPE02=2
MENU_POS02=0
CHG_SCREEN_ID02=0
```
Edit the following item of the [MENU_CHANGE] section.
Key name Details
NUM Specify the number of the changing menu position registration.
Setting range : 0 to 90
Default : 0
SCREEN_TYPEXX
(XX = 01 to 90)
Specify the screen where the menu is added or changed.
Setting range : 0 to 4
0: Monitor
1: Setup
2: Edit
3: Diagnosis
4: Maintenance
MENU_POSXX
(XX = 01 to 90)

Specify the menu position to register.
Setting range : 0 to 29
0 to 9 : First page
10 to 19 : Second page
20 to 29 : Third page
When other menu is registered at the specified menu position, an existing
menu is invalid.
CHG_SCREEN_IDXX
(XX = 01 to 90)
Select the ID No. of the menu to register (refer to supplementation 1) at the
menu position set by the above-mentioned from the following.
When 0 is set, the menu at the position set by the above-mentioned is invalid.
Setting range : The setting range changes by SCREEN_TYPEXX as follows.
SCREEN_TYPEXX : 0 Screen ID : 0,101 to 121
SCREEN_TYPEXX : 1 Screen ID : 0,201 to 212
SCREEN_TYPEXX : 2 Screen ID : 0,301 to 304
SCREEN_TYPEXX : 3 Screen ID : 0,401 to 409
SCREEN_TYPEXX : 4 Screen ID : 0,503
(Note 1) When the NUM key is 1 or more, always set to keys without setting default value.
(Note 2) When a symbol ";" is at the head of the line, the character string is judged to be a
comment.
(Note 3) Do not insert the spaces before and behind " = " between the key and the setting value.

Supplementation 1 Screen ID
The following is a table showing the screens and the corresponding screen IDs when changing the order of the
menus.
Monitor Setup Edit
Search 101 Offset 201 Edit 301
Reserch 102 T-meas 202 Check 302
Edit 103 T-reg 203 NAVI -
Trace 104 T-life 204 - -
Check 105 Coord 205 I/O 305
Cnt exp 106 W-meas 206
Offset 107 User 207
Coord 108 MDI 208
Cnt set 109 Cnt set 209
MST 110 MST 210
Modal 111 T-list 211
Tree 112 Pallet 212
Time 113 T-Mng. 213
Com var 114 - -
Loc var 115 Storage 215
P corr 116 Surf 216
PLC SW 117 MacCond 217
G92 set 118 Barrier 218
Col stp 119 E-mail 219
LdMeter 120 WE mea. 220
Sp-stby 121 Range 221
TipDisp 122
All Sp 123
Dsp sw. 124
- -
S-sel 126
Next Ax 127
W-shift 128
Robot 129
Diagnosis Maintenance
Config 401 Mainte -
Option 402 Param -
I/F dia 403 I/O 503
Drv mon 404
Mem dia 405
Alarm 406
- -
- -
- -
- -
Selfdia 411
NC Smp 412
Safety 413
(Note) The order of NAVI cannot be changed, thus only a non-display setting is available.

17.6.5.4 Focus while the Instance Is Held
When the instance of the custom release window is held, the focus will stay with the control or the
window where the focus was placed when the window was closed last time.
If the initialization while displaying the window is carried out under the specific control, move the
focus to that control to execute initialization.
(EXAMPLE)
If the macro is created as follows to perform operations such as the key processing or initialization
(character string setting of the menu) with GTextBox0000 control, the focus moves to
GButton00001 control when the window is closed by touching GButton00001 control.
As the window is opened again, the key processing and initialization will not be carried out since the
focus stays with GButton control.
Thus, move the focus to GTextBox00000 control at GButton00001-OnSetFocus().

Custom Release Window
v
GNXCounter0000
GTextBox00000
GButton00001
Menu of Custom Release Window
Macro
```
$GTextBox00000-OnSetFocus
 GCSMenuSetMenuButtonLowerName_all(2000,0,1,
 " TEST1, TEST2, TEST3, TEST4, TEST5, TEST6, TEST7, TEST8, TEST9, CLOSE");
$End
$GTextBox00000-OnKeyPress
 long _lShiftKey; 'SHIFT key input status
 'The SHIFT key input status is maintained in the 0th bit of LUPARAM.
 _lShiftKey = LUPARAM & H1;
 if((LLPARAM == 121) && (_lShiftKey == 0))
 GCSMenuSendProcessID(2000,0,0);
 endif;
$End
$GButton00001-OnClick
GCSMenuSendProcessID(2000,0,0);
$End
```
Return the focus to GTextBox00000
```
$GButton00001-OnSetFocus
 GCSChangeActiveFocus(-1,"GTextBox00000");
$End
```

17.6.5.5 Settings of an Operation Message
To display the same operation message as a Mitsubishi standard screen at a menu release, use the GCSMenuSetOpeMessage function for the interpreter method, and the GCSSetOpeMessage function for the compilation method.
* A sample that displays an operation message in the menu part of the set-up screen is shown below.
Interpreter Method
GCSMenuSetOpeMessage function format
GCSMenuSetOpeMessage (1st argument, 2nd argument, 3rd argument);
 1st argument: Screen number (monitor=1000, setup=2000, edit=3000, diagnostic=4000, maintenance=5000)
 2nd argument: Control name to display a message
Monitor screen: "GNXMenu00059"
Setup screen: "GNXMenu00038"
Edit screen: "GNXMenu00015"
Diagnostic screen: "GNXMenu00034"
Maintenance screen: "GNXMenu00005"
 3rd argument: Operation message
Macro
```
GCSMenuSetOpeMessage (2000, "GNXMenu00038", "warning");
```
Compilation Method
GCSSetOpeMessage function format
GCSSetOpeMessage (1st argument, 2nd argument);
 1st argument: Operation target object
Acquire the operation target object by using an object number (Monitor screen: 59, Setup screen: 38, Edit screen: 15, Diagnostic screen: 34, Maintenance screen: 5).
 2nd argument: Operation message
Source Code
```
char pszStringChar[] = "warning\0";
GTCHAR Message[10];
GRCMultiByteToUnicode(GRCLoadNowLanguageStr(), Message, pszStringChar, 10 );
GBaseObject *pParent = GCSGetPanel(GCSGetScreen(GetGBaseObject()));
GBaseObject *pChild = (GBaseObject*)GCSGetChild(pParent, 38);
GCSSetOpeMessage(pChild, (char *)Message);
```

17.6.6 Screen Part Assignment
Screen part assignment is a function that enables a customized window which is created with the interpreter method or the compilation method to be displayed as a part of the standard screen.
There are 2 types.
(1) Screen selection bar display open (4 function tabs)
(2) Operation screen base display open
The customized window which can be displayed with the screen part assignment is for the NC Designer2 window only. Only any one of the above two is enabled for the screen part assignment.

17.6.6.1 Screen Selection Bar Display Open
Screen selection bar display open enables to constantly display a customized window which is created with the interpreter method or the compilation method on screen selection bar (4 function tabs) of the standard screen.
The selected function name is shown on the last remaining function tab. Displays of the function tabs are switched according to the definition of the screen part assignment (customdef.ini).
<10.4 type>
<15 type>
(Note 1) For points of caution for creating customized window used for screen part assignment, refer to "17.6.6.5 Caution for Creating Customized Window for Screen Part Assignment".

(Note 2) Customized window that is created with "Execution file registration method" cannot be displayed.
(Note 3) The screen part assignment area cannot be displayed on PLC onboard and NaviMill/Lathe screens.
(Note 4) Screen part assignment cannot be used for CNC software tools (NC Monitor2, NC Maintainer).
(Note 5) Functions cannot be switched by touching function tabs.
(Note 6) When the screen part assignment is valid, and if I/O window is closed while file transportation, etc. is being carried out on the I/O window in the edit screen, the file operation will be interrupted.
Screen part assignment size
(W: 266pixel)
(H: 21pixel)
(Coordinate: X, Y = 308, 0)
Screen part assignment size
(W: 393pixel)
(H: 32 pixel)
(Coordinate: X, Y=524, 0)
Function tab
- Displays a name of the selected function

17.6.6.2 Operation Screen Base Display Open
Operation screen base display open enables to display a customized window which is created with the interpreter method or the compilation method on the base display of operation screen on the standard screen. Customization window is closed when the screen switches to other functions. It is displayed again when switching back to operation screen. The customization window of the operation screen base display open does not hold instance.
Each menu on operation screen can be used while the customization window is displayed. When the menu is selected, the each menu window of the operation screen is displayed on the front of the customization window and it can be operated.
<8.4type/ 10.4 type>
<15 type>
(Note 1) For points of caution for creating customized window used for operation screen base display open, refer to "17.6.6.5 Caution for Creating Customized Window for Screen Part Assignment".
(Note 2) Customized window that is created with "Execution file registration method" cannot be displayed.
(Note 3) Operation screen base display open cannot be used for CNC software tools (NC Monitor2, NC Maintainer).
(Note 4) When the operation screen base display open is valid, and if I/O window is closed while file transportation, etc. is being carried out on the I/O window in the edit screen, the file operation will be interrupted.
Screen part assignment size
(W: 640 pixel)
(H: 363 pixel)
(Coordinate: X, Y=0, 22)
Screen part assignment size
(W: 1024 pixel)
(H: 633 pixel)
(Coordinate: X, Y=0, 33)

17.6.6.3 Interpreter Method
In order to display a customized window, created with interpreter method, in the screen part assignment area, "config.ini" or "customdef.ini" must be edited. The "customdef.ini" must be written in the UNICODE text format.
17.6.6.3.1 config.ini
Refer to 17.6.4.1.1.
17.6.6.3.2 customdef.ini
Setting example
Edit the following items in [CPART] section.
Key name Details
CPART_OFFSETXX
(XX=01,10)
Set the offset No. of customized screen which will be displayed on screen part assignment area. (Note 1)
To XX, specify the type of screen part assignment.
01: the screen selection bar display open
10: the operation screen base display open
The setting No. will be "Offset No. that is set in PAGE_OFFSET in config.ini + WINDOW No. (0 to 255) in the project". (Note 2)
Setting range: 8000 to 9999
CPART_PERMISSION Set as "input enabled" when the key or touch panel operation is to be enabled in the customized window of the operation screen base display open. (Note 5)
As for the screen selection bar display open, this is disabled (No key or touch panel operation) without fail.
Setting range: 0/1
0: Input disabled (default)
1: Input enabled
(Note 1) When there are multiple settings in the [CPART] section, the setting described later will be valid.
(Note 2) When the offset No. (8000 to 9999) of designated window does not exist in the project at selecting the screen selection bar open (CPART_OFFSET01), the screen selection bar is displayed as one function tab but the customized window will not be displayed.
(Note 3) When a symbol ";" is at the head of the line, the character string is judged as a comment.

(Note 4) Do not insert spaces before and after "=" that is between key and value.
(Note 5) When the input is enabled, the event is received by the customized window of any key. Thus the key event has to be passed from the customized window to the standard screen process when the key to switch the standard screen display (for example, menu key, function key, and the shortcut key which is used on standard screen (M,S,T,X,Y,Z,A,B,C) etc.) is received. The display will not be switched unless the event is passed. (Refer to 17.6.6.5.4.)
; Set the No. of customized window that will be displayed on screen part assignment area.
[CPART]
CPART_OFFSET01=8001

17.6.6.4 Compilation Method
In order to display customized window which is created with the compilation method on screen part assignment area, "config.ini" and "customdef.ini" must be edited. The "customdef.ini" must be written in the UNICODE text format.
17.6.6.4.1 config.ini
Refer to 17.6.4.2.1.
17.6.6.4.2 customdef.ini
Refer to 17.6.6.3.2.
17.6.6.5 Caution for Creating Customized Window for Screen Part Assignment
17.6.6.5.1 Size and Display Coordinate of Displayed Customized Window
Display size and display coordinate of the customized window follows the setting in the panel/window property in NC Designer2. Display size and coordinate is not automatically adjusted to the screen part assignment area. When the property setting is not correctly done, deviation might occur on the display coordinate or the window might be too large for the screen part assignment area. Thus, the setting values must be the values shown below. Also, a total bar, a close button, a window frame, etc. should not be displayed since displaying with those will enlarge the displaying size.
<Property setting (Screen selection bar display open 10.4 type)>
Width
10.4 type: WIDTH=266
15 type: WIDTH=393
Height
10.4 type: HEIGHT=21
15 type: HEIGHT=32
Existence of a title bar: None
Existence of a close bar: None
Existence of a window frame: None
Coordinate
10.4 type: X,Y=308,0
15 type: X,Y=524,0

17.6.6.5.2 Customized Window Focus/ Available Event
Customized window for screen part assignment must be created without being focused. The events input with key operation or touch panel operation will not be received. "OnDraw", "OnTimer", "OnCreate", "OnDelete", "OnInit" and "OnQuit" are only available events for customized window of the screen part assignment.
Therefore, set "None" in the property to avoid using other than those events. Also, "input permission" in the control property should be set to "Prohibition".
However, when "1 (Input enabled)" is specified to "CPART_PERMISSION" of customdef.ini at the operation screen base display open, the event from the touch panel operation and key input can be received. In this case, it is required to carry out the key processing of standard screen from the customized window so that key operation on the standard screen is possible. (Refer to 17.6.6.5.4)
<Event list>
Availability Event Details
OnKeyPress Execute after the key is pressed.
Key event can be retrieved only when the focus of control parts is active.
OnKeyRelease Execute after the key is released
Key event can be retrieved only when the focus of control parts is active.
OnPress Execute after a pointing device such as a mouse is pressed.
OnRelease Execute after a pointing device such as a mouse is released.
OnClick
Execute after a pointing device such as a mouse is clicked.
When a pointing device is released on the same control, it will be executed after "OnRelease" operation.
OnDraw Execute after drawing is completed
OnTimer Execute after timer event process is called.
OnSetFocus Execute after a control is focused.
OnKillFocus Execute after the focus on a control is released.
OnCreate Execute after page / control is created
OnDelete Execute before page/ control is deleted.
OnUser Execute after process of users original event is completed.
OnScroll Execute after a scroll bar is clicked by a pointing device such as a mouse.
OnScrollFinish Execute after caption character scroll is completed
OnSelectChange Change a selecting line with a list.
OnInit Execute after "OnCreate" when page/ control is created.
OnQuit Execute before "OnDelete" when page/ control is deleted.

17.6.6.5.3 Sample Code (Timer Processing)
A picture (resource) of the sample code is switched by attaching "picture control" to the customized window with picture control OnTimer.
<Sample Code>

The display of "picture control" is switched by PLC signal. Display "RPN" during rapid traverse,
"CUT" during cutting feed and it does not display anything for other states.
(Ex.) Customized window on screen selection bar open
(State 0: None)
(State 1: Display "RPN")
(State 2: Display "CUT")
Project Setting Example
(1) Create BMP file for displaying on "picture control" and add it to the resource.
(2) Set the registered resource to the state design of "picture control".
Picture control
Register BMP file
Add a resource (image)
Picture control

Interpreter Method
OnTimer macro in "picture control" should be created with "Screen macro edit".
Macro

```
$GPicture00000-OnTimer
GMEM gControl ;
gControl = GMEMCreate("NCCONTROL", 16) ;
GMEMSetLong(gControl, 0, 1) ; ' Set NC No. to be "1"
GMEMSetLong(gControl, 4, 0) ; ' Do not designate part system No.
GMEMSetLong(gControl, 8, 0) ; ' Set to the standard part system
GMEMSetLong(gControl, 12, H0) ; ' Do not designate axis No.
GMEM mem ;
mem = GMEMCreate("TESTMEM", 8) ;
GMEMSetLong(mem, 0, 0) ;

LONG Stat;
Stat = 0;
'Retrieve $1 rapid traverse state (XC20)
LONG lRpnVal;
lRpnVal = 0;
Stat = GCSNCDataGetGNCValue(gControl, 53, 3105, 3, mem);
if(Stat == 1)
lRpnVal = GMEMGetLong(mem, 0) ;
endif
'Retrieve $1 cutting feed state (XC21)
LONG lCutVal;
lCutVal = 0;
Stat = GCSNCDataGetGNCValue(gControl, 53, 3106, 3, mem);
if(Stat == 1)
lCutVal = GMEMGetLong(mem, 0) ;
endif

'Switch "picture control" state
if(lRpnVal == 1)
GCSPictureSetStatus(-1,"GPicture00000",1); 'Rapid traverse (XC20=1)
state1(display RPN)
elseif(lCutVal == 1)
GCSPictureSetStatus(-1,"GPicture00000",2); 'Cutting feed rate (XC21=1): State2
(Display "CUT")
else
GCSPictureSetStatus(-1,"GPicture00000",0); 'Other than rapid traverse/ cutting
feed states: 0(Display: none)
Endif
GMEMDelete(gControl);
GMEMDelete(mem);
$End
```


Compilation Method
Source is created by setting "with Ontimer" on the property of "picture control".
Created source code is processed with OnTimer function.
Source Code

```
#include "melsect.h"
#include "melssect.h"
#include "meltype.h"
#include "ncmcapi.h"
#include "melncapi.h"
long GCWindow00001::GPICTURE00000OnTimer(unsigned short usMessage, long lLParam, long
lUParam)
{
DWORD _NCSts = 0;
// Retrieve $1 rapid traverse state (XC20)
long _lRpnVal = 0;
_NCSts = melGetData(NULL, ADR_MACHINE(1), M_SEC_PLC_DEV_BIT,
M_SSEC_PLBIT_X_1SHOT(0xC20),
0, &_lRpnVal, T_LONG);
// Retrieve $1cutting feed state (XC21)
long _lCutVal = 0;
_NCSts = melGetData(NULL, ADR_MACHINE(1), M_SEC_PLC_DEV_BIT,
M_SSEC_PLBIT_X_1SHOT(0xC21),
0, &_lCutVal, T_LONG);
// Switch "picture control" state
```

```
if(_lRpnVal == 1)
{
GCSPictureSetStatus(_pPicture, 1); // Rapid traverse (XC20=1): state1 (Display
"RPN")
}
else if(_lCutVal == 1)
{
GCSPictureSetStatus(_pPicture, 2); // Cutting feed (XC21=1): State2 (Display
"CUT")
}
else
{
GCSPictureSetStatus(_pPicture, 0); // Other than rapid traverse/ cutting feed :
State 0 (Display : None)
}

return TRUE;
}
```


17.6.6.5.4 Sample Code (Process to Pass the Key to the Standard Screen When Input Is Enabled)

Paste the textbox control to customized window. With "OnKeyPress" of the textbox control, the sample code of the processing which passes the key events to standard screen is shown for only the following key.

<Key codes that is required to be passed to standard screen>

Key code Operation NC keyboard Key code Operation NC keyboard

SHIFT+F1 Transition to operation screen

MONITOR F1(112) Menu 1 selection Menu key 1

SHIFT+F2 Transition to setup screen

SET UP F2(113) Menu 2 selection Menu key 2

SHIFT+F3 Transition to edit screen EDIT F3(114) Menu 3 selection Menu key 3

SHIFT+F4 Transition to diagnostics screen

DIAGN F4(115) Menu 4 selection Menu key 4

SHIFT+F5 Transition to maintenance screen

MAINTE F5(116) Menu 5 selection Menu key 5

SHIFT+F9 Custom screen display SFP F6(117) Menu 6 selection Menu key 6

SHIFT+F10 Custom screen display F0 F7(118) Menu 7 selection Menu key 7

CTRL+F1 Part system swithch $$ F8(119) Menu 8 selection Menu key 8

CTRL+F2 Guidance display ? F9(120) Menu 9 selection Menu key 9

CTRL+F3 Custom screen display display F10(121) Menu 10 selection Menu key 10

CTRL+F4 Custom screen display switch F11(122) Cancel Menu switch key (left)

CTRL+F8 Menu list display MENU LIST F12(123) Next menu Menu switch key (right)

<Description of sample code>

The operation specification for the custom screen of sample is as below.

- Character string can be input in textbox control (GTEXTBOX00001).
- Specific key operation on standard screen can be performed.
- Setting value at textbox control (GTEXTBOX00001) is set to textbox control (GTEXTBOX00000), when button control (GBUTTON00002) is clicked.

The following 3 types of processing is implemented in the sample code.

(1) Using "OnSetFocus" of other controls, move the focus to textbox control (GTEXTBOX00001) for textbox control (GTEXTBOX00001) to always have focus.

(2) Using "OnKeyPress" of textbox control (GTEXTBOX00001), pass the specific key to the standard screen (KeyPress).

(3) Using "OnClick" of button control (GBUTTON00002), acquire the value of textbox control (GTEXTBOX00001), and set it to textbox control (GTEXTBOX00000).

Counter Control (GNXCOUNTER00003)

<Property setting>

- OnSetFocus: available
- Other than above: Default value

Textbox Control (GTEXTBOX00001)

<Property setting>

- Background color: (RGB)=255,255,255
- Max. character No.: 20
- OnKeyPress: available
- Other than above: Default value

Textbox Control (GTEXTBOX00000)

<Property setting>

- Max. character No.: 20
- OnSetFocus: available
- Other than above: Default value

Button Control (GBUTTON00002)

<Property setting>

- Character string: INPUT TEXT
- OnClick: available
- OnSetFocus: available
- Other than above: Default value

Interpreter Method
Macro of each control event (OnXXX) should be created with "Screen macro edit".
Macro
(1) Processing to move the focus to GTEXTBOX00001 at each control
```
$GButton00002-OnSetFocus
'Move the focus to GTEXTBOX00001
GCSChangeActiveFocus(-1, "GTextBox00001");
$End
$GNXCounter00003-OnSetFocus
'Move the focus to GTEXTBOX00001
GCSChangeActiveFocus(-1, "GTextBox00001");
$End
$GTextBox00000-OnSetFocus
'Move the focus to GTEXTBOX00001
GCSChangeActiveFocus(-1, "GTextBox00001");
$End
```
(2) Processing to pass the specific key to standard screen (KeyPress)
```
$GTextBox00001-OnKeyPress
'Set the status of modifier key. (SHIFT,CTRL,ALT)
long _lAttrKey;
_lAttrKey = 0;
 if((LUPARAM & H1) != 0)
 _lAttrKey = 1; 'SHIFT valid
elseif((LUPARAM & H2) != 0)
 _lAttrKey = 2; 'CTRL valid
elseif((LUPARAM & H4) != 0)
 _lAttrKey = 3; 'ALT valid
endif;
'When the keys below are pressed, KeyPress processing on operation screen panel will be
executed.
' Menu 1 to 10, Cancel, Next menu
' Function (Operation, Setup, Edit, Diagnosis, Maintenance)
' Custom screen (F0, SFP)
' Part system switchover, Guidance, Custom screen (Win display, Win switchover)
' Menu list
if(((_lAttrKey == 0) && ((LLPARAM >= 112) && (LLPARAM <= 123))) ||
 ((_lAttrKey == 1) && ((LLPARAM >= 112) && (LLPARAM <= 116))) ||
 ((_lAttrKey == 1) && ((LLPARAM >= 120) && (LLPARAM <= 121))) ||
 ((_lAttrKey == 2) && (LLPARAM >= 112) && (LLPARAM <= 115)) ||
 ((_lAttrKey == 2) && (LLPARAM == 119)))
 'Call for KeyPress on operation screen.
 GCSKeyPress(1000,LLPARAM,LUPARAM);
endif;
$End
```


(3) Processing to set the value of GTEXTBOX00001 to GTEXTBOX00000 at clicking on button control.
```
$GButton00002-OnClick
STRING _str;
'Acquire the value of GTextBox00001.
GCSTextboxGetString(-1, "GTextBox00001", _str);
'Set the value of GTEXTBOX00000 to GTEXTBOX00001.
GCSTextboxSetString(-1, "GTextBox00000", _str);
$End
```


Compilation Method
Generate source code and implement the processing to callback function (OnXXX) of each control.
Source Code
```
#include <windows.h>
#define KEY_SHIFT 0x01
#define KEY_CTRL 0x02
#define KEY_ALT 0x04
#define GK_F1 112
#define GK_F4 115
#define GK_F5 116
#define GK_F8 119
#define GK_F9 120
#define GK_F10 121
#define GK_F12 123
```
(1) Processing to move the focus to GTEXTBOX00001 at each control
```
long GCWindow00003::GBUTTON00002OnSetFocus(unsigned short usMessage, long lLParam,
long lUParam)
{
// Move focus to GTEXTBOX00001.
GBaseObject *pChild = (GBaseObject*)GCSGetChild( GetGBaseObject(),
GTEXTBOX00001 );
if(pChild != NULL)
 {
 GCSChangeActiveFocus( GetGBaseObject(), pChild );
 }
return TRUE;
}
long GCWindow00003::GNXCOUNTER00003OnSetFocus(unsigned short usMessage, long
```

```
lLParam, long lUParam)
{
// Move focus to GTEXTBOX00001.
GBaseObject *pChild = (GBaseObject*)GCSGetChild( GetGBaseObject(),
GTEXTBOX00001 );
if(pChild != NULL)
 {
 GCSChangeActiveFocus( GetGBaseObject(), pChild );
 }
return TRUE;
}
long GCWindow00003::GTEXTBOX00000OnSetFocus(unsigned short usMessage, long lLParam,
long lUParam)
{
// Move focus to GTEXTBOX00001.
GBaseObject *pChild = (GBaseObject*)GCSGetChild( GetGBaseObject(),
GTEXTBOX00001 );
if(pChild != NULL)
 {
 GCSChangeActiveFocus( GetGBaseObject(), pChild );
 }
return TRUE;
}
```


(2) Processing to pass the specific key to standard screen (KeyPress)

```
long GCWindow00003::GTEXTBOX00001OnKeyPress(unsigned short usMessage, long lLParam,
long lUParam)
{
// Set the status of modifier key. (SHIFT,CTRL,ALT)
short _sAttrKey = 0;
if((lUParam & KEY_SHIFT) != 0)
 {
 _sAttrKey = 1; //SHIFT valid
 }
else if((lUParam & KEY_CTRL) != 0)
 {
 _sAttrKey = 2; //CTRL valid
 }
else if((lUParam & KEY_ALT) != 0)
 {
 _sAttrKey = 3; //ALT valid
 }
// When the keys below are pressed, KeyPress processing on operation screen panel will be
executed.
// Menu 1 to 10, Cancel, Next menu
// Function (Operation to Maintenance)
// Custom screen (F0, SFP)
// Part system switchover, Guidance, Custom screen (Win display, Win switchover)
// Menu list
if( ( (_sAttrKey == 0) && ((lLParam >= GK_F1) && (lLParam <= GK_F12)) ) ||
 ( (_sAttrKey == 1) && ((lLParam >= GK_F1) && (lLParam <= GK_F5)) ) ||
 ( (_sAttrKey == 1) && ((lLParam >= GK_F9) && (lLParam <= GK_F10)) ) ||
 ( (_sAttrKey == 2) && ((lLParam >= GK_F1) && (lLParam <= GK_F4)) ) ||
 ( (_sAttrKey == 2) && (lLParam == GK_F8) ) )
 {
 GBaseObject *_pParent =
(GBaseObject*)GCSGetPanel( GCSGetScreen(GetGBaseObject()) );
 GCSKeyPress( _pParent, lLParam, lUParam);
 }
return TRUE;
}
```


(3) Processing to set the value of GTEXTBOX00001 to GTEXTBOX00000 at clicking on button control.

```
long GCWindow00003::GBUTTON00002OnClick(unsigned short usMessage, long lLParam, long
lUParam)
{
// Aquire the value of GTEXTBOX00001.
GTCHAR _gtText[20];
_sgtprintf(_gtText, TEXT(""));
GBaseObject *pChildText01 = (GBaseObject*)GCSGetChild( GetGBaseObject(),
GTEXTBOX00001 );
if(pChildText01 != NULL)
 {
 GCSTextboxGetString(pChildText01, _gtText, 20);
 }
// Set the value of GTEXTBOX00000.
GBaseObject *pChildText00 = (GBaseObject*)GCSGetChild( GetGBaseObject(),
GTEXTBOX00000 );
if(pChildText00 != NULL)
 {
 GCSTextboxSetString(pChildText00, _gtText);
 }
```

return TRUE;
}

17.6.7 Selectable Display Assignment
Customized window can be displayed on the selectable display area of the monitor screen. In the same way as the selectable display of the standard screen, designated customized window (menu assignment) is opened by pressing the input key.
<10.4 type>
Press [INPUT] key.
Selectable display assignment area
(W: 289pixel)
(H: 238pixel)
(Coordinate: X, Y=350,145)
Customized window
(Menu assignment)
The designated customized window
is opened.

<15 type>
(Note 1) For points of caution for creating customized window used for selectable display assignment, refer to "17.6.7.3 Caution for Creating Customized Window for Selectable Display Assignment".
(Note 2) Customized window that is created with "EXE file registration method" cannot be displayed.
(Note 3) The selectable display assignment area cannot be displayed on the simple monitor screen.
(Note 4) Selectable display assignment cannot be used for CNC software tools (NC Monitor2, NC Maintainer).
Selectable display
assignment area
(W: 319pixel)
(H: 244pixel)
(Coordinate: X, Y=703,421)

17.6.7.1 Interpreter Method
In order to display a customized window that is created with interpreter method on the selectable display assignment area, "config.ini" and "customdef.ini" must be edited. The "customdef.ini" must be written in the UNICODE text format.
17.6.7.1.1 config.ini
Refer to 17.6.4.1.1.
17.6.7.1.2 customdef.ini
Setting example
Edit the following items in [CSELECT] section.
Key name Details
NUM Set the number of customized screens to be assigned in the selectable display assignment.
Setting range: 0 to 3
Default: 0
SELECT_OFFSETXX
(XX=0103)
Relation with the setting
value of #8940
11SELECT_OFFSET01
12SELECT_OFFSET02
13SELECT_OFFSET03
Set the window No. to be displayed.
The setting No. consists of "Offset No. designated in PAGE_OFFSET in config.ini + WINDOW No. in the project (0 to 255)".
Even if the window No. set to this key is set to the menu assignment, the window is not opened as menu assignment.
Setting range: 8000 to 9999
WINDOW_OFFSETXX
(XX=0103)
Set the window No. of a customized window (menu assignment) that is opened by pressing input key. The windows to be displayed are only windows that are registered in the menu assignment on monitor screen.
The setting No. consists of "Offset No. designated in PAGE_OFFSET in config.ini + WINDOW No. in the project (0 to 255)".
However, a customized screen of EXE file registration method cannot be registered.
Setting range: 8000 to 9999
(Note 1) When the NUM key is 1 or more, SELECT_OFFSET key and WINDOW_OFFSET key are required to be set.
(Note 2) Do not insert spaces before and after "=" that is between key and value.
(Note 3) Even when moving from the monitor function to another function, instance in the customized window of selectable display is held. Therefore, it affects the memory utilization of customization.
; Set the No. of customized window to be displayed on the selectable display assignment area.
[CSELECT]
NUM=3
SELECT_OFFSET01=8001
WINDOW_OFFSET01=8002
SELECT_OFFSET02=8501
WINDOW_OFFSET02=8502

SELECT_OFFSET03=9001
WINDOW_OFFSET03=9002

17.6.7.2 Compilation Method
In order to display customized window that is created with the compilation method on selectable display assignment area, "config.ini" and "customdef.ini" must be edited. The "customdef.ini" must be written in the UNICODE text format.
17.6.7.2.1 config.ini
Refer to 17.6.4.2.1.
17.6.7.2.2 customdef.ini
Refer to 17.6.7.1.2.
17.6.7.3 Caution for Creating Customized Window for Selectable Display Assignment
17.6.7.3.1 Size and Display Coordinate of Displayed Customized Window
Display size and display coordinate of the customized window follow the setting in the panel/window property in NC Designer2. Therefore, the values shown below must be set for the property setting (position and size).
When the property (position and size) is not correctly set, deviation might occur on the display coordinate or the window might be too big for the display range.
<Property setting (10.4 type)>
Width
10.4 type: WIDTH=289
15 type: WIDTH=319
Height
10.4 type: HEIGHT=238
15 type: HEIGHT=244
Coordinate
10.4 type: X, Y=350,145
15 type: X, Y=703,421
Existence of a title bar: None
Existence of a close button: None
Existence of a window frame: None

17.6.7.3.2 Customized Window Focus/ Available Event
Customized window for selectable display assignment must be created without being focused. However, the events such as touch panel operation or key input are received and processed by an active control (BasicControl, etc.). Also, the event of touch panel operation is received and processed by a control that is touched (Refer to 17.6.7.3.4). Set "None" to the property of control so that the events that the availability is marked with "" in the following table cannot be used.
<Event list>
Availability Event Details
OnKeyPress Execute after the key is pressed.
An active control receives the key event.
OnKeyRelease Execute after the key is released.
Key event can be retrieved only when the focus of control parts is active.
OnPress Execute after a pointing device such as a mouse is pressed.
OnRelease Execute after a pointing device such as a mouse is released.
OnClick
Execute after a pointing device such as a mouse is clicked.
When a pointing device is released on the same control, it is executed
after "OnRelease" operation.
OnDraw Execute after drawing is completed.
OnTimer Execute after timer event process is called.
OnSetFocus Execute after a control is focused.
OnKillFocus Execute after the focus on a control is released.
OnCreate Execute after page / control is created.
OnDelete Execute before page/ control is deleted.
OnUser Execute after process of users original event is completed.
OnScroll Execute after a scroll bar is clicked by a pointing device such as a mouse.
OnScrollFinish Execute after caption character scroll is completed.
OnSelectChange Change a selecting line with a list.
OnInit Execute after "OnCreate" when page/ control is created.
OnQuit Execute before "OnDelete" when page/ control is deleted.

17.6.7.3.3 Sample Code (Switching Axis to Be Displayed with Page Key/Part System Switch Key)
In the customized window of the selectable display assignment, the display can be switched only by page keys (, , , , , , (right tab), (left tab)) and part system switch key.
The following is sample code when switching an axis displayed in CounterControl and switching a part system with page key ( ).
<Operation of sample code>
Press page key ( ).
The display of
CounterControl is
switched to the next axis.
CounterControl
(GNXCounter00001)
BasicControl
(GBasicControl00000)

Project Setting Example
(1) Paste BasicControl.

(2) Paste CounterControl.
CounterControl
<Property setting>
X:32
Y:17
WIDTH:197
HEIGHT:122
LineNumber:5
OnSetFocus: Available
Other than the above:
Default value
BasicControl
<Property setting>
X: 172
Y: 167
WIDTH: 90
HEIGHT: 37
OnCreate: Available
OnKeyPress: Available
Other than the above:
Default value

Interpreter Method
The following 2 types of processing are implemented in the sample code.
(1) Using "OnSetFocus" of other controls, move the focus to BasicControl so that it is always active.
(2) Switch the display of CounterControl by discriminating the types of keys with "OnKeyPress" of BasicControl.
Macro
(1) Processing to move the focus to GBasicControl00000 at each control

```
$GBasicControl00000-OnCreate
 'Move the focus to GBasicControl00000 at generation.
GCSChangeActiveFocus(-1, "GBasicControl00000");
$End
$GNXCounter00001-OnSetFocus
 'Move the focus to GBasicControl00000.
GCSChangeActiveFocus(-1, "GBasicControl00000");
$End
```

(2) Processing to switch an axis to be displayed in GNXCounter00001 when page key ( ) and part system switch key are input

```
$GBasicControl00000-OnKeyPress
long _lMainKey;
long _lCtrlKey;
_lMainKey = LLPARAM;
_lCtrlKey = LUPARAM & H2;
'Display the next axis when PageDown key is pressed.
if(_lMainKey == 34)
GCSCounterAxisChange(-1, "GNXCounter00001");
Endif
'Display the second part system when the part system switch key is pressed.
if((_lMainKey == 112) && (_lCtrlKey == 2))
GCSSetSystemNumber(-1,"GNXCounter00001",2);
Endif
$End
```


Compilation Method
The following processing is implemented in the sample code.
(1) Using "OnSetFocus" of other controls, move the focus to BasicControl so that it always has focus.
(2) Switch the display of CounterControl by discriminating the types of keys with "KeyPress()" of customized window (GCWindow00002).
Source Code

```
#include <windows.h>
#define GK_NEXT 34
#define KEY_SHIFT 1
#define KEY_CTRL 2
#define GK_F1 112
```

(1) Processing to move the focus to GBASICCONTROL00000 at each control

```
long GCWindow00003::GBASICCONTROL00000OnCreate(unsigned short usMessage, long
lLParam, long lUParam)
{
// Move the focus to GBASICCONTROL00000.
GBaseObject *pChild = (GBaseObject*)GCSGetChild( GetGBaseObject(),
GBASICCONTROL00000 );
if(pChild != NULL)
 {
 GCSChangeActiveFocus( GetGBaseObject(), pChild );
 }
return TRUE;
}
long GCWindow00002::GNXCOUNTER00001OnSetFocus(unsigned short usMessage, long
lLParam, long lUParam)
{
// Move the focus to GBASICCONTROL00000.
GBaseObject *pChild = (GBaseObject*)GCSGetChild( GetGBaseObject(),
GBASICCONTROL00000 );
```

```
if(pChild != NULL)
 {
 GCSChangeActiveFocus( GetGBaseObject(), pChild );
 }
return TRUE;
}
```


(2) Processing to switch an axis to be displayed in GNXCounter00001 when page key ( ) and part system switch key are input

```
long GCWindow00002::GBASICCONTROL00000OnKeyPress(unsigned short usMessage, long
lLParam, long lUParam)
{
// Set the status of modifier key. (SHIFT,CTRL,ALT)
short _sAttrKey = 0;
 if((lUParam & KEY_SHIFT) != 0)
 {
 _sAttrKey = 1; //SHIFT valid
 }
else if((lUParam & KEY_CTRL) != 0)
 {
 _sAttrKey = 2; //CTRL valid
 }

GBaseObject *_pChild = (GBaseObject*)GetChild(GNXCOUNTER00001);
if((_sAttrKey == 0) && (lLParam == GK_NEXT))
 {
 // Display the next axis when PageDown key is pressed.
 GCSSetSystemNumber(_pChild, 2);
 }
if((_sAttrKey == 2) && (lLParam == GK_F1))
 {
 // Display the second part system when part system switch key is pressed.
 GCSSetSystemNumber(_pChild, 2);
 }
return TRUE;
}
```


17.6.7.3.4 Sample Code (Displaying the Next Axis by Touching a Button)

In the customized window of the selectable display assignment, the display can be switched by touching a button.

The following is sample code when switching an axis to be displayed in CounterControl by touching [Next Ax] button.

<Operation of sample code>

Touch [Next Ax] button.

CounterControl
(GNXCounter00001)
BasicControl
(GBasicControl00000)
ButtonControl
(GButton00002)

Project Setting Example

(1) Paste BasicControl.
(2) Paste CounterControl.
(3) Paste ButtonControl.

BasicControl
<Property setting>
X: 221
Y: 157
WIDTH: 53
HEIGHT: 43
OnCreate: Available
OnPress: Available
Other than the above:
Default value

CounterControl
<Property setting>
X: 45
Y: 19
WIDTH: 187
HEIGHT: 88
LineNumber: 3
OnSetFocus: Available
Other than the above:
Default value

ButtonControl
<Property setting>
X: 67
Y: 146
WIDTH: 124
HEIGHT: 34
Input permission: Prohibition

OnSetFocus: Available
Other than the above:
Default value

Interpreter Method
The following 2 types of processing are implemented in the sample code.
(1) Using "OnSetFocus" of other controls, move the focus to BasicControl so that it is always active.
(2) Display the next axis in CounterControl by discriminating the touched position with "OnPress" of BasicControl.
Macro
(1) Processing to move the focus to GBasicControl00000 at each control

```
$GBasicControl00000-OnCreate
'Move the focus to GBasicControl00000 at generation.
GCSChangeActiveFocus(-1, "GBasicControl00000");
$End
$GNXCounter00001-OnSetFocus
'Move the focus to GBasicControl00000.
GCSChangeActiveFocus(-1, "GBasicControl00000");
$End
$GButton00002-OnSetFocus
'Move the focus to GBasicControl00000.
GCSChangeActiveFocus(-1, "GBasicControl00000");
$End
```

(2) Processing to switch an axis to be displayed in GNXCounter00001 when [Next Ax] button is pressed.

```
$GBasicControl00000-OnPress
'Acquire the position of button control.
GMEM mem;
SHORT _RectXmin;
SHORT _RectXmax;
SHORT _RectYmin;
SHORT _RectYmax;
long _PosX;
long _PosY;
mem = GMEMCreate("TESTMEM", 8);
 GCSGetBounds(-1, "GButton00002", mem);
_RectXmin = GMEMGetShort(mem, 0);
_RectYmin = GMEMGetShort(mem, 2);
_RectXmax = GMEMGetShort(mem, 4);
_RectYmax = GMEMGetShort(mem, 6);

'Acquire the touched position.
_PosX = LLPARAM;
_PosY = LUPARAM;
'Switch the axis to be displayed in the counter when the button is touched.
if ((_PosX >= _RectXmin) && (_PosX <= _RectXmax) && (_PosY >= _RectYmin) && (_PosY <=
_RectYmax))
GCSCounterAxisChange(-1, "GNXCounter00001");
Endif
'Delete the area that the button position was stored.
GMEMDelete(mem);
$End
```


Compilation Method
The following processing is implemented in the sample code.
(1) Using "OnSetFocus" of other controls, move the focus to BasicControl so that it is always active.
(2) Display the next axis in CounterControl by discriminating the touched position with "OnPress" of BasicControl.
Source Code

```
#include <windows.h>
```

(1) Processing to move the focus to GBasicControl00000 at each control

```
long GCWindow00003::GBASICCONTROL00000OnCreate(unsigned short usMessage, long
lLParam, long lUParam)
{
// Move the focus to GBASICCONTROL00000.
GBaseObject *pChild = (GBaseObject*)GCSGetChild( GetGBaseObject(),
GBASICCONTROL00000 );
if(pChild != NULL)
 {
 GCSChangeActiveFocus( GetGBaseObject(), pChild );
 }
return TRUE;
}
long GCWindow00003::GNXCOUNTER00001OnSetFocus(unsigned short usMessage, long
lLParam, long lUParam)
{
// Move the focus to GBASICCONTROL00000.
GBaseObject *pChild = (GBaseObject*)GCSGetChild( GetGBaseObject(),
GBASICCONTROL00000 );
if(pChild != NULL)
 {
 GCSChangeActiveFocus( GetGBaseObject(), pChild );
 }
return TRUE;
```

```
}
long GCWindow00003::GBUTTON00002OnSetFocus(unsigned short usMessage, long lLParam,
long lUParam)
{
// Move the focus to GBASICCONTROL00000.
GBaseObject *pChild = (GBaseObject*)GCSGetChild( GetGBaseObject(),
GBASICCONTROL00000 );
if(pChild != NULL)
 {
 GCSChangeActiveFocus( GetGBaseObject(), pChild );
 }
return TRUE;
}
```


(2) Processing to switch an axis to be displayed in GNXCounter00001 when [Next Ax] button is pressed.

```
long GCWindow00003::GBASICCONTROL00000OnPress(unsigned short usMessage, long
lLParam, long lUParam)
{
// Acquire the position of button control.
GRect _GRect;
_GRect.nXmin = 0;
_GRect.nXmax = 0;
_GRect.nYmin = 0;
_GRect.nYmax = 0;
GBaseObject *_pChild = GetChild( GBUTTON00002 );
if(_pChild != NULL)
 {
 GCSGetBounds( _pChild, &_GRect );
 // Switch the axis to be displayed in the counter when the button is touched.
 if((lLParam >= _GRect.nXmin) && (lLParam <= _GRect.nXmax) &&
(lUParam >= _GRect.nYmin) && (lUParam <= _GRect.nYmax))
 {
 _pChild = GetChild( GNXCOUNTER00001 );
 if(_pChild != NULL)
 {
 GCSAxisChange(_pChild);
 }
 }
 }
return TRUE;
}
```


17.6.8 G Code Guidance Release, M Code Guidance Release

MTBs original G code (G code macro) guidance or M code (M code macro) guidance can be displayed on the G code guidance display area in edit screen. The G code guidance corresponding to the G code macro or the M code guidance corresponding to the M code can be displayed when the MTB creates the guidance file (HTML format) for G code macro or for M code and stores it in a custom folder.

If both the standard G code guidance file and MTBs G code guidance file exist, MTBs G code guidance is displayed.

< 10.4 type >

Display the standard G code guidance Display the MTBs G code or M code guidance

< 15type Edit 3 screens >

Fig 1 Figure of G code or M code guidance release

(Note 1) Peripheral tools (NC Monitor, NC Maintainer) cannot display the MTBs G code guidance.

MTBs G code
or M code
guidance

MTBs G code or
M code guidance

Move cursor

17.6.8.1 Designation of the Guidance File Folder

To display the guidance file on the G code guidance display area in edit screen, edit config.ini. If there is no MTBs G code in the designated folder, the standard G code guidance is displayed.

17.6.8.1.1 Config.ini

Example

Edit the following items in [HTML_BROWSER] section.

Table 1 List of the settings of the [HTML_BROWSER] section

Key name Details

HTMLDATA_GCODE - Designate the folder to store the guidance file.

Example) < When using M800W/M80W (terminal with PC) >

HTMLDATA_GCODE=D:\custom\gcode_guide\

Designate the folder under D:\custom.

< When using M800S/M80/M80W (terminal without PC) >

HTMLDATA_GCODE=gcode_guide/

HTMLDATA_MCODE - Designate the folder to store the M code guidance file.

Example) < When using M800W/M80W (terminal with PC) >

HTMLDATA_MCODE=D:\custom\mcode_guide\

Designate the folder under D:\custom.

< When using M800S/M80/M80W (terminal without PC) >
HTMLDATA_MCODE=mcode_guide/
(Note 1) When using the figure in the guidance, create the file of the image figure that uses the background color designated by the base common parameter "#11060 Screen theme color" (blue tone/gray tone). Store it in the same folder where the guidance file is.
[HTML_BROWSER]
HTMLDATA_GCODE=D:\custom\gcode_guide\

17.6.8.2 Format of the Guidance File
Formats of the guidance file are as follows.
17.6.8.2.1 File Name
File names of the format are as follows.
(1) File name of the G code guidance
g_.htm
Table 2 File name settings
Example Details Example
Select between M system and L system. M system: "m"
L system: "l"
*M2 format cannot be designated.
Specify with the four digit number
following the address G multiplied by 10
G80 : "0800"
G180 : "1800"
G180.1 : "1801"
Select the language eng : English jpn: Japanese
deu: German fra: French
ita: Italian spa: Spanish
chi2: Chinese (traditional) kor: Korean
por: Portuguese dut: Dutch
swe: Swedish hun: Hungarian
pol: Polish chi1: Chinese (simplified)
rus: Russian tur: Turkish
cze: Czech ind: Indonesian
* If there is no file for the onscreen language, the file for English is used instead.
(2) File name of the M code guidance
mc_.htm
Table 3 File name settings of the M code guidance
Example Details Example
Specify with the eight digit number
following the address M.
However, when the corresponding M
code guidance file does not exist, the M
code guidance of the command value
whose last digit is excluded is
displayed.
When that M code guidance file does
not exist either, the M code guidance of
the command value whose last two
digits are excluded is displayed.
M1 : "00000001"
M10 : "00000010"
M100 : "00000100"
M1000 : "00001000"
<Example of when the M code guidance does not exist>
M198: When "00000198" does not exist, the M code
guidance of "00000019" is displayed.
When "00000019" does not exist, either, the M code
guidance of "00000001" is displayed, followed by
"00000000".
Select the language eng : English jpn: Japanese
deu: German fra: French
ita: Italian spa: Spanish
chi2: Chinese (traditional) kor: Korean
por: Portuguese dut: Dutch
swe: Swedish hun: Hungarian
pol: Polish chi1: Chinese (simplified)
rus: Russian tur: Turkish
cze: Czech ind: Indonesian
* If there is no file for the onscreen language, the file for English is used instead.

<Creation example of the M code guidance>
By preparing the M code guidance file as shown below, in addition to the entered M code, a list of proposed M codes can also be displayed while entering an M code.
Table 4 File names and the descriptions of the M code guidance
File name Description
mc00000000_<language>.htm Details of "M0" and outlines of all the M codes are described.
mc00000001_<language>.htm Details of "M1" and outlines of the M codes that start with "M1", such as "M10 to M19, the M100s, the M1000s" are described.
mc00000010_<language>.htm Details of "M10" and outlines of the M codes that start with "M10", such as "M100 to M109, the M1000s" are described.
(1)
The contents of "mc00000000_<language>.htm" are displayed in

the guidance.
(2)
The contents of " mc00000001_<language>.htm " are displayed
in the guidance.
Enter "M".
Enter "1".

(3)
The contents of " mc00000010_<language>.htm " are displayed
in the guidance.
(4)
Since the guidance of mc00000100_<language>.htm does not
exist, the guidance of the input value whose last digit is excluded
is displayed.
In this case, mc00000010_<>.htm is displayed.
Enter "0".
Enter "0".

17.6.8.2.2 HTML File
The same tags as HTML browser control can be used. Refer to "Appendix 7. HTML Tag List".
The setting of the character code differs depending on the language. Set as follows.
Table 5 Example of setting the character code for each language
Tag Description Character code
charset Set the character code English :windows-1252 Japanese :Shift_JIS
German :windows-1252 French :windows-1252
Italian :windows-1252 Spanish :windows-1252
Chinese (traditional) :big5 Korean :ks_c_5601-1987
Portuguese :windows-1252 Dutch :windows-1252
Swedish :windows-1252 Hungarian :windows-1250
Polish :windows-1250 Chinese (simplified) :gb2312
Russian :windows-1251 Turkish :cp1254
Czech :windows-1250 Indonesian :windows-1252
The following is the sample file (mg1010_jpn.htm) of the guidance screen.
Fig 2 Sample screen of G code guidance release
```
<html>
<head>
<meta content="text/html; charset=Shift_JIS">
</head>
<body>
<font size="3"> [MTB original command] </font><br>
<br>
<font size="3"> G101 Xx Yy Zz Aa Bb ;</font><br>
<br>
<br>
<font size="1"> a = Additional axis 1<br>
<font size="1"> b = Additional axis 2<br>
<br>
<br>
<br>
<center><img src="mg1010.jpg" width="150" height="150"></center>
</body>
</html>
```
Display with the normal font size
Display with the small font size
Designate the image figure position
Designate the file name of the image
figure
Set the character code

The following is the sample file (mc00000000_jpn.htm) of the M guidance screen.
Fig 3 Sample screen of M code guidance release
```
<html>
<head>
<meta content="text/html; charset=Shift_JIS">
</head>
<body>
<font size="3"> [MTB original command] </font><br>
<br>
<font size="1"> M00: Program stop </font><br>
<font size="1"> M01: Optional stop </font><br>
<font size="1"> M02: Program end </font><br>
<font size="1"> M03: Spindle forward rotation </font><br>
<font size="1"> M04: Spindle reverse rotation </font><br>
<font size="1"> M05: Spindle stop </font><br>
<font size="1"> M06: Tool change </font><br>
<font size="1"> M08: Coolant on </font><br>
<font size="1"> M09: Coolant off </font><br>
<br>
<br>
<font size="1"> M30: Program end </font><br>
<font size="1"> M98: Subprogram call </font><br>
<font size="1"> M99: Return from subprogram </font><br>
```


<font size="1"> M100 to M199: M codes related to measurement </font>
<font size="1"> M200 to M299: M codes related to testing a program </font>
<font size="1"> M300 to M399: M codes related to interrupt operation </font>
</body>
</html>
Table 6 Number of characters that can be displayed in a line for each font size
Display screen Font size Number of characters that can be
displayed in line (one-byte characters)
10.4 type Edit 2 screens
15 type Edit 3 screens
font size="1" 46
font size="3" 35
font size="6" 23
15 type Edit 3 screens font size="1" 59
font size="3" 39
font size="6" 29
Set the character code
Display with the normal font size
Display with the small font size

17.6.8.2.3 Precautions
1. The screen cannot be scrolled even if the length of guidance is larger than the display area. Create a guidance file that matches the G code guidance area size.
2. 100K bite is the upper limit of the HTML file size.
3. The supported image format is jpeg only; other image file formats are not displayed.
4. Select the color between "256 Colors (8 bit) " and "24 bitColors". "24 bit Colors" are reduced to 16 bit Colors (RGB565).
5. Adjust the background color of the figure to the base color (blue tone/gray tone) that MTB uses. The following is the RGB value for each base color.
Table 7 RGB value of screen background color by base common parameters "#11060 Screen theme color"
#11060 value R G B
0 (Gray tone) 216 (0xd8) 216 (0xd8) 224 (0xe0)
1 (Blue tone) 219 (0xdb) 221 (0xdd) 244 (0xf4)
6. When using M800W/M80W (terminal with PC), install the G code guidance or M code guidance by using HMI integrated installer. Refer to "Appendix 9. HMI Integrated Installer" for details.
7. When using M800S/M80/M80W (terminal without PC), install the G code guidance or M code guidance by using M80/M800S SETUP INSTALLER. Refer to "Appendix 11. Installing Custom Data (M800/M80 (Windows-less Display Unit)) ".
8. When the cursor is moved to the letter M or after on a G command block that includes the address M (such as G65), the M code guidance is displayed.

17.6.9 Limitation of Number of Project Registration
Projects of the interpreter method (GIP file) can be registered up to ten. Projects of the compilation method (DLL file) can be registered up to three.
At this time, correspond as follows so as not to exceed the maximum number.
Register two or more windows in one project.
Register two or more screens in one project.
17.6.9.1 Register Two or More Windows in One Project
Two or more windows used by the menu release are registered in one project.
Even if the screen where each window is displayed is different, the windows can be registered.
The example of registering the two windows for menu release in one project is as follows.
Ex.)
WINDOW_PROJECT
Window displayed in
Monitor screen
(Window1)
OFFSET No.+0
OFFSET No.+1
Window displayed in
Edit screen
(Window2)
1. Create two windows in one project.
(The window is number in order of creation: The offset No.+0, the offset No.+1)
2. Create the GIP file or the DLL file from the project created by step 1.
3. Register the file name and offset No. (It is assumed 8000 here.) created by step 2 to Config.ini.
4. Register to display the window offset No. 8000 on Moniter screen and the window offset No. 8001 on Edit screen by [CMENU] section of customdef.ini. (Refer to 17.6.5 for detail of the setting method.)
5. Window1 can be registered on the Moniter screen and Window2 can be registered in the Edit screen.

17.6.9.2 Register Two or More Screens in One Project
Two or more screens used by the F0 release are registered in one project.
The example of registering the screen for F0 key and the screen for SFP key in one project is as follows.
Ex.)
PANEL_PROJECT OFFSET No.+0
OFFSET No.+1

OFFSET No.+2
SFP_PANEL
F0_PANEL
SFP_WINDOW
1. Create the screen when the F0 key is pressed and the screen when the SFP key is pressed in one project.
(In the above example, the panel of F0 is registered as the third screen.)
2. Create the GIP file or the DLL file from the project created by step 1.
3. Register the file name and offset No. (It is assumed 6000 here.) created by step 2 to Config.ini.
4. Register to display the offset No. 6000 at SFP key and the offset No. 6002 at F0 key by [COFFSET] section of customdef.ini. (Refer to 17.6.4 for detail of the setting method.)
5. When the SFP key is pressed, SFP_PANEL is displayed, and when the F0 key is pressed, F0_PANEL is displayed.

17.6.10 About the Switch of Display/Non-display of the Menu by the Parameter
In this paragraph, the specification of function (MCAppGetMenuState()) which checks display/non-display of the menu is explained.
When display/non-display of the menu is switched by parameter, it is necessary to create the function MCAppGetMenuState() in the DLL designated by the [CMENU] section - "MENU_STATE_DLL" key of customdef.ini file and to judge non-display/display.
When the DLL file is specified in the "MENU_STATE_DLL" key, the specified DLL file is called, and display/non-display of the menu is switched by the return value. When the DLL file set in key does not exist or the MCAppGetMenuState() function is not defined in the DLL file, the menu is not displayed. When "MENU_STATE_DLL" is not set, the menu is unconditionally displayed.
Function name MCAppGetMenuState()
Process Returns whether to display the menu at the specified position.
Argument Type Data name I/O Explanation
const long _lScreenType I Screen type (0 to 2)
 0: Monitor
 1: Setup
 2: Edit
 3: Diagnosis
 4: Maintenance
const long _lMenuPos I Menu position (0 to 29)
 0 to 9 : 1st page
 10 to 19 : 2nd page
 20 to 29 : 3rd page
Return value long (TRUE : Display/Not TRUE : Non-display)
Details Judge the display/non-display of the menu, and set TRUE : Display/Not TRUE : Non-display to the return value.
Function model

```
//*****************************************************************************************
//
// <Function name> MCAppGetMenuState
// <Function> Returns whether to display the menu at the specified position.
//
// [Argument]
// const long_lScreenType (i) Screen type (0 to 2)
// const long_lMenuPos (i) Menu position (0 to 29)
// [Return value]
// long TRUE : Menu display
// Not TRUE : Menu non-display
//
//
//*****************************************************************************************
long MCAppGetMenuState( const long _lScreenType, const long _lMenuPos )
{
return TRUE;
}
```


17.6.11 Adjusting Standard and Customized Screen Size according to Resolution
Although the display size of standard and customized screens is either VGA (640480) or XGA (1024768), you can expand or contract the size according to the resolution of the display unit by the Config.ini setting.
This setting is valid only for M800/M80 (Windows-based display unit).
Add "VIEW_WIDTH=XX (display width)" "VIEW_HEIGHT=XX (display height)" in the SCREEN section of Config.ini.
Setting example
[SCREEN] section
Key name Description Setting range
VIEW_WIDTH Specifies screen width in pixels. 480 to 2048
VIEW_HEIGHT Specifies screen height in pixels. 320 to 2048
(Note 1) This function does not work with a model other than M800/M80 (Windows-based display unit).
(Note 2) If either VIEW_WIDHT or VIEW_HEIGHT is undefined, the normal display size (width and height of VGA or XGA) is used.
(Note 3) If you set a value out of setting range, the display appears as a minimum value or maximum value of the setting range.
(Note 4) When you set VIEW_WIDTH and VIEW_HEIGHT to the maximum values, the memory is used around 550MB for the display. In the case that memory cannot be secured, the standard and customized screens are not displayed. Set VIEW_WIDTH or VIEW_HEIGHT to the smaller value.
(Note 5) When you set VIEW_WIDTH and VIEW_HEIGHT to a smaller value than the normal

display size, the boundaries between screen parts and other thin lines are reduced and
may not be displayed.
[SCREEN]
VIEW_WIDTH=1280
VIEW_HEIGHT=1024

17.6.12 Displaying an Original Logo on the Standard Screen
A logo created by the machine tool builders can be displayed on the upper left of the standard
screen. To display the logo, create a logo file (JPG) and install it. If a logo file which is prepared by
the machine tool builders exists, unit name (base common parameter #1135 unt_nm) is not
displayed.
<Logo file specifications>
File name logo.jpg
Storage area *1 M800/M80
(Windows-based
display unit)
D:/custom
M800/M80
(Windows-less
display unit)
/Custom/ *1
Size *2 VGA 2280 pixel
XGA 32135 pixel
Number of colors *3 16 bit
*1 For M800/M80 (Windows-less display unit), add the prepared logo file to the installer in the
same way as the custom screen module (Refer to "Appendix 11. Installing Custom Data
(M800/M80 (Windows-less display unit))" for details).
*2 When the size of the prepared logo file is different from the one specified, the display image
may be different from the original because scaling is executed according to the display range.
*3 When the prepared logo file is other than 16-bit color file, the display image may be different
from the original because the color is converted to 16-bit color.
Logo display position

17.6.13 Parameter
The list of the parameter is described in this paragraph.
17.6.13.1 User Parameters
(1) Operation parameters
No. Name Details Setting range
#8940 Set select display Select the screen to be displayed on the selectable
display assignment area.
0: Common variable
1: Local variable
2: Workpiece coordinate system offset
3: All spindles' rotation speed
4: Common variables
5: Tool center coordinate display *1
6: Tool compensation amount
7 to 10: (Not used)
11: Customized display 1 *2
12: Customized display 2 *2
13: Customized display 3 *2
*1 Tool center coordinate display is displayed only
when any one of 5-axis related options is enabled.
*2 Customized display differs depending on a
machine tool builder.
0 to 13
#8973 Selectable display Select whether to enable selectable display on an
8.4- or 10.4-type display terminal.
0: Disable selectable display
1: Enable selectable display. Select what to display
using the parameter "#8940 Set select display".
0/1
(2) Bit selection parameter
No. Name Details Setting range
#6451 bit0 Onboard on Switch the onboard ON/OFF.
1 : Onboard ON
0 : Onboard OFF
0/1
17.6.13.2 Machine Parameters
(1) Base common parameters
No. Name Details Setting range
#11003
(PR)
APLC valid Temporarily disable APLC. Normally set "1".
0 : Disable
1 : Enable
0/1
#11060
(PR)
Screen theme
color
Select the screen theme colors.
This selection affects the colors of the entire screen.
0: Standard colors (gray tone)

1: Blue tone
0/1
#11080
(PR)
HomeScreen
display
Select whether to display the home screen.
0: Not display
1: Display (display at power ON)
2: Display (not display at power ON)
0 to 2

17.6.14 Limitations
Common
In the interpreter method, the key code flows out only to an active control.
When the page offset No. of the interpreter method and the compilation method overlaps in Config.ini, the page offset No. of the compilation method is given to priority.
When the page offset No. overlaps in the interpreter method or the compilation method, the page * offset No. previously set is given to priority.
When two or more settings overlap to same function key or menu in customdef.ini, The setting described later is active.
When two or more settings overlap to same key code in melAppCtrl, either setting is active.
When the executing file registered by the executing file registration method is not displayed by full-screen, the standard screen is displayed forward to touch the standard screen which operates on the back ground. (The registered execution file is hidden behind the standard screen.)
When using M800/M80 (Windows-less display unit) and M700VS/M70V/E70, switching of onboard / the custom application by bit selection parameter is enabled only when the standard screen is displayed.
When using M800/M80 (Windows-less display unit) and M700VS/M70V/E70, the upper bound of the maximum resource data (.res) size is 2MB.
In the M system, the control dedicated to the L system is not available. In the same way, the control dedicated to the M system is not available in the L system. If it is used, key operations may become unavailable on the displayed custom screen.
<Control dedicated to L system>
L system modal display parts
<Control dedicated to M system>
M system modal display parts
When too many controls or screen macros are used in one screen, the custom screen may not be activated. In that case, review the configuration of the custom screen, and reduce the number of controls or the amount of screen macro descriptions.
For M800S/M80/M80W (terminal without PC), up to 12MB of disk space is available to install custom release and G code guidance release etc., and up to 6MB is available for custom screen module (.o file). For M800W/M80W (Terminal with PC), up to 48MB is available for a master backup, although it depends on the amount of disk space available.
When #19701 VNC server control limit is set to "2", input by keyboard operation of the VNC client (pressing enter), and input by software keyboard operation is not available.
F0 release
When the custom release screen or the execution file is registered in the function key where the process exists, the existing process is invalid.
Two or more screens cannot be registered in one function key by F0 release other than the executing file registration method. Register in another key when two or more screens are displayed.
When the custom release screen is created by NC Designer2, two is standard about number of windows which can be opened at the same time on panel.
With the setting to display the home screen (when "#11080 HomeScreen display" is set to other than "0"), window display key is used to switch between the home screen and standard screen.
Thus, assign the customized screen to another key.

Menu release
When the menu is added or deleted in the position where the main menu exists, the existing menu is overwritten. However, in the diagnostic and maintenance screen only, when MTB's menus are added in the position of Mitsubishi's standard menus, Mitsubishi's standard menus can be automatically moved to vacant space.
The main menu of other screens cannot be set by changing the arrangement of the main menu.
(Ex. :The main menu of Edit screen cannot be set to Monitor screen.)
Neither an existing main menu name nor the icon image are changed.
When the menu of manual operation MST or the counter set is deleted by changing the main menu, the function to display pop-up with the address key is invalid.
Two or more custom release windows cannot be displayed at the same time.
Display the 3D check screen and the custom release window at the position where both do not overlap or where 3D screen is completely hidden in the custom release window when these are displayed at the same time.
When an illegal file path is set in the executing file registration method, the menu is registered, but there is no reaction even if the menu is pressed.
When the panel renewal is stopped to set BG_REFRESH_TIME to -1, the data displayed in the panel is not guaranteed. Take measures to display the registered window by full-screen, etc.
When the display/non-display of the menu added by conditions is switched, the setting is not active until restarting the standard screen even if the corresponding conditions are changed.
When "INSTANCE_HOLD" is set to "1", only instance of the custom window defined by WINDOW_OFFSET in customdef.ini is stored.

Even when you close the customized window of EXE file registration method, the menu
display of the standard screen is not animated.

17.7 Custom Release File Setting
Custom release file setting creates the necessary files such as Config.ini or customdef.ini to display
the customized screen on the NC display unit.
17.7.1 Operation Screen
17.7.1.1 Custom Screen Configuration Dialog
In the Custom screen configuration dialog, specify the data to output to the setting file.
Setting items displayed on the right part are switched depending on the selected item in the tree.
Dialog Image
Tree Structure
The following items are displayed in the tree.
No. Item Description
(1) General Specify the items relating to custom release file setting.
(2) F0 release Specify the necessary items for F0 release.
(3) General under the [Menu
release]
Specify the menu position for menu release.
(4) Standard screen name
(Monitor, Setup and Edit)
under the [Icon image]
Specify an icon image file to display each menu.
(5) General under the [Menu
name]
Specify the language to specify the menu name.
(6) Standard screen name
(Monitor, Setup and Edit)
under the (5)
Specify the menu name to display in each menu position.
(1)
(3)
(4)
(5)
(6)
(2)

Display Item of Each Tree
(1) General
In [General], specify the items relating to custom release file setting. Mainly set whether to output
the necessary setting files for executing the custom release.
No. Item Description
(1) Output the setting files. Select whether to output the setting file (Config.ini or customdef.ini) from
"Yes" or "No".
The default value is "No".
(2) Output Setuplst.ini. Select whether to output Setuplst.ini which is required for using HMI
Integrated Installer from "Yes" or "No".
The default value is "No".
(3) Output customload.txt. Select whether to output customload.txt which is required for using
"M80/M800S SETUP INSTALLER" or "M70/M700 SETUP INSTALLER"
from "Yes" or "No".
The default value is "No".
(4) Application name
displayed in "HMI
integrated installer"
Specify the name to display in the HMI integrated installer application list.
(Note 1) Specify the name within 45 one-byte characters.
(Note 2) The default is the name of NC Designer2 project being edited. If
the NC Designer2 project name is out of the setting range,
"Application01" is set.
(Note 3) For the HMI integrated installer, refer to Appendix 9.
(5) Initial screen No. Specify the No. of screen to display first when the project is launched.
(1000 to 9999)
1000 : Number of standard monitor screen
2000 : Number of standard setup screen
3000 : Number of standard edit screen
4000 : Number of standard diagnosis screen
5000 : Number of standard maintenance screen
6000-9999 : Number of custom screen to which the offset number is
added.
Leave blank when not registering.
(6) HTML file storage folder Designate the folder where the HTML file to output is stored.
"HTMLDATA0" to "HTMLDATA2" or "None" can be selected.
(Note) The file designated in the property "HTML File" of the HTML
browser is created in the designated folder.

No. Item Description
(7) Message file storage
folder
Designate the folder where the PLC message file or alarm list message
definition file to output is stored. "MESSDATA0" to "MESSDATA7" or
"None" can be selected.

(Note) The file designated in the property "Message file" of the PLC
message is created in the designated folder.
NOTE
Whether to output the setting files will differ depending on the model or the development method of the screen.
Set the each item referring to the following table.
Model Development
method Config.ini customdef.ini Setuplst.ini customload.txt
M800/M80 (Windows-based
display unit) and M700VW
Interpreter
method
Compilation
method
M800/M80 (Windows-less
display unit) and
M700VS/M70V/E70
Interpreter
method
Compilation
method
The Setuplst.ini is exported to the folder at the same level as other setting files.
When using HMI integrated installer, create the folder in the same level as Setuplst.ini and store the module
and the setting file of the custom screen. After that, describe the created folder name to the "DIR" key of
Setuplst.ini.
The folder to store HTML file and the folder for PLC message file are created with the names you designated,
and are placed at the same level as Config.ini.
Project folder
Project file (GIP file)
HTMLDATA0
HTML file (html file)
MESSDATA0
Message file (txt file)
Config.ini
customdef.ini
Icon image file

(2) F0 Release
In [F0 release], register the screen created with the panel to the function key.
Specify the screen No. registered to offset No. and each function key (SFP, F0, Window display and
Window selection).
No. Item Description
(1) Offset No. Specify the offset value added to the created project.
(6000 to 7700)
The default value is "6000".
(Note) Specify the arbitrary No. within setting range even if F0 release is
not used.
(2) Screen No. of SFP key Specify the screen No. registered to SFP key. (0 to 255)
Leave blank when not registering.
(3) Screen No. of F0 key Specify the screen No. registered to F0 key. (0 to 255)
Leave blank when not registering.
(4) Screen No. of Window
display key
Specify the screen No. registered to Window display key. (0 to 255)
Leave blank when not registering.
(5) Screen No. of Window
selection key
Specify the screen No. registered to Window selection key.
(0 to 255)
Leave blank when not registering.
(6) Screen No. of SFP key
(reselected) (Note) If you want to reselect a previously displayed screen with the SFP key,
select the screen No.
Leave blank when not registering.
A window cannot be reselected.
(7) Screen No. of F0 key
(reselected) (Note)
If you want to reselect a previously displayed screen with the F0 key,
select the screen No.
Leave blank when not registering.
A window cannot be reselected.
(8) Screen No. of Window
display key (reselected)
(Note)
If you want to reselect a previously displayed screen with the Screen
display key, select the screen No.
Leave blank when not registering.
A window cannot be reselected.

No. Item Description
(9) Screen No. of Window
selection key (reselected)
(Note)
If you want to reselect a previously displayed screen with the Screen
selection key, select the screen No.

Leave blank when not registering.
A window cannot be reselected.
(Note) Following are the setting ranges of the screen No. that is reselected with the press of each function key.
(1) Up to 64 characters can be specified.
(2) For a project being edited, 0 to 255 can be set. To reselect another project's screen number, specify the screen number including the offset number.
(3) The screen numbers to be held can be set with [Individual designation] or [Range designation]. [Individual designation] and [Range designation] can be used together. The following is the example.
[Individual designation] = (Screen No.), (Screen No.), (Screen No.),
[Range designation] = (Screen No.-Screen No.),
Setting example: 1,3,7504-7508,10,50
NOTE
The character color of the corresponding screen No. will turn red in the following cases.
- When the screen No. which is not created in the project is specified
- When the screen created with the window is specified
Note that the character color will not turn red when the compilation method is selected in the Transfer to Memory Card dialog.
If the data is out of the setting range or unspecified, the default value is displayed.

(3) [General] under the [Menu release]
In [Menu release], register the screen created with window to the main menu of the monitor screen, setup screen and edit screen.
Specify the offset No. and the screen No. registered to each menu position. The menu position is added to the tree display immediately after the setting. Up to 50 menus can be registered in the menu release.
No. Item Description
(1) Offset No. Specify the offset value added to the created window. (8000 to 9700)
The default value is "8000".
(Note) Specify the arbitrary No. within setting range if Menu release is not used.
(2) Main menu of the standard screen
Specify the screen No. of the window registered to the menu position of the standard screen. (0 to 255)
Leave blank the menu position that is not registered.
(1)
(2)

NOTE
The following tree is displayed under the [Menu release].
Menu release
|General
|Icon image
| |Monitor
| |Setup
| |Edit
|Menu name
|General
|Language name (Example: English, Japanese)
| |Monitor
| |Setup
| |Edit

Set both the [General] under the [Menu release] and the [General] under the [Menu name] displayed in a tree for menu release.
The character color of the corresponding screen No. will turn red in the following cases.
- When the screen No. which is not created in the project is specified
- When the screen created with the panel is specified
Note that the character color will not turn red when the compilation method is selected in the Transfer to Memory Card dialog.

(4) [Monitor][Setup][Edit] under the [Icon image]
The image file to be displayed in the menu can be specified in the screen displayed under the [Icon image] ([Monitor][Setup][Edit]) in the tree.
No. Item Description
(1) Menu position10 ON Specify the file path of the icon image to display for each menu at ON.
An arbitrary file name can be specified.
(2) Menu position10 OFF Specify the file path of the icon image to display for each menu at OFF.
An arbitrary file name can be specified.
NOTE
Specify the file created 6240-pixel JPEG format. The image might not be correctly displayed when a defect exists.
When the setting file is exported, the file changed to "offset No. + screen No._ON.jpg" or "offset No. + screen No._OFF.jpg" is copied to the export destination.
If the icon image file is not specified when displaying the created screen on the NC display unit, the icon that is registered on the standard screen is displayed.
Use the same icon image when the same screen No. window is registered in different menu position.

(5) [General] under the [Menu name]
In [Menu name], specify whether to enable the language for registering the menu. The language name specified to "Enable" is added immediately in the tree. The language name specified to "Disable" is deleted in the tree.
No. Item Description
(1) Language name
(18 languages)
Specify whether to enable each language.
English is enabled and the other languages are disabled by default.

(6) [Monitor][Setup][Edit] under the each language
The menu names are specified on the screen displayed under the each language in the tree ([Monitor][Setup][Edit]).
No. Item Description
(1) Menu position (No.)
name
Specify the menu name for each menu position.
Specify within 7 one-byte characters for VGA and 10 one-byte characters for XGA.
(2) Menu position (No.)
outline
Specify the outline for each menu.
Specify within 70 one-byte characters.

NOTE
The character color of the corresponding screen No. will turn red in the following case.
- When the screen size is changed by project properties
When the compilation method is selected in the Transfer to Memory Card dialog, menu name can be specified with up to 10 one-byte characters.
When the install destination NC is VGA, specify within 7 one-byte characters. Note that the whole menu name is not displayed when the name is set with 8 or more characters.
When the interpreter method is selected in the Transfer to Memory Card dialog, specify the menu name within 7 one-byte characters for VGA or 10 one-byte characters for XGA.
Contents set to the outline of the menu are displayed on the Menu list (list of menus for each screen). The Menu list window is displayed by pressing [MenuList] key .
The outline of the menu

17.7.2 Operation Procedure
The main operation (custom screen configuration, export for the setting file) is described.
Custom Screen Configuration
1. Select [Custom screen configuration] from the [File] menu.
2. Custom screen configuration dialog is displayed.
3. After the setting, press the [OK] button.
NOTE
When exporting the setting file (either Config.ini or customdef.ini), specify "Output the setting files. " to "Yes".

Export for the Setting File (Interpreter Method)
1. Select [Project convert] - [Export] from the [File] menu.
A confirmation message is displayed. Press the [OK] button.
2. An "export" dialog box is displayed. Specify the location and file name of the project to be exported. Press the [Save] button.
After exportation is successfully finished, a project exportation completion message is displayed.
Exportation is finished.
NOTE
The setting file is exported in the same layer as the GIP file when the macro is generated.
When a GIP file or setting file exists in the specified folder, the confirmation message for overwriting is displayed.
If not overwriting, move these files or change the export destination after canceling the confirmation message for overwriting.

Export for the Setting File (Compilation Method)
1. Select [Source Code Generation] from the [File] menu.
2. The [Source code generation wizard] is displayed.
3. After entering the settings, click on [Next].
4. Click on [Finish] to automatically generate source codes.
After generation is finished, a completion notice dialog box is displayed. Click on the [OK] button.
The generated source codes are saved in the folder designated during project creation.
NOTE
The setting file is exported in the custom folder created at the same level as the CPP folder during source code generation.
Store the custom data created by the compilation method (*.dll or *.o file) in the custom folder to which you exported the setting files.
"Postscript" or "All are overwrite" can be selected for the source file on [Source code generation wizard].
However, overwriting can only be executed for the setting file.
Generate the source code after changing the folder designated or moving the existing setting file because all are overwritten.

17.7.3 Precautions
1. When the setting file is exported with compilation method, "project name.dll" is specified to the [MODULE_NAME] key in the [MODULE] section for the Config.ini file. Create the DLL file with VS2010 and set the [MODULE_NAME] key again.
2. To register the customized screen created by multiple projects, edit the setting file in addition.
3. "Application01" is displayed on the HMI integrated installer screen. Edit the [NAME] key in the [APP] section for the Setuplst.ini file to change the display.
4. When installing with the HMI integrated installer, create the folder in the same layer as the Setuplst.ini file and move Config.ini, customdef.ini and the module of the customized screen (the GIP file and folder, the DLL file and the picture file). Specify the created folder name to the [DIR] key in the [APP] section for the Setuplst.ini file.

17.8 Memory Card Transfer
Memory card transfer function generates the custom data, setting files, etc. on an SD card (CF card) in each installer format. This function enables you to create custom data in the actual installation format without extra operation, leading to greater ease of operation.
17.8.1 Operation screen
In the Transfer to Memory Card dialog, various settings such as the selection of the Write Data or the Destination Drive can be specified.
No. Item Description
(1) Write Data Specify the data to write to the memory card.
Specify the custom data of the interpreter or compilation method.
Interpreter Method Select the interpreter method custom data.
When selected, custom data of the NC Designer2 project being edited is set as the data to write.
Set the custom data (*.GIP) name.
Compilation Method Select the compilation method custom data.
Specify the compilation method custom data (*.dll or *.o file) in the setting file storage folder (custom folder) that is created during the source code generation.
(2) CustomScreen Custom screen configuration dialog is displayed.
When the interpreter method is selected, the setting file data of the currently edited NC Designer2 project is specified.
When the compilation method is selected, the setting file data created during the source code generation is specified.
(2)
(1)
(3)
(4)

No. Item Description
(3) Memory Card Specify the output to the memory card.
Destination The destination can be specified from a drive or folder.
Drive Select the destination drive.
Hard disk, and removable disk are displayed.
Folder Specify the destination folder.
The folder selection dialog box is displayed by pressing the [Browse] button. Specify any desired folder.
NC to install Select the NC model to install.
(4) Write Drive Information Memory information of the drive specified as write destination is displayed.
NOTE
Format the SD card (or CF card) specified as write destination destination before use.
If the custom data name is specified in both the interpreter method and the compilation method, the custom data with enabled radio button is transferred.
When the CustomScreen button is pressed in the state that the interpreter method is selected as the data to write, the Custom screen configuration dialog with currently edited NC Designer2 project data specified is displayed.
The settings are reflected on the currently edited NC Designer2 project data by editing it.
When the CustomScreen button is pressed in the state that the compilation method is selected, the setting file data in the folder which includes the specified custom data is specified as the Custom screen configuration dialog. The settings are not reflected on the currently edited NC Designer2 project's configuration data by editing it. The change is not reflected on the source data to read (the setting file data of the source code generation destination), either.
When the setting file in the same folder as the selected compilation method is out of the data range or is not specified, the initial value is displayed on the Custom screen configuration dialog. Specify the setting again.
Installer format differs depending on the NC to install.
NC to install Installer format
M800/M80 (Windows-less display unit) M80/M800S SETUP INSTALLER
M800/M80 (Windows-based display unit) HMI integrated installer
M700VS/M70V/E70 M70/M700 SETUP INSTALLER
M700VW HMI integrated installer

In HMI integrated installer format, the data to write is created in the following directory configuration.
(1) Interpreter version
SD/CF
CustomInstall
Custom_App1
Project folder
Macro

Project macro file (GMC file)
Project file (GIP file)
Config.ini
customdef.ini
img
Icon image file (BMP file)
HTMLDATA0
HTML file (HTML file)
MESSDATA0
Message file (TXT file)
Setuplst.ini
(2) Compilation version
SD/CF
CustomInstall
Custom_App1
Library file (DLL file)
Config.ini
customdef.ini
img
Icon image file
HTMLDATA0
HTML file (HTML file)
MESSDATA0
Message file (TXT file)
Setuplst.ini

For M80/M800S SETUP INSTALLER or M70/M700 SETUP INSTALLER, the data to write is created in the following directory configuration.
(1) Interpreter version
SD/CF
Installer
installer.o
custom
Project folder
Macro
Project macro file (GMC file)
Project file (GIP file)
Config.ini
customdef.ini
HTMLDATA0
HTML file (HTML file)
MESSDATA0
Message file (TXT file)
Icon image file
custom15
Project folder
Macro
Project macro file (GMC file)
Project file (GIP file)
Config.ini
customdef.ini
HTMLDATA0
HTML file (HTML file)
MESSDATA0
Message file (TXT file)
Icon image file

(2) Compilation version
SD/CF
Installer
installer.o
custom
Object file (o file)
Config.ini
customdef.ini
customload.txt
HTMLDATA0
HTML file (HTML file)
MESSDATA0
PLC message file (TXT file)
Icon image file
custom15
Object file (o file)
Config.ini
customdef.ini
customload.txt
HTMLDATA0
HTML file (HTML file)
MESSDATA0
Message file (TXT file)
Icon image file
(Note 1) The folder name to be created is switched by the setting of "Screen width" and "Screen height" in

project properties.
(Note 2) Data of the custom15 folder is copied to the custom folder in the CNC. When specifying the path name using Config.ini, designate /custom/ instead of /custom15/ even when using 15-type display unit.
The file designated in the property "HTML File" of the HTML browser is created in the folder designated in [HTML file storage folder] of the custom release file setting dialog, regardless of the "HTML Folder" setting.
The file designated in the property "Message file" of the PLC message is created in the folder designated in [Message file storage folder] of the custom release file setting dialog, regardless of the "Message folder" setting.
For the folder which is not designated as [HTML file storage folder] or [Message file storage folder], edit config.ini and create the installation data manually because such folder is not automatically created.

17.8.2 Operation Procedure
This section describes the main operation (write to the memory card).
Write to the Memory Card
1. Select [Write to Memory Card] from the [File] menu.
2. Transfer to Memory Card dialog is displayed.
3. After the setting, press the [Memory Card Write] button.
4. After the transfer to the memory card is successfully finished, a completion message is displayed.

NOTE
If a project macro file is present for the interpreter method, CYCLIC_MACRO key is added to the [PROJECT] section of the Config.ini file and output.

17.9 Home Screen
This section describes how to set configuration settings files relevant to Home screen.
[Definitions of terms]
Term Description
ExtApp folder A folder used to place information about MTB's app (application created by a machine tool builder) to be used on Home screen.
Below are path for respective model type:
M800/M80 (Windows-based display unit): "D:\custom\ExtApp"
M800/M80 (Windows-less display unit): "MSYS:/Custom/ExtApp"
NC Designer2 interpreter method (GIP method)
The methods for incorporating customized screen in Customization (F0 assignment) function.
For details, refer to "17. Application Execution Method".
NC Designer2 compilation method (DLL method)
EXE file registration method (EXE method)
17.9.1 Types of MTB's App
Below are types of MTB's app that can be called on Home screen.
(1) Fixed Home screen display
MTB's app is displayed in area except the fixed display portions in the upper and right side of Home screen.
You can operate Operation menu and Home button on the fixed display part of Home screen, even if MTB's app is displayed. You do not need to incorporate processing for each application.
This method is compatible with NC Designer2 interpreter method (GIP method)/NC Designer2 compilation method (DLL method).
[Example of the fixed Home screen display]
(2) Full-screen display
MTB's app is displayed full-screen.
You cannot operate Operation menu or Home button on the fixed display part of Home screen while MTB's app is displayed.
You need to incorporate key operations such as function keys and return to Home screen as well as touch panel operation for each MTB's app.
This method is compatible with NC Designer2 interpreter method (GIP method)/NC Designer2 compilation method (DLL method)/EXE file registration method (EXE method). However, EXE file registration method (EXE method) is only compatible with M800/M80 (Windows-based display unit).
[Example of Full-screen display]
Display area of MTBs app
See 17.9.3.3.1 for precautions on the display area
MTBs app
MTBs app

17.9.2 Configuration Settings Files
17.9.2.1 List of Configuration Settings Files
Configuration settings files Description
HMI configuration file
Config.ini
This file is used to register the created DLL file or GIP file as operation screen.
This file is used for both NC Designer2 interpreter method (GIP method) and NC Designer2 compilation method (DLL method) for Customization (F0 assignment) function. For how to create and where to store, refer to "17. Application Execution Method".
Home screen configuration file
HomeScrnCustomConfig.ini
By describing the Application definition file to which MTB's app information

has been defined, the MTB's app is registered to the list of Application
buttons.
Store this file in ExtApp folder.
Application definition file
HomeScrn_.ini
is application name.
This file is used to define the information (path to MTB's app, invocation
argument, menu on operation button, etc.) of MTB's app registered to
Home screen.
Store this file in any desired folder under ExtApp folder.
Application language file
HomeScrn__.ini
is application name. Specify the same name
as in Application definition file.
is language code.
This file is used to define texts (application name displayed under
Application button). Prepare this file individually for each language as
needed.
* The file for English is mandatory. Which file to use is changed according
to "#1043 lang". If there is no Application language file for the onscreen
language, the file for English is used instead.
* Store this file in the same folder as that of Application definition file.
*The application names displayed under Application button are fixed to
English.
Language types are as follows:
Code Language Code Language
eng English dut Dutch
jpn Japanese swe Swedish
deu German hun Hungarian
fra French pol Polish
ita Italian chi1 Chinese
(simplified)
spa Spanish rus Russian
chi2 Chinese
(traditional)
tur Turkish
kor Korean cze Czech
por Portuguese ind Indonesian
NC Designer2 Instruction Manual
17. Application Execution Method
604 IB-1501250-J
17.9.2.2 Storage Location of Applications and Configuration Settings Files
Below show the folders in where each configuration settings file is stored.
Release method Storage folders
Config.ini [When using M800/M80 (Windows-based display unit)]
"D:\custom"
[When using M800/M80 (Windows-less display unit)]
"MSYS:/Custom"
HomeScrnCustomConfig.ini [When using M800/M80 (Windows-based display unit)]
"D:\custom\ExtApp"
[When using M800/M80 (Windows-less display unit)]
"MSYS:/Custom/ExtApp"
HomeScrn_.ini Store this file to path defined in "HomeScrnCustomConfig.ini".
*Possible to set in any desired place under D:\custom\ExtApp.
HomeScrn__.ini Store this file in the same place as that of "HomeScrn_.ini".
.GIP [When using M800/M80 (Windows-based display unit)]
"D:\custom"
[When using M800/M80 (Windows-less display unit)]
"MSYS:/Custom/ExtApp"
.DLL [When using M800/M80 (Windows-based display unit)]
"D:\custom"
[When using M800/M80 (Windows-less display unit)]
*Not available
.o [When using M800/M80 (Windows-based display unit)]
*Not available
[When using M800/M80 (Windows-less display unit)]
"MSYS:/Custom"
.exe Store this file to path defined in "HomeScrn_.ini".
*Possible to set in any desired place under D:\custom\ExtApp.
*Not available for M800/M80 (Windows-less display unit)
.jpg Store this file to path defined in "HomeScrn_.ini".
*Possible to set in any desired place under D:\custom\ExtApp.
17.9.2.3 Files Required for Registration
Below are the files required for each release method.
Release method Interpreter
method
Compilation
method
EXE file registration
method
Config.ini
HomeScrnCustomConfig.ini
HomeScrn_.ini
HomeScrn__.ini
.GIP
.DLL
.o
.exe

.jpg
...Need to prepare or edit
...No need to prepare or edit

17.9.3 Fixed Home Screen Display
This section describes how to register an application created by a machine tool builder (referred to as MTB's app) with use of the fixed Home screen display.
17.9.3.1 Interpreter Method
17.9.3.1.1 Setting Home Screen Config File (HomeScrnCustomConfig.ini)
Home screen config file is used to specify a list of Application definition files (HomeScrn_.ini) for each MTB's app to be registered to Home screen.
- Section
Section name Mandatory Description
COMMON Define application to be registered to Home screen.
- [COMMON] section key
Key name Mandatory Description
ITEMnn
(nn= 01 to 27)
- Specify the definition file (Application definition file (*)) of application registered to Home screen.
Use either an absolute or relative path to specify the Application definition file name (e.g. HomeScrn_custom_app1.ini).
For a relative path, specify a path relative to the folder (ExtApp folder) of this definition file.
* For details of Application definition file, refer to "17.9.3.1.2".
Note) If this key is undefined, neither application button nor sub menus of [Add Application] menu are displayed.
Setting range: Up to 128 characters including the path.
[Setting example]
[COMMON]
ITEM01=D:\Custom\ExtApp\HomeScrn_custom_app1.ini ; <- Define MTBs app 1.
ITEM02=D:\Custom\ExtApp\custom_app2\HomeScrn_custom_app2.ini ; <- Define MTBs app 2.
ITEM04=\custom_app4\HomeScrn_custom_app4.ini ; <- Define MTBs app 4.

17.9.3.1.2 Setting Application Definition File (HomeScrn_.ini)
Application definition file is used to define the information of extension application registered to Home screen.
Using this definition file, you define the basic information of extension application, Home button operation, Operation menu button operation, etc.
[File contents]
- Section
Section name Mandatory Description
COMMON Yes Define basic information of the application.
HOME No Define this when you want to hide, minimize or terminate the currently displayed application by touching Home button.
If this section is undefined, Home button does not work.
SETTING nn
(nn=00 to 29)
No Define the main menu information when Operation menu button is touched.
This section is created by the number defined in the SETTINGTOPMENUCOUNT key of [COMMON] section.
Xxx (Arbitrary section name)
No Define the sub menu information when Operation menu button is touched.
Main and sub menus are associated with each other using the SUBMENUSECTIONnn key of [SETTING nn] section.
xxx is any desired character string made of up to 32 letters. Available characters are alphanumeric and symbols (space ' ' and underscore '_').

- [COMMON] section key
Key name Mandatory Description
NAME Yes Specify the character string to be used for the application name displayed under Application button or in the sub menus of [Add Application] menu, using the key described in [LANG] section of Application language file (*).
The actually displayed application name is defined in Application language file.
* For details of Application language file, refer to "17.9.3.1.3".
Note) If this key is undefined, or if application name is unable to be retrieved from the app name key, neither application buttons nor sub menus of [Add Application] menu are displayed.
Setting range: Up to 32 characters
TYPE Yes Specify the type of MTB's app:
0: Fixed Home screen display
1: Full-screen display (NC Designer2 interpreter method/ NC Designer2 compilation method)
2: Full-screen display (EXE file registration method)
ICONFILENAME No Specify the image file (*) to be used as an icon of Application button.
Use either an absolute or relative path to specify the image file name (e.g. custom_app1.jpg). For a relative path, specify a path relative to this definition file.

*Specify an image file with the size below:
- XGA: Up to 52 x 52 pixels
- VGA: Up to 40 x 40 pixels
*Available format is JPG.
Note) If you specify no file, or specified file is nonexistent, the icon of the
execution file (MTB's app) defined in the EXECFILENAME key of
[COMMON] section is used.
Setting range: Up to 128 characters including the path (*1)
PANEL_OFFSET Yes Unique offset value allocated to each screen of MTB's app. Specify the
offset value defined in HMI configuration file (customdef.ini).
SETTINGTOPMEN
UCOUNT
No Specify the number of main menus to be registered to Operation menu
button.
Setting range: 0 to 30
Default: 0
* When set to 0, Operation menu button does not work.
- [HOME] section key
Key name Mandatory Description
COMMANDCOUNT No Specify the number of COMMANDnn keys in [HOME] section.
Setting range: 0 to 29
Default: 0
* When set to 0, Home button does not work.
COMMANDnn
(nn=01 to 30)
No Specify the argument when calling GCSUser function.
(GUSER_FUNC_EXECMENUEVENT) held by the Panel of onscreen
MTB's app.
Setting range: Integer values
NC Designer2 Instruction Manual
17. Application Execution Method
608 IB-1501250-J
- [SETTING nn] section
Key name Mandatory Description
NAME Yes Specify the character string to be used for the main menu name,
using the key of Application language file (*).
The actually displayed menu name is defined in Application language
file.
*For details of Application language file, refer to "17.9.3.1.3".
Note) If this key is undefined, or if menu name is unable to be
retrieved from the menu name key, the menu is not displayed.
Setting range: Up to 32 characters
MENU_ID Yes Specify the ID used when inquiring menu name/status to Panel.
SUBMENUCOUNT No (*) Specify the number of SUBMENUSECTIONnn keys.
Setting range: 0 to 29
Default: 0
SUBMENUSECTIONnn
(nn=01 to 30)
No (*) Define the sub menus to be displayed at a touch of main menu.
Specify the sub menu section name (arbitrary section) (*) to
associate the sub menus with main menu.
* Available characters for a section name are alphanumeric and
symbols (space ' ' and underscore '_').
Setting range: Up to 32 characters
COMMANDCOUNT No (*) Specify the number of COMMANDnn keys.
Setting range: 0 to 29
Default: 0
COMMANDnn
(nn=01 to 30)
No (*) Specify the argument when calling GCSUser function.
(GUSER_FUNC_EXECMENUEVENT) held by the Panel of
onscreen MTB's app.
Setting range: Integer values
*Specify either SubMenuCount and SubMenuSectionXX or CommandCount and CommandXX.
If you define both, SubMenuCount and SubMenuSectionXX have priority.
NC Designer2 Instruction Manual
17. Application Execution Method
609 IB-1501250-J
- [xxx(Arbitrary section)] section
Key name Mandatory Description
NAME Yes Specify the character string to be used for the sub menu name, using the
key of Application language file (*).
The actually displayed menu name is defined in Application language
file.
* For details of Application language file, refer to "17.9.3.1.3".
Note) If this key is undefined, or if menu name is unable to be retrieved
from the menu name key, the menu is not displayed.
Setting range: Up to 32 characters.
MENU_ID Yes Specify the ID used when inquiring menu name/status to Panel.
COMMANDCOUNT No Specify the number of COMMANDnn keys.
Setting range: 0 to 29
Default: 0
COMMANDnn
(nn= 01 to 99)
No Specify the argument when calling GCSUser function.
(GUSER_FUNC_EXECMENUEVENT) held by the Panel of onscreen
MTB's app
Setting range: Integer values

[Setting example]
[COMMON] ; <- Define basic information of application.
NAME=LANG_APP_NAME ; <- Specify the application name.
ICONFILENAME=D:\Custom\ExtApp\custom_app.jpg
; <- Specify the image to be displayed on Application button.
TYPE=0 ; <- Specify the registration type
PANEL_OFFSET=6500 ; <- Specify 6500 to the offset number of the panel to be changed
SETTINGTOPMENUCOUNT=2 ; <- Specify the number of main menus to display on Operation menu buttons.

[HOME] ; <- Define the operation when Home button is touched.
COMMANDCOUNT=1 ; <- COMMANDnn is registered up to 01, thus specify 1.
COMMAND01=0 ; <- Call GCSUser of onscreen Panel by specifying argument 0.

[SETTING 01] ; <- Define the 1st main menu (without sub menus).
NAME=LANG_MENU ; <- Specify the menu name.
MENU_ID=1 ; <- Specify the ID used when specifying menu name/status to Home screen.
COMMANDCOUNT=1 ; <- Command is registered up to 02, thus specify 2.
COMMAND01=1 ; <- Call GCSUser of onscreen Panel by specifying argument 1.

[SETTING 02] ; <- Define the 2nd main menu. (with sub menus).
NAME=LANG_FILE ; <- Specify the menu name.
MENU_ID=2 ; <- Specify the ID used when specifying menu name/status to Home screen.
SUBMMENUCOUNT=2 ; <- SUBMENUSECTION is registered up to 02, thus specify 2.
SUBMENUSECTION01=Setting Copy ; <- Define the sub menu section (arbitrary section name).
SUBMENUSECTION02=Setting Paste ; <- Define the sub menu section (arbitrary section name).

[Setting Copy] ; <- Defined using SUBMENUSECTION01 key of [Setting 02] section.
; Define arbitrary section (Setting Copy) for sub menu.
NAME=LANG_COPY ; <- Specify the menu name.
MENU_ID=201 ; <- Specify the ID used when specifying menu name/status to Home screen.
COMMANDCOUNT=1 ; <- COMMAND is registered up to 01, thus specify 1.
COMMAND01=2 ; <- Call GCSUser of onscreen Panel by specifying argument 2.

[Setting Paste] ; <- Defined using SUBMENUSECTION02 key of [Setting 02] section.
; Define arbitrary section (Setting Paste) for sub menu.
NAME=LANG_PASTE ; <- Specify the menu name.
MENU_ID=202 ; <- Specify the ID used when specifying menu name/status to Home screen.
COMMANDCOUNT=1 ; <- COMMAND is registered up to 01, thus specify 1.
COMMAND01=3 ; <- Call GCSUser of onscreen Panel by specifying argument 2.

17.9.3.1.3 Setting Application Language File (HomeScrn__.ini)
Application language file defines the character string information of the extension application registered to Home screen. Create this file for each language type.
Text of this file needs to be written in UNICODE.
[File contents]
- Section

Section name	Mandatory	Description
LANG	Yes	Define the application registered to Home screen.

- [LANG] section key

Key name	Mandatory	Description
LANG_XXXXX (LANG_XXXXX is any desired string made of up to 32 characters) (*1)	No	Specify the application name and menu name for each language type.

Type	Max. data length	Available character
App name	8 letters (*2)	Alphanumeric, space ( )
Menu name	16 letters (*1)	Other than equal (=) and semi-colon (;)

*1 A two-byte character is treated as two letters.
*2 For the application name, only the English file is referenced, thus if the name is defined for non-English language, it will not be used.
*1 Available characters for arbitrary character string are alphanumeric and underscore (_).
*2 The file for English language is mandatory. If the English file has no key, the character string may not be drawn.
If this key is not included in any non-English file, the data defined to the key in English file is used.
[Setting example]
- Application language file for English
Contents of Application language file (HomeScrn_custom_app1_eng.ini)
[LANG] ; <- section
LANG_APP_NAME=custom1 ; <- a key defined to NAME of [COMMON] section in Application definition file
(Note) App name defined in English file is used, thus a name described in non-English file is ignored.
LANG_MENU=MENU ; <- a key defined to NAME of [SETTING 01] section in Application definition file
LANG_FILE=FILE ; <- a key defined to NAME of [SETTING 02] section in Application definition file
LANG_COPY=COPY ; <- a key defined to NAME of [Setting Copy] section in Application definition file
LANG_PASTE=PASTE ; <- a key defined to NAME of [Setting Paste] section in Application definition file

17.9.3.2 Compilation Method
17.9.3.2.1 Setting Home Screen Config File (HomeScrnCustomConfig.ini)

Refer to 17.9.3.1.1.
17.9.3.2.2 Setting Application Definition File (HomeScrn_.ini)
Refer to 17.9.3.1.2.
17.9.3.2.3 Setting Application Language File (HomeScrn__.ini)
Refer to 17.9.3.1.3.
17.9.3.3 Precaution When Creating Customized Screen with Fixed Home Screen Display
17.9.3.3.1 Displayable Area on Customized Screen
Create a Customized screen as a Panel. The upper side and right end side of the Panel are common display area; thus do not allocate any parts.
When you create a screen, allocate an application control on a part of NC Designer2 panel, and create an application.
Display area for
MTBs app
Display area for MTBs app
VGA
(Coordinate: X,Y=0,49)
(Width: 574 pixels) (Height: 431 pixels)
XGA
(Coordinate: X,Y=0,49)
(Width: 924 pixels) (Height: 719 pixels)
*Parts allocated to area other than the above range are not displayed.
Available creation area for an application
VGA:
(W: 574 pixels) (H: 431 pixels)
XGA:
(W: 924 pixels) (H: 719 pixels)
Red frame "Panel area"
VGA: 640 x 480
XGA: 1024 x 768

17.9.3.3.2 Changing Operation Menu Display
When you change the status of Operation menu button (normal/highlight/invalid/hide), call GCSUser() to Home screen on Customized screen (a screen made by a machine tool builder).
Refer to below program example when you call GCSUser.
Prepare lParam in long form array.
Array number Description
[0] The number of Operation menus to be changed (the number of ns)
[n*2] The information of Operation menu to be changed
The [(n*2)+1]th Specify the MENU_ID number defined in Application definition file (HomeScrn_.ini).
The [(n*2)+2]th Status after change
(0: normal/1: highlight/2: invalid/3: hide)
n= the number of Operation menus to be changed.
Refer to below table for the argument of GCSUser function.
Array number Description
The 1st argument Object to be operated (fixed to 501)
The 2nd argument Command number to execute (fixed to 0 x 9602)
The 3rd argument Accompanying information

[Program example: Specify Operation menu status]
* Below is a program example to display COPY highlighted and PASTE as invalid of the above screen.
(1) Interpreter method
(2) Compilation method

```
long _lParam[(2*2)+1];
_lParam[0] = 2; // Specify the number of Operation menus to change (n=2)
// Highlight sub menu [COPY]
_lParam[1] = 201; // MENU_ID of sub menu [Copy]
_lParam[2] = 1; // Specify highlight (1) to the status after change
// Display sub menu [Paste] as invalid
_lParam[3] = 202; // MENU_ID of sub menu [Paste]
_lParam[4] = 2; // Specify invalid (2) to the status after change
// Call GCSUser() function
GCSUser(GCSGetPanel(GCSGetWindow(GCSGetScreen(GetGBaseObject()), 501 + 1)),
 GUSER_FUNC_SETMENUSTATE, (long)_lParam);
GMEM _Param; // Definition
_Param = GMemCreate("MENU_STAT", 20); // Ensure memory (the 2nd argument is the number of bytes)
GMemSetLong(_Param, 0, 2); // Specify the number of Operation menus to change (n=2)
// Highlight sub menu [Copy]
GMemSetLong(_Param, 4, 201); // MENU_ID of sub menu [Copy]
GMemSetLong(_Param, 8, 1); // Specify highlight (1) to the status after change
// Display sub menu [Paste] as invalid
GMemSetLong(_Param, 12, 202); // MENU_ID MENU_ID of sub menu [Paste]
GMemSetLong(_Param, 16, 2); // Specify invalid (2) to the status after change
// Call GCSUser() function
GCSUser(501, 0x9602, _Param); // GUSER_FUNC_SETMENUSTATE(0x9602)
GMemDelete(_Param); // Memory release
```

17.9.3.3.3 Receiving Notification When Operation Menu Is Pressed on Home Screen

When a setting menu on Home screen is pressed, GCSUser function is used to notify it as a GCSUser event from the Home screen to the customized screen (the screen made by a machine tool builder). The interpreter notifies to OnUser callback function of the control on which focus is set. Create processing to receive GCSUser events with reference to below program example.

Message ID: GUSER_FUNC_EXECMENUEVENT

Parameter: the value defined to "COMMANDnn" in Application definition file (HomeScrn_.ini)

[Program example: Processing when each Operation menu is pressed]

(1) Interpreter method

```
$XXXXXXXXXXXXXXXXXXXXXX-OnUser // XXXXXXXX is a control name
 // Processing when each Operation menu is pressed
 IF[LLPARAM == GUSER_FUNC_EXECMENUEVENT]
 // Home button
 IF[LUPARAM==0] // MenuID of Home button
 {
 Incorporate a process when Home button is pressed
 }
 // The 1st main menu
 ELSEIF[LLPARAM==1] // MenuID of the 1st menu
 {
 Incorporate a process when the 1st main menu is pressed
 }
 // Sub menu [Copy]
 ELSEIF[LLPARAM==2] // MenuID of sub menu [Copy]
 {
 Incorporate a process when sub menu [Copy] is pressed
 }
 _lStatus = TRUE;
 ENDIF
 ENDIF
$END
}
```


(2) Compilation method

```
long XXXXXXXXXXXX::User( long _lLParam, long _lUParam )
{
 long _lStatus = FALSE;
 switch (_lLParam)
 {
 // Process when each Operation menu is pressed
 case GUSER_FUNC_EXECMENUEVENT:
 // Home button
 if (_lUParam == 0)
 {
 Incorporate a process when Home button is pressed
 }
 // The 1st main menu
 else if (_lUParam == 1)
 {
 Incorporate a process when the 1st main menu is pressed
 }
 // Sub menu [Copy]
 else if (_lUParam == 2)
 {
 Incorporate a process when sub menu [Copy] is pressed
 }
 _lStatus = TRUE;
 break;
 default:
 _lStatus = GCPanel::User(_lLParam, _lUParam);
 break;
 }
 return _lStatus;
}
```


17.9.3.3.4 Notifying Key Input from Application

When a key to display Operation menu (LIST key) is pressed or a key to change to Home screen (MENU key [the 10th button from the left]) is pressed, notify the key input from the Customized screen to Home screen so that Operation menu is displayed or screen changes to Home screen. In addition, when a key code shown in below table is notified to Home screen, the Home screen executes the operation described.

Key code Operation detail

MONITOR key Display Monitor screen

SET_UP key Display Setup screen

EDIT key Display Edit screen

DIAGN key Display Diagn screen

MAINTE key Display Mainte screen

SFP key Display the Customization screen registered.

F0 key Display the Customization screen registered.

Window display key Display standard screen

LIST key Display Operation menu

MENU key Home screen (the 10th button from the left)

Use CSKeyPress function to notify Home screen.

Refer to below table for details of CSKeyPress function arguments.
Array number Description
The 1st argument Object to be operated (Fixed to 501)
The 2nd argument Virtual key code
The 3rd argument Key status

[Program example: Notify Home screen side key input when a key is pressed]
Below is a program example to notify Home screen key codes described the above table.
(1) Interpreter method

```
$XXXXXXXXXXXXXXXXX-OnKeyPress // XXXXXXXX is a control name
// Notify Home screen key input
 // Omit
 IF[(LUPARAM AND 2) <> 0] // CTRL key is pressed
 IF[LLPARAM==114] // Window display key pressed
 ELSEIF[LLPARAM==119] // LIST key pressed
 // Notify Home screen by GCSKeyPress
GCSKeyPress(501,LLPARAM,LUPARAM);
 ENDIF
 ELSEIF[(LUPARAM AND 1) <> 0] // SHIFT key is pressed
 IF[LLPARAM==112] // MONITOR key pressed
 ELSEIF[LLPARAM==113] // SETUP key pressed
 ELSEIF[LLPARAM==114] // EDIT key pressed
 ELSEIF[LLPARAM==115] // DIAGN key pressed
 ELSEIF[LLPARAM==116] // MAINTE key pressed
 ELSEIF[LLPARAM==120] // SFP key pressed
 ELSEIF[LLPARAM==121] // F0 key pressed
 // Notify Home screen by GCSKeyPress
GCSKeyPress(501,LLPARAM,LUPARAM);
 ENDIF
 ELSEIF[(LUPARAM AND 7) <> 0] // SHIFT, ALT or CTRL key is not pressed
 IF[LLPARAM==121] // The 10th button from MENU key pressed
 // Notify Home screen by GCSKeyPress
GCSKeyPress(501,LLPARAM,LUPARAM);
 ENDIF
ENDIF
$END
```


(2) Compilation method
17.9.3.4 Caution
- In this method only Panel is called from Home screen.
Regarding changing from one Panel to another Panel and showing Windows, this method only supports the switchover from one Panel to another Panel.
Operations are not guaranteed when Windows are displayed.
- While Operation menu is displayed, the application side cannot receive key events.
- History while the application screen is displayed is left as details/history of Home screen.

```
long XXXXXXXXXXXX::OnKeyPress (unsigned short usKeyCode, unsigned long ulStatus)
{
// Notify Home screen key input
if (_lStatus == KEY_OK)
{
// Omit
switch(_unType)
case MENUT:
if(usKeyCode == GK_F10) // The 10th button from MENU key pressed
 {
GCSKeyPress(GCSGetPanel(GCSGetWindow(GCSGetScreen(GetGBaseObject(
)),
501 + 1)), usKeyCode, ulStatus);
 }
 break;
case FUNCT:
if((usKeyCode == GK_F1) || // MONITOR key pressed
 (usKeyCode == GK_F2) || // SETUP key pressed
 (usKeyCode == GK_F3) || // EDIT key pressed
 (usKeyCode == GK_F4) || // DIAGN key pressed
 (usKeyCode == GK_F5) || // MAINTE key pressed
 (usKeyCode == GK_F9) || // SFP key pressed
 (usKeyCode == GK_F10)) // F0 key pressed
 {
GCSKeyPress(GCSGetPanel(GCSGetWindow(GCSGetScreen(GetGBaseObject(
)),
501 + 1)), usKeyCode, ulStatus);
}
// Omit
}
else if(_lStatus == KEY_SP)
{
// Omit
switch(_unType)
case MENUT:
 if(usKeyCode == GK_F8) // LIST key pressed
 {
GCSKeyPress(GCSGetPanel(GCSGetWindow(GCSGetScreen(GetGBaseObject(
)),
```

501 + 1)), usKeyCode, ulStatus);
}
Barek;
Case WINDOWT:
if(usKeyCode == GK_F3) // Window display key pressed
{
GCSKeyPress(GCSGetPanel(GCSGetWindow(GCSGetScreen(GetGBaseObject(
)),
501 + 1)), usKeyCode, ulStatus);
}
//Omit
}

17.9.4 Full-Screen Display
This section describes how to register an application created by a machine tool builder (referred to as MTB'S app) with use of the full-screen display type.
17.9.4.1 Interpreter Method
17.9.4.1.1 Setting Home Screen Config File (HomeScrnCustomConfig.ini)
Refer to 17.9.3.1.1.

17.9.4.1.2 Setting Application Definition File (HomeScrn_.ini)
Application definition file is used to define the information of extension application registered to Home screen. Using this definition file, you define the basic information of extension application, Home button operation, Operation menu button operation, etc.
[File contents]
- Section
Section name Mandatory Description
COMMON Yes Define basic information of the application.
- [COMMON] section key
Key name Mandatory Description
NAME Yes Specify the character string to be used for the application name displayed under Application button or in the sub menus of [Add Application] menu, using the key described in [LANG] section of Application language file (*).
The actually displayed application name is defined in Application language file.
* For details of Application language file, refer to "17.9.3.1.3".
Note) If this key is undefined, or if application name is unable to be retrieved from the app name key, neither application buttons nor sub menus of [Add Application] menu are displayed.
Setting range: Up to 32 characters
TYPE Yes Specify the type of MTB's app:
0: Fixed Home screen display
1: Full-screen display (NC Designer2 interpreter method/NC Designer2 compilation method)
2: Full-screen display (EXE file registration method)
ICONFILENAME No Specify the image file (*) to be used as an icon of Application button.
Use either an absolute or relative path to specify the image file name (e.g. custom_app1.jpg). For a relative path, specify a path relative to this definition file.
*Specify an image file with the size below:
- XGA: Up to 52 x 52 pixels
- VGA: Up to 40 x 40 pixels
*Available format is JPG.
Note) If you specify no file, or specified file is nonexistent, the icon of the execution file (MTB's app) defined in the EXECFILENAME key of [COMMON] section is used.
Setting range: Up to 128 characters including the path (*1)
PANEL_OFFSET Yes Unique offset value allocated to each screen of MTB's app. Specify the offset value defined in HMI configuration file (customdef.ini).
[Setting example]
17.9.4.1.3 Setting Application Language File (HomeScrn__.ini)
Refer to 17.9.3.1.3.
[COMMON] ; <- Define basic information of application.
NAME=LANG_APP_NAME ; <- Specify the application name.
ICONFILENAME=D:\Custom\ExtApp\custom_app.jpg
; <- Specify the image to be displayed on Application button.
TYPE=1 ; <- Specify the registration type
PANEL_OFFSET=6500 ; <- Specify 6500 to the offset number of the panel to be changed

17.9.4.2 Compilation Method
17.9.4.2.1 Setting Home Screen Config File (HomeScrnCustomConfig.ini)
Refer to 17.9.3.1.1.
17.9.4.2.2 Setting Application Definition File (HomeScrn_.ini)
Refer to 17.9.3.1.2.
17.9.4.2.3 Setting Application Language File (HomeScrn__.ini)
Refer to 17.9.3.1.3.
17.9.4.3 Caution
- In these methods, only Panel is called from Home screen.
Regarding changing from one Panel to another Panel and showing Windows, these methods support both.
- Panel size to be displayed is only available for full-screen display.

17.10 S/W Keyboard
17.10.1 Outline
Custom screen can display the following S/W keyboard window.
This function is adapted to M800/M80 (Windows-based display unit), M800/M80 (Windows-less display unit), and M700VS/M70V/E70.
This S/W keyboard window can be laid out on the left end, middle or right end of the screen. When the [ALLKEY] button is pressed, the keyboard is switched between the ten-key and ALL key display.
This section describes how to use the S/W keyboard window on custom screen.
<Ten-key keyboard> < ALL key keyboard>

17.10.2 Function Specifications
Defining the following items is required to use the S/W keyboard, as the S/W keyboard window has been created as a window of NC Designer2.
Monitor screen's offset No. 1000
S/W keyboard window's page No. 27
By specifying the screen No. as "1027", each of the S/W keyboard functions can be activated.
<Interpreter method>
Description Function name Function No. Setting
1 Open the S/W keyboard GCSCreateGWindow() - -
2 Close the S/W keyboard GCSCloseGWindow() - -
3 Set the S/W keyboard
display position GCSUser() 4193 0: Ten-key keyboard on the left end
1: Ten-key keyboard on the middle
2: Ten-key keyboard on the right end
3: ALL key keyboard on the left end
4: ALL key keyboard on the middle
5: ALL key keyboard on the right end
4 Set the status of entry
area (Enabled/Disabled/
Password entry)
GCSUser() 4189 0: Disabled
1: Enabled
2: Password entry
5 Get the status of entry area
(Enabled/Disabled/
Password entry)
GCSUser() 4194 Entry area's status
(0: Disabled 1: Enabled
2: Password entry)
6 Clear the entry area GCSUser() 4190 0 (fixed)
7 Set a character string to the
entry area
GCSUser() 4196 A character string to enter
8 Get a character string
from the entry area
GCSUser() 4197 A character string in the entry area of S/W
keyboard window
9 Display the S/W keyboard
in the foreground GCSUser() 4195 0 (fixed)
<Compilation method>
Description Function name Event message Setting
1 Open the S/W keyboard GCSCreateGWindow()
2 Close the S/W keyboard GCSDeleteChild()
3 Set the S/W keyboard
display position
GCSUser() USNX_CHANGESWK
EYPOS
0: Ten-key keyboard on the left end
1: Ten-key keyboard on the middle
2: Ten-key keyboard on the right end
3: ALL key keyboard on the left end
4: ALL key keyboard on the middle
5: ALL key keyboard on the right end
4 Set the status of entry
area (Enabled/Disabled/
Password entry)
GCSUser() USNX_SETSWKEYIN
PUTACTIVE
0: Disabled
1: Enabled
2: Password entry
5 Get the status of entry area
(Enabled/Disabled/
Password entry)
GCSUser() USNX_GETSWKEYIN
PUTACTIVE
Entry area's status
(0: Disabled 1: Enabled 2: Password entry)
6 Clear the entry area GCSUser() USNX_CLEARSWKEY
INPUTDATA
0 (fixed)
7 Set a character string to the
entry area

GCSUser() USNX_SETSWKEYIN
PUTDATA
A character string to enter
8 Get a character string
from the entry area
GCSUser() USNX_GETSWKEYIN
PUTDATA
A character string in the entry area of S/W
keyboard window
9 Display the S/W
keyboard in the foreground
GCSUser() USNX_MOVELASTWI
NDOW
0 (fixed)

17.10.3 Programming Method
17.10.3.1 Open S/W Keyboard Window
To open the S/W keyboard window, you need to set the entry area of the S/W keyboard window to either enabled, disabled or password mode. For how to set, refer to "17.10.3.4 Set the Status of Entry Area of S/W Keyboard Window". The default S/W keyboard is the ten-key type and is displayed on the left end. For how to set the keyboard, refer to "17.10.3.3.1 Set the initial display position of the S/W keyboard window".
Example
Interpreter Method
()
Display the S/W keyboard window when the button control (GButton00000) is pressed
(Set the entry area of the S/W keyboard window to disabled)

```
$GButton00000-OnClick
GMEM mem;
mem = GMEMCreate("TESTMEM", 4);
GMEMSetLong(mem, 0, 0);
GCSCreateGWindow (1027); Open the S/W keyboard window
GCSUser (1027, 4189, mem); Set the entry area to disabled
GMEMDelete(mem);
$End
```

Compilation Method
Display the S/W keyboard window using the GCSCreateGWindow function.

```
// Open the S/W keyboard window
long _lStatus = GCSCreateGWindow( GCSGetScreen(GetGBaseObject()),1027 );
if ( _lStatus == TRUE )
{
// Get the S/W keyboard window object
GBaseObject *_gpWindowObj = GCSGetWindow( (GCSGetScreen(GetGBaseObject())),
 (unsigned short)(1027 + 1) );
GBaseObject *_gpWinPanelObj = GCSGetPanel( _gpWindowObj );
// Set the S/W keyboard entry area to disabled
long _lStatus = 0;
GCSUser(_gpWinPanelObj, USNX_SETSWKEYINPUTACTIVE, (long)&_lStatus);
}
```


17.10.3.2 Close S/W Keyboard Window
Example
Interpreter Method
Close the S/W keyboard window when the button control (GButton00000) is pressed.

```
$GButton00000-OnClick
GCSCloseGWindow (1027); Close S/W keyboard window
$End
```

Compilation Method
Close the S/W keyboard window using the GCSDeleteChild function.

```
GBaseObject *_gcFrameObj;
_gcFrameObj = GCSGetFrame( GCSGetScreen(GetGBaseObject()) );
GBaseObject *_pFrmChild;
_pFrmChild = GCSGetChild( _gcFrameObj, (unsigned short)(1027 + 1) );
if (_pFrmChild != NULL)
{
// Close the S/W keyboard window
GCSDeleteChild( _gcFrameObj, _pFrmChild );
}
```


17.10.3.3 Set S/W Keyboard Position
17.10.3.3.1 Set the Initial Display Position of the S/W Keyboard Window
Example
Interpreter Method
Display the ten-key S/W keyboard window in the screen's middle when the button control (GButton00000) is pressed.

```
$GButton00000-OnClick
GMEM mem;
mem = GMEMCreate("TESTMEM", 4);
GMEMSetLong(mem, 0, 1);
GCSCreateGWindow (1027); Open the S/W keyboard window
GCSUser (1027, 4193, mem); Display the ten-key S/W keyboard window
in the screen's middle.
```

GCSUser (1027, 4189, 0); Set the entry area to disabled
GMEMDelete(mem);
$End
Compilation Method
When the GCSUser function (Function: USNX_CHANGESWKEYPOS) is used after the GCSCreateGWindow function, the S/W keyboard window can be opened at the specified display position.

```
// Open the S/W keyboard window
long _lStatus = GCSCreateGWindow( GCSGetScreen(GetGBaseObject()),1027 );
if ( _lStatus == TRUE )
{
// Get the S/W keyboard window object
GBaseObject *_gpWindowObj = GCSGetWindow( (GCSGetScreen(GetGBaseObject())),
 (unsigned short)(1027 + 1) );
GBaseObject *_gpWinPanelObj = GCSGetPanel( _gpWindowObj );
// Change the display position of the S/W keyboard
long _lStatus = 1;
GCSUser(_gpWinPanelObj, USNX_CHANGESWKEYPOS, (long)&_lStatus );
// Set the S/W keyboard entry area to disabled
long _lStatus2 = 0;
GCSUser(_gpWinPanelObj, USNX_SETSWKEYINPUTACTIVE, (long)&_lStatus2 );
}
```


17.10.3.3.2 Change the S/W Keyboard Window Position Arbitrarily While the Window Is Being Displayed

Example

Interpreter Method

Display the ten-key S/W keyboard window in the screen's middle when the button control (GButton00000) is pressed.

$GButton00000-OnClick
GMEM mem;
mem = GMEMCreate("TESTMEM", 4);
GMEMSetLong(mem, 0, 1);
GCSUser (1027, 4193, mem); Display the ten-key S/W keyboard window in the screen's middle
GMEMDelete(mem);
$End

Compilation Method

Change the display position of the S/W keyboard window using the GCSUser function (Function: USNX_CHANGESWKEYPOS).

```
// Get the S/W keyboard window object
GBaseObject *_gpWindowObj = GCSGetWindow( (GCSGetScreen(GetGBaseObject())),
(unsigned short)(1000 + 27 + 1) );
if( gpWindowObj != NULL )
{
GBaseObject *_gpWinPanelObj = GCSGetPanel( _gpWindowObj );
// Change the display position of the S/W keyboard
long _lStatus = 1;
GCSUser(_gpWinPanelObj, USNX_CHANGESWKEYPOS, (long)&_lStatus);
}
```


17.10.3.4 Set the Status of Entry Area of S/W Keyboard Window

The status of the entry area of the S/W keyboard window can be set to disabled, enabled or password mode.

Disabled : When a key is input from the S/W keyboard window, the key is passed to the control where the focus is located.

Enabled : When a key is input from the S/W keyboard window, the entered key is displayed in the entry area of the S/W keyboard window.

(Note) If you wish to display an entered key in the entry area of the S/W keyboard window, refer to "17.10.3.4.1 Display the entered characters on the entry area of S/W keyboard window".

Password display : When a key is entered from the S/W keyboard window, "*" is displayed in the entry area of the S/W keyboard window.

Example

Interpreter Method

Set the entry status of the S/W keyboard window to enabled when the button control (GButton00000) is pressed.

$GButton00000-OnClick
GMEM mem;
mem = GMEMCreate("TESTMEM", 4);
GMEMSetLong(mem, 0, 1);
GCSUser (1027, 4189, mem); Set the entry area to enabled
GMEMDelete(mem);
$End

Compilation Method

Set the status of the entry area of the S/W keyboard window using the GCSUser function (Function: USNX_ SETSWKEYINPUTACTIVE).

```
// Get the S/W keyboard window object
GBaseObject *_gpWindowObj = GCSGetWindow( (GCSGetScreen(GetGBaseObject())), (unsigned short)(1027 + 1) );
if( gpWindowObj != NULL )
{
GBaseObject *_gpWinPanelObj = GCSGetPanel( _gpWindowObj );
// Set the S/W keyboard entry area to enabled or disabled
long _lStatus = 1;
GCSUser( _ gpWinPanelObj, USNX_SETSWKEYINPUTACTIVE, (long)& _lStatus);
}
```

17.10.3.4.1 Display the Entered Characters on the Entry Area of S/W Keyboard Window
If the entry area of the S/W keyboard window is enabled, an entered key is not displayed in the entry area even when a key is entered from the S/W keyboard window.
However, by adding GCSKeyPress() to the OnKeyPress function of a control placed on a panel, a character string is displayed in the entry area of the S/W keyboard window.
Example
Interpreter Method

```
$GTextBox00000-OnKeyPress
GCSKeyPress(1027, LLPARAM, LUPARAM) Pass a key to the S/W keyboard window
endif
```

* Use the virtual key code (LLPARAM) and key state (LUPARAM) given to KeyPress as the arguments of the GCSKeyPress function.
Compilation Method

```
// Get the S/W keyboard window object
GBaseObject *_gpWindowObj = GCSGetWindow( (GCSGetScreen(GetGBaseObject())), (unsigned short)(1027 + 1) );
// If the S/W keyboard window object has been gotten (if the S/W keyboard window is displayed)
if(gpWindowObj != NULL)
{
GBaseObject *_gpWinPanelObj = GCSGetPanel( _gpWindowObj );
// Pass a key to the S/W keyboard window
GCSKeyPress ( _ gpWinPanelObj, lLParam, lUParam);
}
```


17.10.3.4.2 Process When the [INPUT] Key Is Pressed
If the entry area of the S/W keyboard window is enabled, a value in the entry area is not automatically set in the control placed on a panel even when the [INPUT] key on the keyboard window is pressed. To make this enabled, it is required to get the value using the OnKeyPress function of the control.
By adding the below process to a control placed on a panel, a value in the entry area of the S/W keyboard window can be set.
Example
Interpreter Method

```
$GTextBox00000-OnKeyPress
if(LLPARAM == 13)
GMEM mem;
STRING strStat;
mem = GMEMCreate("GETINPUT", 140);
GCSUser (1027, 4197, mem); Get a character string from the entry area
of the S/W keyboard window
strStat = GMEMGetString(mem,0);
GCSTextboxSetString(-1,"GTextBox00000",strStat);
GMEMSetLong(mem, 0, 0);
GCSUser (1027, 4190, mem); Clear the entry area of the S/W keyboard window
GMEMDelete(mem);
GCSChangeActiveFocus(-1,"GTextBox00000"); Move the focus to GTextBox00000
endif
$End
```

Compilation Method

```
if(lLParam == GK_RETURN)
{
char _szData[256];
memset( _szData, 0 , sizeof(_szData) );
// Get the S/W keyboard window object
GBaseObject *_gpWindowObj = GCSGetWindow( (GCSGetScreen(GetGBaseObject())),
(unsigned short)(1027 + 1) );
// If the S/W keyboard window object has been gotten (if the S/W keyboard window is displayed)
if(gpWindowObj != NULL)
{
GBaseObject *_gpWinPanelObj = GCSGetPanel( _gpWindowObj );
// Get a value from the entry area of the S/W keyboard
GCSUser( _ gpWinPanelObj, USNX_ USNX_GETSWKEYINPUTDATA, (long) _szData);
}
```


17.10.3.5 Get the Entry Area Status of S/W Keyboard Window
Example
Interpreter Method
Get the status of the entry area of the S/W keyboard window in Stat when the button control (GButton00000) is pressed.

```
$GButton00000-OnClick
LONG Stat;
GMEM mem;
mem = GMEMCreate("TESTMEM", 4);
GCSUser (1027, 4194, mem); Get the status of the entry area of the S/W keyboard window
Stat = GMEMGetLong(mem, 0);
GMEMDelete(mem);
$End
```

Compilation Method
Get the status of the entry area of the S/W keyboard window using the GCSUser function (Function: USNX_ GETSWKEYINPUTACTIVE).

```
// Get the S/W keyboard window object
```

```
GBaseObject *_gpWindowObj = GCSGetWindow( (GCSGetScreen(GetGBaseObject())), (unsigned short)(1027 + 1) );
if( gpWindowObj != NULL )
{
GBaseObject *_gpWinPanelObj = GCSGetPanel( _gpWindowObj );
Long _lStatus = 0;
// Get the status (enabled or disabled) of the S/W keyboard entry area
GCSUser( _ gpWinPanelObj, USNX_GETSWKEYINPUTACTIVE, (long)&_lStatus );
}
```


17.10.3.6 Clear S/W Keyboard Entry Area

Example

Interpreter Method

Clear the entry area of the S/W keyboard window when the button control (GButton00000) is pressed.

```
$GButton00000-OnClick
GMEM mem;
mem = GMEMCreate("TESTMEM", 4);
GMEMSetLong(mem, 0, 0);
GCSUser (1027, 4190, mem); Clear the entry area of the S/W keyboard window
GMEMDelete(mem);
$End
```

Compilation Method

Clear the entry area of the S/W keyboard window using the GCSUser function (Function: USNX_ CLEARSWKEYINPUTDATA).

```
// Get the S/W keyboard window object
GBaseObject *_gpWindowObj = GCSGetWindow( (GCSGetScreen(GetGBaseObject())),
(unsigned short)(1027 + 1) );
if( gpWindowObj != NULL )
{
GBaseObject *_gpWinPanelObj = GCSGetPanel( _gpWindowObj );
// Clear the entry area of the S/W keyboard
long _lStatus = 0;
GCSUser(_gpWinPanelObj, USNX_CLEARSWKEYINPUTDATA, (long)&_lStatus);
}
```


17.10.3.7 Set Character String in S/W Keyboard Entry Area

Example

Interpreter Method

Set a character string in the entry area of the S/W keyboard window when the button control (GButton00000) is pressed.

```
$GButton00000-OnClick
GMEM mem;
mem = GMEMCreate("TESTMEM", 70);
GMEMSetString(mem, 0, "abcdef");
GCSUser (1027, 4196, mem); Set a character string in the S/W keyboard window
mem = GMEMDelete("TESTMEM ");
GMEMDelete(mem);
$End
```

Compilation Method

Set a character string in the entry area of the S/W keyboard window using the GCSUser function (Function: USNX_ SETSWKEYINPUTDATA).

```
// Character string to be set
char _szData[256];
memset( _szData, 0 , sizeof(_szData) );
_szData = "ABCDE"
// Get the S/W keyboard window object
GBaseObject *_gpWindowObj = GCSGetWindow( (GCSGetScreen(GetGBaseObject())), (unsigned short)(1027 + 1) );
if(gpWindowObj != NULL)
{
GBaseObject *_gpWinPanelObj = GCSGetPanel( _gpWindowObj );
// Set a character string in the S/W keyboard entry area
GCSUser( _ gpWinPanelObj, USNX_SETSWKEYINPUTDATA, (long)_szData);
}
```


17.10.3.8 Get Character String from S/W Keyboard Entry Area

Example

Interpreter Method

Get a character string from the entry area of the S/W keyboard window when the button control (GButton00000) is pressed.

```
$GButton00000-OnClick
GMEM mem;
STRING Data;
mem = GMEMCreate("TESTMEM", 140);
GCSUser (1027, 4197, mem); Get a character string from the entry area of the S/W
keyboard window
Data = GMEMGetString( mem, 0);
GMEMDelete(mem);
$End
```

Compilation Method

Get a character string displayed on the entry area of the S/W keyboard window using the GCSUser (Function: USNX_ GETSWKEYINPUTDATA).

```
char _szData[256];
```

```
memset( _szData, 0 , sizeof(_szData) );
// Get the S/W keyboard window object
GBaseObject *_gpWindowObj = GCSGetWindow( (GCSGetScreen(GetGBaseObject())), (unsigned short)(1027 + 1) );
// If the S/W keyboard window object has been gotten (if the S/W keyboard window is displayed)
if(gpWindowObj != NULL)
{
GBaseObject *_gpWinPanelObj = GCSGetPanel( _gpWindowObj );
// Get a value from the entry area of the S/W keyboard
GCSUser( _ gpWinPanelObj, USNX_ USNX_GETSWKEYINPUTDATA, (long) _szData);
}
```


17.10.3.9 Display S/W Keyboard Window in the Foreground

If the display position of the S/W keyboard window is overlapped with that of the other window, the other window is displayed in the foreground when the other window is displayed or touched. In this case, the S/W keyboard window is displayed in the background of the other window. However, the S/W keyboard window is again displayed in the front by adding the following process.

Example

Interpreter Method

Display the S/W keyboard window in the foreground when the button control (GButton00000) is pressed

```
$GButton00000-OnClick
GMEM mem;
mem = GMEMCreate("TESTMEM", 4);
GMEMSetLong(mem, 0, 0);
GCSUser (1027, 4195, mem); Display the S/W keyboard window in the foreground
GMEMDelete(mem);
$End
```

Compilation Method

Display the S/W keyboard window in the foreground using the GCSUser function (Function: USNX_ MOVELASTWINDOW).

```
// Get the S/W keyboard window object
GBaseObject *_gpWindowObj = GCSGetWindow( (GCSGetScreen(GetGBaseObject())), (unsigned short)(1027 + 1) );
// If the S/W keyboard window object has been gotten (if the S/W keyboard window is displayed)
if(gpWindowObj != NULL)
{
GBaseObject *_gpWinPanelObj = GCSGetPanel( _gpWindowObj );
// Display S/W keyboard in the foreground when the keyboard is not displayed in the foreground
long _lStatus = 0;
GCSUser(_gpWinPanelObj, USNX_MOVELASTWINDOW, (long)&_lStatus);
}
```


17.10.4 Example

Screen Configuration

GTextBox00002

GTextBox00001

for key process

GButton00001 GButton00002

GTextBox00004

GTextBox00005

GButton00003

GTextBox00003

Panel Window S/W keyboard window

Action

(1) When GButton00001 on the panel is pressed, the S/W keyboard window is displayed.

(2) The S/W keyboard window is displayed always in the foreground.

(3) When GButton00002 on the panel is pressed, the window is displayed.

(4) When GButton00003 on the window is pressed, the window is closed.

(5) When a key is entered on the S/W keyboard window while the window is not displayed, the entered character is displayed on the entry areas of both GTextBox00002 and the S/W keyboard window.

(6) When the [INPUT] key is pressed while the window is not displayed, the character string in the entry area of the S/W keyboard window is displayed on GTextBox00003.

(7) When a key is entered on the S/W keyboard window while the window is displayed, the entered character is displayed on the entry areas of both GTextBox00004 and the S/W keyboard window.

(8) When the [INPUT] key is pressed while the window is displayed, the character string in the entry area of the S/W keyboard window is displayed on GTextBox00005.

Source Code

When a window is opened using F0 release, the focus moves to the window. When a key on the S/W keyboard window is touched, the focus moves to the S/W keyboard window, thus the key is not passed to the window.

To enter the key touched on the S/W keyboard window into a control on a window, create the TextBox control on a panel at first, on which a key process to a control on a window is carried out.

The focus should be on the TextBox control created on the panel when the window is displayed.

Get the key touched on the S/W keyboard window using the TextBox control for key process, and get the character string on the TextBox control using a control of window.

< Open the S/W keyboard window>

The control GButton00001 on a panel

When a key on the S/W keyboard window is touched, the entered character is displayed on GTextBox00002, so the focus moves to GTextBox00002.

```
$GButton00001-OnClick
GCSCreateGWindow(1027); Display the S/W keyboard window
GMEM mem;
```

```
mem = GMEMCreate("TESTMEM", 4);
GMEMSetLong(mem,0,0);
GCSUser(1027,4190,mem); Clear the entry area
GMEMSetLong(mem,0,1);
GCSUser(1027,4189,mem); Set the entry area status to enabled
GMEMDelete(mem);
GCSChangeActiveFocus(-1,"GTextBox00002"); Move the focus to GTextBox00002
$End
```

<Display S/W keyboard in the foreground>

When a window is touched while the S/W keyboard window is being displayed, the focus moves to the touched control, so the window is displayed in the foreground of the S/W keyboard window. Therefore, display the S/W keyboard window in the forefront when the focus moves to each control of window.

```
$GTextBox00005-OnSetFocus
GMEM mem;
mem = GMEMCreate("TESTMEM", 4);
GMEMSetLong(mem,0,0);
GCSUser(1027,4195,mem); Display the S/W keyboard window in the foreground
GMEMDelete(mem);
$End
$GTextBox00004-OnSetFocus
GMEM mem;
mem = GMEMCreate("TESTMEM", 4);
GMEMSetLong(mem,0,0);
GCSUser(1027,4195,mem); Display the S/W keyboard window in the foreground
GMEMDelete(mem);
$End
```


<Open a window>

The control GButton00002 on a panel

When a window is opened, the opened window is displayed in the foreground. Therefore, display the S/W keyboard window again in the foreground.

Move the focus to the TextBox control for key process.

```
$GButton00002-OnClick
GCSCreateGWindow(1);
GMEM mem;
mem = GMEMCreate("TESTMEM", 4);
GMEMSetLong(mem,0,0);
GCSUser(1027,4195,mem); Display the S/W keyboard window in the foreground
GCSUser(1027,4190,mem); Clear the entry area
GMEMDelete(mem);
GCSChangeActiveFocus(-1,"GTextBox00001"); Move the focus to GTextBox00001
$End
```

<Close a window>

GButton00003 control on a window

After the window has been closed, the focus is moved to GTextBox00002.

```
$GButton00003-OnClick
GCSCloseGWindow(1);
GCSChangeActiveFocus(0,"GTextBox00002"); Move the focus to GTextBox00002
$End
```

<Key process to a control on a panel>

When the [INPUT] key is pressed, a value in the entry area of the S/W keyboard window is set in the GTextBox00003 control on a window.

The entered key is displayed on the entry area of the S/W keyboard window, thus the key is passed to the S/W keyboard window using GCSKeyPress.

```
$GTextBox00002-OnKeyPress
if(LLPARAM == 13)
STRING strStat;
GMEM mem;
mem = GMEMCreate("TESTMEM", 140);
GCSUser(1027, 4197, mem); Get the character string from the entry area
strStat = GMEMGetString(mem, 0);
GCSTextboxSetString(-1,"GTextBox00003",strStat); Set a character string in
GTextBox00003
 GMEMDelete(mem);
endif;
 GCSKeyPress(1027,LLPARAM, LUPARAM); Pass a key to the S/W keyboard window
$End
```


<Enter a key in a window>

The control GTextBox00001 on a panel (for key process)

A process to be carried out when a key is input to GTextBox00004 is added to the TextBox control for key process.

When the [INPUT] key is pressed, a value in the entry area of the S/W keyboard window is set in the GTextBox00005 control on a window.

In order to display the entered key on the entry area of the S/W keyboard window, the key is passed to the S/W keyboard window using GCSKeyPress.

```
$GTextBox00001-OnKeyPress
if(LLPARAM == 13)
 STRING strStat;
 GMEM mem;
 mem = GMEMCreate("TESTMEM", 140);
 GCSUser(1027, 4197, mem); Get the character string from the entry area
 strStat = GMEMGetString(mem, 0);
```

GCSTextboxSetString(1,"GTextBox00005",strStat); Set a character string
in GTextBox00005
GMEMDelete(mem);
endif;
GCSKeyPress(1027,LLPARAM, LUPARAM); Pass a key to the S/W keyboard window
$End
The control TextBox00004 on a window
Get an entered character string from the TextBox control for key process by use of Timer of
TextBox00004.
After getting the character string, move the focus back to the TextBox control for key process.
$GTextBox00004-OnTimer
STRING strStat;
GCSTextboxGetString(0,"GTextBox00001",strStat); Get a character string
to GTextBox00001
GCSTextboxSetString(-1,"GTextBox00004",strStat); Set a character string
to GTextBox00004
GCSChangeActiveFocus(0,"GTextBox00001"); Move the focus to GTextBox00001
$End

Appendix
Reference items for the operation of NC Designer2 are described here. Refer to the description
given here when necessary.
Appendix 1. Error Message List
The error messages displayed with NC Designer2 and remedies are described below.
(A to Z)
Message Cause and remedy
A A caption character sequence
does not exist.
This message is displayed if the selected NC Trainer2 plus
project is not present because it has been moved or changed.
Select another project.
An unavailable character string
(\t) is included.
This message is displayed when the ENTER key is pressed after
inputting the character string \t while inputting the property
"Character sequence".
Input the characters other than the character string (\t).
An invalid character is in a
locale name. Please set up an
effective character.
This message is displayed if a wrong character is designated
during registration of the locale.
Use letters, numbers or underscores (_) for the locale name.
An invalid character is included. This message is displayed if any invalid character is included in
the screen number which is reselected with each function key.
Application name is limited to 45
single-byte characters or less.
This message is displayed if two-byte characters or symbols are
specified for "Application name displayed in "HMI integrated
installer".
Specify the name within 45 single-byte alphanumeric characters.
As for Panel/Window
information, other users are
performing read-out or
preservation. Please perform
again after waiting for a while.
This message is displayed if a file has been opened by another
user when you read or write the file. (Note)
As for project common
information, other users are
performing read-out or
preservation. Please perform
again after waiting for a while.
This message is displayed if a file has been opened by another
user when you read or write the file. (Note)
C Can not create a frame inside a
frame.
This message is displayed if a view frame is created inside
another view frame. Arrange controls and figures in the view
frame.
Can not create any more
frames.
This message is displayed if 10 or more view frames are created
in a page. Contain within 10 view frames.
Can not create any more new
screens.
This message is displayed if a new page is created beyond the
maximum number of pages at [File] - [New Panel] / [New
Window].
Delete unnecessary pages.
Can not create any more
screens.
This message is displayed if a new page is created beyond the
maximum number of pages at [Tools] - [Screen Maintenance].
Delete unnecessary pages.
Can not delete any more nodes. This message is displayed if the number of vertices of connected

lines or a polygon is "3" or fewer at [Layout] - [Modify] - [Delete
Node].
Can not open any more
screens. Close other screen to
open new screen.
This message is displayed if a new page is opened beyond the
number of simultaneously edited pages permitted to NC
Designer2. The number of pages that can be edited
simultaneously is 16 or fewer. Close unnecessary pages.
Character string is not set. The message is displayed if no search string is specified at [Edit] -
[Find]. Specify the desired search string in the "Find What" field of
the [Find] dialog box.

Message Cause and remedy
C Copy cannot be executed
because Axis No. exceeds the
limit.
This message is displayed when creating a control with number of
axis specified beyond the range.
Set the number of axis from 0 to 32.
Copy cannot be executed
because Device No. exceeds
the limit.
This message is displayed when creating a control with number of
device specified beyond the range.
Set the device number within the range.
Copy cannot be executed
because Object extends out of
the view area.
This message is displayed when a control outside the screen
range (width: 2560, height: 1920) is being created.
Adjust the all objects after copy, margin, and copy direction
settings in the [Continuous copy] dialog box.
Copy cannot be executed
because Part system No.
exceeds the limit.
This message is displayed when creating a control with number of
systems specified beyond the range.
Set the part system number from 1 to 10.
Copy cannot be executed
because Section No. exceeds
the limit.
This message is displayed when creating a control with number of
section specified beyond the range.
Set the number of section from 0 to 999.
Copy cannot be executed
because Sub-section No.
exceeds the limit.
This message is displayed when creating a control with number of
sub-section specified beyond the range.
Set the number of sub-section from 0 to 1000000000.
Copy cannot be executed
because the total number of
objects exceeds the limit.
This message is displayed if the object is created beyond the
maximum number of objects that can be created in a single page
(incl. that in view frame).
Delete unnecessary objects.
Copy cannot be executed
because the number of objects
exceeds the limit.
This message is displayed if the object is created beyond the
maximum number of objects that can be created in a single page
of the page (excl. that in view frame)/view frame
Delete unnecessary objects.
Custom Data name is illegal. This message is displayed if the custom data name (.GIP) is
illegal.
Specify the custom data name again.
D Data is not specified to the
setting file. Set the data in the
environment setup dialog on the
custom screen.
This message is displayed if the custom screen number to
display is not specified when pressing the [Memory Card Write]
button in Transfer to Memory Card dialog.
Specify the screen number to the [F0 release] or [Menu release]
menu in the Custom screen configuration dialog.
Designated custom data of
compilation method (*.dill or *.o
file) does not exist. Check the
setting of custom data.
This message is displayed if the custom data (*.dill or *.o file)
designated as the data to write does not exist.
Check the setting of custom data again.
Do you want to quit without
saving the property?

This message is displayed when the cancel button is pressed on
the property dialog.
When the OK button is pressed, the data specified in the property
dialog is not reflected on the property sheet.
E End page No. is out of range.
Set a number from 0 to 255.
This message is displayed if the last page No. is specified beyond
the range when setting the screen range of a process at [Tools] -
[Functional Object List] or the like.
Specify the screen page number in the range between 0 and 255.
End page No. is smaller than
the start page No.
This message is displayed if the first page number is larger than
the last page No. when setting the screen range of a process at
[Tools] - [Functional Object List] or the like.
Specify a number smaller than the last page number.
Error was found in row of
column in the file to be
imported.
 in the message indicates the row number (including the
comment in the first row), and in the message indicates the
column title of the control list.
This message is displayed if a description contains at least one
different page, ID, inside frame, or type when importing a file
using the control list.
Check the import file (CSV file) contents.

Message Cause and remedy
F Failed to do this operation
because you are not authorized
to edit all of the files in this
project.
Make sure if there are any other
peoples editing these files now.
The general editing right is necessary to execute [Save Project],
[Save Project As], [Screen Maintenance] and [Source Code
Generation] functions. This message is displayed if acquisition of
the general right fails. (Note)
Failed to export project. This message is displayed if exporting of the project has failed.
Check the export destination and retry export.
Failed to export project.
Resource data size has
exceeded the upper limit.
The resource data exceeded the upper limit (5 Mbytes). Reduce
the registered resource data.
Failed to write. This message is displayed if writing to the memory has failed.
Execute write to the memory again.
File access failed.
The following causes are
presumed.
1. The destination file or folder
is read-only.
2. The destination file or folder
is under editing.
3. The available disk space is
not enough.
This message is displayed if file access has failed due to any of
the three causes on the left.
Check the state of the write destination drive, folder and file
before executing write to the memory.
File not found. Check the file
name and try again.
This message is displayed when a file with an extension other
than the designated extension is specified in the file name of the
[Open file] dialog box, and the [Open] button is clicked.
Specify a file name with the designated extension.
I I don't agree with the screen
size of this project about the
model of selected NC Trainer2
plus project. Select project of
the model about which the
screen size agrees with 15 type.
This message is displayed if the model of selected project does
not support the 15-type display.
Select a project of the model which supports the 15-type (M830,
M80 TypeA, M80 TypeB, or M730V).
If you don't save the project
data, functional object property
may break because the project
data contains resource data. Do
you want to continue?
This message is displayed if the project is terminated without
saving the project data after resource data is changed. Execute
[File] - [Save Project], [Save Project As] or [Save All] before
terminating the project.
It is not a numerical value. This message is displayed if other than a value is entered in the

value entry area.
Enter an integer within the permissible range in the area.
L Leave at least one file resource. This message is displayed when all of the file resources are
checked in the [Resource management] dialog box.
Remove 1 or more checks of the file resources.
Leave at least one font
resource.
This message is displayed when all of the font resources are
checked in the [Resource management] dialog box.
Remove 1 or more checks of the font resources.
Leave at least one image
resource.
This message is displayed when all of the image resources are
checked in the [Resource management] dialog box.
Remove 1 or more checks of the image resources.
Leave at least two solid frame
resources.
This message is displayed when all of the solid frame resources
are checked, or when only one solid frame resource is unchecked
in the [Resource management] dialog box.
Remove 2 or more checks of the solid frame resources.
M Memory for undoing/redoing
operation is insufficient.
Increase the free memory by
closing other screens or exiting
other applications etc.
This message is displayed upon memory shortage.
Close other screens or terminate other applications to increase
the free memory, then execute again.
Memory is insufficient. Increase
the free memory by closing
other screens or exiting other
applications etc.
This message is displayed upon memory shortage during source
code generation. Close unnecessary applications or take other
measures to increase the memory and execute source code
generation again.

Message Cause and remedy
M Menu name is limited to
single-byte characters or less.
This message is displayed if the character string set to the menu
name of [Custom screen configuration] dialog box exceeds the
number of characters.
Set the character string within the setting range.
Menu outline is limited to 70
single-byte characters.
This message is displayed if the menu outline is specified with 71
single-byte characters or more.
Specify the outline with up to 70 single-byte characters.
N NC Trainer2 plus is using.
Please select NC Trainer2 plus
project again after waiting for a
while.
This message is displayed while NC Trainer2 plus is in operation.
Execute the simulation again after waiting for a while.
No items are selected. This message is displayed if no check item is specified at [Tools]
- [Error Check].
Select at least one check item and operate again.
O Other project exists in this
directory. Can not create new
one.
This message is displayed if an existing project is designated at
[File] - [New Project].
Designate another project name.
P Please set an alphabetic
character (a-z, A-Z) to the head
of a locale name.
This message is displayed if a wrong character is used during
registration of the locale.
Specify a one-byte letter (A to Z or a to z) at the top of the locale
name.
R Reading of a file went wrong
during import.
The message is displayed if file reading fails during importation of
pages.
Make sure the project at the import source can be correctly
opened.
Reading of a file went wrong
during import. Processing is
interrupted.
The message is displayed if the network is shut off during
importation of a character string resource from a network file.
Restore network connection and import the character string
resource again.
Reading of a file went wrong.

The cause below can be
considered. 1. The specified file
is editing. 2. Network area was
specified to be a reading place
and the network connection was
cut.
This message is displayed if file reading fails during export of a
character string resource or import of pages.
Refer to the message and remove the cause, then export the
character string resource again, or import the pages.
Reselected screen No. is limited
to 64 single-byte characters.
This message is displayed if the screen number which is
reselected with each function key is specified 65 single-byte
characters or more.
Specify the number with up to 64 single-byte characters.
Resource data size has
exceeded the upper limit.
The current upper limit:
5.00Mbyte
Total data size :Mbyte
(Resource data size :Mbyte)
This message is displayed if the resource data exceeded the
upper limit when selecting the interpreter method for the data to
write and pressing the [Memory Card Write] button.
Reduce the registered resources.
S Select the folder for writing. This message is displayed if the folder path is not specified when
selecting [Folder] for the destination.
Press the [Browse] button to designate the destination folder.
Since other users are
performing the page
maintenance, source code
generation cannot be
performed.
Please perform again after
waiting for a while.
This message is displayed if screen maintenance is performed by
another user when you execute the source code generation.
(Note)
NC Designer2 Instruction Manual
Appendix
644 IB-1501250-J
Message Cause and remedy
S Start page No. is out of range.
Set a number from 0 to 255.
This message is displayed if the starting page No. is specified
beyond the range when setting the screen range of a process at
[Tools] - [Functional Object List] or the like.
Specify the screen page number in the range from 0 to 255.
T The available disk space is not
enough.
This message is displayed if available disk space of the
designated drive to write is not enough.
Change the drive to write or delete other files.
The following character cannot
be used for a file name.
\n\V:;*?"<>|
This message is displayed if a wrong character is designated in
the [File Name] at the [Import of a Character Sequence
Resource] dialog box. Designate allowable characters for the file
name.
The following character cannot
be used for a folder name.
\n/:,;*?"<>|
This message is displayed if a wrong character is designated in
the [Folder] at the [Import of a Character Sequence Resource]
dialog box. Designate allowable characters for the folder name.
The input resource data name is
already used.
This message is displayed if the registered resource name is
already used.
Designate another resource data name.
The model of selected NC
Trainer2 plus project is different.
In order to simulate, select NC
Trainer2 plus project of the
same model as this project.
This message is displayed if the model setting is different
between the selected NC Trainer2 plus project and the NC
Designer2 project being edited.
Select the NC Trainer2 plus project of the same model setting as
the NC Designer2 project.
The number of characters of a
folder and a file is to sum
total %d character.
Contain the sum of the folder name and file name characters
within 200 at the [Export of a Character Sequence Resource]
dialog box.

The numerical range is from
XXX to XXX.
This message is displayed if an excessive value is entered or the
field is left blank at a value entry area.
Enter an integer within the permissible range in the area.
The project already exists.
Choose another project name
please.
This message is displayed if an existing project is designated at
[File] - [New Project].
Designate another project name.
The project which is going to
open cannot be read because of
the project edited by NC
Designer2 of a version newer
than NC Designer2 under
execution.
Use NC Designer2 of the version used to create the project.
The registered resources have
exceeded the maximum limit of
5000. Change the import
settings.
This message is displayed if the resource is created beyond the
maximum number of resources that can be registered in one
project.
Delete unnecessary resources.
The setting range of X
coordinate is between 0 and
2559 and Y coordinate is
between 0 and 1919.
This message is displayed if the X coordinate or the Y coordinate
is located out side of the setting range when setting the start
position of the cursor. Set the coordinates within the setting
range.
The specified file name is
unusual.
This message is displayed if there is no drive specification for the
folder specified at the [New Project Wizard] or [Import of a
Character Sequence Resource] dialog box.
Designate the folder together with the full path or, to designate a
network folder, designate the drive, too.
The specified locale name is
already used.
This message is displayed if the registered locale has been
registered.
Specify an unused locale name.
The specified resource data
name already exists. Please
enter a unique resource data
name.
The multiple resource data under the same name can not exist in
one project.
Enter the resource data name which does not overlap with the
other names.
The specified title already
exists. Please enter a unique
title.
The multiple titles under the same name can not exist in one
project.
Enter the resource data name which does not overlap with the
other names.

Message Cause and remedy
T The writing of a file went wrong.
The following causes can be
considered.
1. The specified file is read-only
2. The free memory of a disk is
insufficient.
3. Network area was specified
to be a writing place and the
network connection was cut.
This message is displayed if file writing fails during exportation of
a character string resource.
Refer to the message and remove the cause, then export the
character string resource again.
The writing of a property went
wrong.
The message is displayed if file reading fails during import of
pages.
Make sure the file at the import destination is writable.
The X coordinate is not set. This message is displayed if the X coordinate has not been set
when designating the display start position of the control in which
the sub cursor will be displayed. Set the X coordinate.
The Y coordinate is not set. This message is displayed if the Y coordinate has not been set
when designating the display start position of the control in which

the sub cursor will be displayed. Set the Y coordinate.
U Up to 50 menu items can be set
on the screen.
This message is displayed if 51 or more menus are registered on
[Menu Release] of [Custom screen configuration] dialog box.
Adjust the number of menus to register the screen No.
(Note) If you are not authorized to edit files in a project when you open a project again after NC Designer2 is
forced to quit unexpectedly during editing a project, please close NC Designer2 once, make sure that no
other users are editing the project and delete ".g2loc" and ".g2edt" files.

Appendix 2. Shortcut Key List
The shortcut keys that can be used with NC Designer2 are shown below.
Menu Function Shortcut key
File New Panel Ctrl + N
Open Panel/Window Ctrl + O
New Window Ctrl + Shift + N
Save Panel/Window Ctrl + S
Edit Undo Ctrl + Z
Redo Ctrl + Y
Cut Ctrl + X
Copy Ctrl + C
Paste Ctrl + V
Delete Delete
Find Ctrl + F
Edit of a caption Space (for control selection only)
All Objects Ctrl + A
Same Object Type Ctrl + D (for control/ figure selection only)
View Previous Page Shift + PageUp
Next Page Shift + PageDown
Previous Frame Page PageUp (for frame selection only)
Next Frame Page PageDown (for frame selection only)
Refresh F9
Layout Up (for control selection only)
Down (for control selection only)
Left (for control selection only)
Right (for control selection only)
Group Ctrl + G (for selection of multiple controls only)
Ungroup Ctrl + U(for group selection only)
Tools Error check Ctrl + E
Functional Object List Ctrl + L
Test Ctrl + T

Appendix 3. About NC Designer2
The version of NC Designer2 is displayed.
1. Select [About NC Designer2] from the [Help] menu.
2. The [About NC Designer2] dialog box is displayed.
Click on the [OK] button to close the dialog box.

Appendix 4. Pattern List
Appendix 4.1 Filling Pattern List
The standard version of NC Designer2 supports the following 38 filling patterns.
No.0
No.1
No.2
No.3
No.4
No.5
No.6
No.7
No.8
No.9
No.10
No.11
No.12
No.13
No.14
No.15
No.16
No.17
No.18
No.19
No.20
No.21
No.22
No.23
No.24
No.25
No.26
No.27
No.28
No.29
No.30

No.31
No.32
No.33
No.34
No.35
No.36
No.37
Appendix 4.2 Line Pattern List
The standard version of NC Designer2 supports the following 9 line patterns.
No.0
No.1
No.2
No.3
No.4
No.5
No.6
No.7
No.8

Appendix 5. Default Palette Color
The standard version of NC Designer2 supports the following palette.
Color No. RGB Color No. RGB Color No. RGB Color No. RGB
0 (0,0,0) 32 (44,0,0) 64 (0,0,44) 96 (86,255,44)
1 (0,0,128) 33 (86,0,0) 65 (44,0,44) 97 (135,255,44)
2 (0,128,0) 34 (135,0,0) 66 (86,0,44) 98 (192,255,44)
3 (0,128,128) 35 (192,0,0) 67 (135,0,44) 99 (255,255,44)
4 (128,0,0) 36 (0,44,0) 68 (192,0,44) 100 (0,0,86)
5 (128,0,128) 37 (44,44,0) 69 (255,0,44) 101 (44,0,86)
6 (128,128,0) 38 (86,44,0) 70 (0,44,44) 102 (86,0,86)
7 (192,192,192) 39 (135,44,0) 71 (44,44,44) 103 (135,0,86)
8 (128,128,128) 40 (192,44,0) 72 (86,44,44) 104 (192,0,86)
9 (0,0,255) 41 (255,44,0) 73 (135,44,44) 105 (255,0,86)
10 (0,255,0) 42 (0,86,0) 74 (192,44,44) 106 (0,44,86)
11 (0,255,255) 43 (44,86,0) 75 (255,44,44) 107 (44,44,86)
12 (255,0,0) 44 (86,86,0) 76 (0,86,44) 108 (86,44,86)
13 (255,0,255) 45 (135,86,0) 77 (44,86,44) 109 (135,44,86)
14 (255,255,0) 46 (192,86,0) 78 (86,86,44) 110 (192,44,86)
15 (255,255,255) 47 (255,86,0) 79 (135,86,44) 111 (255,44,86)
16 (192,220,192) 48 (0,135,0) 80 (192,86,44) 112 (0,86,86)
17 (166,202,240) 49 (44,135,0) 81 (255,86,44) 113 (44,86,86)
18 (255,251,240) 50 (86,135,0) 82 (0,135,44) 114 (86,86,86)
19 (160,160,164) 51 (135,135,0) 83 (44,135,44) 115 (135,86,86)
20 (32,192,192) 52 (192,135,0) 84 (86,135,44) 116 (192,86,86)
21 (64,192,192) 53 (255,135,0) 85 (135,135,44) 117 (255,86,86)
22 (96,192,192) 54 (0,192,0) 86 (192,135,44) 118 (0,135,86)
23 (128,192,192) 55 (44,192,0) 87 (255,135,44) 119 (44,135,86)
24 (192,32,192) 56 (86,192,0) 88 (0,192,44) 120 (86,135,86)
25 (192,64,192) 57 (135,192,0) 89 (44,192,44) 121 (135,135,86)
26 (192,96,192) 58 (192,192,0) 90 (86,192,44) 122 (192,135,86)
27 (192,128,192) 59 (255,192,0) 91 (135,192,44) 123 (255,135,86)
28 (192,192,32) 60 (44,255,0) 92 (192,192,44) 124 (0,192,86)
29 (192,192,64) 61 (86,255,0) 93 (255,192,44) 125 (44,192,86)
30 (192,192,96) 62 (135,255,0) 94 (0,255,44) 126 (86,192,86)
31 (192,192,128) 63 (192,255,0) 95 (44,255,44) 127 (135,192,86)

Color No. RGB Color No. RGB Color No. RGB Color No. RGB
128 (192,192,86) 160 (0,192,135) 192 (86,135,192) 224 (44,135,255)
129 (255,192,86) 161 (44,192,135) 193 (135,135,192) 225 (86,135,255)
130 (0,255,86) 162 (86,192,135) 194 (192,135,192) 226 (135,135,255)
131 (44,255,86) 163 (135,192,135) 195 (255,135,192) 227 (192,135,255)
132 (86,255,86) 164 (192,192,135) 196 (0,192,192) 228 (255,135,255)
133 (135,255,86) 165 (255,192,135) 197 (44,192,192) 229 (0,192,255)
134 (192,255,86) 166 (0,255,135) 198 (86,192,192) 230 (44,192,255)
135 (255,255,86) 167 (44,255,135) 199 (135,192,192) 231 (86,192,255)
136 (0,0,135) 168 (86,255,135) 200 (255,192,192) 232 (135,192,255)
137 (44,0,135) 169 (135,255,135) 201 (0,255,192) 233 (192,192,255)
138 (86,0,135) 170 (192,255,135) 202 (44,255,192) 234 (255,192,255)
139 (135,0,135) 171 (255,255,135) 203 (86,255,192) 235 (44,255,255)
140 (192,0,135) 172 (0,0,192) 204 (135,255,192) 236 (86,255,255)
141 (255,0,135) 173 (44,0,192) 205 (192,255,192) 237 (135,255,255)
142 (0,44,135) 174 (86,0,192) 206 (255,255,192) 238 (192,255,255)
143 (44,44,135) 175 (135,0,192) 207 (44,0,255) 239 (24,24,24)
144 (86,44,135) 176 (192,0,192) 208 (86,0,255) 240 (37,37,37)
145 (135,44,135) 177 (255,0,192) 209 (135,0,255) 241 (52,52,52)
146 (192,44,135) 178 (0,44,192) 210 (192,0,255) 242 (68,68,68)
147 (255,44,135) 179 (44,44,192) 211 (0,44,255) 243 (77,77,77)
148 (0,86,135) 180 (86,44,192) 212 (44,44,255) 244 (95,95,95)
149 (44,86,135) 181 (135,44,192) 213 (86,44,255) 245 (105,105,105)
150 (86,86,135) 182 (192,44,192) 214 (135,44,255) 246 (114,114,114)
151 (135,86,135) 183 (255,44,192) 215 (192,44,255) 247 (125,125,125)
152 (192,86,135) 184 (0,86,192) 216 (255,44,255) 248 (146,146,146)
153 (255,86,135) 185 (44,86,192) 217 (0,86,255) 249 (157,157,157)
154 (0,135,135) 186 (86,86,192) 218 (44,86,255) 250 (168,168,168)
155 (44,135,135) 187 (135,86,192) 219 (86,86,255) 251 (180,180,180)

156 (86,135,135) 188 (192,86,192) 220 (135,86,255) 252 (204,204,204)
157 (135,135,135) 189 (255,86,192) 221 (192,86,255) 253 (216,216,216)
158 (192,135,135) 190 (0,135,192) 222 (255,86,255) 254 (229,229,229)
159 (255,135,135) 191 (44,135,192) 223 (0,135,255) 255 (242,242,242)

Appendix 6. Data Type Definitions
The definitions for various structure data types are given below.

```
#define GColor long /* color variable */
#define HGFONT GFontHandle* /* 2 font handle */
#define HGDRAW GDraw* /* drawing handle */
/*****************************************************************************
 * Rectangle structure
*****************************************************************************/
typedef struct _GRect{
short nXmin; /* upper left X coordinate */
short nYmin; /* upper left Y coordinate */
short nXmax; /* lower right X coordinate */
short nYmax; /* lower right Y coordinate */
}GRect;
/*****************************************************************************
* Point structure
*****************************************************************************/
typedef struct _GPoint{
short nX; /* X coordinate */
short nY; /* Y coordinate */
}GPoint;
/*****************************************************************************
* Line structure
*****************************************************************************/
typedef struct _GLine{
short nX1; /* X coordinate for starting point */
short nY1; /* Y coordinate for starting point */
short nX2; /* X coordinate for ending point */
short nY2; /* Y coordinate for ending point */
}GLine;
/*****************************************************************************
* Polygon structure
*****************************************************************************/
typedef struct _GPoly{
short nNumPoints; /* number of vertices */
GPoint *pgptPoints; /* pointer to vertex data */
GRect grBounds; /* outline rectangle */
}GPoly;
/*****************************************************************************
* Brush structure
*****************************************************************************/
typedef struct _GBrush{
short nFillPattern; /* fill pattern */
GColor gcForeColor; /* fill foreground color */
GColor gcBackColor; /* fill background color */
}GBrush;
/*****************************************************************************
* Border structure
*****************************************************************************/
typedef struct _GBorder{
unsigned char fBorder; /* 3D border present or absent */
GColor gcULColor; /* upper left border color */
GColor gcLRColor; /* lower right border color */
GColor gcLineColor; /* line color */
short nSize; /* 3D border size */
}GBorder;
```



```
/*****************************************************************************
* Caption structure
*****************************************************************************/
typedef struct _GCaption{
GColor gcColor; /* caption character color */
unsigned char ucHPosition; /* horizontal display position */
unsigned char ucVPosition; /* vertical display position */
short nLeftMargin; /* left margin */
short nRightMargin; /* right margin */
short nTopMargin; /* top margin */
short nBottomMargin; /* bottom margin */
}GCaption;
/*****************************************************************************
* Cursor structure
*****************************************************************************/
typedef struct _GCursor{
unsigned char ucType; /* cursor type */
GColor gcColor; /* cursor color */
}GCursor;
/*****************************************************************************
* Font structure
*****************************************************************************/
```

```
typedef struct _GFontSize{
short nAscent; /* height from baseline to top line */
short nDscent; /* height from baseline to bottom line */
unsigned short usWidth; /* basic character width */
unsigned short usHeight; /* character height */
unsigned short usMaxWidth; /* maximum character width */
}GFontSize;
```



```
/*****************************************************************************
* Simple font structure
*****************************************************************************/
typedef struct _GSimpleFont{
GTCHAR szFontName[MAX_FONTNAME_LEN+1]; /* font name */
unsigned char ucSize; /* font size */
unsigned char gptXScale; /* horizontal scale */
unsigned char gptYScale; /* vertical scale */
unsigned char ucWeight; /* thickness */
unsigned char ucStyle; /* shape */
}GSimpleFont;
typedef struct _GFont{
short nID; /* font ID */
GTCHAR szFontName[MAX_FONTNAME_LEN+1]; /* font name */
unsigned short usCharacterSet; /* character code */
short nFontSizeCount; /* number of font sizes */
GFontSize *gfsSize; /* pointer to font size array */
short nFixedWidth; /* fixed width font information */
long lFontSupport; /* forms supported by the font (italics, bold, etc.) */
}GFont;
typedef struct _GFontAttribute{
unsigned short usWidth; /* character width */
unsigned short usHeight; /* character height */
unsigned short usWeight; /* character thickness */
unsigned short usItalic; /* character italics */
unsigned short usOutline; /* character border */
void *pData; /* additional information */
unsigned char ucXScale; /* horizontal scale */
unsigned char ucYScale; /* vertical scale */
}GFontAttribute;
typedef struct _GFontPattern{
GTCHAR *pcChar; /* pointer to character data */
GTCHAR *pcNextChar; /* pointer to next character data */
short nWidth; /* width */
short nHeight; /* height */
short nBpp; /* number of dots per pixel */
char *pcPattern; /* pointer to pattern */
short nGetSize; /* get size flag */
}GFontPattern;
typedef struct _GFontHandle{
short nID; /* font ID */
short nAttributeType; /* use either pgfaAttribute or */
 /* pnAttributeArray as attribute */
GFontAttribute *pgfaAttribute; /* font attribute */
short *pnAttributeArray; /* font attribute (array) */
}GFontHandle;
```



```
/*****************************************************************************
* Image data structure
*****************************************************************************/
typedef struct _GRFHeader{
short nType; /* image type */
short nWidth; /* width */
short nHeight; /* height */
short nBpp; /* number of bits per pixel */
long lSize; /* data size */
unsigned char *pData; /* pointer to real data */
}GRFHeader;
typedef struct _GRFHeaderDIB{
short nType; /* image type */
short nWidth; /* width */
short nHeight; /* height */
short nBpp; /* number of bits per pixel */
long lSize; /* data size */
unsigned char *pData; /* pointer to real data */
unsigned char *pPalette; /* pointer to palette data */
}GRFHeaderDIB;
/* image structure */
typedef struct _GImage{
GRFHeader *pImage; /* pointer to image data structure */
}GImage;
/*****************************************************************************
* System time structure
*****************************************************************************/
typedef struct _GSystemTime{
unsigned long ulLTime; /* lower-side 32 bits for system time */
```

```
unsigned long ulUTime; /* upper-side 32 bits for system time */
}GSystemTime;
```

```
/*****************************************************************************
* Drawing environment structure
*****************************************************************************/
/* GDraw structure */
typedef struct _GDraw{
GRect grLocalRect; /* physical coordinate area */
GPoint gptLocalOrigin; /* position of origin on physical coordinates */
GRect grVirtualRect; /* virtual coordinate area */
GRect grClipRect; /* clipping rectangle */
GPoint gptPenPosition; /* current position */
GColor gcPenColor; /* line color */
GPoint gptPenSize; /* line thickness */
short nPenCap; /* line end shape */
short nPenJoin; /* line contact shape */
short nPenDash; /* line type No. */
short nDashOffset; /* line pattern offset */
short nTextMode; /* text mode */
GColor gcForeColor; /* fill foreground color */
GColor gcBackColor; /* fill background color */
short nFillPattern; /* fill pattern No. */
short nDrawCondition; /* drawing condition */
short nDrawingMode; /* raster operation */
HGVRAM hSystemVram; /* display destination VRAM */
HGVRAM hDrawVram; /* drawing destination VRAM */
HGFONT hFont; /* font */
void *vgdftDraw; /* function table for drawing */
char cDashPatterns[NUM_DASH_PATS][DASH_PAT_SIZE];
 /* line pattern */
char cFillPatterns[NUM_FILL_PATS][FILL_PAT_SIZE];
 /* fill pattern */
GDrawParamPoly gpPoly; /* polygon drawing parameter */
GDrawParamWideLine gpwWideLine; /* wide line drawing parameter */
GDrawParamOval gpwOval; /* circle, arc and sector drawing parameter */
unsigned short usErrorCode; /* previous error code */
unsigned char ucGradationType; /* gradation type */
 /* (0: up to down, 1: left to right) */
GColor gcGradationColor1; /* color1 */
GColor gcGradationColor2; /* color2 */
unsigned short usVertexPos; /* gradation vertex position (0 to 100) */
unsigned short usGradationLevel; /* gradation level (0 to 256) */
unsigned char ucColorMode; /* actual VRAM color
 environment information */
GColor gcRedMask; /* direct color R value mask */
GColor gcGreenMask; /* direct color G value mask */
GColor gcBlueMask; /* direct color B value mask */
char cRedShift; / * direct color R value shift value */
char cGreenShift; /* direct color G value shift value */
char cBlueShift; /* direct color B value shift value */
GColor gcForeColorOrg; /* foreground color (original) */
GColor gcBackColorOrg; /* background color (original) */
GColor gcPenColorOrg; /* background color (original) */
unsigned long ulExParam; /* extension parameter */
short nExParam; /* extension parameter */
}GDraw;
```

```
/*****************************************************************************
* Memory management structure
*****************************************************************************/
typedef struct _GMemory{
unsigned char fUseSpace; /* shows use (0)/not use (1) status for memory space */
unsigned char cReserve[3]; /* reserved space (for 4 byte environment adjustment) */
unsigned long ulSize; /* memory space size */
struct _GMemory *pvPrevMemorySpace;
 /* pointer to GMemory in previous memory space */
struct _GMemory *pvSmallMemorySpace;/* pointer to space GMemory in small */
 /* memory space */
struct _GMemory *pvLargeMemorySpace;/* pointer to space GMemory in large */
 /* memory space */
}GMemory;
typedef struct _GMemorySpaceInformation{
unsigned char ucType; /* memory space type */
unsigned char ucPlane; /* memory space plane No. */
unsigned char cReserve[2]; /* reserved space (for 4 byte environment adjustment) */
char *pvMemorySpace; /* pointer to memory space allocated by user */
unsigned long ulMemorySpaceSize;
 /* size of memory space allocated by user (multiples of 32) */
GMemory *pgmNoUseMemoryTree;
 /* pointer to unused two-branch memory management */
}GMemorySpaceInformation;
```

```
/*****************************************************************************
* Control related structures
*****************************************************************************/
/* Design structure */
typedef struct GDesign{
GBrush gbBrush; /* fill brush */
unsigned short usImageID; /* image resource ID */
}GDesign;
/* Focus movement structure */
typedef struct GFocusObject{
unsigned short usKeyCode; /* virtual key code */
unsigned short usType; /* focus movement method */
unsigned short usID; /* ID of object being moved */
}GFocusObject;
/* Focus movement structure */
typedef struct GFocusInformation{
unsigned short usCount; /* number of focus settings */
GFocusObject *pFocusArray; /* focus setting (array) */
}GFocusInformation;
/* Value structure */
typedef union GValue{
short nValue; /* short value */
unsigned short usValue; /* unsigned short value */
long lValue; /* long value */
unsigned long ulValue; /* unsigned long value */
float fValue; /* float value */
}GValue;
/* GBaseWindow Export/Import structure */
typedef struct GBaseWindowProperty{
unsigned short usType; /* object type */
unsigned short usID; /* object ID */
short nX; /* X coordinate */
short nY; /* Y coordinate */
short nWidth; /* width */
short nHeight; /* height */
unsigned long ulStyle; /* object shape */
GFocusInformation *pFocusInfo; /* focus object */
}GBaseWindowProperty;
```



```
/*****************************************************************************
* NC data access-related structure
*****************************************************************************/
/* NC information structure */
typedef struct GNCControl{
long lMachine; /* NC No. */
 /* Setting range: 1 to 255 */
long lSystem; /* Part system number */
 /* Setting range: 0 to 10 */
long lGround; /* Ground */
 /* 0 : Basic part system / Foreground */
 /* 1 : Basic part system / Background */
 /* 2 : Current part system during cross control / Foreground */
 /* 3 : Current part system during cross control / Background */
unsigned long ulAxis; /* Axis number */
 /* Setting range: 0 to 16 */
}GNCControl;
/* NC data structure */
typedef union GNCValue{
char cValue; /* One-byte integer value */
unsigned char ucValue; /* Unsigned one-byte integer value */
short nValue; /* Two-byte integer value */
unsigned short usValue; /* Unsigned two-byte integer value */
long lValue; /* Four-byte integer value */
unsigned long ulValue; /* Unsigned four-byte integer value */
double dValue; /* Real number value */
}GNCValue;
```


Appendix 7. HTML Tag List

NC Designer2 supports the following HTML tags.

Function	Tag name
Document Document structure definition	<html> - </html>, <head> - </head>,<body> - </body>
TEXT Title setting	<hxxx> - </hxxx>
Paragraph setting	-
Carriage return	
Long sentence quotation	<blockquote> - </blockquote>
Emphasis	- , -
Superscript and subscript designation	⁻, ₋
Text direction designation	<bdo dir="xxx"> - </bdo>
PAGE Background color designation	<body bgcolor="xxx"> - </body>
Background image designation	<body background="xxx

"bgproperties="fixed"> - </body>
Text color designation <body text="xxx"> - </body>,
<body link="xxx"> - </body>
Partial text color designation <font color="xxx"> - </font>
Title position designation <hxxx align="yyy"> - </hxxx>
Paragraph position designation -
Designation of position of
designated range
 -
Centering -
Horizontal ruler display <hr>,<hr xxx>
Horizontal ruler color
designation
<hr color="xxx">
Page margin designation <body xxx> - </body>
FONT Absolute font size designation <font size="xxx"> - </font>
Relative font size designation,
pattern 1
<font size=" xxx"> - </font>
Relative font size designation,
pattern 2
<basefont size="xxx">,
<font size=" yyy"> - </font>
Font type designation <font face="xxx,xxx,"> - </font>
Font style designation, pattern 1 - ,<I> - </I>,
<strike> - </strike>,
<s> - </s>,<tt> - </tt>,<u> - </u>
Font style designation, pattern 2 <big> - </big>,<small> - </small>
Special character display & number;, & key word
LIST Numbered list creation <ol><li> - </li></ol>
List mark change <ul type="xxx"><li> - </li></ul>,
<ul><li type="xxx"> - </li></ul>
Numbered list mark change <ol type="xxx"><li> - </li></ol>,
<ol><li type="xxx"> - </li></ol>
List starting number change <ol start="xxx"><li> - </li></ol>
Serial list number change <ol><li value="xxx"> - </li></ol>
Term definition list display <dl><dt> - </dl><dd> - </dd></dl>,
<dl compact><dt> - </dl><dd> - </dd></dl>
NC Designer2 Instruction Manual
Appendix
660 IB-1501250-J
Function Tag name
LIST List mark change <ul type="xxx"><li> - </li></ul>,
<ul><li type="xxx"> - </li></ul>
Numbered list mark change <ol type="xxx"><li> - </li></ol>,
<ol><li type="xxx"> - </li></ol>
IMAGE Image display <img src="xxx">
Image size designation <img src="xxx" width="yyy" height="zzz">
Designation of arrangement
with text
<img src="xxx" align="yyy">
Arrangement of text around
image
<img src="xxx" align="yyy">
Resetting of arrangement
around image
<br clear="xxx">
Image-to-text gap designation <img src="xxx" vspace="yyy" hspace="zzz">
TABLE Table creation <table "xxx"> - </table>,<tr> - </tr>,
<td> - </td>
Table title creation <th> - </th>
Designation of table position to
text
<table align="xxx"> - </table>
Resetting of arrangement
around table
<br clear="xxx">
Table size designation <table width="xxx" height="yyy"> - </table>
Cell size designation <th width="xxx" height="yyy"> - </th>,
<td width="xxx" height="yyy"> - </td>
Caption <caption> - </caption>,
<caption align="xxx"> - </caption>
Vertical cell merge <th rowspan="xxx"> - </th>,
<td rowspan="xxx"> - </td>
Horizontal cell merge <th colspan="xxx"> - </th>
LINK Link creation <a href="xxx"> - </a>,
<a name="xxx"> - </a>
* "xxx", " yyy" and "zzz" are parameters specified as a tag.
NOTE
Tags not found in the list are not supported. Unsupported tags are ignored when the file is displayed.
The supported image format is jpeg only; other image file formats are not displayed.
The upper limit of the HTML file size is 100K bytes.
NC Designer2 Instruction Manual
Appendix
661 IB-1501250-J
Appendix 8. Executing File Registration Method
Appendix 8.1 F0 Release
To register the executing file data to the function key, it is necessary to edit melAppCtrl.ini.

Create the registered executing file by full-screen as much as possible.
Appendix 8.1.1 melAppCtrl.ini
Example of setting
; When the Shift+F10 key (F0 key) is pressed, the calculator is started.
[Program00]
VirtualKey=VK_F10
KeyData=VK_SHIFT
Command00=Execute,C:\WINDOWS\system32\calc.exe,the calculator,,0,0
Refer to Appendix 8.1.2 for details of items.
Appendix 8.1.2 Details of melAppCtrl.ini
The configuration file (melAppCtrl.ini) conforms to the description format of the Windows INI file in principle, and the upper bound of the maximum INI file size is 32KByte.
The description format of Windows INI
[(Section)]
(Key) = (Value of key)
:
[(Section)]
(Key) = (Value of key)
:
Edit the following item of the [General] section.
Section name Details Initial value
(when undefined)
GENERAL Specify general system requirements.
A set number of the following "StartUp" section and
"Program" section is set.
-
Key name Details Initial value
(when undefined)
StartUpCount Specify the set number of the [StartUp] section.
Setting range : 0 to 5
0
ProgramCount Specify the set number of the [Program] section.
Setting range : 0 to 10
0

Edit the following item of the [StartUp] section.
Section name Details Initial value
(when undefined)
StartUp** Specify the executing file information when the power
supply is turned ON.
To ** of section name, specify the sequential No. (0 to)
until the values in which 1 is subtracted from the
[StartUp] key setting value of [General] section.
No setting
Key name Details Initial value
(when undefined)
CommandCount Specify the number of executing commands.
Setting range : 0 to 10
1
Command** Specify the executing commands.
The command is executed in ascending order of the No.
set to **. To **, specify the sequential No. (0 to) until the
values in which 1 is subtracted from the
[CommandCount] key setting value.
Refer to "Command list" for the command which can be
specified.
Setting range : Number of commands of maximum
characters = 256 byte
NULL (No commands)

Edit the following item of the [Program] section.
Section name Details Initial value
(when undefined)
ControlParam Designate a parameter to control the execution of
commands.
Setting range :1(Standard screen), 100 to 199(Custom
screen)
1:Standard screen
Program** Specify the executing file corresponding to the input key.
To ** of section name, specify the sequential No. (0 to)
until the values in which 1 is subtracted from the
[Program] key setting value of [General] section.
No setting
Key name Details Initial value
(when undefined)
VirtualKey Specify the key code of operation board to register the
execution file.
The key code which can be set is as follows.
Key name Virtual key code
F1 to F12 VK_F1 to F12
0 to 9 VK_0 to VK_9
A to Z VK_A to VK_Z
No setting
KeyData Specify the Shift/Ctrl/Alt key that combines with

above-mentioned "VirtualKey" and is input.
This key can be defined by combining two or more key
codes. (In that case, insert a space between the key
codes.)
Ex.) The Shift/Ctrl key was pressed at the same time
KeyData = VK_SHIFT VK_CONTROL
The key code which can be set is as follows.
Key name Virtual key code
Shift VK_SHIFT
Ctrl VK_CONTROL
Alt VK_MENU
No setting
CommandCount Specify the number of executing commands.
Setting range : 1 to 10
1
Command** Specify the executing commands.
The command is executed in ascending order of the No.
set to **. To **, specify the sequential No. (0 to) until the
values in which 1 is subtracted from the
[CommandCount] key setting value.
Refer to "Command list" for the command which can be
specified.
Setting range : Number of commands of maximum
characters = 256 byte
NULL (No commands)

Command list
The command set with the "Command**" key is set as a comma-delimited character string
(command character string).
Format for command character string is shown below.
(Command name), (1st argument), (2nd argument), (3rd argument)
When the numerical value is set to the argument, the value is processed as a hexadecimal
number when the character of "0x" is added to the head. Other numerical values are processed
as a decimal number.
Command
name
Details
Execute Start the designated executing file.
The starting status of the executing file can be judged by setting the title bar character string
and the class name of the window. As a result, a multiple start of the execution file can be
controlled.
If both the title bar character string and the class names of the window are set, it is judged
"The execution file is starting" when each requirement is satisfied at the same time.
When the executing file has already started, the focus is set to the corresponding executing
file, and the order of displaying the window is changed to most significant. This can be
invalidated by the setting of the 4th argument and the 5th argument.)
The detail of argument is as shown below.
Argument Details
1st
argument
The file name of the starting executing file (including the folder name)
2nd
argument
The title bar character string of window referred to confirm the starting
status of the executing file
Wild-card (*) can be specified in the character string.
When the character string is not specified, it is judged as the unsetting.
3rd
argument
The class name of window referred to confirm the starting status of the
executing file
Wild-card (*) can be specified in the character string.
When the character string is not specified, it is judged as the unsetting.
4th
argument
Presence of focus control
0 : Move focus to the executing file.
-1 : Do not control the focus.
When the value is not specified, it is judged the setting value is 0.
5th
argument
Presence of window position control
0 : Display the window in most significant.
1 : Display the window in least significant.
-1 : Do not control the window position.
[Restrictions]
When two or more executing files matched to the condition exist, the executing file found
first is operated.

Command
name
Details
Sleep Stop the command execution only at specified time (ms).
The detail of argument is as shown below.

Argument Details
1st argument Stop time (ms)
Exit End the designated executing file.
The ending executing file can be selected by setting the title bar character string and the
class name of the window.
If both the title bar character string and the class names of the window are set, the
executing file which satisfies each requirement at the same time is ended.
Only when the executing file has already started, the corresponding executing file is ended.
The detail of argument is as shown below.
Argument Details
1st
argument
The title bar character string of window referred to confirm the starting
status of the executing file
Wild-card (*) can be specified in the character string.
When the character string is not specified, it is judged as the unsetting.
2nd
argument
The class name of window referred to confirm the starting status of the
executing file
Wild-card (*) can be specified in the character string.
When the character string is not specified, it is judged as the unsetting.
[Restrictions]]
When two or more executing files matched to the condition exist, the executing file found
first is operated.
NC Designer2 Instruction Manual
Appendix
666 IB-1501250-J
Command
name
Details
PostMessage Send the Windows messages to the designated executing file.
The executing file sent the Windows messages can be selected by setting the title bar
character string and the class name of the window.
If both the title bar character string and the class names of the window are set, the
Windows messages are send to the executing file which meets each requirement at the
same time.
Only when the executing file has already started, the Windows messages specified for the
corresponding executing file are sent.
The detail of argument is as shown below.
Argument Details
1st
argument
The title bar character string of window referred to confirm the starting
status of the executing file
Wild-card (*) can be specified in the character string.
When the character string is not specified, it is judged the unsetting.
2nd
argument
The class name of window referred to confirm the starting status of the
executing file
Wild-card (*) can be specified in the character string.
When the character string is not specified, it is judged the unsetting.
3rd
argument
Message ID of sent Windows messages
4th
argument
Argument 1 (wParam) of sent Windows message
5th
argument
Argument 2 (lParam) of sent Windows message
[Restrictions]
When two or more executing files matched to the condition exist, the executing file found
first is operated.
NC Designer2 Instruction Manual
Appendix
667 IB-1501250-J
Appendix 8.1.3 Function of Update Cycle Setting
When the executing file registered by F0 release is started, update cycle of the standard screen
which is operated on the background can be set by melAppCtrl.ini. As a result, the time that the
starting execution file occupies CPU can be extended.
When a standard screen moves to an active screen, the setting of the update cycle (sleep time) is
released.
<The argument of sleep time setting PostMessage>
Argument Setting value
1st argument Mitsubishi CNC HMI (fixed)
2nd argument Mitsubishi CNC HMI Class (fixed)
3rd argument 0x500(fixed)
4th argument Specify the update cycle time of a standard screen when the custom
application is started.
When the registered custom application is started, a standard screen is
updated at the set update cycle only.
It is possible to set "Do not update", "Release setting" or "until 0 to 1 second by
each millisecond unit".
Setting rang : -1 to 1000
-1 : Do not update.
0 : Release the setting.

1 to 1000 : Changes to the set update cycle.
Out of range : Do not change the update cycle.
5th argument 0 (fixed)
Refer to Appendix 8.1.2 for details of PostMessage.
Setting example of melAppCtrl
; The calculator is started when the F0 key is pressed, and the update cycle of a standard screen is set to 500ms.
[Program00]
ControlParam=1
VirtualKey=VK_F10
KeyData=VK_SHIFT
CommandCount=2
Command00=PostMessage,Mitsubishi CNC HMI,Mitsubishi CNC HMI Class,0x500,500,0
Command01=Execute,C:\WINDOWS\SYSTEM32\calc.exe,calculator,,
Update at
500ms cycle
NOTE
When an application is switched by Alt + Tab, the update cycle changing function is not applied.
Whether the start of the execution file succeeded is not checked. Even if the start of the executing file is failed, the update cycle of a standard screen is changed.
The start time of the registered executing file can be shortened by executing the PostMessage command ahead of the Execute command.
The update cycle setting is released by moving the standard screen to the background screen once, and displaying the standard screen on an active screen again. Note that the setting is not released in the display on an active screen.

Appendix 8.2 Menu Release
An arbitrary executing file can be registered in the main menu.
A standard screen can be operated with the executing file started.
To register the executing file registration method data to the main menu, it is necessary to edit Config.ini, and to prepare the icon image and the executing file for registration.
The customdef.ini has to be described by UNICODE text.
Create the registered executing file by full-screen as much as possible.
Appendix 8.2.1 customdef.ini
Refer to 17.6.5.1.2.
Appendix 8.2.2 Icon Image
Refer to 17.6.5.1.3.

Appendix 8.3 Using a Function Key (Screen Switching Key) in the Custom Screen
The function keys for switching the standard screen, such as [MONITOR], [SETUP], [EDIT], [DIAGN] and [MAINTE], can be used as a screen switching key and operation key in the custom screen for the executing file registration method custom screen.
To use the function keys mentioned above as keys in the custom screen, execute the setting to switch the CotrolParam key in the Program section. There are three specific methods to switch the ControlParam key:
1) Utilization method 1 by adding a definition to melAppCtrl.ini (only the meaning of function key can be changed with "F0" key)
2) Utilization method 2 by adding a definition to melAppCtrl.ini (changing to a specific standard screen with "F0" key)
3) Utilization method 3 by adding a definition to melAppCtrl.ini (changing to the specific standard screen with "Menu" key)
By switching the ControlParam key, the custom screen can receive a function key without a definition in "melAppCtrl.ini". The key allocations are as follows:
Function key Key that the custom screen receives
MONITOR SHIFT+F1
SETUP SHIFT+F2
EDIT SHIFT+F3
DIAGN SHIFT+F4
MAINTE SHIFT+F5
(Complement) The explanations for specific methods for switching the CotrolParam key are based on when the custom screen of the executing file registration method is allocated to "F0" key.
The same applies to SFP key, Screen display key( ), and Screen selection key ( ).

Appendix 8.3.1 Utilization Method 1 by Adding a Definition to melAppCtrl.ini
(Only the Meaning of Function Key Can Be Changed with "F0" Key)
The below shows the setting example of melAppCtrl.ini in order that, after displaying the custom screen by pressing "F0", the allocated function keys become transition keys to the standard screen while the custom screen is maintained when "F0" is pressed again.
When "F0" is pressed while the standard screen is displayed, the screen changes to the custom screen and then [MONITOR], [SETUP], [EDIT], [DIAGN] and [MAINTE] become the keys to be used in the custom screen. When "F0" is pressed again, [MONITOR], [SETUP], [EDIT], [DIAGN] and [MAINTE] become transition keys to the standard screen even the custom screen is still valid. After that, it goes back to the standard screen by pressing [MONITOR], [SETUP], [EDIT], [DIAGN] or [MAINTE] key.
Setting example of "melAppCtrl.ini"
[GENERAL]
;Program The number of sections
ProgramCount=2
;Startup the custom screen
[Program00]
ControlParam=1
VirtualKey=VK_F10

KeyData=VK_SHIFT
CommandCount=2
Command00=Execute,d:\Ccustoum\custom.exe,Custom Ttitle,Custom Class,0,0
Command01=PostMessage,Mitsubishi CNC Application Control Task,Mitsubishi CNC Application Control
Class,0x400,1,100
;Change the function keys back to the keys for the standard screen (F0 key)
[Program01]
ControlParam=100
VirtualKey=VK_F10
KeyData=VK_SHIFT
CommandCount=1
Command00=PostMessage,Mitsubishi CNC Application Control Task,Mitsubishi CNC Application Control
Class,0x400,1,1
Change "ControlParam" to "100"
Setting range100 to 199
Change "ControlParam" back to "1".
* "1" is the standard screen.
Standard
screen key
To the custom
screen Custom screen key
Switch to standard
screen keys
Press function keys

Appendix 8.3.2 Utilization Method 2 by Adding a Definition to melAppCtrl.ini
(Changing to a Specific Standard Screen with "F0" Key)
The below shows the setting example of melAppCtrl.ini to change to a specific standard screen by
pressing "F0" again after the custom screen is displayed by pressing "F0" key.
When "F0" is pressed while the standard screen is displayed, it changes to the custom screen and
then [MONITOR], [SETUP], [EDIT], [DIAGN] and [MAINTE] become the keys to be used in the
custom screen. When "F0" is pressed again, it changes to a specific standard screen (it is "monitor
screen" in this example) and then [MONITOR], [SETUP], [EDIT], [DIAGN] and [MAINTE] become
transition keys to the standard screen.
Setting example of "melAppCtrl.ini"
[GENERAL]
;Program The number of sections
ProgramCount=2
;Startup the custom screen (F0 key)
[Program00]
ControlParam=1
VirtualKey=VK_F10
KeyData=VK_SHIFT
CommandCount=2
Command00=Execute,d:\Ccustoum\custom.exe,Custom Ttitle,Custom Class,0,0
Command01=PostMessage,Mitsubishi CNC Application Control Task,Mitsubishi CNC Application Control
Class,0x400,1,100
;Change the function keys back to the keys for the standard screen (F0 key)
[Program01]
ControlParam=100
VirtualKey=VK_F10
KeyData=VK_SHIFT
CommandCount=4
Command00=PostMessage,Mitsubishi CNC Application Control Task,Mitsubishi CNC Application Control
Class,0x400,1,1
Command01=PostMessage,Mitsubishi CNC HMI,Mitsubishi CNC HMI Class,0x500,0,0
Command02=Execute,c:\ncsys\melhmi.exe,Mitsubishi CNC HMI,Mitsubishi CNC HMI Class,0,0
Command03=PostMessage,Mitsubishi CNC HMI,Mitsubishi CNC HMI Class,0x401,0x70,0x00000001
Display the "monitor screen"
Change "ControlParam" to "100"
Setting range100 to 199
Set ControlParam back to "1".
* "1" is the standard screen.
Standard screen
key
To the custom
screen Custom screen key
To the screen designated by
melAppCtrl.ini.

Setting for displaying the screen other than the operation screen
//Changes to the setup screen
Command03=PostMessage,Mitsubishi CNC HMI,Mitsubishi CNC HMI
Class,0x401,0x71,0x00000001
//Changes to the edit screen
Command03=PostMessage,Mitsubishi CNC HMI,Mitsubishi CNC HMI
Class,0x401,0x72,0x00000001
//Changes to the diagnosis screen
Command03=PostMessage,Mitsubishi CNC HMI,Mitsubishi CNC HMI
Class,0x401,0x73,0x00000001

Appendix 8.3.3 Utilization Method 3 by Adding a Definition to melAppCtrl.ini
(Changing to the Specific Standard Screen with "Menu" Key)
The below shows the setting example of melAppCtrl.ini to change to a specific standard screen by pressing "F0" again after the custom screen is displayed by pressing "F0" key, and the sample source.
When "F0" is pressed while the standard screen is displayed, it changes to the custom screen and then [MONITOR], [SETUP], [EDIT], [DIAGN] and [MAINTE] become the keys to be used in the custom screen. When Menu is then pressed, it changes to a specific standard screen (it is "monitor screen" in this example) and then [MONITOR], [SETUP], [EDIT], [DIAGN] and [MAINTE] become transition keys to the standard screen. To use this method, it needs to incorporate the processes of switching the ControlParam key from the menu in the custom screen and of changing to the standard screen into the source code for custom screen application.
Setting example of "melAppCtrl.ini"
[GENERAL]
;Program The number of sections
ProgramCount=1
;Startup the custom screen (F0 key)
[Program00]
ControlParam=1
VirtualKey=VK_F10
KeyData=VK_SHIFT
CommandCount=2
Command00=Execute,d:\Ccustoum\custom.exe,Custom Ttitle,Custom Class,0,0
Command01=PostMessage,Mitsubishi CNC Application Control Task,Mitsubishi CNC Application Control Class,0x400,1,100
Change "ControlParam" to "100"
Setting range100 to 199
To the custom
Standard screen
key
To the custom
screen Custom screen key
Example)
Press menus on the custom screen to
go to the standard screen.

Sample source codeprocessing example of changing to the operation screen from the menu of the custom application
```
// Return the operation of function keys to the standard screen (return "ControlParam" to "1")
CWnd* _hmiApphwd = FindWindow("Mitsubishi CNC Application Control Class",
"Mitsubishi CNC Application Control Task");
_hmiApphwd->PostMessage(WM_USER, (WPARAM)1, (LPARAM)1);
// Display the standard screen in the most front
CWnd* _hmihwd = FindWindow("Mitsubishi CNC HMI Class","Mitsubishi CNC HMI");
_hmihwd->SetForegroundWindow();
// Display the monitor screen (Monitor) of the standard screen
LPARAM _lKeyStatus = 0;
_lKeyStatus |= 0x00000001;
_hmihwd->PostMessage((WM_USER+0x0001), VK_F1, lKeyStatus);
```


Appendix 8.3.4 The Standard Screen After Changing
When switching to standard screens from custom screens, the screen returns to the screen that had been displayed before switching to custom screens.
If a window was displayed, the window is closed, and the screen which had been displayed before displaying the window is displayed.
All menus return to the main menu, and the menu which was displayed is highlighted.

Appendix 8.4 Home Screen
Appendix 8.4.1 Setting Home Screen Config File (HomeScrnCustomConfig.ini)
Refer to 17.9.3.1.1.
Appendix 8.4.2 Setting Application Definition File (HomeScrn_.ini)
Application definition file is used to define the information of extension application registered to Home screen.
Using this definition file, you define the basic information of extension application, Home button operation, Operation menu button operation, etc.
[File contents]
- Section

Section name	Mandatory	Description
COMMON	Yes	Define basic information of the application.
PROGRAM	Yes	Specify the command to execute in accordance with key input.

- [COMMON] section key

Key name	Mandatory	Description
NAME	Yes	Specify the character string to be used for the application name displayed under Application button or in the sub menus of [Add Application] menu, using the key described in [LANG] section of Application language file (*). The actually displayed application name is defined in Application language file. * For details of Application language file, refer to "17.9.3.1.3". Note) If this key is undefined, or if application name is unable to be retrieved from the app name key, neither application buttons nor sub

menus of [Add Application] menu are displayed.
Setting range: Up to 32 characters
TYPE Yes Specify the type of MTB's app:
0: Fixed Home screen display
1: Full-screen display (NC Designer2 interpreter method/
NC Designer2 compilation method)
2: Full-screen display (EXE file registration method)
ICONFILENAME No Specify the image file (*) to be used as an icon of Application button.
Use either an absolute or relative path to specify the image file name
(e.g. custom_app1.jpg). For a relative path, specify a path relative to this
definition file.
*Specify an image file with the size below:
- XGA: Up to 52 x 52 pixels
- VGA: Up to 40 x 40 pixels
*Available format is JPG.
Note) If you specify no file, or specified file is nonexistent, the icon of the
execution file (MTB's app) defined in the EXECFILENAME key of
[COMMON] section is used.
Setting range: Up to 128 characters including the path

- [PROGRAM] section key
Key name Mandatory Description
COMMANDCOUNT Yes Specify the number of commands to execute.
Setting range: 1 to 10
COMMANDnn
(nn=01 to 10)
Yes Specify the commands (Execute/Sleep/Exit/PostMessage) to execute.
For details of commands, refer to "Appendix 8.1.2 Details of
melAppCtrl.ini".
Setting range: the maximum command length = 256 bytes
[Setting example]
Appendix 8.4.3 Setting Application Language File (HomeScrn__.ini)
Refer to 17.9.3.1.3.
Appendix 8.4.4 Precautions
- Panel size to be displayed is only available for full-screen display.
[COMMON] ; <- Define basic information of the application.
NAME=LANG_APP_NAM ; <- Specify the application name.
ICONFILENAME=D:\Custom\ExtApp\custom_app.jpg
; <- Specify the image to be displayed on Application button.
TYPE=2 ; <- Specify the registration type.
[PROGRAM] ; <- Define commands to execute.
COMMANDCOUNT=2 ; <-Specify the number of commands to execute (2 commands in this setting
example, thus specify 2).
Command01=PostMessage,Mitsubishi CNC HMI,Mitsubishi CNC HMI Class,0x500,500,0
; <- Renew standard screen at every 500ms.
Command02=Execute,C:\WINDOWS\SYSTEM32\calc.exe,calculator,,
; <- Start Calculator.

Appendix 9. HMI Integrated Installer
Appendix 9.1 Outline
"HMI integrated installer" is a function to install and upgrade "Application of custom release" and
"Application of HMI related" with the data in the memory card or USB memory.
For integrated installer, two methods are prepared to install and upgrade the application.
[Methods of installing and upgrading application]
(1) Method of starting installer (EXE file) for each application prepared beforehand, and installing
application
(Thereafter, this method is described "Installer start method".)
(2) Method of copying, deleting specified file (directory) with integrated installer, setting registry, and
installing application
(Thereafter, this method is described "File copy method".)
The following are prepared in the memory card or USB memory even if which method is used, and
then each application is installed and upgraded:
Installation environment of each application (EXE file and a file to copy, etc.)
Setting file which collects information on installation of each application
(Thereafter, this setting file is described "setup application list".)

Appendix 9.2 Configuration
The entire configuration of the HMI integrated installer function is as follows.
Memory card / USB memory
Setup application list
[Installation environment of
Application] Installer
(EXE file)
Installation file
Acquire the installation setting of each
application
Screen display name
Installation method
Start the installer of the application
(EXE file)
Execute the installation
processing used the installation

file with an integrated installer
PC (Display unit)
Standard
screen
Integrated installer
Start
The flow until installation completion of the application is as follows.
Power ON
Standard
screen
Integrated
installer
The installation processes by the
integrated installer
The installation processes by installer in memory
card
Start the installer of application in the memory card
Installation
complete
[Start the integrated installer]
[Select application to install]
[If "File copy method"] [If "Installer start method"]

Appendix 9.3 Screen Configuration
Screen image
(1)
(3)
(2)
(5)
(4)

Display items
Display item Details
(1) Application list This displays the list of the application name which can be installed. The
display content of the table changes depending on the selected menu.
" Custom screen menu is selected"
-> "Application of custom release" list which can be installed
" Standard HMI menu is selected"
-> "Application of HMI related" list which can be installed
"Application of custom release" is displayed as a default. The name set to
"Setup application list" is displayed as application name.
The cursor is displayed, and the installed application can be selected. The
selected application name is highlighted as follows. Two or more applications
can be selected.
"Application name which has not been selected"
"Application name which has been selected"
"Application name displaying cursor"
The cursor can be moved by PAGE PAGE keys.
(Note) After the line of the final data display, an empty column is displayed.
The line No. is not displayed, too.
[Example of display (when number of application is 7)]
Empty
display

Display item Details
(2) Installation status
display part
This displays the installation status of the installing application.
Also, an application register message is displayed when it is enabled by
pressing the security menu.
Status message display part
Application name display part
[After installation]
[Before installation]
[Display examples]
<When installing>
"Application name display part"
The name of currently installing application is displayed.
"Status message display part"
The current installation status is displayed as a message. The message
"Installing" is blinked every second while installing the application. When an
error will occur during installation, an error message is displayed.
(Note) When the installation method is "Installer start method", nothing is
displayed in all the display parts (The application installation status is
not displayed).
<When registering application>
"Application name display part"
Nothing is displayed.
"Status message display part"
The registration status of the application that is permitted to operate while the
security function is enabled is displayed as a message. The message
"Application registration is in progress" is blinked every second while

registering the application. Also, when the application registration is
completed, "Application registration is complete" is displayed.
(3) Operation/Power
supply restart
message display
part
This displays the operation messages and the power supply restart
messages. The background color is different depending on the kind of the
displaying message.
"Operation message"
"Power supply restart message"

Display item Details
(4)
(5)
[Y] button
[N] button
There are buttons to decide whether to execute or cancel the operation when
a confirmation message is displayed in "Operation/Power supply restart
message display part" and then the status is changed to the waiting. The
meaning of each button is as follows.
[Y] button : Execute the operation
[N] button : Cancel the operation
Usually (the confirmation message is not displayed), each button is "Invalid
status", and cannot be selected.
"Button invalid status (grayout)"
When the confirmation waiting status, either button is "Selection status", and
the other is "Normal status". (The [Y] button turns to "Selection status" when
the status is changed to the waiting.)
"Button selection status (highlight)"
"Button normal status (normal display)"
The selected button can be switched with the ->| , |<- key at the
confirmation waiting status.
key
[Y] button selected status key [N] button selected status

Menus
Menu Details
Install
Start
This starts the installation of the selected application.
Custom
Screen
This displays the "Application of custom release" name which can be installed in the
application list.
Std
HMI
This displays the "Application of HMI related" name which can be installed in the
application list.
Scty
protect
This changes the security function status to protect, scans the applications in the
display, and starts registering the application that is permitted to operate while the
security function is enabled.
(Note) This menu is only enabled when an option is set. When an option is not set this
menu is disabled and is not displayed.
Also, when the security function is enabled, this menu is highlighted, and
cannot be operated.
Select This selects the application at the cursor, and cancels the selection status.
All
Select
This selects all applications in the application list.
All
Cancel
This cancels the selected status of all applications in the application list.
Quit This quits the integrated installer.
After selected, the end confirmation message is displayed.

Appendix 9.4 Operation Methods
Appendix 9.4.1 Installing the Application
(1) The memory card or USB memory where
either of installation environment of
"Application of custom release" or
"Application of HMI related" is stored is
prepared, and the memory card is inserted in
the memory card interface in front of the
display.
(2) Select Mainte - Password input menu on the
Maintenance screen.
(3) Input the password, and select the INPUT
key.
The password is set, and the HMI integrated

installer can be started.
(4) Select HMI verup menu. The HMI verup menu is highlighted, and the
message to confirm the stop of PLC is displayed.

(5) Select the Y or INPUT key. After PLC is stopped, HMI integrated installer is
started, and then the screen is displayed.
When the installation environment of
"Application of custom release" in memory card
or USB memory, the "Application of custom
release" name which can be installed in the
application list is displayed.
(6) Select one application to install from the
displaying application list.
(7) Select Install start menu. The Install start menu is highlighted, and a
message to confirm installing application is
displayed in "Operation/Power supply restart
message display part". The [Y] button turns to
"Selection status".
(Note 1) If any application has not been selected
when Install start menu is selected, an
error message is displayed and the
Install start menu is unhighlighted.

(8) Select the INPUT key.
Or touch the selection status [Y] button.
The installation of the selected application is
started. The screen display is different
depending on the installation method.
(Note 1) When the selection status [N] button or
the menu is touched, the Install start
menu is unhighlighted and the
application is not installed.
(Note 2) While installing, all menus are invalid
menus (grayout), and cannot be
selected.
[Invalid menu display]
(Note 3) All tasks except the related system are
quitted immediately before installing the
selected application. Quit all
unnecessary tasks before an integrated
installer starts.

<<When the application of "File copy method" is selected>>
The application is installed according to the setting of the setup application list. A current installation situation is displayed in "Installation status display part". The message "Installing" is blinked every second while installing the application.
[Example of display 1]
Application name (registered name) -> TEST Application
When an error will occur during installing, an application is not installed, and an error message is displayed in "Installation status display part". In that case, quit the integrated installer once, and review the installation environment and the setup application list, etc. in the memory card or USB memory.
[Example of display 1]
Application name (registered name) -> Custom 13
To copy the designated file failed.
[Example of display 2]
Application name (registered name) -> Test Application
To delete the designated directory failed.
(Note 1) When the installation is interrupted by error, the file installed until interruption does not return to the origin.
(Note 2) The message other than "Installing" displayed while installing is not blinked ("Finish installed" "Can't copy file", etc.).

<<When the application of "Installer start method" is selected>>
The installer set to the setup application list is started, and displayed in front of the screen. Install the application according to the guidance displayed on the installer screen.
[Example of display]
(Note) When no USB keyboard is connected for a 19-type display, the screen keyboard appears.
(9) The application installation is completed.
<<When the installation of "File copy method" application is completed>>
The installation completion message is displayed in "Installation status display part", and the Install start menu highlighting and the selection status of the application are canceled. The power supply-restart message is displayed in "Operation/Power supply restart message display part".
<<When the installation of "Installer start method" application is completed>>
When returning to the integrated installer screen after the installation screen was quitted, the Install start menu highlighting and the selection status of the application are canceled. The power supply-restart message is displayed in "Operation/Power supply restart message display part".
(Note 1) For "Installer start method", even if canceling the installation on the started installer screen and then returning to the integrated installer screen, the power supply-restart message is displayed in "Operation/Power supply restart message display part". (When the registered

installer is started the power supply-restart message is displayed in "Operation/Power supply restart message display part".)

Appendix 9.5 Details for Functions

Appendix 9.5.1 Installation Method

For integrated installer, two methods are prepared to install and upgrade the application according to the description of "Appendix 9.1 Outline": "Installer start method" and "File copy method".

Installer start method

The installer for the application (EXE file) prepared beforehand in the memory card or USB memory is started from an integrated installer, and installed by the installer for the application.

In this method, the setup application list setting is easy, however, it is necessary to create the installer for the application (EXE file). The process outline of the prepared installer is as follows.

Create the created installer file by full-screen as much as possible.

Start installer

Confirm the
current system

Install What do? Uninstall

Upgrade

The processing
of installing

The processing
of upgrading

The processing
of uninstalling

Quit

<<The process outline of the installer for the application>>

File copy method

The application is installed by "Installation file" in the memory card or USB memory and an integrated installer.

In this method, it is not necessary to create the installer for the application (EXE file), however, the setup application list setting is complex.

The possible installation processes by an integrated installer are as follows.

<<The possible installation processes>>

- Overwrite the designated file to an arbitrary directory.
- Copy a new file after deleting the file in an arbitrary directory when the designated file exists in an arbitrary directory.
- Overwrite the designated directory to an arbitrary directory.
- Copy a new file after deleting the directory in an arbitrary directory when the designated directory exists in an arbitrary directory.
- Delete the designated file.
- Delete the designated directory.
- Add the registry key to the registry newly.
- Add the new registry entry to the registry key.
- Change the registry entry data.

(Only following three types can be changed and added: "32-bit value (DWORD value)", "Character string value", "Binary value".)

Appendix 9.5.2 About the Memory Card or USB Memory for Upgrade

Directory configuration

The directory configuration of the memory card or USB memory for the upgrade is as follows.

Drive name:\
 CustomInstall
 Setuplst.ini
 Custom_App1
 Custom_App2
 :
 :

Directory for custom release application
(The name is "CustomInstall" fixed.)

Directory name to store installation environment of each
application (An arbitrary name)
-> Store a necessary files in this directory

Setup application list for custom release
application

Create for the root directory of the memory card or USB memory as follows:

- Directory for custom release application (directory name : CustomInstall)

Create the followings in the created directory:

- Setup application list (file name : Setuplst.ini)
- Directory to store installation environment of each application

Setup application list (Setuplst.ini)

"Setup application list" is a file to set the installation settings of each application. The integrated installer installs the application according to the setup application list setting.

(1) File name

Setup application list file name is "Setuplst.ini". Do not apply other file name. Apply the same file name to "For application of custom release" and "For application of HMI related".

(2) Description format

Setup application list (Setuplst.ini) conforms to the description format of the Windows INI file as a rule, and the maximum size of the INI file is 32KByte. Apply the same file name to "For

application of custom release" and "For application of HMI related".
The description format of Windows INI
[(Section)]
(Key) = (Value of key)
:
[(Section)]
(Key) = (Value of key)
:
:
(3) About each section and key
[APPLIST] Section
Section name APPLIST
Details
Specify the input password when application is installed and the set number of the [APP] section.
Initial value (when undefined)
No setting
1 Key name PASSWORD
Details
Specify the input password when application installation is started.
Character type which can be set : Only the alphanumeric character
Number of character which can be set : Within 15 one-byte characters
Initial value (when undefined)
No setting

2 Key name APPCOUNT
Details
Specify the number of applications (number of the [APP] section setting) registered in the integrated installer.
Setting range : 1 to 15
(15 applications or less can be registered.))
Initial value (when undefined)
0
[APP] Section
Section name APP**
Details
Specify the information of each application installation.
Specify the sequential No. (1 to 15) to the set value [APPCOUNT] of [APPLIST] section to ** of section name.
(Note 1) Number from 1 sequentially.
(Note 2) [APP] section to which larger No. than the value set to [APPCOUNT] key of [APPLIST] section is set is ignored.
Initial value (when undefined)
No setting
1 Key name NAME
Details
Specify the name displayed in "Application list".
Character type which can be set : Only the alphanumeric character
Number of character which can be set : Within 45 one-byte characters
Initial value (when undefined)
"Application" + "No. set to [APP] section (** part)"
[Example of display]
For example of [APP01] section, "Application01" is displayed in "Application list".
2 Key name DIR
Details
Specify the "Directory name to store installation environment" of each application in memory card or USB memory.
Character type which can be set : Only the alphanumeric character
Number of character which can be set : Within 100 one-byte characters
(Note 1) The following directory cannot be selected: the directory name of 100 or more characters, or the directory name used with two-byte character.
Initial value (when undefined)
No setting

3 Key name INSTALLTYPE
Details
Specify the application installation method. The key which needs setting is changed depending on this key setting value.
Setting range : 1 to 2
1 : Installer start method
2 : File copy method
Initial value (when undefined)
1 (Installer start method)
4 Key name INSTALLER
Details
Specify the file name (include the extension (.exe)) of the installer (EXE file) which is started when the installation method is "Installer start method ([INSTALLTYPE] key is 1.)".
Character type which can be set : Only the alphanumeric character
Number of character which can be set : Within 50 one-byte characters
(Note 1) Specify the installer (EXE file) which exists in the directory specified with the [DIR] key. The file name of the installer which exists in other directories cannot be specified.
(Note 2) When the installation method is "File copy method ([INSTALLTYPE] key is 2)", the key is ignored. It is not necessary to set.
Initial value (when undefined)
setup.exe

5 Key name FILE
Details
Specify the setting of operation to the file by comma-deliminated character when the installation method is "File copy method ([INSTALLTYPE] key is 2)". The format of character string is as follows.
"The format of character string"
(Action), (FileName), (ActionDir)
Name Detail
1 Action Designate the operation to the file (directory) specified by "FileName".
Setting range : 1 to 3
1 : Overwrite the file (directory) to the copy destination.
2 : Copy after the file (directory) to the copy destination is deleted.
3 : Delete the file (directory).
4 : Add an additional copy of the file (directory) to the copy destination. (Note 1)
(Note 1) Used when adding custom data afterwards. Add an additional copy of the custom file, and add the details of the custom data setting file.
2 FileName Specify the operation file (directory) name designated by "Action".
Character type which can be set : Only the alphanumeric character
Number of character which can be set : Within 50 one-byte characters
(Note 1) Specification with wild-card (*") is also possible.
["*." + extension]
[Setting example] *.txt
-> All files with "txt" as extension
["*"]
-> All files and directory
(Note 2) When the file is copied ("Action" is "1" or "2"), specify the file (directory) which exists in the directory specified with the [DIR] key. The file name (directory) which exists in other directories cannot be specified.
3 ActionDir Specify the directory path which relates to the operation designated by "Action".
Character type which can be set : Only the alphanumeric character
Number of character which can be set : Within 100 characters
<<When copying the file ("Action" is "1" or "2")>>
Specify the directory path of the file (directory) to the copy destination specified by "FileName".
<<When deleting the file ("Action" is "3")>>
Specify the directory path in which the file (directory) specified by "FileName" exists.
(Note 1) In both cases, the path is set by full path.

(Note 1) The number of [FILE] keys which can be set to one [APP**] section is up to 100. All [FILE] keys over 100 are disregarded.
(Note 2) When the application is installed, the file designated with each [FILE] key is operated by the setup application list sequence.
(Note 3) When the installation method is "Installer start method ([INSTALLTYPE] key is 1)", all [FILE] key is ignored. It is not necessary to set.
(Note 4) When the "Action" is "2" or "3" and the deleted file (directory) does not exist, the deletion is not executed. An error will not occur during installation.
(Note 5) The read-only file cannot be rewritten and deleted.
Initial value (when undefined)
No setting
6 Key name REGKEY
Details
Specify the name of registry key which is created newly when the installation method is "Installer start method ([INSTALLTYPE] key is 2.)". Set the key name including all the parents keys. Specify the separation of each key name "\".
Character type which can be set : Only the alphanumeric character
Number of character which can be set : Within 150 one-byte characters (including the parents key name and each key name separation "\")
(Note 1) The number of [REGKEY] keys which can be set to one [APP**] section is up to 100. All [REGKEY] keys over 100 are disregarded.
(Note 2) When the application is installed, the registry key designated with each [REGKEY] key is created by the setup application list sequence.
(Note 3) When the installation method is "Installer start method ([INSTALLTYPE] key is 1)", all [REGKEY] key is ignored. It is not necessary to set.
(Note 4) When the set registry key has already existed, nothing is executed. An existing registry key cannot be deleted. An error will not occur during installation.
Initial value (when undefined)
No setting

7 Key name REGKEYVALUE
Details
Specify the registry entry set to the registry key by comma-deliminated character when the installation method is "File copy method ([INSTALLTYPE] key is 2)". The format of character string is as follows.
"The format of character string"
(RegistryKeyName), (ValueName), (ValueType), (Value)
Name Details
1 RegistryKeyName Specify "Registry key name" which newly sets the registry entry. Set the key name including all the parents keys. Specify the separation of each key name "\".
Character type which can be set : Only the alphanumeric character
Number of character which can be set : Within 150 one-byte characters (including the parents key name and each key name separation "\")
2 ValueName Specify the name of the registry entry set to registry key designated by "RegistryKeyName".
Character type which can be set : Only the alphanumeric character

Number of character which can be set : Within 50 one-byte characters
3 ValueType Specify the data type of the registry entry set to registry key designated by
"RegistryKeyName".
Setting range : 1 to 3
1 : 32-bit value (DWORD value)
2 : Character string value
3 : Binary value

4 Value Specify the value of the registry entry set to registry key designated by
"RegistryKeyName".
The setting range is different depending on the setting value of "ValueType".
Setting range
[When ValueType = 1 (32-bit value)]
Notation : Either decimal or hexadecimal notation
<<Example of setting (when the value is "10000")>>
Value=10000 (decimal notation)
Value=0x2710 (hexadecimal notation)
(Note 1) Add "0x" on the head of the value when the notation is hexadecimal.
[When ValueType = 2 (character string value)]
Character type which can be set : Only the alphanumeric character
Number of character which can be set : Within 50 one-byte characters
<<Example of setting (when the value is "Custom1")>>
Value="Custom1"
(Note 2) Enclose the character string with " (double quotation mark).
[When ValueType = 3 (binary value)]
Character type which can be set : Only the alphanumeric character
Number of character which can be set : Within 50 one-byte characters
(Note 1) The number of [REGKEYVALUE] keys which can be set to one [APP**] section is up to 100. All
[REGKEYVALUE] keys over 100 are disregarded.
(Note 2) When the application is installed, the registry entry designated with each [REGKEYVALUE] key is set
by the setup application list sequence.
(Note 3) When the installation method is "Installer start method ([INSTALLTYPE] key is 1)", all
[REGKEYVALUE] key is ignored. It is not necessary to set.
(Note 4) When the designated registry entry has already existed, the existing registry entry is changed.
(Note 5) An existing registry entry cannot be deleted.
Initial value (when undefined)
No setting
(Note 1) When the application is installed, the installation is operated by the following sequence.
(1) [FILE] key : (Designated file operation)
(2) [REGKEY] key : (Add registry key)
(3) [REGKEYVALUE] key : (Add registry entry)
This sequence cannot be changed.

(Note 2) The key which needs settings are different depending on the method of installing the
application.
Installer start method
Key name Comment
1 NAME
2 DIR Indispensability
3 INSTALLTYPE
4 INSTALLER Indispensability
File copy method
Key name Comment
1 NAME
2 DIR Indispensability
3 INSTALLTYPE Indispensability
5 FILE
6 REGKEY
7 REGVALUE
(Note 3) Define the each section key to the setup application list in following the sequence.
[APPLIST] section
Key name Comment
1 PASSWORD
2 APPCOUNT Indispensability
[APP] section
Key name Comment
1 NAME
2 DIR Indispensability
3 INSTALLTYPE Indispensability
4 or
later
Any of the following:
INSTALLER
FILE
REGKEY
REGKEYVALUE
Indispensability

(4) Example of setting ("For application of custom release")
Setup application list
[APPLIST]
PASSWORD=CUSTOM

```
APPCOUNT=3
[APP1]
NAME=Custom Application(EXE)
DIR=Custom_App1
INSTALLTYPE=1
INSTALLER=Custom_SetUp.exe
[APP2]
NAME=Custom Application(FileCopy)
DIR=Custom_App2
INSTALLTYPE=2
FILE=3,temp,C:\Program Files\Custom Application2
FILE=3,*.dll,C:\Program Files\Custom Application2\work
FILE=2,*,C:\Program Files\Custom Application2
FILE=1, config.ini, D:\Custom
FILE=1, customdef.ini, D:\Custom
REGKEY=HKEY_LOCAL_MACHINE\SOFTWARE\CUSTOM\APPLICATION2\TESTDATA1
REGKEY=HKEY_LOCAL_MACHINE\SOFTWARE\CUSTOM\APPLICATION2\TESTDATA2
REGKEYVALUE=HKEY_LOCAL_MACHINE\SOFTWARE\CUSTOM\APPLICATION2\TESTDATA1,data1,1,0x64
REGKEYVALUE=HKEY_LOCAL_MACHINE\SOFTWARE\CUSTOM\APPLICATION2\TESTDATA1,data2,2,Custom App 2
REGKEYVALUE=HKEY_LOCAL_MACHINE\SOFTWARE\CUSTOM\APPLICATION2\TESTDATA1,data3,3,437573746F6D204170702032
[APP3]
NAME= G Code Guide
DIR=gcode_guide
INSTALLTYPE=2
FILE=2, *, D:\Custom\gcode_guide
FILE=1, config.ini, D:\Custom
```

The name of application displayed the "Application list"
The directory name to store the application installation environment
Methods of installing the application (Installer start method)
The EXE file (installer) name to start when application is installed
The file operation when application is installed
The registry operation when application is installed
The number of application registered the "Application list"
The G code guidance folder designated in config.ini

NOTE

[APP1] is the installer start method, and [APP2] is the file copy method.

File configuration in memory card

Drive name:\

```
 CustomInstall

 Setuplst.ini

 Custom_App1
 Custom_SetUp.exe
 Disk1
 Disk2
 Disk3

 Custom_App2
 custom1
 custom2
 custom3
 config.ini
 customdef.ini
 custom1.dll
 custom2.dll
 custom3.dll

 gcode_guide
 mg0101_jpn.htm
 mg0101_eng.htm
 config.ini
```

Directory for custom release application
Installation environment of "Custom Application (EXE)" application
Setup application list for custom release application
Installation environment of "Custom Application(FileCopy)" application
Installation environment of "G Code Guide" G code guidance
"Application list" when Custom screen menu is selected

The flow of each application installation

"Custom Application (EXE)" application

1) Select "Custom Application (EXE)" from the application list, and select [Install start] menu.
2) The installer (Custom_SetUp.exe) which exists in the "Custom_App1" directory (the installation environment of "Custom Application (EXE)" application) is started, and the installer screen is displayed in front of the screen.
3) Install the application according to the guidance displayed on the installer screen.

4) After the installation is completed, the installer screen is quitted, and return to the integrated installer screen.

"Custom Application (FileCopy)" application

1) Select "Custom Application (FileCopy)" from the application list, and select [Install start] menu.
2) Delete the "temp" directory including file if the "temp" directory exists in the "D:\Custom\Custom Application2" directory.
3) Delete the file with ".dll" as extension if the file with ".dll" as extension exists in the "D:\Custom\Custom Application2\work" directory.
4) Copy all files and directories which exist in the "Custom_App2" directory (the installation environment of "Custom Application (FileCopy)" application) after all files and directories in "D:\Custom\Custom Application2" directory are deleted.
5) Overwrite "config.ini" file which exists in "Custom_App2" directory (the installation environment of "Custom Application (FileCopy)" application) to "D:\Custom" directory.
6) Overwrite "customdef.ini" file which exists in "Custom_App2" directory (the installation environment of "Custom Application (FileCopy)" application) to "D:\Custom" directory.
7) Create the "TESTDATA1" key as a subkey of "HKEY_LOCAL_MACHINE\SOFTWARE\CUSTOM\APPLICATION2" key to the registry.
8) Create the "TESTDATA2" key as a subkey of "HKEY_LOCAL_MACHINE\SOFTWARE\CUSTOM\APPLICATION2" key to the registry.
9) Add the entry (entry name "data1", data type "32-bit value", data "0x00000064") to the key created in "6)".
10) Add the entry (entry name "data2", data type "character string value", data "Custom App 2") to the key created in "6)".
11) Add the entry (entry name "data3", data type "binary value", data "437573746F6D204170702032") to the key created in "6)".
12) The installation is completed.

"G Code Guide" G code guidance

1) Select "G Code Guide" from the application list, and select [Install start] menu.
2) Copy all files and directories which exist in the "gcode guide" directory (the installation environment of "G Code Guide" G code guidance) after all files and directories in "D:\Custom\gcode_guide" directory are deleted.
3) Overwrite "config.ini" file which exists in "gcode guide" directory (the installation environment of "G Code Guide" G code guidance) to "D:\Custom" directory.
4) The installation is completed.

Appendix 9.6 Parameter

The following table shows the related parameters.

[Parameter list]

No.	Name	Detail	Range
#1043	lang (Select language displayed)	Specify the display language. 0: English display (Standard) 1: Japanese display (Standard) 11: Display in German (Option) 12: Display in French (Option) 13: Display in Italian (Option) 14: Display in Spanish (Option) 15: Display in Chinese (Option) (traditional Chinese) 16: Display in Korean (Option) 17: Display in Portuguese (Option) 18: Display in Dutch (Option) 19: Display in Swedish (Option) 20: Display in Hungarian (Option) 21: Display in Polish (Option) 22: Display in Chinese (Option) (simplified Chinese) 23: Display in Russian (Option) 24: Display in Turkish (Option) 25: Display in Czech (Option) 31: Display in Indonesian (Option)	0 to 1 11 to 25 31

NOTE

On the standard screen, start the integrated installer after the related parameters is set.
The integrated installer cannot set the related parameters.
The integrated installer refers the parameter setting value when the integrated installer has started.
Even if the parameter is changed after starting, the change is invalid.

Appendix 9.7 Operation/Alarm Messages

The message displayed in each display part is as follows.

[Message list]

<<Operation/Power supply restart message display part>>

Message	Details
Operation message	
Install application?	It is confirmed whether the installation of the application is started. [Y] : Start the installation of the application. [N] : Do not start the installation of the application.
Select application to install	An application to install has not been selected from "Application list".
Select an application.	
Can't install application	The selected application cannot be installed. Confirm the mounting status

of the memory card or USB memory and the installation environment in the
memory card or USB memory.
Is it OK to change the
settings? (Y/N)
It is confirmed whether to start registration of applications that are
permitted to operate while the security function is enabled.
[Y] : Start registration of the application.
[N] : Do not start registration of the application.
Quit ?
It is confirmed whether the integrated installer is quitted.
[Y] : Quit the integrated installer.
[N] : Do not quit the integrated installer.
Power supply restart message
Turning the power ON again It is necessary to turn the power supply ON again because the application
was installed. Turn the power supply ON again.
<<Installation status display part>>
Message Details
Installing The application is installing.
Finish installed The application installation was completed.
Can't copy file To copy the specified file failed while installing. Confirm the setting of the
setup application list and the installation environment in the memory card.
Can't delete file To delete the specified file failed while installing. Confirm the setting of the
setup application list and the file to delete.
Can't copy directory
To copy the specified directory failed while installing. Confirm the setting of
the setup application list and the installation environment in the memory
card or USB memory.
Can't delete directory To delete the specified directory failed while installing. Confirm the setting
of the setup application list and the directory to delete.
Can't add registry key To add the specified registry key failed while installing. Confirm the setting
of the setup application list.
Can't add registry entry The registry entry could not be added to the specified registry key while
installing. Confirm the setting of the setup application list.
Can't copy
To copy the specified file or directory failed while installing. Confirm the
setting of the setup application list and the installation environment in the
memory card or USB memory.
Can't delete To delete the specified file or directory failed while installing. Confirm the
setting of the setup application list and the file/directory to delete.
Application registration is in
progress
Registering the application that is permitted to operate while the security
function is enabled.
Application registration is
complete
Registration of the application that is permitted to operate while the
security function is enabled is completed.
Unable to start security
protection
When the McAfee Application Control software is not installed, or when
the display is not provided by Mitsubishi, install McAfee Application
Control and confirm the display being used.

Appendix 9.8 Limitations
(1) Available languages for the display are "Japanese" and "English" only. If the setting value of
base common parameter "#1043 lang (Select language displayed)" is other than "0" or "1", the
language displayed is "English".
(2) When the HMI-related application installer or the data of application of custom release exists in
both the memory card and the USB memory, the data in the memory card is installed.
If the memory card has no data to install, the data in the USB memory is installed.
Appendix 9.9 Precautions
- When adding an additional copy ("4" in "Action" of [FILE] key) of Setuplst.ini for application of
custom release
(1) Files (directories) other than custom data setting files (Config.ini, customdef.ini) are overwritten.
(2) Custom data setting files (Config.ini, customdef.ini) add contents when there is no duplicated
data for all sections. However, when registered information (items within sections such as
screen No. offset values, custom screen menu positions, function buttons) is duplicated, an
installation error occurs and the data is not installed.
Refer to 17.6 Custom Release for details of each section.
(3) When the number of custom data registrations exceeds the upper limit, an installation error
occurs and the data is not installed.

Appendix 10. Installing Custom Data (M700VS/M70V/E70)
For M700VS/M70V/E70, use M70/M700 SETUP INSTALLER to install the custom screen data. Use a CF card
to install.
(1) Data for M70/M700 SETUP INSTALLER
Type Data Contents Remarks
Custom data Custom screen
module
Interpreter data and object data
Config.ini Setting file for the assignment of the
custom screen
customdef.ini Setting file for the assignment of the
custom screen to a menu or function

button on the standard screen.
customload.txt Setting file for registering the object data
name and the load order (Note)
*.jpg File for the icon image
(Note) For the module name set in [MODULE_NAME**] of Config.ini, specify the project name of NC
Designer2 excluding the extension (.IPP). For customload.txt, specify the object data name including
the extension (.o).
(2) Folder configuration in CF card
Make the following folder configuration in a CF card to store the data for M70/M700 SETUP INSTALLER.
CF card "Custom" folder (for custom data)
Custom screen modules
Setting files
"Installer" folder (for installer)
installer.o (installer)
Create the "Custom" folder
to store the data.
Create the "Installer" folder
to store the data.
Icon image files
(Note 1) installer.o is included in the M70 M700VS SETUP INSTALLER folder of the NC Designer2 software
package. Create the "Installer" folder in a CF card to store it.

Starting up M70/M700 SETUP INSTALLER
(1) Insert a CF card for M70/M700 SETUP
INSTALLER into the front panel CF.
(2) Turn the power ON while pressing the
menu.
Startup screen appears. A bleep sounds after a
while.
Then the mode selection screen
for M70/M700 SETUP INSTALLER appears.
(Note 1) Keep pressing the key until the Mode Select screen appears.

Installing custom data
(1) Press the [Custom Data] menu key on the
mode selection screen.
Custom data installation screen appears.
(2) Press the [Install] menu key. A comfirmation message appears.
(3) Press the [Yes] menu key. A message appears after the installation has
completed.
Pressing the [No] menu key returns to the first menu.
Do not turn the power OFF during the installation of custom data.

Appendix 11. Installing Custom Data (M800/M80 (Windows-less Display Unit))
The M800/M80 (Windows-less display unit) installs custom screen data using M80/M800S SETUP
INSTALLER.
Data compatible with M80/M800S SETUP INSTALLER is written onto an SD card in the following folder
configuration.
SD
- Installer
| - installer.o.....(Execution file) (Note 1)
|
- custom .....(Custom data folder)
| - PLCAlarm .....(PLC alarm message folder)
| | - PLCAlarm_0001_jpn.htm
| | -
| - (Custom screen module).o.....(Custom screen module)
| - (Custom G code guidance data) (Note 4)
| - config.ini.....(Configuration file) (Note 2)
| - customdef.ini.....(Configuration file)
| - customload.txt.....(Configuration file) (Note 2)
| - logo.jpg .....(Logo image file)
- custom15 .....(Model 15 custom data folder) (Note 6)
 - PLCAlarm .....(Model 15 PLC alarm message folder)
| - PLCAlarm_0001_jpn.htm
| -
 - (Custom screen module).o .....(Model 15 custom screen module)
 - (Custom G code guidance data) (Note 4)
 - config.ini .....(Model 15 configuration file)
 - customdef.ini .....(Model 15 configuration file)
 - customload.txt .....(Model 15 configuration file)
 - logo.jpg.....(Logo image file)
(Note 1) "installer.o" is included in the M80 M800S SETUP INSTALLER folder of the NC Designer2
software package. Create an Installer folder on an SD card, and store it in the folder.
(Note 2) For the module name set in [MODULE_NAME**] of Config.ini, specify the project name of NC
Designer2 excluding the extension (.ND2). For customload.txt, specify the object data name
including the extension (.o).
(Note 3) The custom data storage capacity is less than 12MB. The storage capacity may be different
from the data size on installation media because it is calculated on the built-in memory. Up to
6MB of storage capacity is available for custom screen module (.o file).
(Note 4) About custom G code guidance data
- Store the G code guidance data which is created in the G code guidance folder designated in

config.ini.
(Note 5) When GMEMOVER occurs, use the resource management function to delete unnecessary resource data.
(Note 6) Data of the custom15 folder is copied to the custom folder in the CNC. When specifying the path name using Config.ini, designate /custom/ instead of /custom15/ even when using 15-type display unit.

Launching M80/M800S SETUP INSTALLER

(1) Insert the SD card for the M80/M800S SETUP INSTALLER data, into the SD card interface in the front.

(2) While pressing the [Back] menu key , turn the power on.
Shortly after the startup screen is displayed, the buzzer bleeps, and the M80/M800S SETUP INSTALLER mode selection screen is displayed.

Display unit SD card

Installing custom data
(1) Press the [Custom Data] menu on the mode selection screen.
The custom data installation screen appears.
(2) Press the [Install] menu.
(3) Press the [Yes] menu.
(4) When installation is completed, "Installation completed" appears.
(Note 1) To uninstall the custom screen, press the [Uninst] menu instead of [Install] menu on the custom data installation screen. Note that uninstallation processing uninstalls the "custom screen", "PLC alarm message", and "logo file".
(Note 2) The custom data size must be less than 12MB. If the size exceeds 12MB, the message "Installation Error. Please check the file size." will appear and the data installation will not be executed.
(Note 3) Installation/uninstallation is not carried out even if the [Yes] menu is pressed continuously after installation/uninstallation has been carried out. Press the [Back] menu key to return to the first screen once.
(Note 4) Do not turn the power off during installation.
Installing...

Installing additional custom data
(1) Press the [Custom Data] menu on the mode selection screen.
The custom data installation screen appears.
(2) Press the [Add Install] menu.
(3) A confirmation message appears. Press the [Yes] menu.
(Note) Do not turn the power off during installation.
(4) When installation is completed, "Installation completed" appears.
(Note 1) Files (directories) other than custom data setting files (Config.ini, customdef.ini, customload.txt) are overwritten.
(Note 2) Custom data setting files (Config.ini, customdef.ini, customload.txt) add contents when there is no duplicated data for all sections. However, when registered information (items within sections such as screen No. offset values, custom screen menu positions, function buttons) is duplicated, the message "Installation error" will appear and the file cannot be installed. Refer to 17.6 Custom Release for details of each section.
(Note 3) When the number of custom data registrations exceed the upper limit, the message "Installation error" will appear and the file cannot be installed.
(Note 4) If the total size of custom data exceeds 12MB, the message "Installation Error. Please check the file size." will appear and the file cannot be installed.
(Note 5) Add install is not carried out even if the [Yes] menu is pressed continuously after add install has been carried out. Press the [Back] menu key to return to the first screen once.
Installing...

Appendix 12. Entry Key Code List at KeyPress/KeyRelease
The following is the entry key code list at KeyPress/KeyRelease. The entered main key code and auxiliary key code are stored in LLPARAM and LUPARAM at KeyPress/KeyRelease.

Key entry	LLPARAM	LUPARAM	Key entry	LLPARAM	LUPARAM
A	65	-	0	48	-
B	66	-	1	49	-
C	67	-	2	50	-
D	68	-	3	51	-
E	69	-	4	52	-
F	70	-	5	53	-
G	71	-	6	54	-
H	72	-	7	55	-
I	73	-	8	56	-
J	74	-	9	57	-
K	75	-	-	189	-
L	76	-	+	107	-
M	77	-	/	191	-

N 78 - * 186 BIT0
O 79 - . 190 -
P 80 - @ 192 -
Q 81 - _ 226 BIT0
R 82 - , 188 -
S 83 - ! 49 BIT0
T 84 - : 186 -
U 85 - \ 220 -
V 86 - < 188 BIT0
W 87 - > 190 BIT0
X 88 -
Y 89 - PAGE UP 33 -
Z 90 - PAGE DOWN 34 -
[219 - 37 -
] 221 - 38 -
(56 BIT0 39 -
) 57 BIT0 40 -
MONITOR 112 BIT0 | 9 BIT0
SET UP 113 BIT0 | 9 -
Edit 114 BIT0 ALTER - -
DIAGN 115 BIT0 CTRL - -
MAINTE 116 BIT0 SHIFT - -
Tab changeover left 120 BIT1 SP 32 -
Tab changeover right 121 BIT1 # 51 BIT0
Part system changeover 112 BIT1 $ 52 BIT0
SFP 120 BIT0 CB 36 BIT0
F0 121 BIT0 CAN 27 -
LIST 119 BIT1 INS 45 -
Window display 114 BIT1 DEL 46 -
Window changeover 115 BIT1 = 189 BIT0
F1 112 ~ 222 BIT0
F2 113 - EOB(;) 187 -
F3 114 -
F4 115 - INPUT 13 -
F5 116 - RESET - -
F6 117 -
NC Designer2 Instruction Manual
Appendix
715 IB-1501250-J
Key entry LLPARAM LUPARAM Key entry LLPARAM LUPARAM
F7 118 -
F8 119 -
F9 120 -
F10 121 -
CANCEL 122 -
Page feed 123 -
NOTE
The list above describes the key code that can be entered with ABC array NC keyboard.
F1 to 10, cancel, and page feed keys correspond to the buttons at the bottom of the display unit.
For LUPARAM, BIT0 is turned ON by entering Shift and BIT1 is turned ON by entering Ctrl.
(Note) Shift etc. indicated here are not the key names (buttons) on the NC keyboard, but indicated the ones by the key entry.
Ex.) When the MONITOR key is pressed, 112 is stored in LLPARAM and BIT0 for LUPARAM is turned ON.
NC Matching List [NC Designer2 full-function]
NC Designer2 must be combined with the corresponding version of NC as listed below to provide all its functions.
NC Designer2
Version
Type
M700VS M700VW M70V E70 M800W M800S M80 M80W E80
A0 K4 A0
A1 K7 A1
A2 L0 B1
A3 L6 C4
A4 L6 C6
A5 L6 D5
A6 L6 E5
A7 L6 F4
NC Matching List [Additional controls]
NC Designer2 must be combined with the corresponding version of NC as listed below to provide additional controls.
Additional control
Type
M700VS M700VW M70V E70 M800W M800S M80 M80W E80
Page change button A0 A1 A1 C0 D3
Stacked graph A0 A1 A1 C0 D3
Statistics graph A0 A1 A1 C0 D3
Alarm list C4 D3
Extension Menu C6 D3
Meter D3
Trend Graph D3
NC Matching List [Additional functions]
NC Designer2 must be combined with the corresponding version of NC as listed below to provide additional functions.
Additional function
Type
M700VS M700VW M70V E70 M800W M800S M80 M80W E80
M code guidance

release by machine
tool builders
F2
NC Matching List [Additional functions/property]
NC Designer2 must be combined with the corresponding version of NC as listed below to provide additional functions and property.
Additional functions/property
Type
M700VS M700VW M70V E70 M800W M800S M80 M80W E80
PLC message/PLC button/
PLC extension button/PLC text
"Project No." property
A0 A1 A1 C0 D5
Custom API function A0 A1 A1 C0 D5
String operation function
(C standard function) A1 A1 A1 C0 D5
LTOA/FTOA function A1 A1 A1 C0 D5
HTML browser
"Display scroll bar" property
"Painting out"
A2 A2 A2 C0 D5
Page change button
"InputKeyID" property
"MONITOR", etc.
C0 C0 C0 C0 D5
HTML browser/Scroll bar/List
"Touch gestures" property C2 C2 C2 C2 D5
Alarm list
"Message file" property
"Message conversion"
property
C6 C6 C6 C6 D5
Extension menu
"Animation direction" property
"Touch gestures" property D5 D5 D5 D5 D5
SLEEP function
Extension menu
"All OFF state" property
"Write PLC device" property
"Write PLC device enabled"
property
"Write Bit position of PLC
device" property
"Write PLC device project No."
property
"Read PLC device" property
"Read PLC device enabled"
property
"Read Bit position of PLC
device" property
"Read PLC device project No."
property
"Button type" property "Button
group1" to "Button group5"
All macro functions
E5 E5 E5 E5 E5
PLC extension button
"Character color at the time of
Focus" property
Dynamic change property
(Status 1 - 7)
E5 E5 E5 E5 E5
Input box
"Extended function (A7)
enabled" property
F2 F2 F2 F2 F2
PLC textbox
"Format" property "Character
sequence
"
F2 F2 F2 F2 F2
Custom API Library Correspondence Table
Each NC Designer2 installer includes the following custom API library version.
NC Designer2 version Custom API library version
A0 A0
A1 A1
A2 A1
A3 C3
A4 C3
A5 D5
A6 E5
A7 F4
List of Functions Supported for Each Project [Additional functions]
To use the following additional functions, you need to use a project that supports each function in the latest version of NC Designer2.
Additional functions/property
Type
M700V/M70V/E70 Series M800/M80 Series

Change theme color -
Parts library -
Property setup dialog -
Input assist function -
Template function -
Resource management function
: Supported -: Not supported
NC Designer2 Matching List [Additional controls]
Use the NC Designer2 version as listed below to use additional controls.
Additional control NC Designer2 version
Page change button A0
Stacked graph A0
Statistics Graph A0
Alarm List A3
Extension menu A4
Meter A5
Trend graph A5
(Note) When the NC Designer2 version is downgraded, the editing of projects with controls that are not supported are not guaranteed.

Revision History
Date of revision Manual No. Revision details
Nov. 2014 IB(NA)1501250-A First edition created.
May 2015 IB(NA)1501250-B Corresponded to NC Designer2 Ver.A1.
Line number display was added in Macro Edit Dialog
The functions to operate string in the macro editing were added.
Corresponded to Mitsubishi CNC M800S/M80 Series.
The following sections were added.
9.2.10 Grid
15.3.2.2 Operation Procedure with NC Compiler/NC Compiler2
16.7 String Operation Functions
Appendix 11 Installing Custom Data (M80/M800S)
The following sections were changed.
3.3.1 Function of Each Part of Basic Screen
The menu for the type of selected object was removed from the status bar.
5.1 What Is Page?
The cursor shape was changed.
6.5.3 Specifying Font Resource
Notes related to the font specifications for each model were added.
7.3.19.1 Property Settings
The "Update cycle" property was added.
7.3.19.2 Complements
The priority order of the alarm message was added.
9.7.4 Limitations
The limitation for sub cursor setting was added.
15.3.2.1 Operation Procedure with Visual Studio2010
The settings for VS2010 properties were changed.
15.6.9 Limitations
The limitations related to Custom Release were added.
16.5 Function Details
Notes of the following functions were added or changed.
GCSTextboxSetTextType
GCSTextboxSetFormatID
GCSTextboxSetGValue
GCSTextboxGetGValue
An argument was added to the following function.
GCSMenuSetNextMenuButtonState
Mistakes were corrected.
Dec. 2015 IB(NA)1501250-C Corresponded to NC Designer2 Ver.A2.
(Continue to the next page)
Date of revision Manual No. Revision details
(Continued)
The following sections were added.
5.10.9 Changing the Theme Color
8. Parts Library
16.7 Custom Release File Setting
Appendix 12. Entry Key Code List at KeyPress/KeyRelease
The following sections were changed.
2.2.3 Operating Environment of NC Designer2
Windows 10 was added.
2.3.1 File
"Correspondence table for the combination of the type and the display format"
was added.
2.3.3 View
"Change theme color" was added.
7.2.3.1 Property Settings
"Change theme color" was added.
7.2.6.1 Property Settings
"Start Effect" was changed.
7.3.1.1/7.3.2.1/7.3.3.1/7.3.4.1/7.3.5.1/7.3.6.1/7.3.7.1/7.3.8.1/7.3.9.1/7.3.10.1/7.3.1
1.17.3.18.1/7.3.19.1/7.3.20.1/7.3.21.1 Property Settings
"Color type" was added.
7.3.1.1 Property Settings
Descriptions were added to "CounterKind".
7.3.9.1 Property Settings
Descriptions were added to "DisplayNestLevel".
7.3.13.2 Complements
Descriptions related to the number of characters were added.

7.3.17.1 Property Settings
Descriptions were added to "Menu Type".
7.3.19.1 Property Settings
"Update cycle" was added.
13.1.1 Export
NOTE was added.
14.1 Generating Screen Data Source Codes
"Destination Folder" was added.
Descriptions were added to NOTE.
16.2.2 Flow of Operation
Detailed descriptions for exporting were deleted.
16.4.2 Launching the Application Window
Windows 10 was added.
16.6.4.1/16.6.5.1 Interpreter Method, 16.6.4.2/16.6.5.2 Compilation Method
Descriptions related to custom release file setting were added.
(Continue to the next page)
Date of revision Manual No. Revision details
(Continued)
17.4.2 Program Describing Method
"Function Argument" was added.
17.4.3 Programming Language
Example for error judgment in "Custom API Function" was changed.
17.5 Function Details
GCSGetStandardColor was added.
Descriptions of the following functions were added or changed.
GCSMenuSetNextMenuButtonState
GCSCounterSetCounterType
melSetData
melGetData
melGetLumpData
melSelectExecPrg
Appendix 1. Error Message List
Error messages were added.
Appendix 7. HTML Tag List
LINK was added.
Appendix 10. Installing Custom Data (M70/M70V/M700VS/E70),
Appendix 11. Installing Custom Data (M800S/M80)
Notes were added.
Mistakes were corrected.
Jul. 2017 IB(NA)1501250-D Corresponded to NC Designer2 Ver.A3.
The following sections were added.
7.1.15 Touch Gesture
7.1.16 Property Setup Dialog
7.2.5.2 Complements
7.2.10.2 Complements
7.2.11.2 Complements
7.3.12.1 Property Settings
7.3.13.1 Property Settings
7.3.25 Alarm List
12. Simulation (NC Trainer2 plus)
17.6.6 Screen Part Assignment
17.6.7 Selectable Display Assignment
17.6.10 Adjusting Standard and Customized Screen Size according to Resolution
17.6.11 Displaying an Original Logo on the Standard Screen
17.6.12.1 User Parameters
17.6.12.2 Machine Parameters
17.8 Memory Card Transfer
17.9 Home screen
(Continue to the next page)
Date of revision Manual No. Revision details
(Continued)
Appendix 8.4 Home screen
Appendix 9.8 Limitations
NC Matching List
List of Functions Supported for Each Project
The following sections were changed.
Introduction
Supported models were added.
6.5.3 Specifying Font Resource
NOTE was revised.
6.6.3 Specifying an Image File
Note was added.
7.2.5.1/7.2.10.1/7.2.11.1 Property Settings
"Operation" setting was added.
7.3.10.1/7.3.13.1/7.3.22.1 Property Settings
Note was added.
7.3.10.2 Complements
The image was changed.
7.3.22.2 Complements
Restrictions were added.
10.7.3.1 Move the Sub Cursor by Key Input (Arrow Key, TAB Key, Input Key)
10.7.3.4 Transfer a Key to Other Control
The macro example for interpreter method was revised.
15.1 Generating Screen Data Source Codes
Remedy for the resource data exceeds 5 Mbytes was added.
17.6.1 Outline
17.6.3 Development Procedure of Custom Release S/W
17.6.4.1.1 Config.ini

17.6.4.1.2 customdef.ini
17.6.4.2.1 Config.ini
17.6.5.1.2 customdef.ini
17.6.5.3.1 customdef.ini
17.6.13 Limitations
Descliptions related to screen part assignment and selectable display assignment
were added.
17.7.1.1 Custom Screen Configuration Dialog
The images were changed, display items were added, and NOTEs were revised.
17.7.2 Operation Procedure
NOTE for the custom data created by the compilation method was added.
17.10.3.1 Open S/W Keyboard Window
17.10.3.3.1 Set the Initial Display Position of the S/W Keyboard Window
17.10.3.3.2 Change the S/W Keyboard Window Position Arbitrarily While the
Window Is Being Displayed
(Continue to the next page)
Date of revision Manual No. Revision details
(Continued)
17.10.3.6 Clear S/W Keyboard Entry Area
17.10.3.9 Display S/W Keyboard Window in the Foreground
The example for compilation method was revised.
Appendix 1 Error Message List
Error messages were added.
Appendix 8.3.4 The Standard Screen After Changing
Items were added to "Setup".
Appendix 9.1 Outline
Appendix 9.2 Configuration
Appendix 9.5.1 Installation Method
Appendix 9.5.2 About the Memory Card or USB Memory for Upgrade
Appendix 9.7 Operation/Alarm Messages
USB memory was added.
Appendix 9.4.1 Installing the Application
USB memory and note were added.
Appendix 9.6 Parameter
The display language 2 and 3 were deleted.
Appendix 10 Installing Custom Data (M700VS/M70V/E70)
Note was revised.
Appendix 11 Installing Custom Data (M800/M80 (Windows-less display unit))
The folder configuration was revised, and note was revised and added.
The following section was deleted.
18. Macro Function
Mistakes were corrected.
Feb. 2018 IB(NA)1501250-E Corresponded to NC Designer2 Ver.A4.

The following sections were added.
7.2.3.1 Property Setup Dialog
7.3.14.1 Property Setup Dialog
7.3.15.1 Property Setup Dialog
7.3.18 Extension Menu (GNCExMenu); Extension Menu Display Part
7.3.23.1 Property Setup Dialog
Custom API Library Correspondence Table

The following sections were changed.
Precautions for Safety
Items in "Caution" were added.
5.5 Entering Window Properties
Note contents were revised.
(Continue to the next page)
Date of revision Manual No. Revision details
(Continued)
5.12.1.2 Resource Data Name Conversion Table Dialog
Note contents were revised.
7.3.2 CycleTime (GNXCycleTime); Cycle Time Display Part
"Cut time (CUT)" was added.
7.3.26.1 Property Settings
"Message file" was added.
"Message conversion" was added to "Message Area".
7.3.26.2 Complements
Description related to message conversion was added.
13.1.3 Output Image
Note contents were revised.
16. Features and Configuration of GUI Library
Reference was added.
17.3.2.1 Operation Procedure with Visual Studio2010
Note was added.
17.7.1.1 Custom Screen Configuration Dialog
Illustration was revised.
"Message file storage folder" description was revised.
17.8.1 Operation screen
Note contents were revised.
Appendix 1 Error Message List
Error messages were added.
Appendix 11 Installing Custom Data (M800/M80 (Windows-less Display Unit))
Custom data storage capacity was revised.
Illustration was revised.
NC Matching List
Items were added.

Mistakes were corrected.
Oct. 2018 IB(NA)1501250-F Corresponded to NC Designer2 Ver.A5.
The following sections were added.
4.7 Template function
7.1.16.4 Input assist function
7.2.2.1 Property setup dialog
7.2.6.1 Property setup dialog
7.2.10.1 Property setup dialog
7.2.14.1 Property setup dialog
7.2.15.1 Property setup dialog
7.3.18.1 Property setup dialog
7.3.26.1 Property setup dialog
7.3.27 Meter
(Continue to the next page)
Date of revision Manual No. Revision details
(Continued)
7.3.28 Trend Graph
17.6.8 G Code Guidance Release
NC Designer2 Matching List [Additional controls]
The following sections were changed.
Introduction
E80 was added to supported models.
2.3.1 File
Contents were added to "New Project".
"Write to the memory card" was added.
2.3.4 Control
"Extension Menu", "Alarm List", "Meter", "TrendGraph" were added.
2.3.8 Tool
"Open at NC Trainer2 plus" was added.
6.4.5 Importing or Exporting Character String Resource
Note was revised.
7.3.1.1 Property Settings
"FontType" of "Character Attribute" was revised.
Contents were added to "CounterKind" of "Counter Kind".
"CharacterNumber" of "Coordinate" was revised.
7.3.9.1 Property Settings
Contents were added to "DispType" of "Display".
7.3.14.1 Property Setup Dialog
The image was changed.
7.3.14.1.1 [Device Tab]
The image was changed, and items revised.
7.3.18 Extension Menu (GNCExMenu); Extension Menu Display Part
Contents regarding supported models were added.
7.3.18.2 Property Settings
"Animation direction" was added to "Menu group".
"Operation" was added.
Contents of "Destination menu group number" were revised.
Contents of "Animation direction" were added.
7.3.18.3 Complements
"Operation specifications" was added.
8.1.1 Image List Dialogue
Contents were added to Note
8.2 Operation Procedure
Operation procedure and Note were revised.
10.7.3.1 Move the Sub Cursor by Key Input (Arrow Key, TAB Key, Input Key)
"Compilation method" was revised.
10.7.3.4 Transfer a Key to Other Control
"Compilation method" was revised.
(Continue to the next page)
Date of revision Manual No. Revision details
(Continued)
17.1.1 Outline
The image of "Interpreter Method" was changed.
17.5.2.2 Changing the Menu Name While Displaying Custom Screen (Menu Release)
The contents of "Interpreter Method" and "Compilation Method" were revised.
17.5.2.3 Closing the Custom Screen (Menu Release)
The contents of "Interpreter Method" were revised.
17.6.1 Outline
Contents were added to "Menu release".
17.6.5 Menu Release
Contents were added.
17.6.5.1.2 customdef.ini
Contents of "SCREEN_TYPEXX (XX = 01 to 50)" and "MENU_POSXX (XX = 01 to 50)" were revised.
"MENU_MOVE" and a Note were added.
17.6.5.3 Changing the Arrangement of the Main Menu
Contents were added.
17.6.5.3.1 customdef.ini
Contents of "SCREEN_TYPEXX (XX = 01 to 90)" and "CHG_SCREEN_IDXX (XX = 01 to 90)" were revised.
"Supplementation 1 Screen ID" was added.
17.6.10 About the Switch of Display/Non-display of the Menu by the Parameter
Added content to explanation of "MCAppGetMenuState()".
17.6.11 Adjusting Standard and Customized Screen Size according to Resolution
A Note was added.
17.6.14 Limitations
"Common" and "Menu release" were revised.

17.9.3.1.3 Setting Application Language File (HomeScrn__.ini)
"Application language file for Japanese" was deleted.
Appendix 8.3.4 The Standard Screen After Changing
The contents were revised.
Appendix 9.5.2 About the Memory Card or USB Memory for Upgrade
"(4) Example of setting ("For application of custom release")" was revised.
Appendix 11. Installing Custom Data (M800/M80 (Windows-less Display Unit))
The contents were revised.
A Note was added.
NC Matching List
E80 was added.
Items were deleted.
Mistakes were corrected.
Sep. 2020 IB(NA)1501250-H Corresponded to NC Designer2 Ver.A6.
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Date of revision Manual No. Revision details
(Continued)
The following sections were added.
Notes on using this software
2.2.5 Precautions
6.11 Resource management
7.3.15.1.5 [Dynamic change property (Status 1 - 7)] Tab
10.3.1 Operation Screen
10.3.2 Operation Specifications
10.3.3 Restrictions
Appendix 9.9 Precautions
The following sections were changed.
1.1 What Is NC Designer2?
2.2.3 Operating Environment of NC Designer2
Details were revised.
2.2.4 Specification List
"Outline" in "Number of controls that can be created in each frame"
Note was added to "Background image file"
2.3.8 Tool
"Resource management" was added.
4.1 Creating a New Project
The images were changed.
5.4 Entering Panel Properties
Contents were added.
5.5 Entering Window Properties
Contents were added.
6. Resource
Section title was changed to "Resource".
6.2 Resource Tree
The image was changed.
7.1.7 Scrolling Caption Character String
Item was changed.
7.1.9 Solid Frame
Item and Description were changed.
7.1.15 Touch Gesture
Description was changed.
7.1.16 Property Setup Dialog
The image was changed.
7.1.16.1 Standard Control
The images were changed.
Items and Descriptions were changed.
7.2.2.1 Property Setup Dialog
The images were changed.
Items were changed.
(Continue to the next page)
Date of revision Manual No. Revision details
(Continued)
7.2.3.2 Property Settings
Item and Description were changed.
7.2.6.1 Property Setup Dialog
The image was changed.
7.2.6.1.1 [Style] Tab
The image was changed.
Item was added.
7.2.6.1.2 [Text] Tab
The image was changed.
7.2.6.1.3 [Extended] Tab
Description was changed.
7.2.6.2 Property Settings
Item and Descriptions were changed.
7.2.7.1 Property Settings
Item was changed.
7.2.8.1 Property Settings
Item was changed.
7.2.10.1.2 [Style] Tab
The image was changed.
Item was changed.
7.2.10.2 Property Settings
Item and Description were changed.
7.2.11.1 Property Settings
Items and Descriptions were changed.
7.2.12.1 Property Settings
Items and Descriptions were changed.

7.2.13.1 Property Settings
Items and Descriptions were changed.
7.2.13.2 Complements
Properties values were changed.
7.2.14.1 Property Setup Dialog
The images were changed.
Items were changed.
7.2.14.2 Property Settings
Item and Description were changed.
7.2.15.1.2 [Style] Tab
The image was changed.
7.2.15.2 Property Settings
Item and Description were changed.
7.3.12.1 Property Setup Dialog
The images were changed.
Items were changed.
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Date of revision Manual No. Revision details
(Continued)
7.3.13.2 Property Settings
Items and Description were changed.
7.3.14.2 Property Settings
Item and Description were changed.
7.3.15.1 Property Setup Dialog
The images were changed.
Descriptions related to Dynamic change property (Status 1 - 7) were added.
Item was changed.
7.3.15.2 Property Settings
"Dynamic change property" was added.
Item was added to "Character Attribute".
Items and Descriptions were added and changed.
7.3.15.3 Complements
Note was added to "Priority of PLC devices".
"Dynamic change property" was added.
7.3.16.2 Complements
Content of NOTE was changed.
7.3.18 Extension Menu (GNCExMenu); Extension Menu Display
Contents were added.
7.3.18.1 Property Setup Dialog
The image was changed.
7.3.18.1.1 [Behavior Settings] Tab
The image was changed.
The items and Descriptions were added and deleted.
7.3.18.1.2 [Style/Text] Tab
The image was changed.
Content of NOTE was changed.
Descriptions were changed.
7.3.18.2 Property Settings
Items and Descriptions were added and changed.
Contents were revised.
7.3.18.3 Complements
"Precautions" was revised.
7.3.23.1.2 [Style] Tab
The image was changed.
7.3.23.1.3 [Text] Tab
The image was changed.
7.3.23.1.4 [Extended] Tab
The image was changed.
Items were changed.
7.3.23.2 Property Settings
Item was changed.
(Continue to the next page)
Date of revision Manual No. Revision details
(Continued)
7.3.26 Alarm List (GNCAlarmList)
Section title was changed to "Alarm List (GNCAlarmList)".
7.3.27 Meter (GNCMeter)
Section title was changed to "Meter (GNCMeter)".
7.3.28 Trend Graph (GNCTrendGraph)
Section title was changed to "Trend Graph (GNCTrendGraph)".
10.1.9 Repeat
The images were changed.
Contents were changed.
10.3 Control List
Contents were changed.
11.1.3 Function List
Items were added.
15.1 Generating Screen Data Source Codes
Description was changed.
17.3.2.1 Operation Procedure with Visual Studio2010
Details were revised.
17.4.2 Launching the Application Window
Details were revised.
17.6.5.1.2 customdef.ini
Details were revised.
17.6.5.3.1 customdef.ini
Screen ID was changed.
17.6.8.2.1 File Name/17.6.8.2.2 HTML File

Contents were changed.
17.6.14 Limitations
Descriptions related to custom release in "Common" were added.
17.7.1.1 Custom Screen Configuration Dialog
In the Custom screen configuration dialog, specify
The image was changed.
Item was changed.
17.7.2 Operation Procedure
The image was changed.
17.8.1 Operation screen
The image was changed.
Items were changed.
17.8.2 Operation Procedure
The images were changed.
17.9.2.1 List of Configuration Settings Files
Contents were changed.
Appendix 1. Error Message List
Error messages were added.
(Continue to the next page)
Date of revision Manual No. Revision details
(Continued)
Appendix 9.6 Parameter
Contents were changed.
Appendix 9.3 Screen Configuration
The image was changed.
Contents were changed.
Appendix 9.5.2 About the Memory Card or USB Memory for Upgrade
Contents were changed.
Appendix 9.7 Operation/Alarm Messages
Messages were added.
Appendix 11. Installing Custom Data (M800/M80 (Windows-less Display Unit))
The images were added and changed.
Contents were added.
NC Matching List
Items were added.
Mistakes were corrected.
Oct. 2021 IB(NA)1501250-J Corresponded to NC Designer2 Ver.A7.
The following section was added.
7.3.23.1.5 [Open] Tab
7.3.23.1.6 [Close] Tab
17.6.5.5 Settings of an Operation Message
The following sections were changed.
7.2.10.2 Property Settings
Contents were changed.
7.2.14.2 Property Settings
Descriptions related to extended function were added.
7.3.13.1 Property Setup Dialog
The image was changed.
7.3.13.1.1 [Device] Tab
The image was changed.
Contents were changed.
7.3.13.1.4 [Input Range] Tab
The image was changed.
Contents were changed.
7.3.13.2 Property Settings
Contents were changed.
7.3.13.3 Complements
Contents were changed.
7.3.23.1 Property Setup Dialog
7.3.23.1.1 [Behavior Settings] Tab
7.3.23.1.2 [Style] Tab
(Continue to the next page)
Date of revision Manual No. Revision details
(Continued)
7.3.23.1.3 [Text] Tab
The image was changed.
7.3.23.1.4 [Extended] Tab
The image was changed.
Contents were changed.
7.3.23.2 Property Settings
The item was added.
7.3.23.3 Complements
Contents were changed.
10.7.4 Limitations
The item was added.
17.5.2.3 Closing the Custom Screen (Menu Release)
Contents were changed.
17.6.8 G Code Guidance Release, M Code Guidance Release
17.6.8.1 Designation of the Guidance File Folder
17.6.8.2 Format of the Guidance File
Descriptions related to M code guidance were added.
17.8.1 Operation screen
NOTE was revised.
Appendix 11. Installing Custom Data (M800/M80 (Windows-less Display Unit))
NC Matching List
Items were added.
Mistakes were corrected.

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Central Region Service Center (Chicago) European Service Headquarters (Dusseldorf, GERMANY)
.A.S.U ,16006 SIONILLI ,SLLIH NONREV ,YAWKRAP SDOOW ETAROPROC 005 YNAMREG ,NEGNITAR 28804 1 ztalP-cirtcelE-ihsibustiM
0562-874-748-1+ :XAF / 0052-874-748-1+ :LET 0195-684-2012-94+ :XAF / 0005-684-2012-94+ :LET
Minneapolis, MN Service Satellite
Detroit, MI Service Satellite South Germany Service Center (Stuttgart)
Grand Rapids, MI Service Satellite SCHELMENWASENSTRASSE 16-20, 70567 STUTTGART, GERMANY
Milwaukee, WI Service Satellite TEL: + 49-711-770598-123 / FAX: +49-711-770598-141
Cleveland, OH Service Satellite
Indianapolis, IN Service Satellite France Service Center (Paris)
St. Louis, MO Service Satellite 2 RUE DE LUNION, 92565 RUEIL-MALMAISON CEDEX, FRANCE
TEL: +33-1-41-02-83-13 / FAX: +33-1-49-01-07-25
South/East Region Service Center (Georgia)
1845 SATTELITE BOULEVARD STE. 450, DULUTH, GEORGIA 30097, U.S.A. France Service Satellite (Lyon)
2-876-1+ LET 9154-852-876-1+ XAF / 9254-85 ECNARF TSEIRP TNIAS 00896 DONOM SEUQCAJ EELLA ,021
Charleston, SC Service Satellite TEL: +33-1-41-02-83-13 / FAX: +33-1-49-01-07-25
Charlotte, NC Service Satellite
Raleigh, NC Service Satellite Italy Service Center (Milan)
Dallas, TX Service Satellite CENTRO DIR. COLLEONI, PALAZZO SIRIO, VIALE COLLEONI 7, 20864 AGRATE BRIANZA (MB) ITALY
Houston, TX Service Satellite TEL: +39-039-6053-342 / FAX: +39-039-6053-206
Hartford, CT Service Satellite
Knoxville, TN Service Satellite Italy Service Satellite (Padova)
Nashville, TN Service Satellite VIA G. SAVELLI, 24 - 35129 PADOVA, ITALY
Baltimore, MD Service Satellite TEL: +39-039-6053-342 / FAX: +39-039-6053-206
Pittsburg, PA Service Satellite
Tampa, FL Service Satellite U.K. Service Center
Syracuse, NY Service Satellite TRAVELLERS LANE, HATFIELD, HERTFORDSHIRE, AL10 8XB, U.K.
Orlando, FL Service Satellite TEL: +49-2102-486-5000 / FAX: +49-2102-486-5910
Lafayette, LA Service Satellite
Philadelphia, PA Service Satellite Spain Service Center
CTRA. RUBI, 76-80 8174 SAINT CUGAT DEL VALLES, BARCELONA SPAIN
Western Region Service Center (California) TEL: +34-935-65-2236 / FAX: +34-935-89-1579
5900-B KATELLA AVE. - 5900-A KATELLA AVE. CYPRESS, CALIFORNIA 90630, U.S.A.
TEL: +1-714-699-2625 / FAX: +1-847-478-2650 Poland Service Center
San Jose, CA Service Satellite UL.KRAKOWSKA 50, 32-083 BALICE, POLAND
Seattle, WA Service Satellite TEL: +48-12-347-6500 / FAX: +48-12-630-4701
Denver, CO Service Satellite
Hungary Service Center
Canada Region Service Center (Tronto) BUDARS OFFICE PARK, SZABADSG T 117., 2040 BUDARS, HUNGARY
AC ,2JO R3L OIRATNO ,MAHKRAM EUNEVA HT41 9924 ADAN 1074-036-21-84+ :XAF / 0056-743-21-84+ :LET
TEL: +1-905-475-7728 / FAX: +1-905-475-7935
Edmonton, AB Service Satellite Turkey Service Center
Montreal, QC Service Satellite MITSUBISHI ELECTRIC TURKEY A.
SERIFALI MAHALLESI KALE SOKAK. NO.41 34775
Mexico Region Service Center (Queretaro) UMRANIYE, ISTANBUL, TURKEY
Parque Tecnolgico Innovacin Quertaro, Lateral Carretera Estatal 431, Km 2+200, Lote 91 Modulos 1 y 2 TEL: +90-216-969-2500 / FAX: +90-216-661-44-47
Hacienda la Machorra, CP 76246, El Marqus, Quertaro, Mxico
TEL: +52-442-153 6050 Czech Republic Service Center
Monterrey, NL Service Satellite AutoCont Control Systems s.r.o (Service Partner)
Mexico City, DF Service Satellite KAFKOVA 1853/3, 702 00 OSTRAVA 2, CZECH REPUBLIC
TEL: +420-59-5691-185 / FAX: +420-59-5691-199
BRAZIL Russia Service Center
MITSUBISHI ELECTRIC RUSSIA LLC
MITSUBISHI ELECTRIC DO BRASIL COMRCIO E SERVIOS LTDA. LETNIKOVSKAYA STREET 2, BLD.1, 5TH 115114 MOSCOW, RUSSIA
Votorantim Office TEL: +7-495-721-2070 / FAX: +7-495-721-2071
AV. GISELE CONSTANTINO,1578, PARQUE BELA VISTA, VOTORANTIM-SP, BRAZIL CEP:18.110-650
TEL: +55-15-3023-9000 Sweden Service Center
Blumenau, Santa Catarina office HAMMARBACKEN 14, P.O.BOX 750 SE-19127, SOLLENTUNA, SWEDEN
TEL: +46-8-6251000 / FAX: +46-8-6251014
Bulgaria Service Center
AKHNATON Ltd. (Service Partner)
4 ANDREJ LJAPCHEV BLVD. POB 21, BG-1756 SOFIA, BULGARIA
TEL: +359-2-8176009 / FAX: +359-2-9744061
Ukraine Service Center (Kiev)
CSC Automation Ltd. (Service Partner)
4 B, YEVHENA SVERSTYUKA STR., 02002 KIEV, UKRAINE
TEL: +380-44-494-3344 / FAX: +380-44-494-3366
Belarus Service Center
TECHNIKON Ltd. (Service Partner)
NEZAVISIMOSTI PR.177, 220125 MINSK, BELARUS
TEL: +375-17-393-1177 / FAX: +375-17-393-0081
South Africa Service Center
Adroit Technologies (Service Partner)
20 WATERFORD OFFICE PARK, WATERFORD DRIVE, CNR OF WITKOPPEN ROAD,
FOURWAYS JOHANNESBURG SOUTH AFRICA
TEL: +27-11-658-8100 / FAX: +27-11- 658-8101
ASEAN CHINA
)RETNEC AF NAESA(.DTL .ETP AISA CIRTCELE IHSIBUSTIM)RETNEC AF ANIHC(.DTL)ANIHC(NOITAMOTUA CIRTCELE IHSIBUSTIM
Singapore Service Center CNC Call Center
307 ALEXANDRA ROAD #05-01/02 MITSUBISHI ELECTRIC BUILDING SINGAPORE 159943 TEL: +86-400-921-5130
TEL: +65-6473-2308 / FAX: +65-6476-7439
Shanghai Service Center
1-3,5-10,18-23/F, NO.1386 HONG QIAO ROAD, CHANG NING QU,
PHILIPPINE SHANGHAI 200336, CHINA
TEL: +86-21-2322-3030 / FAX: +86-21-2322-3000*8422
MELCO FACTORY AUTOMATION PHILIPPINES INC. Qingdao Service Center

Head Office Suzhou Service Center
128 LOPEZ RIZAL STREET, BRGY., HIGHWAY HILLS, MANDALUYONG CITY , MM PHILIPPINES 1550 Wuhan Service Center
TEL: +63-2-8256-8042 / FAX: +632-8637-2294 Ningbo Service Center
Hefei Service Center
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Vietnam Ho Chi Minh Service Center SHENZHEN 518129, CHINA
11TH & 12TH FLOOR, VIETTEL TOWER B, 285 CACH MANG THANG 8 STREET, WARD 12, DISTRICT 10, TEL: +86-755-2399-8272 / FAX: +86-755-8229-3686
HO CHI MINH CITY, VIETNAM Dongguan Service Center
TEL: +84-28-3910 5945 / FAX: +84-28-3910 5947 Xiamen Service Center
Vietnam Hanoi Service Center
24TH FLOOR, HANDICO TOWER, PHAM HUNG ROAD, ME TRI HA, ME TRI WARD, KOREA
NAM TU LIEM DISTRICT, HA NOI CITY, VIETNAM
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Korea Service Center
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INDONESIA SEOUL 07528 KOREA
TEL: +82-2-3660-9609 / FAX: +82-2-3664-8668
PT. MITSUBISHI ELECTRIC INDONESIA Korea Daegu Service Satellite
Indonesia Service Center (Cikarang)
JL. KENARI RAYA BLOK G2-07A, DELTA SILICON 5, LIPPO CIKARANG - BEKASI 17550, INDONESIA
TEL: +62-21-2961-7797 / FAX: +62-21-2961-7794 TAIWAN
MITSUBISHI ELECTRIC TAIWAN CO., LTD. (TAIWAN FA CENTER)
MALAYSIA Taiwan Taichung Service Center
NO.8-1, GONGYEQU 16TH RD., XITUN DIST., TAICHUNG CITY 40768, TAIWAN
MITSUBISHI ELECTRIC SALES MALAYSIA SDN. BHD. TEL: +886-4-2359-0688 / FAX: +886-4-2359-0689
Malaysia Service Center (Kuala Lumpur Service Center)
LOT 11, JALAN 219, P.O BOX 1036, 46860 PETALING JAYA, SELANGOR DARUL EHSAN. MALAYSIA Taiwan Taipei Service Center
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Johor Bahru Service Satellite TEL: +886-2-2833-5430 / FAX: +886-2-2833-5433
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THAILAND 11F.-1, NO.30, ZHONGZHENG S. RD., YONGKANG DIST., TAINAN CITY 71067, TAIWAN
TEL: +886-6-252-5030 / FAX: +886-6-252-5031
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Thailand Service Center (Bangkok)
101, TRUE DIGITAL PARK OFFICE, 5TH FLOOR, SUKHUMVIT ROAD, BANGCHAK, PHRAKHANONG, OCEANIA
BANGKOK, 10260 THAILAND
TEL: +66-2-092-8600 / FAX: +66-2-043-1231-33 MITSUBISHI ELECTRIC AUSTRALIA PTY. LTD.
Bowin Service Center (Chonburi) Oceania Service Center
Korat Service Center 348 VICTORIA ROAD, RYDALMERE, N.S.W. 2116 AUSTRALIA
TEL: +61-2-9684-7269/ FAX: +61-2-9684-7245
INDIA
MITSUBISHI ELECTRIC INDIA PVT., LTD.
CNC Technical Center (Bangalore)
PLOT NO. 56, 4TH MAIN ROAD, PEENYA PHASE 3,
PEENYA INDUSTRIAL AREA, BANGALORE 560058, KARNATAKA, INDIA
TEL : +91-80-4655-2121 / FAX : +91-80-4655-2147
Chennai Service Satellite
Coimbatore Service Satellite
Hyderabad Service Satellite
North India Service Center (Gurgaon)
PLOT 517, GROUND FLOOR, UDYOG VIHAR PHASE-III, GURUGRAM 122008, HARYANA, INDIA
TEL : +91-124-463-0300 / FAX : +91-124-463-0399
Ludhiana Service Satellite
Panthnagar Service Satellite
Delhi Service Satellite
Jamshedpur Service Satellite
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West India Service Center (Pune)
ICC-Devi GAURAV TECHNOLOGY PARK, UNIT NO.402, FOURTH FLOOR, NORTH WING,
SURVEY NUMBER 191-192 (P), NEXT to INDIAN CARD CLOTHING COMPANY Ltd,
OPP. VALLABH NAGAR, PIMPRI, PUNE- 411 018, MAHARASHTRA, INDIA
TEL : +91-20-6819 2274 / FAX : +91-20-4624 2100
Kolhapur Service Satellite
Aurangabad Service Satellite
Mumbai Service Satellite
West India Service Center (Ahmedabad)
204-209, 2ND FLOOR, 31FIVE, CORPORATE ROAD PRAHLADNAGAR,
AHMEDABAD -380015, GUJARAT, INDIA
TEL : + 91-79-6777 7888
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Every effort has been made to keep up with software and hardware revisions in the
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IB-1501279(ENG)-S

Alarm/Parameter Manual

M800/M80/E80 Series

Numerical Control (CNC)

Introduction

This manual describes the alarms and parameters of Mitsubishi Electric CNC.

Improper handling can cause unexpected malfunctions. To use this device correctly, be sure to read this manual before use.

Supported models of this manual are as follows:

Abbreviations for model names used in this manual are as follows:

To safely use this CNC unit, thoroughly study the "Precautions for Safety" before use.

Be sure to keep this manual on hand so that users can refer to it at any time.

Also refer to the manuals on "Manual List" as necessary.

Notes on reading this manual

(1) This manual explains general parameters which are operated on the CNC side.

For information about each machine tool, refer to manuals issued by the machine tool builder.

If the descriptions relating to "restrictions" and "allowable conditions" conflict between this manual and the machine tool builder's manual, the later has priority over the former.

(2) This manual is intended to contain as much descriptions as possible even about special operations.

The operations to which no reference is made in this manual should be considered "impossible".

Details described in this manual

In this manual, the following abbreviations might be used.

L system: Lathe system

M system: Machining center system

MTB: Machine tool builder

Supported models Abbreviations in this manual

M800W Series M850W, M830W

M800S Series M850S, M830S

M80W Series M80W

M80 Series M80 TypeA, M80 TypeB

E80 Series E80 TypeA, E80 TypeB

Abbreviations Supported models

M800, M800 Series M800W Series/M800S Series

M80, M80 Series M80W Series/M80 Series

M800/M80, M800/M80 Series M800W Series/M800S Series/M80W Series/M80 Series

M8, M8 Series M800W Series/M800S Series/M80W Series/M80 Series/E80 Series

Manual List

Manuals related to M800/M80/E80/C80 Series are listed as follows.

These manuals are written on the assumption that all optional functions are added to the targeted model.

Some functions or screens may not be available depending on the machine or specifications set by MTB. (Confirm the specifications before use.)

The manuals issued by MTB take precedence over these manuals.

Manual IB No. Purpose and Contents

M800/M80/E80 Series

Instruction Manual IB-1501274 Operation guide for NC

Explanation for screen operation, etc.

C80 Series

Instruction Manual IB-1501453 Operation guide for NC

Explanation for screen operation, etc.

M800/M80/E80/C80 Series

Programming Manual

(Lathe System) (1/2)

IB-1501275 G code programming for lathe system

Basic functions, etc.

M800/M80/E80/C80 Series

Programming Manual

(Lathe System) (2/2)

IB-1501276 G code programming for lathe system

Functions for multi-part system, high-accuracy function, etc.

M800/M80/E80/C80 Series

Programming Manual

(Machining Center System) (1/2)

IB-1501277 G code programming for machining center system

Basic functions, etc.

M800/M80/E80/C80 Series

Programming Manual

(Machining Center System) (2/2)

IB-1501278 G code programming for machining center system

Functions for multi-part system, high-accuracy function, etc.

M800/M80/E80 Series

Alarm/Parameter Manual IB-1501279 Alarms

Parameters

C80 Series

Alarm/Parameter Manual IB-1501560 Alarms

Parameters

Manuals for MTBs (NC)

Manuals for MTBs (drive section)

Manual IB No. Purpose and Contents

M800/M80/E80/C80 Series

Specifications Manual (Function) IB-1501505 Model selection

Outline of various functions

M800/M80/E80/C80 Series

Specifications Manual (Hardware) IB-1501506 Model selection

Specifications of hardware unit

M800W/M80W Series

Connection and Setup Manual IB-1501268 Detailed specifications of hardware unit

Installation, connection, wiring, setup (startup/adjustment)

M800S/M80/E80 Series
Connection and Setup Manual IB-1501269 Detailed specifications of hardware unit
Installation, connection, wiring, setup (startup/adjustment)
C80 Series
Connection and Setup Manual IB-1501452 Detailed specifications of hardware unit
Installation, connection, wiring, setup (startup/adjustment)
M800/M80/E80 Series
PLC Development Manual IB-1501270
Electrical design
I/O relation (assignment, setting, connection), field network
Development environment (PLC on-board, peripheral
development environment), etc.
M800/M80/E80 Series
PLC Programming Manual IB-1501271
Electrical design
Sequence programming
PLC support functions, etc.
M800/M80/E80/C80 Series
PLC Interface Manual IB-1501272 Electrical design
Interface signals between NC and PLC
M800/M80/E80 Series
Maintenance Manual IB-1501273 Cleaning and replacement for each unit
Other items related to maintenance
C80 Series
Maintenance Manual IB-1501454 Cleaning and replacement for each unit
Other items related to maintenance
Manual IB No. Contents
MDS-E/EH Series
Specifications Manual IB-1501226 Specifications for power supply regeneration type
MDS-E/EH Series
Instruction Manual IB-1501229 Instruction for power supply regeneration type
MDS-EJ/EJH Series
Specifications Manual IB-1501232 Specifications for regenerative resistor type
MDS-EJ/EJH Series
Instruction Manual IB-1501235 Instruction for regenerative resistor type
MDS-EM/EMH Series
Specifications Manual IB-1501238 Specifications for multi-hybrid, power supply regeneration
type
MDS-EM/EMH Series
Instruction Manual IB-1501241 Instruction for multi-hybrid, power supply regeneration type
DATA BOOK IB-1501252 Specifications of servo drive unit, spindle drive unit, motor, etc.
Manuals for MTBs (Others)
For M800/M80/E80 Series
Manual No. Purpose and Contents
GOT2000 Series Users Manual
(Hardware) SH-081194ENG Outline of hardware such as part names, external dimensions,
installation, wiring, maintenance, etc. of GOTs
GOT2000 Series Users Manual
(Utility) SH-081195ENG Outline of utilities such as screen display setting, operation
method, etc. of GOTs
GOT2000 Series Users Manual
(Monitor) SH-081196ENG Outline of each monitor function of GOTs
GOT2000 Series Connection
Manual (Mitsubishi Electric
Products)
SH-081197ENG Outline of connection types and connection method between
GOT and Mitsubishi Electric connection devices
GT Designer3 (GOT2000) Screen
Design Manual SH-081220ENG Outline of screen design method using screen creation
software GT Designer3
Manual No. Purpose and Contents
GOT2000 Series Connection
Manual (Non-Mitsubishi Electric
Products 1)
SH-081198ENG
Explanation for connection types and connection method
GOT2000 Series Connection between GOT and other company's devices
Manual (Non-Mitsubishi Electric
Products 2)
SH-081199ENG
GOT2000 Series Connection
Manual (Microcomputers, MODBUS/
Fieldbus Products, Peripherals)
SH-081200ENG
Explanation for connection types and connection method
between GOT and microcomputers, MODBUS/fieldbus
products, peripherals
GT SoftGOT2000 Version1
Operating Manual SH-081201ENG
Explanation for system configuration, screen configuration
and operation method of monitoring software GT
SoftGOT2000
GOT2000/GOT1000 Series CC-Link
Communication Unit User's Manual IB-0800351 Explanation for handling CC-Link communication unit (for
GOT2000 series/GOT1000 series)
GX Developer Version 8 Operating
Manual (Startup) SH-080372E Explanation for system configuration, installation, etc. of PLC
development tool GX Developer

GX Developer Version 8 Operating
Manual SH-080373E Explanation for operations using PLC development tool GX
Developer
GX Converter Version 1 Operating
Manual IB-0800004 Explanation for operations using data conversion tool GX
Converter
GX Works2 Installation Instructions BCN-P5999-0944 Explanation for the operating environment and installation
method of GX Works2
GX Works2 Version 1 Operating
Manual (Common) SH-080779ENG
 Explanation for the system configuration of GX Works2 and
the functions common to Simple project and Structured project
such as parameter setting, operation method for the online
function
GX Works2 Version 1 Operating
Manual (Simple Project) SH-080780ENG Explanation for methods for such as creating and monitoring
programs in Simple project of GX Works2
GX Works2 Version 1 Operating
Manual (Simple Project, Function
Block)
SH-080984ENG
 Explanation for methods for such as creating function blocks,
pasting function blocks to sequence programs, and operating
FB library in Simple project of GX Works2
GX Works2 Version 1 Operating
Manual (Structured Project) SH-080781ENG Explanation for methods for such as creating and monitoring
programs in Structured project of GX Works2
GX Works3 Installation Instructions BCN-P5999-0391 Explanation for the operating environment and installation
method of GX Works3
MELSEC-Q CC-Link System Master/
Local Module Users Manual SH-080394E Explanation for system configuration, installation, wiring, etc.
of master/local modules for CC-Link system
 For C80 Series
Reference Manual for MTBs
Manual No. Purpose and Contents
MELSEC iQ-R Module Configuration
Manual SH-081262 Outline of system configuration, specifications, installation,
wiring, maintenance, etc.
MELSEC iQ-R CPU Module Users
Manual (Startup) SH-081263 Outline of specifications, procedures before operation,
troubleshooting, etc. for CPU module
MELSEC iQ-R CPU Module Users
Manual (Application) SH-081264 Outline of memory, functions, devices, parameters, etc. for
CPU module
MELSEC iQ-R CC-Link IE Field
Network User's Manual (Application) SH-081259 Explanation for functions, parameter settings, programming,
troubleshooting, etc. of the CC-Link IE Field Network function
QCPU Users Manual (Hardware
Design, Maintenance and
Inspection)
SH-080483
 Outline of specifications, necessary knowledge to configure
the system and maintenance-related descriptions for Q series
CPU module, etc.
GX Works3 Operating Manual SH-081215 Outline of functions, programming, etc.
Manual No. Purpose and Contents
M800/M80 Series Smart safety
observation Specification manual BNP-C3072-022
 Explanation for smart safety observation function C80 Series Smart safety observation
Specification manual BNP-C3077-022
M800/M80 Series Interactive cycle
insertion (Customization)
Specification manual
BNP-C3072-121-
0003 Explanation for interactive cycle insertion
M800/M80 Series Synchronous
Control Specifications manual BNP-C3072-074 Explanation for synchronous control
M800/M80 Series Multiple-Axis
Synchronization Control
Specifications manual
BNP-C3072-339 Explanation for multiple-axis synchronization control
M800/M80 Series GOT Connection
Specifications manual BNP-C3072-314 Explanation for GOT connection
M800/M80 Series PROFIBUS-DP
Specification manual BNP-C3072-118 Explanation for PROFIBUS-DP communication function
M800/M80 Series EtherNet/IP
Specifications manual BNP-C3072-263 Explanation for EtherNet/IP
M800/M80 Series FL-net
Specifications manual BNP-C3072-368 Explanation for FL-net
M800/M80 Series CC-Link (Master/
Local) Specification manual BNP-C3072-089 Explanation for CC-Link
M800/M80 Series CC-Link IE Field
(Master/local) Specifications manual BNP-C3072-283 Explanation for CC-Link IE Field
M800/M80 Series CC-Link IE Field
Basic Specifications manual BNP-C3072-337 Explanation for CC-Link IE Field Basic
Precautions for Safety
Always read the specifications issued by the machine tool builder, this manual, related manuals and attached documents be fore installation, operation, programming, maintenance or inspection to ensure correct use.
Understand this numerical controller, safety items and cautions before using the unit.

This manual ranks the safety precautions into "DANGER", "WARNING" and "CAUTION".
Note that even items ranked as " CAUTION" may lead to serious consequences depending on the situation. All the items are important and must always be observed.
The following signs indicate prohibition and compulsory.
The meaning of each pictorial sign is as follows.
Mitsubishi Electric CNC is designed and manufactured solely for applications to machine tools to be used for industrial purpos es.
Do not use this product in any applications other than those specified above, especially those which are substantially influential on the public interest or which are expected to have significant influence on human lives or properties.
Not applicable in this manual.
Not applicable in this manual.
DANGER
When the user may be subject to imminent fatalities or major injuries if handling is mistaken.
WARNING
When the user may be subject to fatalities or major injuries if handling is mistaken.
CAUTION
When the user may be subject to medium or minor injuries or when only property damage may occur, if handling is mistaken.
This sign indicates prohibited behavior (must not do).
For example, indicates "Keep fire away".
This sign indicated a thing that is pompously (must do).
For example, indicates "it must be grounded".

CAUTION

CAUTION
rotated object
CAUTION HOT

Danger
Electric shock risk

Danger
explosive

Prohibited

Disassembly is prohibited

KEEP FIRE AWAY

General instruction

Earth ground
For Safe Use
DANGER
WARNING
(1) Product and manual
For items described as "Restrictions" or "Usable State" in this manual, the instruction manual issued by the machine tool builder takes precedence over this manual.
Items not described in this manual must be interpreted as "not possible".
This manual is written on the assumption that all the applicable functions are included. Some of them, however, may not be available for your NC system. Refer to the specifications issued by the machine tool builder before use.
Refer to the Instruction Manual issued by each machine tool builder for details on each machine tool.
Some screens and functions may differ depending on the NC system (or its version), and some functions may not be pos sible. Please confirm the specifications before use.
To protect the availability, integrity and confidentiality of the NC system against cyber-attacks including unauthorized ac cess, denial-of-service (DoS) (*1) attack, and computer virus from external sources via a network, take security measures such as firewall, VPN, and anti-virus software.
(*1) Denial-of-service (DoS) refers to a type of cyber-attack that disrupts services by overloading the system or by exploiting a vulnerability of the system.
Mitsubishi Electric assumes no responsibility for any problems caused to the NC system by any type of cyber-attacks in cluding DoS attack, unauthorized access and computer virus.
(2) Adjustments
Do not adjust or change the parameter settings greatly as operation could become unstable.
In the explanation on bits, set all bits not used, including blank bits, to "0".
(3) Troubleshooting
If the battery low warning is issued in the controller side, save the machining programs, tool data and parameters in an input/output device, and then replace the battery. When the battery alarm is issued, the machining programs, tool data and parameters may have been destroyed. Replace the battery and then reload the data.
If the battery low warning is issued in the drive unit side, immediately replace the battery. Replace the batteries while ap plying the drive unit's control power.
(4) Maintenance, inspection and part replacement
Do not short-circuit, charge, heat, incinerate or disassemble the battery.
Dispose of the spent battery according to local laws.
CAUTION
Disposal
(Note) This symbol mark is for EU countries only.
This symbol mark is according to the directive 2006/66/EC Article 20 Information for end-users and Annex II.
Your MITSUBISHI ELECTRIC product is designed and manufactured with high quality materials and components which can be recycled and/or reused.
This symbol means that batteries and accumulators, at their end-of-life, should be disposed of separately from your household waste.
If a chemical symbol is printed beneath the symbol shown above, this chemical symbol means that the battery or accumulator contains a heavy metal at a certain concentration. This will be indicated as follows:
Hg: mercury (0.0005%), Cd: cadmium (0.002%), Pb: lead (0.004%)
In the European Union there are separate collection systems for used batteries and accumulators.
Please, dispose of batteries and accumulators correctly at your local community waste collection/recycling centre.
Please, help us to conserve the environment we live in!
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BiSS is a registered trademark of iC-Haus GmbH.
Other company and product names that appear in this manual are trademarks or registered trademarks of the respective companies.

(/Japanese)
(A)

Handling of our product
(English)
This is a class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

(/Korean)
(A)
.

Contents

Alarm
1 Operation Errors (M) 3
2 Stop Codes (T)..... 43
3 Servo/Spindle Alarms (S) 53
3.1 Servo Errors (S01/S03/S04) 54
3.2 Initial Parameter Errors (S02) 64
3.3 Safety Function Errors (S05) 66
3.4 Parameter Errors (S51) 67
3.5 Servo Warnings (S52) 68
3.6 Safety Function Warnings (S53)..... 71
4 MCP Alarms (Y) 73
5 System Alarms (Z)..... 89
6 Absolute Position Detection System Alarms (Z7*) 105
7 Distance-coded Reference Scale Errors (Z8*)..... 109
8 Emergency Stop Alarms (EMG) 111
9 Computer Link Errors (L) 115
10 User PLC Alarms (U)..... 117
11 Network Service Errors (N) 127
12 Program Errors (P)..... 131
13 Smart Safety Observation Alarm (V) 171
13.1 Smart Safety Observation Error (V01/V02/V03/V04/V05/V06/V07) 172
13.2 Smart Safety Observation Warning (V50/V51/V52/V53/V54)..... 183
Parameter
14 User Parameters..... 189
14.1 Machining Parameters..... 190
14.2 Fixed Cycle Parameters 206
14.3 Control Parameters 1..... 208
14.4 Control Parameters 2..... 216
14.5 I/O Parameters 218
14.6 Axis Parameters 238
14.7 Ethernet Parameters..... 242
14.8 Computer Link Parameters..... 255
14.9 Subprogram Storage Location Parameters 258
14.10 Barrier Data (for L system only)..... 261
14.11 High-accuracy Control Parameters..... 264
14.12 High-accuracy Control Axis Parameters..... 273
14.13 Operation Parameters 275
14.14 Machining Condition Selection Parameters..... 296
14.15 Menu Selection Parameters 311
14.16 Tolerance Parameters 313
15 Machine Parameters 315
15.1 Base System Parameters 316
15.2 Base Axis Specification Parameters..... 346
15.3 Base Common Parameters 351
15.4 Axis Specifications Parameters 446
15.5 Zero Point Return Parameters..... 488
15.6 Absolute Position Detection Parameters 494
15.7 Servo Parameters..... 496
15.8 Spindle Specification Parameters..... 530
15.9 Spindle Parameters 571
15.10 Spindle-type Servo Parameters..... 604
15.11 Rotary Axis Configuration Parameters 605
15.12 PLC Timer..... 614
15.13 PLC Integrated Timer 615

15.14 PLC Counter 616
15.15 PLC Constants..... 617
15.16 PLC Bit Selection..... 618
15.17 Machine Error Compensation Parameters 620
15.18 Macro List 622
15.19 Position Switches..... 631
15.20 RIO Device Allocation Parameters 632
15.21 Open Parameters 644
15.22 Device Open Parameters 645
15.23 SRAM Open Parameters 646
15.24 CC-Link Parameters 647
15.25 PLC Axis Indexing Parameters..... 660
15.26 Machine Type Parameters..... 671
15.27 Machining Time Parameters..... 674
15.28 Safety Common Parameters 676
15.29 Safety Axis Parameters 678
15.30 Safety Spindle Parameters 684
15.31 Safety I/O Assignment Parameters 687
15.32 EtherNet/IP Parameters..... 689
15.32.1 EtherNet/IP Parameters Scanner 1..... 689
15.32.2 EtherNet/IP Parameters Scanner 2..... 692
15.32.3 EtherNet/IP Parameters Adapter 1 693
15.32.4 EtherNet/IP Parameters Adapter 2 696
15.33 CC-Link IE Field Parameters 698
15.33.1 CC-Link IE Field Network 1..... 698
15.33.2 CC-Link IE Field Network 2..... 702
15.33.3 CC-Link IE Field Master Parameters 706
15.33.4 CC-Link IE Field Network Basic..... 708
15.34 PROFIBUS-DP Parameters..... 719
15.35 FL-net Parameters..... 720
15.36 NC Axis Switch Parameters..... 732
15.37 Spindle Switch Parameters..... 733

1Operation Errors (M)
Details
[Dog overrun]
When returning to the reference position, the near-point detection limit switch did not stop over the dog, but overran the dog.
[Aux ax dog overrun]
When executing dog-type reference position, the zero point return speed is too fast or the dog length is too short.
Remedy
[Dog overrun]
Increase the length of the near-point dog.
Reduce the reference position return speed.
[Aux ax dog overrun]
Lower the zero point return speed or increase the dog length.
Details
One of the axes did not pass the Z-phase during the initial reference position return after the power was turned ON.
Remedy
Move the encoder one rotation or more in the opposite direction of the reference position, and repeat ref erence position return.
Details
[R-pnt direction illegal]
When manually returning to the reference position, the return direction differs from the axis movement direction selected with the AXIS SELECTION key.
[Aux ax R-pnt direction illegal]
When executing reference position return, the axis was moved in the opposite of the designated direction.
Remedy
[R-pnt direction illegal]
The selection of the AXIS SELECTION key's +/- direction is incorrect. The error is canceled by feeding the axis in the correct direction.
[Aux ax R-pnt direction illegal]
Move the axis in the correct direction.
Details
[External interlock axis exists]
The external interlock function has activated (the input signal is "OFF") and one of the axes has entered the interlock state.
[Aux ax external interlock]
The axis interlock function is valid.
Remedy
[External interlock axis exists]
As the interlock function has activated, release it before resuming operation.
Check the sequence on the machine side.
Check for broken wires in the interlock signal line.
[Aux ax external interlock]
Cancel the interlock signal.
M01 Dog overrun 0001
M01 Some ax does not pass Z phase 0002

M01 R-pnt direction illegal 0003
M01 External interlock axis exists 0004

Details
[Internal interlock axis exists]
The internal interlock state has been entered.
The absolute position detector axis has been removed.
A command for the manual/automatic simultaneous valid axis was issued from the automatic mode.
The manual speed command was issued while the tool length measurement 1 signal is ON.
A travel command has been issued to an inclined axis whose base axis is in control axis synchronization across part systems.
A travel command has been issued to an axis stopped by the collision detection function.
[Aux ax internal interlock]
An interlock was established by the servo OFF function.
Remedy
[Internal interlock axis exists]
The servo OFF function is valid, so release it first.
An axis that can be removed has been issued, so perform the correct operations.
The command is issued in the same direction as the direction where manual skip turned ON, so perform the correct operations.
During the manual/automatic simultaneous mode, the axis commanded in the automatic mode became the manual operation axis. Turn OFF the manual/automatic valid signal for the commanded axis.
Turn ON the power again, and perform absolute position initialization.
Turn OFF the tool length measurement 1 signal to start the program by the manual speed command.
Cancel the control axis synchronization across part systems, then issue a travel command to the inclined axis.
Cancel the collision detection alarm.
[Aux ax internal interlock]
Cancel the servo OFF.
Details
The stroke end function has activated (the input signal is "OFF") and one of the axes is in the stroke end status.
Remedy
Move the machine manually.
Check for any broken wires in the "stroke end" signal line.
Check for any limit switch failure.
Details
[S/W stroke end axis exists]
The stored stroke limit I, II, IIB or IB function has activated.
[Aux ax stored stroke limit]
The stored stroke limit was reached.
Remedy
[S/W stroke end axis exists]
Move it manually.
If the stored stroke limit in the parameter is incorrectly set, correct it.
[Aux ax stored stroke limit]
Check the stored stroke limit setting and machine position.
Details
The chuck/tail-stock barrier function turned ON, and an axis entered the stroke end state.
Remedy
Reset the alarm with reset, and move the machine in the reverse direction.
M01 Internal interlock axis exists 0005
M01 H/W stroke end axis exists 0006
M01 S/W stroke end axis exists 0007
M01 Chuck/tailstock stroke end ax 0008

Details
2nd reference position return was performed before 1st reference position return has been completed.
Remedy
Execute 1st reference position return.
Details
The operation mode was changed to MDI during single block stop at the middle point of G28/G29/G30.
Remedy
Change the operation mode.
Reset to clear the alarm.
Details
The direction for Tool length measurement cannot be determined.
Remedy
Turn OFF TLM signal, and move the tool away from the sensor.
Maintain a clearance of "#2709 TLM_approach" or more between the tool nose and the sensor.
Turn ON TLM signal, and execute tool length measurement again.
Details
The sensor signal was already ON when the tool measurement mode (TLM) signal was validated.
The sensor signal turned ON when there was no axis movement after the tool measurement mode (TLM) signal was validated.
The sensor signal turned ON at a position within 100 m from the final entry start position.
Remedy
Turn the tool measurement mode signal input OFF, and move the axis in a safe direction.
Disabling the sensor signal also clears the operation alarm.
(Note) When the "tool length measurement 1" signal is disabled, the axis can be moved in either direction. Pay attention to the movement direction.
Details
Reference position retract was performed while the coordinates had not been established.
Remedy
Execute reference position return.

Details
Reference position return had been performed during the tool retract and return, which invalidated the tool com pensation amount after the reference position return.
Remedy
The error is cleared if the operation mode is changed to other than reference position return before the
axis performs reference position return.
The error is cleared when the tool return is completed.
The error is cleared if reset 1 is input or the emergency stop button is pushed.
M01 Ref point return No. invalid 0009
M01 Illegal op in mid pt sg block 0013
M01 TLM dir. determine impossible 0017
M01 Sensor signal illegal ON 0019
M01 Ref point retract invalid 0020
M01 Tool ofs invld after R-pnt 0021

Details
[R-pnt ret invld at abs pos alm]
A zero point return signal was input during an absolute position detection alarm.
[Aux ax R ret invld at abs alm]
Reference position return was executed during an absolute position alarm.
Remedy
[R-pnt ret invld at abs pos alm]
Reset the absolute position detection alarm, and then perform zero point return.
[Aux ax R ret invld at abs alm]
Initialize the absolute position reference point and then fix the absolute position coordinates.
Details
[R-pnt ret invld at zero pt ini]
A zero point return signal was input during zero point initialization of the absolute position detection system.
[Aux ax R ret invld at ini]
Reference position return was executed during absolute position initial setting.
Remedy
[R-pnt ret invld at zero pt ini]
Complete zero point initialization, and then perform zero point return.
[Aux ax R ret invld at ini]
Initialize the absolute position reference point and then fix the absolute position coordinates.
Details
The drive unit's hardware or software does not conform to the high-accuracy skip.
Remedy
The software or hardware does not conform to the function. Contact service center.
Details
Failed to retrieve the skip coordinate value from the drive unit.
Remedy
Check the wiring.
Check the parameters.
Details
The "skip input" signal remains enabled when the operation has shifted from skip retract to measurement.
Remedy
Increase the skip retract amount.
Details
Even though the 1st skip was to the correct position, the 2nd skip could not be found.
Remedy
Check whether the measurement target has moved.
M01 R-pnt ret invld at abs pos alm 0024
M01 R-pnt ret invld at zero pt ini 0025
M01 High-accuracy skip disabled 0028
M01 Hi-ac skip coord retrieval err 0029
M01 Now skip on 0030
M01 No skip 0031

Details
Return direction in manual measurement is the opposite of the parameter setting.
Remedy
Check the setting of the parameter "#2169 Rtn dir err in manual measure" (Return direction in manual
measurement).
Move the axis manually in the direction to a safe position, then reset.
Details
The specification is not supported.
Remedy
Check the specifications.
Details
Chopping mode has been entered while the chopping axis has not completed reference position return.
All axes interlock has been applied.
Remedy
Reset the NC or disable the "chopping" signal, and then carry out the reference position return.
Details
The synchronization error of the master and slave axes exceeded the allowable value under synchronous con trol.
A deviation exceeding the synchronization error limit value was found with the synchronization deviation detec tion.
Remedy
Select the correction mode and move one of the axes in the direction in which the errors are reduced.
Check the parameter "#2024 synerr".
Increase the allowable value or reset it to "0" (check disabled).
When using simple C-axis synchronous control, set the contents of the R2589 register to "0".
Details
Synchronous tapping command was issued when the spindle select signals (SWS) for all spindles were OFF
in the multiple-spindle control II.

Remedy
Turn ON the spindle select signal (SWS) responding to the tapping spindle before performing the synchro nous tapping command.
Details
Synchronous tapping command was issued when the spindle that the spindle select signal (SWS) was ON was
not serially connected in the multiple-spindle control II.
Remedy
Make sure the spindle select signal (SWS) for the responding spindle is ON.
Consider the machine construction when issuing the command.
Details
Asynchronous tapping command was issued when M code of the spindle forward/reverse run command, set
by the parameter "#3028 sprcmm", was one of the followings in the multiple-spindle control II.
M0, M1, M2, M30, M98, M99, or M198
M code No. that commands to enable/disable the "macro interrupt" signal
Remedy
Correct the parameter "#3028 sprcmm" (Tap cycle spindle forward run/reverse run M command) setting.
M01 Rtn dir err in manual measure 0033
M01 No specifications 0036
M01 Chopping axis R-pnt incomplete 0050
M01 Synchronous error excessive 0051
M01 No spindle select signal 0053
M01 No spindle serial connection 0054
M01 Spindle fwd/rvs run para err 0055

Details
The command for the pitch or the number of threads is not correct in the synchronous tapping command of the
multiple-spindle control II.
The pitch is too small for the spindle rotation speed.
Thread number is too large for the spindle rotation speed.
Remedy
Correct the pitch, number of threads or rotation speed of the tapping spindle.
Details
The axis travel command is interlocked as the tap retract is being enabled.
Remedy
If tapping is necessary, perform tapping retract in advance. However, tapping retract is not allowed during
cycle start operation. Carry out tapping retract after resetting.
If tapping is not necessary, cancel the tap retract enabled condition by the tap retract enabled cancel sig nal.
Details
The handle ratio is too large for the handle feed clamp speed.
(The handle feed clamp speed changes according to the rapid traverse rate, external feedrate, maximum
speed outside the soft limit range and etc. (or external deceleration speed when external deceleration is valid))
Too large handle ratio means the ratio with which the machine is unable to move the distance of [iunit * handle
ratio] within 0.1ms at the clamp speed.
Example)
When iunit=B (0.001mm) and clamp speed cs (mm/min)
The operation error (M01 0060) will occur if
ratio M>cs/60(s)*0.1(ms)/0.001(mm)=cs*10/6.
Remedy
Change the settings of the handle feed clamp speed or the handle ratio.
Details
At the start of reference position initial setting, the parameter "#2034 rfpofs" (Distance-coded reference position
detection offset) is not set to "0".
Remedy
Set the parameter "#2034 rfpofs" to "0", then turn the power ON again to perform the reference position
initial setting.
Details
Reference position could not be established within the maximum scan distance.
Remedy
Check the scale to see if it has dirt or damage.
Check if the servo drive unit supports this function.
M01 Tap pitch/thread number error 0056
M01 Wait for tap retract 0057
M01 Handle ratio too large 0060
M01 R-pos offset value illegal 0065
M01 R-pos scan distance exceeded 0066

Details
One of the following operations was attempted during workpiece installation error compensation.
Manual interruption
Automatic operation handle interruption
MDI interruption
PLC interruption
Remedy
Return the operation mode to the original mode to remove the cause. During workpiece installation error
compensation, manual interruption, automatic operation handle interruption, MDI interruption, PLC inter ruption, etc. is not allowed.
Details
An axis used in the following functions is also used as an axis to perform diameter/radius designation selection.
Chopping
Synchronization control
Or diameter/radius designation selection (G10.9) was issued to the axis in the above mode.
Remedy
Check the program.
Do not carry out the following functions using an axis to perform diameter/radius designation selection.
- Chopping
- Synchronization control

Details
[No operation mode]
No operation mode
[Aux ax no operation mode]
The operation mode is not designated, or the operation mode was changed during axis movement.
Remedy
[No operation mode]
Check for any broken wires in the input mode signal wire.
Check for any failure of the MODE SELECT switch.
Correct the sequence program.
[Aux ax no operation mode]
Correctly designate the operation mode.
Details
The "cutting feed override" switch on the machine operation panel is set to"0".
The override was set to "0" during a single block stop.
Remedy
Set the "cutting feed override" switch to a value other than "0" to clear the error.
If the "cutting feed override" switch has been set to a value other than "0", check for any short circuit in the signal line.
Correct the sequence program.
M01 Illegal op in wk instl err cmp 0070
M01 Illegal op in dia/rad select 0095
M01 No operation mode 0101
M01 Cutting override zero 0102

Details
[External feed rate zero]
The MANUAL FEEDRATE switch on the machine operation panel is set to zero when the machine is in the jog mode or automatic dry run mode.
The "Manual feedrate B speed" signal is set to zero during the jog mode when Manual feedrate B is valid.
The "Each axis manual feedrate B speed" is set to zero during the jog mode when Each axis manual feedrate B is valid.
[Aux ax feedrate 0]
The feedrate set in the operation parameter is zero.
Or the override is enabled but is set to zero.
Remedy
[External feed rate zero]
Set the MANUAL FEEDRATE switch to a value other than "0" to release the error.
If the MANUAL FEEDRATE switch has been set to a value other than "0" check for any short circuit in the signal line.
Correct the sequence program.
[Aux ax feedrate 0]
Set a value other than zero in the feedrate setting or override value.
Details
The F1-digit feedrate has been set to "0" when the F1-digit feed command was executed.
Remedy
Set the F1-digit feedrate (the parameter "#1185 spd_F1" (F1 digit feedrate F1) to "#1189 spd_F5" (F1 digit feedrate F5)).
Details
The spindle stopped during the synchronous feed/thread cutting command.
Remedy
Rotate the spindle.
If the workpiece is not being cut, start dry run.
Check for any broken wire in the spindle encoder cable.
Check the connections for the spindle encoder connectors.
Check the spindle encoder pulse.
Correct the program. (commands and addresses)
Details
The axis, designated at handle feed, is out of specifications.
No axis has been selected for handle feed.
Multiple axes in a part system are allocated to a handle.
Remedy
Check for any broken wires in the handle feed axis selection signal line.
Correct the sequence program.
Check the number of axes in the specifications.
Check the axis allocation to the handle.
Details
Spindle rotation speed exceeded the axis clamp speed during the thread cutting command.
Remedy
Lower the commanded rotation speed.
M01 External feed rate zero 0103
M01 F 1-digit feed rate zero 0104
M01 Spindle stop 0105
M01 Handle feed ax No. illegal 0106
M01 Spindle rotation speed over 0107

Details
The axis, designated in the manual arbitrary feed, is out of specifications.
The feedrate in manual arbitrary feed mode is illegal.
Remedy
Check for any broken wires in the axis selection signal line or the feedrate line for the manual arbitrary feed mode.
Check the specifications for the manual arbitrary feed mode.
Details

An interlock signal has been input to lock the block start.
Remedy
Correct the sequence program.
Details
An interlock signal has been input to lock the cutting block start.
Remedy
Correct the sequence program.
Details
Restart switch has been turned ON and manual mode has been selected before the restart search is complet ed.
Remedy
Search the block to restart.
Turn the restart switch OFF.
Details
The cycle start button was pressed during program check or in program check mode.
Remedy
Press the reset button to cancel the program check mode.
Details
The cycle start button was pressed during buffer correction.
Remedy
Press the cycle start button after the buffer correction is completed.
Details
The cycle start button was pressed during resetting or tape rewinding.
Remedy
When rewinding the tape, wait for the winding to end, or press the reset button to stop the winding, and
then press the cycle start button.
During resetting, wait for the resetting to end, and then press the automatic start button.
Details
The playback switch was turned ON during editing.
Remedy
Cancel the editing by pressing the input or previous screen key before turning ON the playback switch.
M01 Fixed pnt mode feed ax illegal 0108
M01 Block start interlock 0109
M01 Cutting block start interlock 0110
M01 Restart switch ON 0111
M01 Program check mode 0112
M01 Cycle st. in buffer correct 0113
M01 In reset process 0115
M01 Playback not possible 0117

Details
The turning angle at the block joint exceeded the limit during normal line control.
In normal line control type I:
The parameter "#1523 C_feed" (Normal line control axis turning speed) has not been set.
In normal line control type II:
When turning in the inside of the arc, the set value for the parameter "#8041 C-rot. R" is larger than the arc
radius.
Remedy
Correct the program.
Correct the parameter "#1523 C_feed" (Normal line control axis turning speed) setting.
Correct the parameter "#8041 C-rot. R" setting.
Details
Any of the following conditions are occurring.
a) There is no block to run backward
b) Eight blocks without a travel command continued
Remedy
Execute forward run to clear the alarm.
Reset to clear the alarm.
Details
The synchronous correction mode switch was pressed in non-handle mode.
Remedy
Select the handle or manual arbitrary feed mode.
Turn OFF the correction mode switch.
Details
The synchronous control operation method was set (with R2589) while no synchronous control option was pro vided.
Remedy
Set "0" for "synchronous control operation method".
Details
Cycle start was attempted before resetting was completed.
Computer link B operation was attempted at the 2nd or further part system in a multi-part system.
Remedy
Perform the cycle start after resetting has been completed.
Set "#8109 HOST LINK" to "0" and then set to "1" before performing the cycle start.
Computer link B operation cannot be performed at the 2nd or further part system in a multi-part system.
Details
The basic axis corresponding to the inclined axis was started simultaneously in the manual mode while the in clined axis control was valid.
Remedy
Turn the inclined axis and basic axis start OFF for both axes. (This is also applied for manual/automatic
simultaneous start.)
Disable the basic axis compensation, or command it to axes one by one.
M01 Turn stop in normal line cntrl 0118
M01 Reverse run impossible 0119
M01 In synchronous correction mode 0120
M01 No synchronous control option 0121
M01 Computer link B not possible 0123
M01 X/Z axes simultaneous prohibit 0124

Details
The RAPID TRAVERSE OVERRIDE switch on the machine operation panel is set to "0".
Override was set to "0" during single block stop.
Remedy
Set the RAPID TRAVERSE OVERRIDE switch to a value other than "0" to clear the error.
If the RAPID TRAVERSE OVERRIDE switch has been set to a value other than "0", check for any short circuit in the signal line.
Correct the sequence program.
Details
Machine lock was applied on the return axis being manually returned to the restart position.
Remedy
Cancel the machine lock and resume the operation.
Details
Orthogonal coordinate axis name does not exist.
Rotary axis name does not exist.
A duplicate name is used for the designated orthogonal coordinate axis.
The number of axes that were selected to change tool length compensation along the tool axis amount exceeds the maximum number of axes.
The designated orthogonal coordinate axis name is the same as the rotary axis name.
Remedy
Correct the rotary axis configuration parameters.
Details
Cycle start was performed with an axis whose return to the restart position was not complete.
Remedy
Perform restart position return manually.
Validate the parameter "#1302 AutoRP" (Automatic return by program restart), then execute cycle start.
Details
After the cycle start, the "PLC interrupt" signal was turned ON during buffer correction, program restart, arbi trary reverse run, tool retract and return, high-speed high-accuracy control II, NURBS interpolation or single block stop at the middle point of G28/G29/G30.
Remedy
By turning OFF the "PLC interrupt" signal, or by resetting the NC the error can be cancelled.
Details
Restart position return was attempted in a mode where the return is disabled.
Remedy
Correct the program restart position.
Details
Compound type fixed cycle program was interrupted with manual zero point return, and cycle start was carried out without carrying out reset.
Remedy
Cancel the program execution by reset.
M01 Rapid override zero 0125
M01 Program restart machine lock 0126
M01 Rot axis parameter error 0127
M01 Restart pos return incomplete 0128
M01 PLC interruption impossible 0129
M01 Restart posn return disabled 0130
M01 Zero point return interruption 0131

Details
During the reverse run in arbitrary reverse run, any one of the part systems reverse-ran for 20 blocks.
Remedy
This error is cancelled by forward run.
Details
Any of the following modes has been turned ON during the manual arbitrary reverse run mode.
MDI interruption mode
Manual/automatic simultaneous valid (MAE1 to 8)
Arbitrary feed mode (PTP)
Arbitrary reverse control mode (RVMD)
Manual speed command enabled
High-speed simple program check mode (SMLK)
Remedy
The error can be cancelled by turning OFF the error-causing mode.
Details
High-accuracy control has been executed in a part system which has 9 or more enabled control axes, except for a slave or synchronized axis.
Remedy
Reduce the number of enabled control axes (except for a slave axis and synchronized axis) of the part system to 8 or less through synchronous control, control axis synchronization between part systems, or mixed control before executing high-accuracy control.
Details
The parameter "#12060 VblAccPreInt" (Variable-acceleration pre-interpolation acceleration/deceleration ON) is set to "1" and the parameter "#8090 SSS ON" is set to "0".
Remedy
To enable the variable acceleration pre-interpolation acceleration/deceleration, set the parameter "#8090 SSS ON" to "1".
To disable the variable acceleration pre-interpolation acceleration/deceleration, set the parameter "#12060 VblAccPreInt" to "0".
Details
Although start of automatic operation is not allowed after a machine groupwise alarm stop ("#1472 mgralmrestart"=0), start of automatic operation has been attempted after the said alarm stop.
The cycle operation is started with the guide bushing spindle synchronization related spindle is not being set.
The cycle operation is started while the "G/B spindle synchronization: temporary cancel" signal is turned ON.

Remedy
Remove the cause of the stop by alarm.
Set the parameter "#1472 mgralmrestart" (Allowing automatic operation to start after machine groupwise alarm stop) to "1".
Check the parameter "#3074 GBsp".
Turning OFF the "G/B spindle synchronization: temporary cancel" signal before starting the cycle opera tion.
M01 Excessive no. of reverse block 0133
M01 Illegal mode in prg check mode 0134
M01 Too many active axes per sys 0135
M01 Pre-intrpl variable accel err 0136
M01 Unable to start automatic mode 0137

Details
Cycle start or graphic check has been attempted during sorting of tool management data.
Remedy
Execute cycle start after the tool data sorting is completed.
Execute graphic check after the tool data sorting is completed.
Details
The parameter "#12066 Tolerance ctrl ON" is set to "1", although "#8090 SSS ON" is "0".
Remedy
To enable the tolerance control, set "#8090 SSS ON" to "1".
To disable the tolerance control, set "#12066 Tolerance ctrl ON" to "0".
Details
The following unselectable manual mode was selected during 3-dimensional coordinate conversion.
manual reference position return
Remedy
Cancel the 3-dimensional coordinate conversion modal.
Details
Axis start has been attempted with any of the following operations while the coordinate rotation by parameter for manual feed is enabled.
Tool retract and return
Manual tool length measurement
Manual skip
Remedy
Turn OFF the "Coordinate rotation by parameter: Coordinate switch for manual feed" signal.
Details
Two or more of the three basic axes were started at a time for the coordinate rotation by parameter for manual feed.
Remedy
Disable the coordinate rotation by parameter for manual feed or start one axis at a time.
Details
The override became "0" in the chopping operation.
Remedy
Check the chopping override (R2503).
Check the rapid traverse override (R2502).
Details
A chopping axis movement command was issued from the program during the chopping mode. (This alarm will not occur for the command with the movement amount "0".)
(All axes interlock state will be applied.)
Remedy
Press the reset button or turn OFF the "chopping" signal. When the "chopping" signal is turned OFF, the axis returns to the reference position and performs the movement command in the program.
M01 Tool data sorting in progress 0138
M01 Tolerance control invalid 0139
M01 Ill manualmode select in 3Dcnv 0145
M01 Start err in PRM rot manu feed 0146
M01 Multiaxes in RRM rot manu feed 0147
M01 Chopping override zero 0150
M01 Command axis chopping axis 0151

Details
The bottom dead center position is set to the same position as the upper dead center position.
Remedy
Correct the bottom dead center position.
Details
Chopping has been attempted while the chopping axis is selected as the handle axis.
Remedy
Select an axis other than the chopping axis as the handle axis, or start chopping after changing the mode to the other mode.
Details
The drive unit's software or hardware does not conform to the direct command mode.
Inclined axis control is active.
Control axis synchronization between part systems is active.
Control axis superimposition was activated during direct command mode.
Remedy
The software or hardware does not conform to the function. Contact service center.
Turn the inclined axis control valid signal OFF.
Turn the synchronous control request signal OFF.
Turn the superimposition control request signal OFF.
Details
Cycle start was carried out without reset after the retract in direct command mode.
Remedy
Finish the machining for now by resetting the NC.
Details

[No speed set out of soft limit]
The axis, without any maximum speed outside of the soft limit range set, was returned from the outside of the soft limit range.
[Aux ax sta No. illegal]
A station No. exceeding the No. of indexed divisions was designated.
Remedy
[No speed set out of soft limit]
Correct the parameter "#2021 out_f" (Maximum speed outside soft limit range) setting.
Correct the soft limit range (with the parameter "#2013 OT-" (Soft limit I-) and "#2014 OT+" (Soft limit I+)).
[Aux ax sta No. illegal]
Correctly designate the station No.
Details
Automatic/manual operation was started before reference position return was executed with the incremental system.
Remedy
Execute the reference position return.
M01 Bottom dead center pos. zero 0153
M01 Chopping disable for handle ax 0154
M01 Dir cmnd mode invalid 0157
M01 Dir cmnd mode restart invalid 0158
M01 No speed set out of soft limit 0160
M01 Aux ax R-pnt ret incomplete 0161

Details
The start signal was input while initializing the absolute position reference point.
Remedy
Complete the absolute position reference point initialization.
Details
The start signal was input during an absolute position alarm.
Remedy
Initialize the absolute position reference point and then fix the absolute position coordinates.
Details
The manual operation mode was started during the random positioning mode.
Remedy
Turn the random positioning mode OFF before switching to the manual operation mode.
Details
The commanded station No. was higher than 20 or the number of indexing stations during uneven indexing.
The station No.0 was specified during uneven indexing.
Remedy
Check the commanded station No. and the parameter "#12801 aux_station" setting.
Details
One of the following attempts was made on an axis that is switchable between NC axis and auxiliary axis.
A command intended for an NC axis in manual mode was issued to an auxiliary axis.
NC axis control select signal was turned OFF while the NC axis was in motion.
NC axis control select signal was turned ON while the auxiliary axis was in motion.
Remedy
If you wish to issue a command intended for an NC axis in manual mode, turn ON the NC axis control select signal so as to set the axis as an NC axis.
Do not change NC axis control select signal while the axis is in motion.
Details
Torque limit value of the parameter group to use is "0".
Remedy
Check the torque limit value of the parameter group to use (#12814 aux_TL1, #12824 aux_TL2, #12834 aux_TL3, or #12844 aux_TL4).
Details
Illegal operation was attempted during tool tip center control.
Remedy
Change the operation mode to the previous one and restart.
M01 Aux abs position initializing 0162
M01 Aux ax abs position error 0163
M01 Aux ax arbitrary positioning 0164
M01 Aux uneven index sta No. ilgl 0165
M01 Aux axis changeover error 0166
M01 Aux ax torque limit value zero 0167
M01 Ill. op during T tip control 0170

Details
Any of the following operations was performed during spline interpolation 2.
Change to manual mode
Change to MDI mode
PLC interruption
Remedy
Return to the original operation mode, and then remove the error cause.
Details
Any of the following illegal operations was attempted during inclined surface machining mode.
Manual interrupt
Handle interrupt in automatic operation
MDI interrupt
PLC interrupt
Arbitrary reverse run
Remedy
Switch the operation mode back to the previous to remove the cause of this failure.
During inclined surface machining mode, it's impossible to perform manual interrupt, handle interrupt in automatic operation, MDI interrupt, PLC interrupt, etc.

Details
The operation you input cannot be executed under the axis configuration of the part system.
3D manual feed was attempted.
The rotation center error compensation has been turned ON.
The rotary axis is set to the spindle mode of the spindle position control.
An unavailable function command was given when "Select specifications of rotation direction parameter" is enabled (#1450/bit3 = 1), and the left-hand screw direction is selected by the rotation direction parameter (#7923, #7933, #7943, #7953 = 1).
Remedy
Check the rotary axis configuration parameters.
Correct the axis configuration of the part system.
Reset the NC or remove the error cause to cancel the alarm.
Details
The rotary axis configuration parameter switch request signal has turned ON for a part system where any of the following modes is active.
Tool center point control mode
Inclined surface machining mode
Workpiece installation error compensation mode
Tool axis direction tool length compensation mode
Simple inclined surface machining mode
3D radius compensation mode
3D manual feed
Tool handle feed & interruption
R-Navi mode
Remedy
Cancel the alarm by NC reset or by turning OFF the rotary axis configuration parameter switch request signal.
M01 Illegal op in spline interpol2 0180
M01 Illegal OP in tilted face cut 0185
M01 Invalid axis configuration 0186
M01 Rotary axis para unswitchable 0187

Details
3D machine interference check is disabled. This alarm is output to NC alarm 5.
Remedy
Enable all the interference check settings.
If there is any axis which has not completed zero point return, establish the zero point first.
Details
It was judged that an interference occurred in the No.1 step interference check and caused a deceleration stop.
When machine interference is detected, the interfered part is highlighted (yellow/red) and the part's name is displayed on the 3D monitor's model display.
Remedy
Move the axis in a direction which does not cause interference.
Press RESET to cancel the alarm.
(In manual operation)
You can move the axis in the same travel direction as before the interference.
But the axis movement is done using the 2nd step interference check distance.
Details
It was judged that an interference occurred in the No.2 step interference check and caused a deceleration stop.
When machine interference is detected, the interfered part is highlighted (red) and the part's name is displayed on the 3D monitor's model display.
Remedy
Move the axis in a direction which doesn't cause interference.
Press RESET to cancel the alarm.
Details
Tool interference check has been disabled.
This alarm is output to the NC alarm 5.
Remedy
Turn ON the [Tool check] menu of 3D monitor.
Set the tool data.
If you prevent an alarm from being output while the tool interference check is disabled, set "0" in "#11100 3D_MChk_ToolAlm".
Details
The given command has caused any axis other than those commanded to move. So the total number of axes to move has exceeded the maximum number of simultaneous contour control axes.
Remedy
Check the maximum number of simultaneous contour control axes of your NC.
Check the machining program to make sure the total number of axes to move will not exceed the maximum number of simultaneous contour control axes.
Details
The PFCHR signal has been switched (from ON to OFF or OFF to ON) during automatic operation.
Remedy
Use G188 to change the program format during automatic operation.
* The warning display is cancelled by changing PFCHR back to the previous state.
M01 Interference check disabled 0200
M01 Machine interference 1 0201
M01 Machine interference 2 0202
M01 Tool interfere. check disabled 0205
M01 Too many simul. control axes 0211
M01 Changing prg format disabled 0215

Details
The following parameters are enabled while there is no option for Rapid traverse block overlap.
"#1442 G0ol" (Enable G00 rapid traverse block overlap)

"#1443 G28ol" (Enable G28 rapid traverse block overlap)
"#12056 I_G0ol" (Enable G00 initial rapid traverse block overlap)
Remedy
Check the specification.
Disable the parameter.
Details
You have set 13 or more axes as the objectives of 3D machine interference check.
Remedy
Correct the setting of "#2673 3D_MChk_Ax".
Details
The commanded function is invalid during 3D machine interference check.
Remedy
Disable interference check before the command.
Details
More than one axis was designated in manual mode while the 3-dimensional manual feed was valid.
Remedy
Command the manual feed to each axis one by one.
Details
More than one of the three bits for selecting hypothetical coordinate system was turned ON.
Virtual coordinate system was selected while the 3-dimensional manual feed was invalidated by the pa rameter setting.
The manual tool length measurement or workpiece position measurement is being attempted.
Remedy
Check the sequence program.
Enable 3-dimensional tool radius compensation (set the parameter "#7912 NO_MANUAL" to "0").
Finish the manual tool length measurement or workpiece position measurement.
Details
An illegal operation (such as manual interrupt) was attempted during 3-dimensional tool radius compensation
(tool vertical direction compensation).
Remedy
Operations such as manual interrupt are disabled while 3-dimensional tool radius compensation (tool ver tical direction compensation) is being performed.
Details
Hypothetical coordinate system has been selected although 3D manual feed is not included in the specifica tions.
Remedy
Turn OFF all the 3D manual feed coordinate system selection signals (including MJCT).
M01 Rapid block overlap inv 0216
M01 Too many axes in 3D interf chk 0220
M01 Invalid cmd in 3D interf check 0221
M01 Multi ax for 3D manual feed 0230
M01 3D manual feed coord sys err 0231
M01 Illegal op in 3D tool R comp 0232
M01 Coord select w/o 3D man. Feed 0233

Details
No option of rotation center error compensation is found.
Remedy
Check the specifications.
Details
The calculated compensation amount was excessive, thus the amount was clamped to +/- 1mm.
Compensation for angle deviation was executed although the preset tool length is not in the height-axis
direction.
Remedy
Check the values of the position deviation and the angle deviation.
Check the tool length value.
Details
You executed cycle start while measurement of rotation center error or workpiece installation error is invalid.
Remedy
Execute cycle start for one part system that is ready for measurement.
Activate memory mode before executing cycle start.
Details
You switched the operation to any mode other than memory during measurement of rotation center error or
workpiece installation error.
Remedy
Switch the operation to memory mode.
Manual interruption, automatic operation handle interruption, MDI interruption, etc. are invalid during error mea surement.
Execute cycle start after completion or cancel of the measurement.
Details
Machining surface operation (selection, indexing or cancel) was attempted while the operation is disabled.
Remedy
Cancel the other modes so that the inclined surface machining command (G68.2), tool axis direction con trol (G53.1) and the inclined surface machining cancel command (G69) can be issued.
Wait until the axes stop completely (until the smoothing for all axes reaches zero).
Perform operation search for machining programs.
Details
Moving a rotary axis was attempted during manual machining surface indexing, when a manual operation
mode other than handle mode was selected.
Remedy
Change the operation mode to a handle mode before carrying out the manual surface indexing.
Details
The tool length compensation amount for performing the R-Navi indexing type 2 is 0.
Remedy
Set the tool length compensation amount for performing the indexing type 2 to a value other than 0.
M01 No spec: Rot center error comp 0240
M01 Rot center err comp incorrect 0241
M01 Unable to start measuring err 0245
M01 Invalid op mode in err measure 0246
M01 Machining surface operation disabled 0250
M01 Axs travel n/a in manual index 0251

M01 Tool length compensation amt 0 0252

Details
Manual feed feature coordinate system was selected while two or more handles were ON.
Remedy
Manual feed on a feature coordinate system is disabled while two or more handles are enabled (*).
Press [Manual coord] and select the machine coordinate system.
Reduce the number of enabled handles (*) to one.
(*) An enabled handle means the handle for which "Nth handle valid" signal (HSnS) is ON.
Details
The spatial error compensation option is not available.
Remedy
Check the specifications.
Details
The compensation amount is outside the setting range.
Due to the calculation of the excessive amount, it is clamped by +/-1mm.
Remedy
Set the compensation amount within the setting range.
Details
A measurement condition adjustment or backlash adjustment was attempted to an axis with which auto matic backlash adjustment is impossible.
A measurement condition adjustment or backlash adjustment was attempted even though all the axes had
not reached the 1st reference position.
The operation mode is other than memory mode.
The slave axis of synchronous control is selected as adjustment axis.
An attempt has been made to start an adjustment by cycle start.
Remedy
Check the adjustment axis.
Start the adjustment after all the axes return to the 1st reference position.
Check the operation mode.
Select the master axis of synchronous control as adjustment axis when adjusting the slave axis.
Start the adjustment by automatic backlash adjustment start signal.
Details
An illegal operation was attempted during measurement condition adjustment or backlash adjustment.
Remedy
Continue the operation after canceling the measurement condition adjustment and backlash adjustment.
Details
The APLC authentication password is inconsistent.
Remedy
Contact the machine tool builder.
M01 Feat coord ill w/ multi-handle 0253
M01 No spec: Spatial error comp 0260
M01 Spatial error comp excessive 0261
M01 Auto backlash adjust illegal 0270
M01 Operating auto backlash adjust 0271
M01 APLC password mismatch 0280

Details
The drive unit's hardware or software does not conform to the high-cycle sampling mode.
High-cycle data are not used even when high-cycle sampling has been set.
High-cycle sampling was attempted while the axis targeted for high-cycle sampling was moving.
High-cycle sampling was attempted during speed monitor mode.
High-cycle sampling was attempted while any of the following operations is being executed: Dog-type zero
point return, absolute position setting, synchronous tapping, spindle synchronization, hobbing, tool spindle
synchronization IC.
Remedy
The software or hardware does not conform to the function. Contact service center.
Set data for high-cycle sampling.
Execute high-cycle sampling after stopping the axis targeted for high-cycle sampling.
Execute high-cycle sampling after cancelling the speed monitor mode.
Execute high-cycle sampling after stopping the currently executed functions.
Details
An attempt to activate "Speed monitor mode" was made during the high-cycle sampling mode.
An attempt to change the gear signal was made during the high-cycle sampling mode.
An attempt to execute spindle orientation was made during the high-cycle sampling mode.
Spindle detach was attempted during the high-cycle sampling mode.
Any of the following operations was attempted during the high-cycle sampling mode: Dog-type zero point
return, absolute position setting, spindle/C axis changeover, synchronous tapping, spindle synchronization,
hobbing, or tool spindle synchronization IC.
Remedy
Change the speed monitor mode signal back, finish high-cycle sampling, and then select the speed mon itor mode.
Change the gear signal back, finish high-cycle sampling, and then change the gear.
Change the spindle orientation signal back, finish high-cycle sampling, and then execute orientation.
Change the spindle detach signal back, finish high-cycle sampling, and then carry out spindle detachment.
Execute the operation after terminating high-cycle sampling.
Details
A function which is unavailable during parameter write was commanded.
Spindle/C axis changeover
Speed observation mode signal ON
High-speed synchronous tapping
PLC axis indexing
Remedy
Cancel the write of the parameter.
Command the following functions after the parameter write is completed.
- Spindle/C axis changeover

- Speed observation mode signal ON
- High-speed synchronous tapping
- PLC axis indexing

Details

Z phase detection has failed to be completed during execution of proximity-switch orientation.

Remedy

Check for a failure of the proximity switch.

M01 High-cycle sampling disabled 0290

M01 N/A during high-cycle sampling 0291

M01 Invalid cmd during param write 0292 (Axis name)

M01 SP orient. Z detection error 0301

Details

Communication with BiSS encoder failed.

Remedy

Check parameters "#11376 BiSS_enc_rate" through "#11380 BiSS_enc1_CRC_init".

Details

Communication with BiSS encoder failed.

Remedy

Check the cable connected with BiSS encoder.

Details

Communication with BiSS encoder failed.

Remedy

Check the cable connected with BiSS encoder.

Details

The conditions for starting brake wear diagnostics are not met when the brake wear diagnostics start signal (BWDSTm) is turned on.

The cause preventing brake wear diagnostics from starting is displayed.

(If there is more than one cause, the cause with the smallest number is displayed.)

0001: part systems in automatic operation

0002: not in in-position

0003: in servo OFF state

0004: in current limit

0005: synchronous control secondary axis

0006: in superimposition control

0007: in arbitrary axis exchange control

0008: in mixed control

0009: invalid brake wear diagnostics parameters

000A: reference position establishment incomplete

000B: meeting exclusion condition of brake wear diagnostics

000C: secondary axis brake wear diagnostics invalid

000D: secondary axis unable to start brake wear diagnostics

000E: secondary axis in single method

1001: unable to start due to Smart Safety observation

1002: PLC axis unable to start brake wear diagnostics

1003: in brake wear diagnostics alarm reset ON

1004: in coordinate rotation

1005: controlled as auxiliary axis

1007: inclined axis under inclined axis control

1008: multiple-axis synchronization control secondary axis

1009: secondary axis brake wear diagnostics invalid

100A: secondary axis unable to start brake wear diagnostics

100B: axis involved in control axis synchronization between part systems

Remedy

Check the conditions for starting brake wear diagnostics.

Brake wear diagnostics will be started after the cause of the alarm is resolved, and the brake wear diagnostics start signal is turned on again.

M01 BiSS encoder comm error 1 0350

M01 BiSS encoder comm error 2 0351

M01 BiSS encoder comm error 3 0352

M01 Unable to start BrakeWear Diag 0370

Details

The axis travel amount exceeded the allowable value during brake wear diagnostics.

The axis name of the axis where the error occurred is displayed.

Remedy

Move the axis to a safe position with manual operation, turn off the power, and take corrective action for the brake. This warning is cleared upon successful completion of brake wear diagnostics, which is per formed after the power is turned back on.

This warning can be cleared by the brake wear diagnostics alarm reset signal. The brake wear diagnostics incomplete signal (BWDNFm) remains on.

Details

Specifications do not include brake wear diagnostics.

Remedy

Check the specifications.

Details

A machine command was issued to the superimposed axis.

Reference position return was attempted on the superimposed axis.

Skip command was issued to the reference or superimposed axis.

Dog-type reference position return was attempted on the reference axis.

Remedy

Correct the program.

Details

Superimposition start command was issued to the axis which was in any of the following states.

Synchronization control

Milling interpolation
Feed-forward thread cutting control
Superimposition start command was issued to the axis which was under superimposition control.
Superimposition start command was issued to an axis that belongs to the same part system as a reference
or synchronized axis of control axis synchronization between part systems.
Remedy
Correct the program.
Turn OFF the feed-forward control request signal.
Details
G114.n has been commanded during the execution of G114.n.
G51.2 has been commanded when G51.2 spindle-spindle polygon machining mode has been already entered
at another part system.
Multiple spindle synchronization set command is illegal.
Remedy
Command G113 to cancel the operation.
Turn ON the "spindle synchronization cancel" signal (Y18B8: SPSYC) to cancel the operation.
Command G50.2 to cancel the operation.
Turn ON the "spindle-spindle polygon cancel" signal (YCD1) to cancel the operation.
Correct the program.
Details
The spindle is being used in synchronized tapping.
Remedy
Cancel the synchronized tapping.
M01 BrakeWearDiagnostics (Warning) 0371
M01 No spec: Brake wear diagnostics 0372
M01 Illegal movement command during superimposition 1003
M01 Superimposition command illegal 1004
M01 G114.n command illegal 1005
M01 Spindle in-use by synchro tap 1007

Details
A forward run, reverse run, orientation, synchronous tapping, spindle synchronization, tool spindle syn chronization I, tool spindle synchronization II or C-axis servo ON command was issued to the reference
spindle while the guide bushing spindle synchronization signal was OFF.
The guide bushing spindle synchronization signal was turned OFF during a forward run, reverse run, ori entation, synchronous tapping, spindle synchronization, tool spindle synchronization I, tool spindle synchro nization II or C-axis servo ON command.
Orientation was commanded during the "guide bushing spindle synchronization" signal ON with spindle
zero point detection with proximity switch and turret indexing enabled.
C axis servo ON was commanded during the "guide bushing spindle synchronization" signal ON with spin dle C axis parameter change enabled.
Remedy
Check the ladder program.
Check the parameters.
Details
An analog spindle is used for the master spindle or the guide bushing spindle.
Spindle-mode servo is used for the master spindle or the guide bushing spindle.
Turret gear change control valid spindle is used for the master spindle or the guide bushing spindle.
Remedy
Check the parameters.
Change the reference spindle or the guide bushing spindle to spindle drive unit.
Change the reference spindle or the guide bushing spindle to turret gear change control invalid.
Details
The guide bushing spindle synchronization phase memory signal was turned ON while the master spindle
or guide bushing spindle was rotating.
The guide bushing spindle synchronization phase memory signal was turned ON while the guide bushing
spindle synchronization signal was OFF.
Remedy
Check the ladder program.
Details
The guide bushing spindle synchronization phase alignment signal was turned ON while the master spin dle or guide bushing spindle was stopped.
Remedy
Check the ladder program.
Details
When the guide bushing spindle synchronization phase memory signal was ON, the master spindle or
guide bushing spindles Z-phase was not passed.
Remedy
Check the ladder program.
Details
Toward the synchronous tapping spindle, the switch to servo-mode is commanded to the spindle-mode rotary
axis.
The spindle-mode rotary axis in servo-mode is commanded as the synchronous tapping spindle.
Remedy
Switch to the spindle-mode rotary axis.
M01 GB spindle synchro signal OFF 1014
M01 GB SP sync:Spindle type error 1015
M01 GB SP sync:Phase mem sgnl ilgl 1021
M01 GB SP sync:Phase set sgnl ilgl 1022
M01 GB SP sync:Z phase not pass 1023
M01 Cmnd impsbl in spindle rtry ax 1024

Details
Spindle superimposition control command has been given to an orientation mode spindle with the said
spindle treated as either the reference or superimposed spindle.
Orientation command has been given to the reference or superimposed spindle that is under spindle su perimposition control.
Remedy
Cancel the orientation mode.

Use G113 or the "Spindle sync cancel" signal to cancel spindle superimposition.
Details
C axis mode command has been issued for polygon machining spindle.
C axis mode command has been issued for synchronized tapping spindle.
Polygon command has been issued for synchronized tapping spindle.
Spindle is being used as spindle/C axis.
Remedy
Cancel the C axis command.
Cancel the polygon machining command.
Cancel the C axis with servo OFF.
Details
The lead axis for thread recutting is not present in a thread recut enabled part system.
A variable lead thread cut command has been given in the first thread cut block of thread recutting.
Remedy
Thread recutting is not supported. Disable thread recutting or press RESET to cancel the alarm, and cor rect the program.
Details
The lead axis and spindle for thread cutting are different from those predetermined.
Remedy
Disable thread recutting or press RESET to cancel the alarm, and correct the settings of lead axis and spin dle.
Details
"#8045 Varying spd thread" has been set to "1" to issue a variable speed thread cut command even
though the function is not included in the specifications.
A variable speed thread cut command has been given while the feed axis acceleration/deceleration type
is soft acceleration/deceleration.
A variable speed thread cut command has been given while the spindle encoder signal is not sent via serial
input.
A variable speed thread cut command has been given even though the spindle, lead axis or plane com posing axes are controlled by drive other than MDS-E Series.
The spindle intended for thread cutting is executing synchronous tapping, spindle synchronization, guide
bushing spindle synchronization or spindle/C axis control.
Remedy
Check the specifications.
Check the parameters.
Check the program.
Check the Encoder selection signal (R register).
M01 Other cmnd disabled in orient. 1025
M01 SP-C ax ctrl runs independntly 1026
M01 Thread recutting impossible 1027
M01 Thread recutting data illegal 1028
M01 Variable speed thread disabled 1029

Details
Different M codes were each commanded as synchronization M code in each of the two part systems.
Synchronization with the "!" code was commanded in another part system during M code synchronization.
Synchronization with the M code was commanded in another part system during synchronization with the "!"
code.
Remedy
Correct the program so that the M codes match.
Correct the program so that the same synchronization codes are commanded.
Details
The "C axis selection" signal has been changed when the multiple C axes selection is not available.
The selected axis by the "C axis selection" signal cannot be controlled for the multiple C axes selection.
Remedy
Correct the parameter settings and program.
Details
Tap retract has been executed with a different spindle selected. Cutting feed is in wait state until synchroniza tion is completed.
Remedy
Select the spindle for which tap cycle was halted before turning ON the "tap retract" signal.
Details
Cutting feed is in wait state until synchronization is completed.
Remedy
Wait for the synchronization to end.
Details
There is a mistake in the settings of mixed control axis parameters (crsax [1] to [8]).
Mixed control was attempted within one and the same part system.
Any of the parameter settings is disabling mixed control.
Remedy
Check the parameter settings for mixed synchronization control.
M01 Synchronization mismatch 1030
M01 Multiple C axes select invalid 1031
M01 Tap retract Sp select illegal 1032
M01 Sp-Sp polygon cut interlock 1033
M01 Mixed sync ctrl prmtr illegal 1034

Details
Mixed synchronization control was commanded for a part system in which mixed synchronization control is dis abled as shown below.
During nose R compensation mode
During pole coordinate interpolation mode
During cylindrical interpolation mode
During balance cut mode
During fixed cycle machining mode
During facing turret mirror image
During constant surface speed control mode
During hobbing mode
During axis name switch

During interference check III alarm (interference detection, interference alarm area intrusion or interfer ence warning area intrusion)
An axis was transferred to another part system, and mixed control was attempted with the part system's max imum number of control axes exceeded.
An axis was removed from the part system, and mixed control was attempted with the part system's number of
axes zero.
Another axis exchange was attempted to the axis which was already transferred to another part system for
mixed control.
Mixed control was attempted with an axis of a part system not in automatic operation.
Remedy
Correct the program.
Details
The synchronous control operation method selection (R2589 register) was set while the C axis mode was
inactive.
The synchronous control operation method selection (R2589 register) was set while the zero point was
undetermined.
Mirror image disable state
The external mirror image or parameter mirror image was commanded during facing turret mirror image.
Synchronous control was started while either the master or slave axis is in the PLC axis mode due to NC
axis/PLC axis switchover.
The synchronous control mode was switched while the PLC axis mode was active due to NC axis/PLC
axis switchover.
Manual operation was attempted while the setting of the parameter "#2703 manual_acc" (Enable constant gradient acceleration/deceleration in manual feed) is different between the master and slave axes.
Synchronous control operation method (R2589) has been set to the axis in chopping operation.
Remedy
Set the R2589 register to "0".
Check the program and parameters.
Details
Synchronous control start/cancel command was issued when the start/cancel is disabled.
Remedy
Correct the program and parameters.
Details
A travel command was issued to a synchronized axis in synchronous control.
Remedy
Correct the program.
M01 Mixed sync ctrl disable modal 1035
M01 Synchro ctrl setting disable 1036
M01 Synchro start/cancel disable 1037
M01 Move cmnd invld to synchro ax 1038

Details
When "#1146 Sclamp" has been set to "1", the constant surface speed command (G96) was issued to the
spindle which is not selected for the spindle speed clamp command (G92/G50) under Multiple spindle con trol II.
When "#1146 Sclamp" has been set to "0", both the G96 (Constant surface speed control ON) modal and
the spindle forward or reverse rotation signal have turned ON for the spindle, on which the speed clamp
command is disabled.
Remedy
Press the reset key and carry out the remedy below.
Issue the G92/G50 command to the spindle that is to be used for the constant surface speed control.
Details
There is a mistake in the setting of the superimposition control reference axis parameter (#2089 bsax_pl).
Superimposition control is not available under the current parameter settings.
Remedy
Correct the parameter.
Details
After a single block stop or automatic operation pause was executed during single block between part systems,
cycle start has not been performed on either part system.
Remedy
Perform cycle start for all the part systems where a single block stop or automatic operation pause was exe cuted.
Details
Phase-Z detection speed has not been set in "#3109 zdetspd".
Remedy
Set the phase-Z detection speed in "#3109 zdetspd".
Details
Setting of Interference check across part systems is incorrect.
Remedy
Correct the setting of Interference check across part systems.
Details
Interference is already occurring on the set interfering object.
Remedy
Turn OFF the interference check valid signal, moving the axis to a position where the interfering objects
do not collide each other, and then restart Interference check across part systems.
Details
A command has been given that causes the interfering objects to collide each other.
Remedy
Correct the program.
M01 No spindle speed clamp 1043
M01 Cont ax superimpos II prm illg 1044
M01 Sync error btwn part systems 1045
M01 Z detect speed parameter error 1049
M01 Intrf chck across sys: Set err 1050
M01 Intrf chck across sys: Area AL 1051
M01 Intrf check across sys: Alarm 1052

Details
Interference check between part systems had started while zero point return of the part system set interfering

object has not completed.
Remedy
Turn OFF the interference check valid signal, and complete zero point return in the all part systems set
interfering object.
Details
Feed-forward control was attempted while any of the following functions was enabled.
Control axis superimposition I/II
Control axis synchronization between part systems I/II
Remedy
Turn OFF the feed-forward control request signal.
Details
Cutting feed clamp rate is unspecified for a superimposition-related axis. Or the specified rate is outside
the setting range.
"#2091 plclamp", "#2629 pl3clamp" or "#2630 pl3clamp2"
Rapid traverse rate is unspecified for a superimposition-related axis.
Or the specified rate is outside the setting range.
"#2090 plrapid", "#2621 plrapid2",
"#2626 pl3rapid", "#2627 pl3rapid2" or "#2628 pl3rapid3"
Remedy
Set the cutting feed clamp rate of the superimposition-related axis within the setting range.
Set the rapid traverse rate of the superimposition-related axis within the setting range.
Details
Tool retract and return command has been given in any of the following modes:
Mixed control (Cross axis control) I
Mixed control (Cross axis control) II
Control axis synchronization between part systems I
Control axis synchronization between part systems II
Control axis superimposition I
Control axis superimposition II
Arbitrary axis superimposition control
Tool spindle synchronization IA (spindle - spindle polygon)
Tool spindle synchronization IB (spindle - spindle polygon)
Tool spindle synchronization IC (spindle - NC axis polygon)
Tool spindle synchronization II (hob)
Spindle superimposition control
Remedy
Turn OFF the transit point designation signal.
Details
The axis declared in the arbitrary axis exchange command is incapable of being exchanged.
Remedy
Correct the program (mainly check the processing timing).
M01 Interfe chk 0pt return incomp 1053
M01 Feed-forward control disabled 1060
M01 Superimposition axis param err 1070
M01 Tool retract & return disabled 1080
M01 Arbitrary axis unexchangeable 1101

Details
A manual travel command has been given to the axis being exchanged when manual interruption is disabled
under cross machining control (when "#1435 crsman" = 0).
Remedy
This error can be cancelled by either one of the following operations.
1: Cancel the manual travel command
2: Reset the NC
Details
Arbitrary axis superimposition command has been issued in any part system other than the one that con tains either the reference or superimposed axis of arbitrary axis superimposition control.
Arbitrary axis superimposition cancel command has been issued in any part system other than the one
that contains the superimposed axis of arbitrary axis superimposition control.
Remedy
Correct the program so that the arbitrary axis superimposition command is given in an appropriate part
system.
Details
The actual spindle speed has fluctuated exceeding the allowable range, while spindle speed fluctuation detec tion (G162) is active.
The number following "S", which is output together with this alarm, indicates the spindle where speed fluctua tions were detected.
Remedy
Unnecessarily large load may be applied to the spindle during automatic operation.
Reduce the spindle load.
To prevent this alarm from being output during spindle speed fluctuation detection (G162), set the param eter #1242 set14 BIT2 to ON.
Details
Spindle synchronization phase alignment command was issued while the "phase shift calculation request" sig nal was ON.
Remedy
Correct the program.
Correct the sequence program.
Details
A function that cannot be used with spindle oscillation was commanded during spindle oscillation.
Remedy
Command the function after finishing spindle oscillation.
Details
Spindle oscillation was commanded during executing a function that cannot be used with spindle oscillation.
Remedy
Command spindle oscillation after finishing the function that cannot used with spindle oscillation.
Details
Spindle oscillation was commanded while a value out of range is set as spindle oscillation amplitude or spindle
oscillation frequency.
Remedy
Check the setting values of the amplitude and frequency.

M01 Cross control axis exists 1102
M01 Arbitrary ax superimp. sys err 1103
M01 Spindle speed fluctuation 1105
M01 Sp synchro phase calc illegal 1106
M01 Illegal cmd in SP oscillation 1108
M01 SP oscillation cmd illegal 1109
M01 SP oscillation set val illegal 1110

Details
Sub part system control I command (G122) has been given to a part system where the sub part system I operation mode is deactivated.
Sub part system control I command (G122) has been given to a part system which is not reserved as the sub part system in M80.
Remedy
Activate the sub part system I operation mode for the sub part system before issuing G122.
Part systems marked "SUB" on the monitor screen are under the sub partsystem I operation mode.
Command the sub part system start to the sub part system which is reserved with "#1483 SBS1_sys num" for M80.
Details
When the sub part system control II has been commanded, no part system is left capable of being activated as a sub part system.
Remedy
Do not exceed the maximum number of simultaneously activatable sub part systems when commanding G144.
Set the parameter #1437 SBS2_Spec BIT0 to 0 if you wish to wait until the sub part system becomes ca pable of being activated.
Details
Constant surface speed is commanded from other part system to the spindle that is in the thread/ thread cycle or the tapping cycle/ synchronous tapping cycle.
To the spindle in constant surface speed control, the thread/ thread cycle or the tapping cycle/ synchro nous tapping cycle are commanded from other part system.
Remedy
Check the program.
Details
Constant torque control is commanded to the axis which the parameter "#2296 SV096(TQC)" (Constant torque control: Stopper-direction torque) setting is "0".
Constant or proportional torque stopper control is commanded to the axis which is in movement by auto matic or manual operation.
Constant torque control is canceled to the constant torque control axis in movement by automatic or man ual operation.
Constant torque control is commanded to the proportional torque stopper control axis.
Constant torque control is commanded again during the axis movement by constant torque control cancel.
Constant torque control axis is at stroke limit or H/W stroke end.
Remedy
Check the program.
Check the sequence program.
Details
Proportional torque stopper control is commanded to the axis which the parameter "#2296 SV096(TQC)" (Constant torque control: Stopper-direction torque) setting is "0".
Proportional torque stopper control is commanded to the axis which is in movement by automatic or man ual operation.
The axis movement is commanded to the axis which is in the proportional torque constant control.
Proportional torque constant control is commanded again during the axis movement by proportional torque constant control cancel.
Proportional torque constant control axis is at stroke limit or H/W stroke end.
Remedy
Check the program.
Check the sequence program.
M01 Sub part system I call error 1111
M01 Sub part system II start error 1112
M01 Constant surface speed rdndnt 1113
M01 Constant torque disabled 1114
M01 P torque stopper disabled 1115

Details
Constant torque control droop cancel is commanded to the axis which is not in the constant/ proportional torque control.
Constant torque control droop cancel is commanded to the axis in movement by automatic or manual op eration.
Remedy
Check the program.
Check the sequence program.
Details
The axis movement by automatic or manual operation is commanded to the axis which the constant torque con trol droop is being canceled.
Remedy
Check the program.
Check the sequence program.
Details
The equivalent load factor of the spindle motor has exceeded the set threshold that causes the excess warning.
Remedy
Change the operation pattern in a way that decreases the spindle motor load.
Details
Differential speed tap command has been given although any rotation command has not been input to the reference spindle that is under spindle superimposition control.
Synchronous tap command has been given to the reference spindle that is under spindle superimposition control.
Remedy
Cancel the synchronous tapping cycle.
Details
A tap cycle or synchronous tap cycle command given to the superimposed spindle has caused the spin dle's actual rotation speed to exceed the spindle clamp speed.

Remedy
Correct the spindle rotation speed in synchronous tap cycle.
Details
A constant surface speed control command has been given to the reference or superimposed spindle
during differential speed tapping under spindle superimposition control.
A differential speed tapping command has been issued while constant surface speed control is executed
on the reference or superimposed spindle that is under spindle superimposition control.
Remedy
Cancel the synchronous tap cycle or constant surface speed control.
M01 Droop cancel disabled 1116
M01 Cmnd disabled in droop cancel 1117
M01 SP equivalent load factor over 1120
M01 Differential tap cmnd disabled 1131
M01 Spd clamp in differential tap 1132
M01 Constant surface spd disabled 1133

Details
Spindle synchronization cancel command has been issued during rotation of C axis under spindle sync C
axis control.
G113 (without the address H or D) has been issued during the spindle synchronization for two or more
sync sets.
Remedy
This operation error is cancelled when C axis stops. Issue a spindle sync cancel command after C axis
has stopped.
Use G113D or G113H to cancel the spindle synchronization.
Details
The guide bushing spindle synchronization temporary cancel signal was turned ON/OFF when the master spin dle and the guide bushing spindle were in one of the following modes.
During rotation (when not stopped)
During tap cycle synchronization mode
During spindle synchronization mode
During tool-spindle synchronization I (polygon machining) mode
During tool-spindle synchronization II (hobbing) mode
During spindle C axis control C axis mode
During orientation/indexing
Remedy
Check the ladder program.
Details
The reference spindle was commanded as a spindle related to tool spindle synchronization IC (polygon).
The guide bushing spindle was commanded as a synchronous tapping spindle.
The guide bushing spindle was commanded as a spindle related to spindle synchronization/tool spindle
synchronization I (polygon)/tool spindle synchronization II (hobbing).
Remedy
Check the program.
Details
Synchronous tapping was issued for the reference spindle or the synchronized spindle during spindle synchro nization.
Remedy
Cancel the synchronous tapping cycle by reset.
Details
An axis in STO state exists in the part system.
Remedy
Release the STO state and reset the NC.
Details
An axis in SOS state exists in the part system.
Remedy
Release the SOS state and reset the NC.
M01 Spindle sync cancel error 1135
M01 GB SP sync:Cancel sgnl illegal 1137
M01 GB SP sync runs independently 1138
M01 Cmds illegal in spindle synchr 1139
M01 Operation non-continuable(STO) 1151
M01 Operation non-continuable(SOS) 1152

Details
When the NC reset signal is input with the High-speed simple program check: Coordinate position check ON
signal (Y76B) set to ON, the workpiece coordinate position is different from the position at the program start.
Remedy
Correct the machining program.
Details
When the NC reset signal is input with the High-speed simple program check: Coordinate position check ON
signal (Y76B) set to ON, the machine coordinate position is different from the position at the program start.
Remedy
Correct the machining program.
Details
The following operation was performed to an axis which can be switched over between NC axis and PLC axis.
PLC axis switchover signal was turned ON or OFF when it was prohibited to switch over the axis.
Remedy
Make sure the axis switchover status signal is OFF and change the ON/OFF of the axis switchover signal.
Details
You have set the R register for selecting synchronous control operation method, although the option of multiple
axis synchronization control is OFF.
Remedy
Set 0 in R2589 (Synchronous control operation method selection).
Details
For the multiple axis synchronization control, you selected two or more slave axes without selecting any master

axis.
Remedy
Correct the setting of R2589 (Synchronous control operation method selection).
Details
The trigger for NC axis switchover was activated for an axis not in a state where NC axis switchover is
permissible.
The trigger for NC axis switchover was activated specifying a number outside the range for the setting of
NC-axis switchover.
Remedy
Cancel the error by turning off the signal for requesting NC axis switchover (AXCHGCMD/bit8) for the cor responding axis, and modify the state of the axis before turning on the signal again.
Correct the number for the setting of NC-axis switchover (AXCHGCMD/LO 8bit), and turn on the signal for
requesting NC axis switchover (AXCHGCMD/bit8) again.
Details
The trigger for spindle switchover was activated for a spindle not in a state where spindle switchover is
permissible.
The trigger for spindle switchover was activated specifying a number outside the range for the setting of
spindle switchover.
Remedy
Cancel the error by turning off the signal for requesting spindle switchover (SPCHGCMD/bit8) for the cor responding spindle, and modify the state of the spindle before turning on the signal again.
Correct the number for the setting of spindle switchover (SPCHGCMD/LO 8bit), and turn on the signal for
requesting spindle switchover (SPCHGCMD/bit8) again.
M01 Prog check: work posn error 1215
M01 Prog check: machine posn error 1216
M01 NC/PLC axis switch illegal 1250
M01 No spec: Multi axis synch ctrl 1254
M01 Multiple secondary ax selected 1255
M01 NC axis not switchable 1260
M01 Spindle not switchable 1261

Details
Synchronous control operation method (R2589) has been changed for the axis in which Synchronous control
and chopping are used together.
Remedy
Change the axis bits of Synchronous control operation method (R2589) back to the previous settings.
Details
Chopping has been started up for the axis in Independent operation.
Remedy
Reset or turn OFF "Chopping" signal (CHPS).
Details
Chopping has been started up for the slave axis in Synchronous control operation.
Remedy
Reset or turn OFF "Chopping" signal (CHPS).
Specify the master axis as the chopping axis.
Details
The issued command is disabled during the vibration cutting mode.
Remedy
Correct the program.
Details
Vibration cutting mode start command has been issued although the command is disabled during the currently
active mode.
Remedy
Correct the program.
Details
[When error cause No. is 0001]
Cutting is being performed without vibration cutting control.
[When error cause No. is 0002]
Vibration cutting is being performed with OMR-FF being disabled.
Remedy
[When error cause No. is 0001]
Make sure that the "VCC: Temporary cancel of axis vibration" signal (R22532) is OFF.
Make sure that the spindle speed command is not "0" when the cutting command is issued.
Make sure that neither synchronized axis nor superimposed axis is included in the part system.
[When error cause No. is 0002]
Make sure that the servo parameter "#2313 SV113" bit0 is "1" and bit1 is "0" for the VCC objective axes.
Details
The feedrate command issued during the vibration cutting mode is exceeding "#12571 VibClamp_VCC".
Remedy
Correct the program.
M01 Sync ctrl op method chg dsbl 1270
M01 Independent op ax chop invld 1271
M01 Slave ax set as chopping ax 1272
M01 Cmnd invalid during VCC mode 1300
M01 VCC mode command invalid 1301
M01 VCC invalid 1302 Error cause number
M01 Feedrate limited during VCC 1303

Details
No applicable condition is found during the selection of the vibration cutting condition.
Remedy
Correct the program.
Check the setting of the frequency upper limit "#12131 FrqClmpSys_VCC".
Check the settings of the maximum spindle rotation speed "#3005 smax1" to "#3008 smax4" and the min imum rotation speed "#3023 smini".
Details
You changed the spindle rotation speed during vibration cutting control.

Remedy
Wait for completion of vibration cutting control, or input Reset to cancel the VCC mode.
Details
You stopped the spindle during vibration cutting control, and then attempted to re-run it.
Remedy
If you have stopped the spindle during vibration cutting control, input Reset to cancel the VCC mode before
re-running the spindle.
Details
A command has been given that causes two or more objects to interfere with each other.
yy : Interference object definition number (1)
zz : Interference object definition number (2)
Remedy
Cancel the alarm with reset.
Disable the interference check III mode first before moving the interfering object further in the interference
direction.
Details
Two or more interfering objects are in the interference alarm area.
yy : Interference object definition number (1)
zz : Interference object definition number (2)
Remedy
Disable the interference check III mode before moving.
Check the interference definition and the interference selection.
Details
A command has been given that causes two or more interfering objects to enter the interference warning area.
yy : Interference object definition number (1)
zz : Interference object definition number (2)
Remedy
Interfering objects are in the interference warning area.
If an operational problem is expected to occur, stop moving the axes with feed hold, cancellation of manual axis
movement or reset.
Details
You attempted to turn ON the interference check III mode with the interfering object data disabled.
Remedy
Execute the interference data ON command to enable the interference data before turning ON the inter ference check III mode.
M01 VCC condition not found 1304
M01 Cannot change SP speed in VCC 1307
M01 Cannot re-run SP during VCC 1308
M03 Interference detection 0001 yyzz
M03 Entry in interfere alarm area 0002 yyzz
M03 Entry in interfere warn area 0003 yyzz
M03 Interference data unspecified 1001

Details
The total number of solid objects used as interfering object has exceeded the maximum.
Remedy
The total number of interfering solid objects set in the system variable or R register has exceeded the max imum. Correct the setting.
Details
The allowable process time for interference check III has been exceeded.
Remedy
Turn OFF the interference check III mode.
Correct the interfering object definition.
Details
In the interfering object definition, the IJK control axes have been set as follows:
Nonexistent axis name (an axis not set in the base axis specification parameter "#1022 axname2")
I, J and K axes belong to different part systems
Rotary axis
Remedy
Correct the setting of the IJK control axes in the interfering object definition.
Details
In the interfering object definition, two or more rotary axes have been set for the cylindrical solid definition No.
Remedy
Correct the solid designation and the setting of the IJK axis rotation angle in the interfering object definition.
Details
In the interfering object definition, two or more rotary axes have been set for the cuboidal solid definition No.
Remedy
Correct the setting of the IJK axis rotation angle in the interfering object definition.
Details
In the interfering object definition, the IJK rotary axes have been set as follows:
Nonexistent axis name
(an axis not set in the base axis specification parameter (#1022 axname2))
Linear axis
All three axes are rotary axes
Remedy
Correct the setting of the IJK rotary axes in the interfering object definition.
Details
The solid object set in the interfering object definition is unavailable as an interfering object defined with two
rotary axes.
Remedy
Correct the setting of the solid in the interfering object definition.
M03 Interf. 3D objects count error 1002
M03 Interfere check III: time over 1003
M03 Interfere: control axis error 2001 Interference object defi nition number
M03 Interf:2 rot axes in cylinder 2002 Interference object defi nition number
M03 Interfere:2 rot axes in cuboid 2003 Interference object defi nition number
M03 Interfere: rotary axis error 2004 Interference object defi nition number
M03 Interfere:2 rot axes object er 2005 Interference object defi nition number

Details
The solid object set in the interfering object definition is unavailable as an interfering object defined with one
rotary axis.
Remedy
Correct the setting of the solid in the interfering object definition.
Details
In the interfering object selection, the interfering object model coordinate system offset 1 has exceeded the set ting.
Remedy
Correct the setting of the interfering object model coordinate system offset 1 in the interfering object se lection.
Details
The following selection was made for the rotary interfering objects:
You selected a one-rotary-axis object and two-rotary-axis object at a time.
You selected two or more two-rotary-axis objects.
Remedy
Correct the setting of the n-th interfering object selection.
Details
Any of the following items being selected has not been reflected in the workpiece position counter or in the pro gram position counter: workpiece coordinate system offset, extended workpiece coordinate system offset, ex ternal workpiece coordinate system offset or workpiece coordinate system shift.
Remedy
Perform one of the following actions to cancel the warning.
Cycle start
Reset
Emergency stop
Details
Multiple key presses were detected.
0xxx: indicates the first detected key-code.
Simultaneous key presses were detected.
No key-code is indicated.
Remedy
Go to the alarm history to check the key-codes.
Clean the keys and check the performance.
Press one key at a time.
Details
Parameter is being written in every PLC scan cycle using a "write window" of the PLC window function. This
may affect the performance.
Remedy
Correct the user PLC (ladder sequence).
M03 Interfere:1 rot axis object er 2006 Interference object defi nition number
M03 Interf. selection: offset over 3001 Interference object defi nition number
M03 Interf:rot objects comb. error 3002 Interference object defi nition number
M50 WCS offset not reflected 5000
M50 Multiple key inputs invalid 5002
M50 Continuous write of parameter 5003

Details
A displacement occurred when switching axis from spindle mode to C axis mode.
Remedy
Contact our service center.
Cancel the alarm by resetting.
Details
The bit of the register R2589 (Synchronous control operation method) that corresponds to the multiple-axis
synchronization control axis has been set to "1" while multiple-axis synchronization control is disabled.
Remedy
Set the bits of R2589 (Synchronous control operation method) that correspond to the multiple-axis syn chronization control axes to "0".
Details
The axis travel amount exceeded the brake wear diagnostics allowable travel amount (Caution) during brake
wear diagnostics.
The axis name of the axis where the error occurred is displayed.
Remedy
Move the axis to a safe position with manual operation, turn off the power, and take corrective action for
the brake. This warning is cleared upon successful completion of brake wear diagnostics, which is per formed after the power is turned back on.
This warning can be cleared by the brake wear diagnostics alarm reset signal. The brake wear diagnostics
incomplete signal (BWDNFm) remains on.
Details
The brake wear diagnostics parameters are incorrectly configured.
The value of "#12597 BWD_TOL(Caution)" is greater than or equal to "#12596 BWD_TOL(Warning)". The
operation error (M50 5006) is not generated.
Remedy
Correct the parameter settings so that "#12597 BWD_TOL(Caution)" value is smaller than "#12596
BWD_TOL(Warning)" value.
Details
The setup parameter lock is released.
Cycle start is disabled when setup parameters can be set.
Remedy
Refer to the manual issued by the machine tool builder.
Details
Activated maintenance part has not completed the product procedures.
Remedy
Contact our service center.
M50 Spindle/C axis displacement 5004
M50 Cannot start multi-axis sync 5005
M50 BrakeWearDiagnostics (Caution) 5006
M50 Brake wear diag param invalid 5007

M90 Parameter set mode
M97 Maintenance part activated
2

Details
Automatic start is not possible as one of the axes is moving.
Remedy
Try automatic start again after all axes have stopped.
Details
Automatic start is not possible as the NC is not ready.
Remedy
Another alarm has occurred. Check the details and remedy.
Details
Automatic start is not possible as the "reset" signal has been input.
Remedy
Turn OFF the "reset" signal.
Check for any failure of the reset switch which has caused the switch's continuous ON.
Correct the sequence program.
Details
The feed hold switch on the machine operation panel is ON (valid).
Remedy
Correct the feed hold switch setting.
The feed hold switch is B contact switch.
Fix any broken wires in the feed hold signal line.
Correct the sequence program.
Details
Automatic start is not possible as one of the axes is at the stroke end.
Remedy
Manually move any axis whose end is at the stroke end.
Check for any broken wires in the stroke end signal line.
Check for any failure in the stroke end limit switch.
Details
Automatic start is not possible as one of the axes is at the stored stroke limit.
Remedy
Move the axis manually.
If the axis's end is not at the stroke end, check the parameters.
Details
The operation mode has not been selected.
Remedy
Select automatic operation mode.
Check for any broken wires in the signal line for automatic operation mode (memory, tape, MDI).
T01 Axis in motion 0101
T01 NC not ready 0102
T01 Reset signal ON 0103
T01 Auto operation pause signal ON 0104
T01 H/W stroke end axis exists 0105
T01 S/W stroke end axis exists 0106
T01 No operation mode 0107

Details
Two or more automatic operation modes have been selected.
Remedy
Check for any short circuit in the mode (memory, tape, MDI) selection signal line.
Check for any failure in the switch.
Correct the sequence program.
Details
The automatic operation mode has changed to another automatic operation mode.
Remedy
Return to the original automatic operation mode, and execute automatic start.
Details
Automatic start is not possible as tape search is being executed.
Remedy
Wait for the tape search to be completed and then execute the automatic start.
Details
Automatic start is disabled because restart search is in execution.
Remedy
Execute automatic start after the restart search is completed.
Details
Automatic start is not possible because a thermal alarm (Z53 CNC overheat) has occurred.
Remedy
Temperature of the control unit has exceeded the specified temperature.
Take appropriate measures to cool the unit.
Details
Automatic start cannot is not possible because the NC is communicating with the host computer.
Remedy
Wait for the communication with host computer to be ended and then execute the automatic start.
Details
Automatic start is not possible because the voltage of the battery in the NC control unit has dropped.
Remedy
Replace the battery of the NC control unit.
Contact the service center.

Details
Automatic operation is not possible because no reference position offset value has been set.
Remedy
Perform the reference position initialization setting, then set "#2034 rfpofs(Distance-coded reference po sition detection offset)".
T01 Operation mode duplicated 0108
T01 Operation mode changed 0109
T01 Tape search execution 0110
T01 Cycle start prohibit 0111
T01 CNC overheat 0113
T01 Cycle st. prohibit(Host comm.) 0115
T01 Cycle st prohibit(Battery alm) 0116
T01 R-pnt offset value not set 0117

Details
A start signal was input during an absolute position detection alarm.
Remedy
Clear the absolute position detection alarm, and then input the start signal.
Details
A start signal was input during zero point initialization in the absolute position detection system.
Remedy
Complete zero point initialization before inputting the start signal.
Details
Automatic start is disabled because manual measurement is in execution.
Remedy
Execute automatic start after the manual measurement is completed.
Details
Cycle start signal was input for the part system that has applied Sub-part system I operation mode.
Remedy
Use Sub-part system I operation mode signal to switch whether to start the operation as Sub-part system
control or to execute cycle start as Main-part system.
Details
Machining interruption related functions cannot be started up.
Remedy
To resume the operation from the state of being stopped at the selected point, set the automatic operation
mode to the memory mode.
To perform the retraction, confirm that retraction is enabled (the "Retraction executable" signal is ON).
To resume the operation from the state of being stopped at a certain block of the retraction program, acti vate the memory mode and turn ON the "Retraction start" signal.
Check the sequence program to make sure that multiple start signals are not input at the same time.
(Note) The remedies stated above apply not only to retraction but also to the other machining interruption-re lated functions. (The start signals and ready states are replaced with those for each function.)
Details
Automatic start is disabled because the APLC authentication password is inconsistent.
Remedy
Contact the machine tool builder.
Details
An automatic operation was started in one of the following machining modes during the safe speed clamp:
thread cutting, synchronous tapping, cross machining, superimposition control, tool center point control or SSS
control.
Remedy
Turn ON the safely-limited speed monitoring request signal and press the cycle start button.
Close the door and press the cycle start button.
T01 In absolute position alarm 0138
T01 In abs posn initial setting 0139
T01 In manual measurement 0143
T01 Sub part sys I mode is active 0146
T01 Mach. interrupt non-startable 0147
T01 APLC password mismatch 0160
T01 Cycle st. prohibit(safe speed) 0165

Details
Cycle operation cannot be started because of the operation error "M01 0371 BrakeWearDiagnostics (Warn ing)".
Remedy
Clear the operation error (M01 0371), and then start cycle operation.
Details
Cycle operation cannot be started because there is an axis under brake wear diagnostics in the system.
Remedy
After the completion of brake wear diagnostics, start cycle operation.
Details
Cycle start is disabled while the system alarm Z83 (NC started during SP rotation) is occurring.
Remedy
Turn OFF the power and make sure that the spindle is at a standstill. And then turn the power ON again.
Details
Cycle start cannot be operated because interference check alarm is in progress.
Remedy
Release the interference check alarm before operating the cycle start.
Details
Cycle start cannot be executed for other part systems during measurement of rotation center error or workpiece
installation error.
Remedy
Execute cycle start for one part system that is ready for measurement.
Cancel measurement when error measurement is not executed.
Details
Cycle start was executed during operation error where cycle start cannot be executed.
Remedy
After canceling operation error, execute cycle start.

Details
Cycle start is disabled because the axis in SBT warning exists in the system.
Remedy
After cancelling the SBT warning, execute the cycle start.
Details
Automatic start is not possible because the setting of setup parameters is enabled.
Remedy
Refer to the manual issued by the machine tool builder.
T01 Cannot start Cyc OP (BWD WARN) 0166
T01 Cannot start Cyc OP (in BWD) 0167
T01 Cycle start prohibit (AL Z83) 0172
T01 In interference check alarm 0173
T01 Cycle st forbid (measuring err) 0176
T01 Cycle start prohibit (OP error) 0177
T01 Cycle start prohibit(SBT warn) 0185
T01 Cycle start prohibit 0190

Details
Automatic start was attempted while a file was being deleted/written.
Remedy
Wait for the file to be deleted/written and then execute the automatic start.
Details
Automatic start is not possible because the valid term has been expired.
Remedy
Obtain a decryption code from the machine tool builder and input it in the NC, then turn the power ON again.
Details
Cycle start is disabled because the break test is being executed for some axes in the system.
Remedy
Execute cycle start after the break test is completed.
Details
Cycle start is disabled because the axis in brake test exists in the system.
Remedy
After the brake test completed, execute the cycle start.
Details
An emergency stop occurred during automatic operation.
Remedy
After the emergency stop is canceled, the operation can be continued.
Details
An axis is at the stroke end.
Remedy
Manually move the axis away from the stroke end limit switch.
Correct the machining program.
Details
An axis is at the stored stroke limit.
Remedy
Manually move the axis.
Correct the machining program.
Details
The reset has been entered.
Remedy
The program execution position has returned to the start of the program. Execute automatic operation from the start of the machining program.
T01 Cycle start prohibit 0191
T01 Cycle st. prohibit (Term exp'd) 0193
T01 Cycle start disabled (in SBT) 0194
T01 Cycle start prohibit(in SBT) 0197
T02 EMG stop 0200
T02 H/W stroke end axis exists 0201
T02 S/W stroke end axis exists 0202
T02 Reset signal ON 0203

Details
The "feed hold" switch is ON.
Remedy
Press the CYCLE START switch to resume the automatic operation.
Details
The operation mode has changed to another mode during automatic operation.
Remedy
Return to the original automatic operation mode, and press the CYCLE START switch to resume the au tomatic operation.
Details
The acceleration and deceleration time constants are too large. (This alarm occurs with the system alarm Z59.)
Remedy
Set a larger value for "#1206 G1bF(Maximum speed)".
Set a smaller value for "#1207 G1btL(Time constant)".
Set a lower cutting speed.
Details
An absolute position detection alarm occurred.
Remedy
Clear the absolute position detection alarm.
Details
A travel command was issued to an auxiliary axis.
Remedy
Turn ON the "NC axis control selection" signal and press the CYCLE START switch to restart the auto matic operation with.

Details
SOS axis exists in the system.
Remedy
Cancel SOS state and execute cycle start, and you can continue automatic operation from the stop point.
Details
The SINGLE BLOCK switch on the machine operation panel is ON.
The SINGLE BLOCK or MACHINE LOCK switch changed.
Remedy
Press the CYCLE START switch to resume the automatic operation.
Details
A block stop command was issued in the user macro program.
Remedy
Press the CYCLE START switch to resume the automatic operation.
T02 Auto operation pause signal ON 0204
T02 Operation mode changed 0205
T02 Acc/dec time cnst too large 0206
T02 Abs posn detect alarm occurred 0215
T02 Aux axis changeover error 0220
T02 FEED HOLD: SOS axis 0221
T03 Single block stop signal ON 0301
T03 Block stop cmnd in user macro 0302

Details
Automatic mode changed to another automatic mode.
Remedy
Return to the original automatic operation mode, and press the CYCLE START switch to resume the au tomatic operation.
Details
MDI operation has ended the last block.
Remedy
Set the MDI operation again, and press the CYCLE START switch to start the MDl operation.
Details
The interlock signal, which locks the block start, is ON.
Remedy
Correct the sequence program.
Details
The interlock signal, which locks the block cutting start, is ON.
Remedy
Correct the sequence program.
Details
One of the following commands was issued during the safe speed clamp:
thread cutting, synchronous tapping, cross machining, superimposition control, tool center point control or SSS
control.
Remedy
Turn ON the safely-limited speed monitoring request signal before performing the operation.
Perform the operation with the door closed.
Details
The "inclined axis control: No Z axis compensation" signal has turned ON or OFF during the program operation.
Remedy
Press the CYCLE START switch to resume the automatic operation.
Details
Operation has stopped at the selected point.
Remedy
Perform the automatic start to execute the program from the block.
Details
The "NC axis control selection" signal was turned OFF while a NC axis was traveling.
Remedy
Turn the "NC axis control selection" signal ON and press the CYCLE START switch to resume the auto matic operation.
T03 Operation mode changed 0303
T03 MDI completed 0304
T03 Block start interlock 0305
T03 Cutting blck start interlock 0306
T03 Safe speed clamp is ON 0308
T03 Inclined Z offset change 0310
T03 Stop at selected point 0320
T03 Aux axis changeover error 0330

Details
Collation stop occurred.
Remedy
Execute the automatic start to resume the automatic operation.
Details
The following Nos. are shown during the operation of the corresponding completion wait factor. The numbers
will disappear when the operation is completed.
The completion wait factor is indicated with four digits (in hexadecimal).
Display format of completion wait factor
0__ __ __
(a)(b)(c)
Each of the hexadecimal numbers (a), (b) and (c) indicates the following details.
(a)
bit0: In dwell execution
bit3: Unclamp signal wait (Note 1)
(b)
bit0: Waiting for spindle position to be looped
bit3: Door open (Note 2)

(c)
bit0: Waiting for MSTB completion
bit1: Waiting for rapid traverse deceleration
bit2: Waiting for cutting speed deceleration
bit3: Waiting for spindle orientation completion
(Note 1)
For type A (#1282 ext18/bit3 = 0)
Waiting for turning ON or OFF of the unclamp finish signal for the index table indexing.
For type B (#1282 ext18/bit3 = 1)
Waiting for turning ON of the unclamp finish signal for the index table indexing.
Waiting for turning ON of the clamp finish signal for the index table indexing.
(*) The complete standby status is established when the unclamp finish and clamp finish signals are both
turned ON. Set the clamp finish signal to OFF after performing required process with the PLC.
(Note 2) This shows the door open state caused by the door interlock function.
T04 Collation stop 0401
T10 Fin wait (Factors for waiting com pletion)

Details
The following Nos. are shown during the operation of the corresponding completion wait factor. The numbers
will disappear when the operation is completed.
The completion wait factor is indicated with four digits (in hexadecimal).
Display format of completion wait factor
0__ __ __
(a)(b)(c)
Each of the hexadecimal numbers (a), (b) and (c) indicates the following details.

(b)
bit0:Operation alarm display being postponed
Remedy
The parameter "#1342 AlmDly" may be able to postpone displaying a part of an operation alarm, depend ing on the setting.
This stop code will remain displayed while any alarm is being postponed.
And it will disappear if the postponed alarm is displayed or canceled.
T11 Fin wait (Factors for waiting com pletion)

3.1 Servo Errors (S01/S03/S04)
Servo alarm is displayed in the following format.
The numerical value in the column of "No." in the table after the following page is the double-digit number displayed
on the LED which is on the front-side of the drive unit.
At the time of the occurrence of the servo errors (S01/S03/S04), this number will be displayed in the last two digits
of the "alarm number".
(Note 1) For the troubleshooting at the time of the occurrence of the servo errors, refer to your drive unit's instruction
manual.
(Note 2) When multiple servo alarms have occurred, only an alarm which occurred first is displayed on the alarm
screen. Refer to the alarm history on the drive monitor screen as necessary.
Axis name
Servo : Axis name
Spindle : "S1", "S2", "S3" ...
Alarm No.
Message
Alarm class
Alarm class Message Reset method Resetting methods
S01 Name or "Servo
alarm"
PR After removing the cause of the alarm, reset the alarm by
turning the NC power ON again.
S03 Name or "Servo
alarm"
NR After removing the cause of the alarm, reset the alarm by
inputting the NC RESET key.
S04 Name or "Servo
alarm"
AR After removing the cause of the alarm, reset the alarm by
turning the NC and drive unit power ON again.
S 0 0

(1) Drive unit alarm
(Note 1) Definitions of terms in the table are as follows.
Main side encoder: Encoder connected to CN2
Sub side encoder: Encoder connected to CN3
(Note 2) Resetting methods
NR: Reset with the NC RESET button. This alarm can also be reset with the PR and AR resetting conditions.
PR: Reset by turning the NC power ON again. This alarm can also be reset with the AR resetting conditions. When the control
axis is removed, this alarm can be reset with the NC RESET button. (Excluding alarms 32 and 37.)
AR: Reset by turning the NC and servo drive unit power ON again.
No. Name Details Reset
method
Servo
stop method

Spindle
stop method
10 Insufficient voltage A drop of bus voltage was detected in main circuit. PR Dynamic stop Coast to a stop
11 Axis selection error The axis selection rotary switch has been incorrectly set. AR Initial error Initial error
12 Memory error 1 A hardware error was detected during the power ON self-check. AR Initial error Initial error
13 Software processing error 1 An error was detected for the software execution state. PR Dynamic stop Coast to a stop
14 Software processing error2 The current processor is not operating correctly. AR Dynamic stop Coast to a stop
16 Initial magnetic pole position
detection error
In the built-in motor which uses the absolute position encoder,
the servo ON has been set before the magnetic pole shift
amount is set.
The magnetic pole position, detected in the initial magnetic pole
position detection control, is not correctly set.
PR Dynamic stop Coast to a stop
17 A/D converter error A current feedback error was detected. PR Dynamic stop Coast to a stop
18 Main side encoder:
Initial communication error
An error was detected in the initial communication with the mo tor side encoder.
PR Initial error Initial error
19 Encoder communication er ror in synchronous control
An error of the shared encoder on the machine side was detect ed on the secondary axis of the speed command synchroniza tion control.
PR Dynamic stop -
1A Sub side encoder:
Initial communication error
An error was detected in the initial communication with the ma chine side encoder.
PR Initial error Initial error
1B Sub side encoder: Error 1 An error was detected by the encoder connected to the machine side.
The error details are different according to the encoder type.
Refer to "Encoder alarm" for details.
Dynamic stop Coast to a stop
1C Sub side encoder: Error 2
1D Sub side encoder: Error 3
1E Sub side encoder: Error 4
1F Sub side encoder:
Communication error
An error was detected in the communication with the machine
side encoder.
PR Dynamic stop Coast to a stop
21 Sub side encoder no signal
2
In the machine side encoder, ABZ-phase feedback cannot be
returned even when the motor moves.
PR Dynamic stop Coast to a stop
22 Encoder data error An error was detected in the feedback data from the position en coder.
AR Dynamic stop Coast to a stop
23 Excessive speed error The state that there is a difference between the actual speed
and command speed continued for longer than the excessive
speed deviation timer setting.
NR - Coast to a stop
24 Grounding The motor power cable is in contact with FG (Frame Ground). PR Dynamic stop Coast to a stop
25 Absolute position data lost The absolute position data was lost in the encoder. AR Initial error -
26 Unused axis error In the multiaxis drive unit, there is an axis set to free, and the
other axis detected a power module error.
PR Dynamic stop Coast to a stop

(Note 1) Definitions of terms in the table are as follows.
Main side encoder: Encoder connected to CN2
Sub side encoder: Encoder connected to CN3
(Note 2) Resetting methods
NR: Reset with the NC RESET button. This alarm can also be reset with the PR and AR resetting conditions.
PR: Reset by turning the NC power ON again. This alarm can also be reset with the AR resetting conditions. When the control
axis is removed, this alarm can be reset with the NC RESET button. (Excluding alarms 32 and 37.)
AR: Reset by turning the NC and servo drive unit power ON again.
No. Name Details Reset
method
Servo
stop method
Spindle
stop method
27 Sub side encoder: Error 5 An error was detected by the encoder connected to the machine side.
The error details are different according to the encoder type.
Refer to "Encoder alarm" for details.
Dynamic stop Coast to a stop
28 Sub side encoder: Error 6
29 Sub side encoder: Error 7
2A Sub side encoder: Error 8
2B Main side encoder: Error 1 An error was detected by the encoder connected to the motor side.
The error details are different according to the encoder type.
Refer to "Encoder alarm" for details.
Dynamic stop Coast to a stop
2C Main side encoder: Error 2
2D Main side encoder: Error 3
2E Main side encoder: Error 4
2F Main side encoder:
Communication error

An error was detected in the communication with the motor side
encoder.
PR Dynamic stop Coast to a stop
30 Over regeneration Over-regeneration level exceeded 100%. The regenerative re sistor is overloaded.
PR Dynamic stop Coast to a stop
31 Overspeed The motor speed exceeded the allowable speed. PR Deceleration
stop
Deceleration
stop
32 Power module error
(overcurrent)
The power module detected the overcurrent. PR Dynamic stop Coast to a stop
33 Overvoltage The bus voltage in main circuit exceeded the allowable value. PR Dynamic stop Coast to a stop
34 NC communication:
CRC error
The data received from the NC was outside the setting range. PR Deceleration
stop
Deceleration
stop
35 NC command error The travel command data received from the NC was excessive. PR Deceleration
stop
Deceleration
stop
36 NC communication:
Communication error
The communication with the NC was interrupted. PR Deceleration
stop
Deceleration
stop
37 Initial parameter error An incorrect set value was detected among the parameters
send from the NC at the power ON.
In the SLS(Safely Limited Speed) function, an error was detect ed in the relation between the safety speed and safety rotation
number in the speed observation mode.
PR Initial error Initial error
38 NC communication:
Protocol error 1
An error was detected in the communication frames received
from the NC.
Or, removing an axis or changing an axis was performed in the
synchronous control.
PR Deceleration
stop
Deceleration
stop
39 NC communication:
Protocol error 2
An error was detected in the axis data received from the NC.
Or, in changing an axis, the parameter setting of the synchro nous control was applied when the axis was installed.
PR Deceleration
stop
Deceleration
stop
3A Overcurrent Excessive motor drive current was detected. PR Dynamic stop Coast to a stop
3B Power module error
(overheat)
The power module detected an overheat. PR Dynamic stop Coast to a stop
3C Regeneration circuit error An error was detected in the regenerative transistor or in the re generative resistor.
PR Dynamic stop -
3D Power supply voltage error
at acceleration/deceleration
A motor control error during acceleration/deceleration, due to a
power voltage failure, was detected.
PR Dynamic stop -
3E Magnetic pole position de tection error
The magnetic pole position, detected in the magnetic pole posi tion detection control, is not correctly detected.
AR Dynamic stop Coast to a stop

(Note 1) Definitions of terms in the table are as follows.
Main side encoder: Encoder connected to CN2
Sub side encoder: Encoder connected to CN3
(Note 2) Resetting methods
NR: Reset with the NC RESET button. This alarm can also be reset with the PR and AR resetting conditions.
PR: Reset by turning the NC power ON again. This alarm can also be reset with the AR resetting conditions. When the control
axis is removed, this alarm can be reset with the NC RESET button. (Excluding alarms 32 and 37.)
AR: Reset by turning the NC and servo drive unit power ON again.
No. Name Details Reset
method
Servo
stop method
Spindle
stop method
41 Feedback error 3 Either a missed feedback pulse in the motor side encoder or an
error in the Z-phase was detected in the full closed loop system.
PR Dynamic stop Coast to a stop
42 Feedback error 1 Either a missed feedback pulse in the position detection or an
error in the Z-phase was detected. Or the distance-coded refer ence check error exceeded the allowable value when the dis tance-coded reference scale was used.

PR Dynamic stop Coast to a stop
43 Feedback error 2 An excessive difference in feedback was detected between the
machine side encoder and the motor side encoder.
PR Dynamic stop Coast to a stop
45 Fan stop An overheat of the power module was detected during the cool ing fan stopping.
PR Dynamic stop Coast to a stop
46 Motor overheat /
Thermal error
Either the motor or the motor side encoder detected an over heat.
Or, the thermistor signal receiving circuit of the linear motor or
direct-drive motor was disconnected.
Or, the thermistor signal receiving circuit was short-circuited.
NR Deceleration
stop
Deceleration
stop
48 Main side encoder: Error 5 An error was detected by the encoder connected to the main side.
The error details are different according to the connected encoder.
Refer to "Encoder alarm".
Dynamic stop Coast to a stop
49 Main side encoder: Error 6
4A Main side encoder: Error 7
4B Main side encoder: Error 8
4C Current error at initial mag netic pole estimate
Current detection failed at the initial magnetic pole estimation. NR Dynamic stop Coast to a stop
4D Dual signal error An error was detected in the signal related to the dual signal.
Refer to "Dual signal error (4D)" for details.
4E NC command mode error An error was detected in the control mode send from the NC. NR Deceleration
stop
Deceleration
stop
4F Instantaneous power inter rupt
The control power supply has remained shut down. NR Deceleration
stop
Deceleration
stop
50 Overload 1 Overload detection level became 100% or more. The motor or
the drive unit is overloaded.
NR Deceleration
stop
Deceleration
stop
51 Overload 2 In a servo system, current command of 95% or more of the units
max. current was given continuously for 1 second or longer. In
a spindle system, current command of 95% or more of the mo tors max. current was given continuously for 1 second or lon ger.
NR Deceleration
stop
Deceleration
stop
52 Excessive error 1 A position tracking error during servo ON was excessive. NR Deceleration
stop
Deceleration
stop
53 Excessive error 2 A position tracking error during servo OFF was excessive. NR Dynamic stop -
54 Excessive error 3 There was no motor current feedback when the alarm "Exces sive error 1" was detected.
NR Dynamic stop Coast to a stop
56 Commanded speed error The encoder has detected that the commanded speed exceed ed 1.15 times of the rapid traverse rate (rapid), or the motor ro tation speed exceeded the maximum speed.
NR Deceleration
stop
Deceleration
stop
58 Collision detection 1: G0 A disturbance torque exceeded the allowable value in rapid tra verse modal (G0).
NR Max cap dec
stop
-
59 Collision detection 1: G1 A disturbance torque exceeded the allowable value in the cut ting feed modal (G1).
NR Max cap dec
stop
-
5A Collision detection 2 A current command with the maximum drive unit current value
was detected.
NR Max cap dec
stop
-

(Note 1) Definitions of terms in the table are as follows.
Main side encoder: Encoder connected to CN2
Sub side encoder: Encoder connected to CN3
(Note 2) Resetting methods
NR: Reset with the NC RESET button. This alarm can also be reset with the PR and AR resetting conditions.
PR: Reset by turning the NC power ON again. This alarm can also be reset with the AR resetting conditions. When the control
axis is removed, this alarm can be reset with the NC RESET button. (Excluding alarms 32 and 37.)
AR: Reset by turning the NC and servo drive unit power ON again.
No. Name Details Reset
method
Servo

stop method
Spindle
stop method
5B Safely limited: Commanded
speed monitoring error
A commanded speed exceeding the safely limited speed was
detected in the safely limited mode.
PR Deceleration
stop
Deceleration
stop
5D Safely limited:
Door state error
The door state signal input in the NC does not coincide with the
door state signal input in the drive unit in the safely limited mode.
Otherwise, door open state was detected in normal mode.
PR Deceleration
stop
Deceleration
stop
5E Safely limited: Speed feed back monitoring error
A motor speed exceeding the safely limited speed was detected
in the safely limited mode.
PR Deceleration
stop
Deceleration
stop
5F External contactor error A contact of the external contactor is welding. NR Deceleration
stop
Deceleration
stop
60,
61,
63
to
77
Power supply alarm The power supply unit detected an error.
The error details are different according to the connected power supply
unit. Refer to "Power supply alarm" for details.
Dynamic stop Coast to a stop
62 Power supply:
Frequency error
Deceleration
stop
Deceleration
stop
80 Main side encoder cable er ror
The cable type of the motor side encoder cable is for rectangular
wave signal.
AR Initial error -
81 Sub side encoder cable er ror
The cable type of the machine side encoder cable does not co incide with the encoder type which is set by the parameter.
AR Initial error -
87 Drivers communication error The communication frame between drive units was aborted. PR Dynamic stop Coast to a stop
88 Watchdog The drive unit does not operate correctly. LED display is fixed as
"88".
"888" is displayed for MDS-EJ/EJH Series.
AR Dynamic stop Coast to a stop
8A Drivers communication data
error 1
The communication data 1 between drivers exceeded the toler able value in the communication between drive units.
PR Dynamic stop Coast to a stop
8B Drivers communication data
error 2
The communication data 2 between drivers exceeded the toler able value in the communication between drive units.
PR Dynamic stop Coast to a stop

Encoder alarm (Servo drive unit)
(Note 1) A drive unit processes all reset types of alarms as "PR". However, "AR" will be applied according to the encoder.
(Note 2) Bit No. in the table refers to a bit assignation for encoder side alarm management data.
Alarm number when the encod er is connected to CN2 side
2B 2C 2D 2E 48 49 4A 4B
Alarm number when the encod er is connected to CN3 side
1B 1C 1D 1E 27 28 29 2A
OSA405
OSA676
OSA24RS
Mitsubishi
Electric
Memory
alarm
LED alarm Data alarm Encoder
thermal error

OSA405ET2AS
OSA676ET2AS

Memory
alarm
LED alarm Data alarm Encoder
thermal error

MDS-EX-HR Memory error - Data error - Scale not
connected

CSW26KS Memory
alarm
LED alarm Data alarm Encoder
thermal error

AT343
AT543
AT545
AT1143
ST748
Mitsutoyo Initialization
error
(bit0)
EEPROM er ror
(bit5)
Photoelec tric type, stat ic capacity
type data
mismatch
(bit1)
ROM/RAM
error
(bit6)
CPU error
(bit4)
Photoelec tric type over speed
(bit7)
Static capaci ty type error
(bit3)
Photoelec tric type error
(bit2)
LC195M,
LC495M,
LC291M,
LIC2197M,
LIC2199M
MC15
RCN2590M,
RCN5390M,
RCN5590M,
RCN8390M
ROC425M,
ROC2390M
ECA4000Series
EIB Series
HEIDENHAIN Initialization
error
(bit0)
EEPROM er ror
(bit5)
Relative/ab solute posi tion data
mismatch
(bit1)
ROM/RAM
error
(bit6)
CPU error
(bit4)
Overspeed
(bit7)
Absolute po sition data er ror
(bit3)
Relative po sition data er ror
(bit2)
MPRZ scale NIDEC MA CHINE TOOL
Installation
accuracy
fault
(bit4)
- Detection po sition devi ance
(bit1)
Scale break ing
(bit0)
Absolute po sition detec tion fault
(bit5)
- Gain fault
(bit3)
Phase fault
(bit2)
SR67A,
SR75, SR85

SR74, SR77
SR87, SR84
RU77
RS87
Magnescale Laser diode
error
(bit0)
System
memory error
(bit5)
Encoder mis match error
(bit1)
- - Over speed
(bit7)
Absolute po sition data er ror
(bit3)
Relative po sition data er ror
(bit2)
SAM/SVAM/
GAM/G2AM/
LAM/G3BM/
HAM/H2AM
Series
FAGOR - - Absolute val ue detection
error
(bit3)
H/W error
(bit1)
CPU error
(bit0)

RL40N/RA/FOR TiS Series
Renishaw Initialization
error
(bit0)
- Absolute po sition data er ror
(bit3)
- - Over speed
(bit7)
- -
WMFA/WMBA/
WMRA/LMFA/
LMBA Series
(Note)
AMO Initialization
error
(bit0)
- Relative/ab solute posi tion data
mismatch
(bit2)
- - Over speed
(bit5)
Absolute po sition data er ror
(bit6)
-
AMS-ABS-3B
Series
Schneeberger -
(bit0)
- - Absolute po sition data er ror
(bit3)

MHS-04B Series GUBOA H/W error
(bit0)
Waveform
error
(bit1)
- Power volt age warning
(bit3)

M800/M80/E80 Series Alarm/Parameter Manual
3 Servo/Spindle Alarms (S)
IB-1501279-S 60
Encoder alarm (Spindle drive unit)
(Note 1) A drive unit processes all reset types of alarms as "PR". However, "AR" will be applied according to the encoder.
(Note 2) Bit No. in the table refers to a bit assignation for encoder side alarm management data.
Alarm number when the encod er is connected toCN2 side
2B 2C 2D 2E 48 49 4A 4B
Alarm number when the encod er is connected to CN3 side
1B 1C 1D 1E 27 28 29 2A
TS5690
TS5691
Mitsubishi
Electric
Memory error Waveform
error
- - - Overspeed - Relative po sition data er ror
MDS-EX-HR Initialization

error
- Data error - Connection
error

OSA24RS CPU error Waveform
error
Data alarm Encoder
thermal error

EIB Series HEIDENHAIN Initialization
error
(bit0)
EEPROM er ror
(bit5)
- - CPU error
(bit4)
Overspeed
(bit7)
- Relative po sition data er ror
(bit2)
ADB-K70M NIDEC MA CHINE TOOL
Installation
accuracy
fault
(bit4)
- Detection po sition devi ance
(bit1)
Scale break ing
(bit0)
- - Gain fault
(bit3)
Phase fault
(bit2)
GEL2449M LE NORD+BAU ER
Waveform
error
(bit0)
Analog sig nal warning
(bit1)
EEPROM er ror
(bit2)
Power volt age warning
(bit3)
H/W error
(bit4)
Overspeed
warning
(bit5)
Count error
(bit6)
Overheat
warning
(bit7)
MHS-04B Series GUBOA H/W error
(bit0)
Waveform
error
(bit1)
- Power volt age warning
(bit3)

M800/M80/E80 Series Alarm/Parameter Manual
3 Servo/Spindle Alarms (S)
61 IB-1501279-S
Dual signal error (4D)
(Note) Resetting method may be "PR" depending on the sub-number in the decimal place.
No. Name Sub info Details
004D.xxx Dual signal error - An error was detected in the signal related to the dual signal. The name of
the axis with an error is displayed. The number "xxx" in the decimal place in dicates the sub-number.
004D.xxx : Alarm number.Sub-number
Sub-No. Name Details Reset
method
Axis
type
Servo
stop method
Spindle
stop method
1 Power shutoff error Either of the STO signals entered an input
state while the STO function is disabled.
NR Each axis Dynamic stop Coast to a stop
2 Illegal power shutoff error Either of the STO signals entered an input
state during servo ON command or during de celeration and stop with the STO function en abled.
NR Each axis Dynamic stop Coast to a stop
3 STO signal mismatch error Input states of two STO signals were mis matched while the STO function is enabled.
NR Each axis Dynamic stop Coast to a stop
15 Safety communication:
Communication error 1

A receiving error was detected in the safety
communication.
NR Each axis Dynamic stop Coast to a stop
16 Safety communication:
Initial communication error 1
A receiving error was detected in the initial
communication for the safety communication.
PR Each axis Dynamic stop Coast to a stop
17 Voltage diagnosis error A power error was detected in the safety func tion.
NR Each axis Dynamic stop Coast to a stop
19 DRAM diagnosis error A DRAM error was detected in the safety
function.
PR Each axis Dynamic stop Coast to a stop
21 Control process error An error was detected in the status of soft ware execution for the safety function.
PR Each axis Dynamic stop Coast to a stop
23 Safety encoder:
Initial communication error 1
An error was detected in the initial communi cation with a safety encoder.
PR Each axis Initial error Initial error
24 PCB error A PCB error was detected in the safety func tion.
PR Each axis Initial error Initial error
25 Synchronization error A synchronization error was detected in the
safety function.
PR Each axis Dynamic stop Coast to a stop
26 Flash ROM diagnosis error A Flash ROM error was detected in the safety
function.
PR Each axis Initial error Initial error
33 Safety encoder:
Communication error 1
An error was detected in the communication
with a safety encoder.
PR Each axis Dynamic stop Coast to a stop
34 Safety encoder:
Diagnosis error 1
A power supply voltage error was detected in
the safety encoder.
PR Each axis Dynamic stop Coast to a stop
35 Safety encoder:
Diagnosis error 2
A H/W error was detected in the safety en coder.
PR Each axis Dynamic stop Coast to a stop
36 Safety encoder:
Diagnosis error 3
A process error was detected in the safety en coder.
PR Each axis Dynamic stop Coast to a stop
37 Safety encoder:
Diagnosis error 4
An A/D conversion error was detected in the
safety encoder.
PR Each axis Dynamic stop Coast to a stop
39 Non-safety encoder:
Position feedback fixation
diagnosis error
The position feedback from the non-safety
encoder remains unchanged.
PR Each axis Dynamic stop Coast to a stop
40 Safety encoder:
Thermal error
The safety encoder detected a thermal error. PR Each axis Dynamic stop Coast to a stop
53 Safety communication:
Transmission interval mis match error
An error was detected in the transmission in terval setting.
NR Each axis Initial error Initial error
54 Safety communication:
Initial communication error 2
A receiving error was detected in the initial
communication for the safety communication.
NR Each axis Initial error Initial error
55 Safety communication:
Communication error 2
A receiving error was detected in the safety
communication.
NR Each axis Dynamic stop Coast to a stop
56 Safety parameter setting
range error
A setting error was detected in the safety pa rameter.
PR Each axis Initial error Initial error
57 Safety parameter combina tion error
A combination error was detected in the safe ty parameter.
PR Each axis Initial error Initial error
65 Register diagnosis error A resister diagnosis error was detected in the
safety function.
PR Each axis Initial error Initial error

66 Calculation device diagno sis error
An error was detected in the calculation de vice diagnosis for the safety function.

PR Each axis Initial error Initial error
67 Sequence diagnosis error An error was detected in the sequence diag nosis for the safety function.
PR Each axis Dynamic stop Coast to a stop
68 Stack diagnosis error An error was detected in the stack diagnosis
for the safety function.
PR Each axis Dynamic stop Coast to a stop
69 Temperature diagnosis er ror
Overheat was detected in the safety function. NR Each axis Dynamic stop Coast to a stop
71 Watchdog error The safety function is not operating correctly. PR Each axis Dynamic stop Coast to a stop
72 Clock diagnosis error An error was detected in the clock diagnosis
for the safety function.
PR Each axis Dynamic stop Coast to a stop
74 DO output compare error An error was detected in the status of DO out put for the safety function.
PR Each axis Dynamic stop Coast to a stop
75 ISC communication error An error was detected in the inter-system
communication for the safety function.
PR Each axis Dynamic stop Coast to a stop
78 Safety communication:
Initial communication error 3
A receiving error was detected in the initial
communication for the safety communication.
PR Each axis Dynamic stop Coast to a stop
88 Safety circuit: STO error An error was detected in the read-back diag nosis for STO.
PR Each axis Dynamic stop Coast to a stop
91 Safety circuit: SBC error An error was detected in the read-back diag nosis for SBC.
PR Each axis Dynamic stop Coast to a stop
126 Safety communication:
Communication error 3
A receiving error was detected in the safety
communication.
PR Each axis Dynamic stop Coast to a stop
004D.xxx : Alarm number.Sub-number
Sub-No. Name Details Reset
method
Axis
type
Servo
stop method
Spindle
stop method
M800/M80/E80 Series Alarm/Parameter Manual
3 Servo/Spindle Alarms (S)
63 IB-1501279-S
(2) Power supply alarm
(Note 1) If a power supply alarm (60 to 77) occurs, all servos will stop with the dynamic brakes, and all spindles will coast to a stop.
(Note 2) "b", "C" and "d" displayed on the power supply unit's LED as a solid light (not flickering) do not indicate an alarm.
(Note 3) Check the LED display of the power backup unit to identify what alarm is occurring to the power backup unit.
** Refer to your drive unit's instruction manual for details.
(Note 4) When the power supply alarm (6F) is detected in the 2nd part system, the reset method differs depending on the detected
power supply alarm.
No. Name Details Reset
method
61 Power supply: Power module overcurrent Overcurrent protection function in the power module has started its operation. PR
62 Power supply: Frequency error The input power supply frequency increased above the specification range. PR
66 Power supply: Process error An error occurred in the process cycle. PR
67 Power supply: Phase interruption An open-phase condition was detected in input power supply circuit. PR
68 Power supply: Watchdog The system does not operate correctly. LED display is fixed as "8". AR
69 Power supply: Grounding The motor power cable is in contact with FG (Frame Ground). PR
6A Power supply: External contactor welding A contact of the external contactor is welding. PR
6B Power supply: Rush circuit error An error was detected in the rush circuit. PR
6C Power supply: Main circuit error An error was detected in charging operation of the main circuit capacitor. PR
6D Parameter setting error An error was detected in the parameter sent from the drive unit. PR
6E Power supply: H/W error An error was detected in the internal memory. AR
A/D error An error was detected in the A/D converter.
Unit ID error An error was detected in the unit identification.
6F Power supply error No power supply is connected to the drive unit, or a communication error was
detected.
AR
(Note 4)
70 Power supply: External emergency stop er ror
A mismatch of the external emergency stop input and NC emergency stop input
continued for 30 seconds.
PR
71 Power supply: Instantaneous power inter ruption
The power was momentarily interrupted. NR
72 Power supply: Fan stop A cooling fan built in the power supply unit stopped, and overheat occurred in
the power module.
PR
73 Power supply: Over regeneration Over-regeneration detection level became over 100%. The regenerative resistor
is overloaded. This alarm cannot be reset for 15 min from the occurrence to pro tect the regeneration resistor. Leave the drive system energized for more than
15 min, then turn the power ON to reset the alarm.
NR
74 Power supply: Option unit error An alarm was detected in the power backup unit (power supply option unit). NR
(Note 3)
75 Power supply: Overvoltage L+ and L- bus voltage in main circuit exceeded the allowable value. As the volt age between L+ and L- is high immediately after this alarm, another alarm may
occur if this alarm is reset in a short time. Wait more than 5 min before resetting
so that the voltage drops.
NR

76 Power supply: Function setting error The rotary switch setting of external emergency stop is not correct, or a wrong external emergency stop signal is input.

AR

Power supply: Function selection error Undefined area for the rotary switch is selected

77 Power supply: Power module overheat Thermal protection function in the power module has started its operation. PR

3.2 Initial Parameter Errors (S02)

Details

The servo parameter setting data is illegal.The alarm No. is the No. of the servo parameter where the error occurred.

Remedy

Check the descriptions for the appropriate servo parameters and correct them.

Refer to "Parameter Numbers during Initial Parameter Error" of each drive unit instruction manual for details.

Details

The number of constants to be used in the following functions is too large:

- Electronic gears.
- Position loop gain.
- Speed feedback conversion.

Remedy

Check that all the related parameters are specified correctly.

sv001: PC1, sv002: PC2, sv003: PGN1

sv018: PIT, sv019: RNG1, sv020: RNG2

Details

When high-speed serial incremental encoder (OSE104, OSE105) is connected, parameters for absolute posi tion are set to ON.

Set the parameters for absolute position detection to OFF.

To detect an absolute position, replace the incremental specification encoder with an absolute encoder.

Remedy

Check that all the related parameters are specified correctly.

sv017: SPEC, sv025: MTYP

Details

No servo option is found.

The closed loop (including the ball screw-end detection) or dual feedback control is an optional function.

Remedy

Check that all the related parameters are specified correctly.

sv025: MTYP/pen

sv017: SPEC/dfbx

Details

No servo option is found.

The SHG control is an optional function.

Remedy

Check that all the related parameters are specified correctly.

sv057: SHGC

sv058: SHGCsp

Details

No servo option is found.

The adaptive filtering is an optional function.

Remedy

Check that all the related parameters are specified correctly.

sv027: SSF1/aflt

S02 Initial parameter error 2201-2264 (Axis name)

S02 Initial parameter error 2301 (Axis name)

S02 Initial parameter error 2302 (Axis name)

S02 Initial parameter error 2303 (Axis name)

S02 Initial parameter error 2304 (Axis name)

S02 Initial parameter error 2305 (Axis name)

Details

Parameter error

The spindle parameter setting data is illegal.

The alarm No. is the No. of the spindle parameter where the error occurred.

Remedy

Check the descriptions for the appropriate spindle parameters and correct them.

Even when the parameter is set to a value within the setting range, an error is occurring due to the hardware compatibility or specifications or in relation to several other parameters.

Refer to "Parameter Numbers during Initial Parameter Error" of each drive unit instruction manual for details.

(Note) When the power is turned OFF and ON after setting "#13229 SP229/bitD" (safely limited speed setting unit: 100) enabled with S/W Version D or previous one for M8 Series, the initial parameter error (S02 13238) occurs.

S02 Initial parameter error:PR 13001-13256 (Axis name)

3.3 Safety Function Errors (S05)

Details

The STO signal has been input through the CN8 connector.

Remedy

Make sure that a short-circuiting connector has been inserted into CN8.

Details

STO signal is input by dedicated wiring STO function during servo ON.

Remedy

Refer to the manual of drive unit.

Details

STO signal is illegally input by dedicated wiring STO function during servo OFF.

(Illegal input : Signal input state for STO1 and STO2 is mismatched.)

Remedy
Refer to the manual of drive unit.
Details
STO signal is illegally input by dedicated wiring STO function during servo ON.
(Illegal input : Signal input state for STO1 and STO2 is mismatched.)
Remedy
Refer to the manual of drive unit.
S05 Safety function error 0001 (Axis name)
S05 Safety function error 0002 (Axis name)
S05 Safety function error 0004 (Axis name)
S05 Safety function error 0006 (Axis name)

3.4 Parameter Errors (S51)
Details
Servo parameter setting data is illegal.The alarm No. is the No. of the servo parameter where the warning oc curred.
Remedy
Check the descriptions for the appropriate servo parameters and correct them.
Details
Spindle parameter setting data is illegal.
The alarm No. is the No. of the spindle parameter where the warning occurred.
Remedy
Check the descriptions for the appropriate spindle parameters and correct them.
Even when the parameter is set to a value within the setting range, an error is occurring due to the hardware compatibility or specifications or in relation to several other parameters.
Refer to "Parameter Numbers during Initial Parameter Error" of each drive unit instruction manual for details.
S51 Parameter error 2201-2264 (Axis name)
S51 Parameter error 13001-13256 (Axis name)

3.5 Servo Warnings (S52)
Servo warning is displayed in the following format.
The numerical value in the column of "No." in the table after the following page is the double-digit number displayed on the LED which is on the front-side of the drive unit.
At the time of the occurrence of the servo warnings (S52), this number will be displayed in the last two digits of the "alarm number".
(Note 1) For the troubleshooting at the time of the occurrence of the servo warnings, refer to your drive unit's instruc tion manual.
(Note 2) When multiple servo alarms have occurred, only an alarm which occurred first is displayed on the alarm screen. Refer to the alarm history on the drive monitor screen as necessary.
Axis name
Servo : Axis name
Spindle : "S1", "S2", "S3" ...
Alarm No.
Message
Alarm class
Alarm class Message
S52 Name or "Servo warning"
S 0 0

(1) Drive unit warning
(Note1) Definitions of terms in the table are as follows.
Main side encoder: Encoder connected to CN2
Sub side encoder: Encoder connected to CN3
(Note 2) Resetting methods
* : Automatically reset once the cause of the warning is removed.
NR: Reset with the NC RESET button. This warning can also be reset with the PR and AR resetting conditions.
PR: Reset by turning the NC power ON again. This warning can also be reset with the AR resetting conditions. When the control axis is removed, this warning can be reset with the NC RESET button. (Excluding warning 93.)
AR: Reset by turning the NC and servo drive unit power ON again.
(Note 3) Servo and spindle motor do not stop when the warning occurs.
(Note 4) When an emergency stop is input, servo and spindle motor decelerate to a stop. (When SV048, SV055 or SV056 is set for servo and when SP055 or SP056 is set for spindle.)
Dual signal warning (A4)
No. Name Details Reset
method
Stop
method
96 Scale feedback error An excessive difference in feedback amount was detected between the main side encoder and the MPI scale in MPI scale absolute position detec tion system.
* -
97 Scale offset error An error was detected in the offset data that is read at the NC power-ON in MPI scale absolute position detection system.
PR -
9B Incremental encoder/
magnetic pole shift warning
The difference between the magnetic pole position after the phase Z has been passed (magnetic pole shift amount:SV028) and the initially detected position is excessive in the built-in motor's incremental control system.The magnetic pole is controlled by the initial detection value.
PR -
9E Absolute position encoder:
Revolution counter error
An error was detected in the revolution counter data of the absolute posi tion encoder. The accuracy of absolute position is not guaranteed.
* -

9F Battery voltage drop The battery voltage to be supplied to the absolute position encoder is drop ping.
NR -
A3 In initial setup of ABS position This warning is detected until the axis reaches the reference position during
the initial setup of the distance-coded reference check function. This warn ing turns OFF after the axis has reached the position, thus set the value dis played on the drive monitor to the parameter.
PR -
A4 Dual signal warning An input was detected in the signal related to the dual signal.
Refer to "Dual signal warning (A4)" for details.
* -
A6 Fan stop warning A cooling fan in the drive unit stopped. * -
E0 Overregeneration warning Over-regeneration detection level exceeded 80%. * -
E1 Overload warning A level of 80% of the Overload 1 alarm state was detected. * -
E4 Parameter warning An incorrect set value was detected among the parameters send from the
NC in the normal operation.
* -
E6 Control axis detachment warning A control axis is being detached. (State display) * -
E7 NC emergency stop In NC emergency stop. (State display) * Dec stop en abled
E8
to
EF
Power supply warning The power supply unit detected a warning.
The error details are different according to the connected power supply unit.
Refer to "Power supply warning".
* -
*EA:
Dec stop en abled
No. Name Sub info Details
00A4.00 Dual signal warning Axis name The system has been set in the STO state. The STO state is also entered at
the time of emergency stop, but in this case, this warning will not appear be cause the emergency stop has priority.
M800/M80/E80 Series Alarm/Parameter Manual
3 Servo/Spindle Alarms (S)
IB-1501279-S 70
(2) Power supply warning
(Note 1) Resetting methods
* : Automatically reset once the cause of the warning is removed.
NR: Reset with the NC RESET button. This warning can also be reset with the PR and AR resetting conditions.
PR: Reset by turning the NC power ON again. This warning can also be reset with the AR resetting conditions. When the control
axis is removed, this warning can be reset with the NC RESET button. (Excluding warning 93.)
AR: Reset by turning the NC and servo drive unit power ON again.
(Note 2) Servo and spindle motor do not stop when the warning occurs.
(Note 3) Check the LED display of the power backup unit to identify what warning is occurring to the power backup unit.
** Refer to your drive unit's instruction manual for details.
No. Name Details Reset
method
E9 Instantaneous power interruption warning The power was momentarily interrupted. NR
EA In external emergency stop state External emergency stop signal was input. *
EB Power supply: Over regeneration warning Over-regeneration detection level exceeded 80%. *
EE Power supply: Fan stop warning A cooling fan built in the power supply unit stopped. *
EF Power supply: Option unit warning A warning was detected in the power backup unit (power supply option unit). * (Note 3)
M800/M80/E80 Series Alarm/Parameter Manual
3 Servo/Spindle Alarms (S)
71 IB-1501279-S
3.6 Safety Function Warnings (S53)
Details
The system has been set in the STO state.
The STO state is also entered at the time of emergency stop, but in this case, this warning will not appear be cause the emergency stop has priority.
S53 Safety function warning 0001 (Axis name)
M800/M80/E80 Series Alarm/Parameter Manual
3 Servo/Spindle Alarms (S)
IB-1501279-S 72
4
73 IB-1501279-S
MCP Alarms (Y)
M800/M80/E80 Series Alarm/Parameter Manual
4 MCP Alarms (Y)
IB-1501279-S 74
4MCP Alarms (Y)
Details
System alarm: Process time is over.
Remedy
The software or hardware may be damaged.
Contact the service center.
(Note) When two or more alarms (Y02 0051) occur at the same time, only the alarm which has occurred first is
displayed.
Details
A communication error has occurred between controller and drive unit.
x: Channel No. (0 to)
y: Drive unit rotary switch No. (0 to)
Remedy
Take measures against noise.
Check for any failure of the communication cable connectors between controller and drive unit or between
two drive units.
Check for any failure of the communication cables between controller and drive unit or between two drive
units.
A drive unit may be faulty. Take a note of the 7-segment LED contents of each drive unit and contact the
Service Center.
Update the drive unit software version.
(Note) When two or more alarms (Y02 0051) occur at the same time, only the alarm which has occurred first is
displayed.

Details
A communication error has occurred between controller and drive unit.
x: Channel No. (from 0)
y: Drive unit rotary switch No. (from 0)
Remedy
Take measures against noise.
Check for any failure of the communication cable connectors between controller and drive unit or between two drive units.
Check for any failure of the communication cables between controller and drive unit or between two drive units.
A drive unit may be faulty. Take a note of the 7-segment LED contents of each drive unit and contact the Service Center.
Update the drive unit software version.
(Note) When two or more alarms (Y02 0051) occur at the same time, only the alarm which has occurred first is displayed.
Details
A communication error has occurred between controller and drive unit.
x: Channel No. (from 0)
Remedy
Take measures against noise.
Check for any failure of the communication cable connectors between controller and drive unit or between two drive units.
Check for any failure of the communication cables between controller and drive unit or between two drive units.
A drive unit may be faulty. Take a note of the 7-segment LED contents of each drive unit and contact the Service Center.
Update the drive unit software version.
(Note) When two or more alarms (Y02 0051) occur at the same time, only the alarm which has occurred first is displayed.
Y02 System alm: Process time over 0050
Y02 SV commu er: Data ID error 0051 xy03
Y02 SV commu er: Recv frame No. 0051 xy04
Y02 SV commu er: Commu error 0051 x005

Details
A communication error has occurred between controller and drive unit.
x: Channel No. (from 0)
Remedy
Take measures against noise.
Check for any failure of the communication cable connectors between controller and drive unit or between two drive units.
Check for any failure of the communication cables between controller and drive unit or between two drive units.
A drive unit may be faulty. Take a note of the 7-segment LED contents of each drive unit and contact the Service Center.
Update the drive unit software version.
(Note) When two or more alarms (Y02 0051) occur at the same time, only the alarm which has occurred first is displayed.
Details
A communication error has occurred between controller and drive unit.
x: Channel No. (from 0)
Remedy
Take measures against noise.
Check for any failure of the communication cable connectors between controller and drive unit or between two drive units.
Check for any failure of the communication cables between controller and drive unit or between two drive units.
A drive unit may be faulty. Take a note of the 7-segment LED contents of each drive unit and contact the Service Center.
Update the drive unit software version.
(Note) When two or more alarms (Y02 0051) occur at the same time, only the alarm which has occurred first is displayed.
Details
A communication error has occurred between controller and drive unit.
A drive unit stopped due to transition failure from initial communication to runtime.
x: Channel No. (from 0)
y: Drive unit rotary switch No. (from 0)
Remedy
Take measures against noise.
Check for any failure of the communication cable connectors between controller and drive unit or between two drive units.
Check for any failure of the communication cables between controller and drive unit or between two drive units.
A drive unit may be faulty. Take a note of the 7-segment LED contents of each drive unit and contact the Service Center.
Update the drive unit software version.
(Note) When two or more alarms (Y02 0051) occur at the same time, only the alarm which has occurred first is displayed.
Y02 SV commu er: Connect error 0051 x006
Y02 SV commu er: Safe posn FB err 0051 x007
Y02 SV commu er : Init commu error 0051 xy20

Details
A communication error has occurred between controller and drive unit.

No response from drive unit to the request from NC when setting network configuration.
x: Channel No. (from 0)
y: Station No. (from 0)
Remedy
Take measures against noise.
Check for any failure of the communication cable connectors between controller and drive unit or between two drive units.
Check for any failure of the communication cables between controller and drive unit or between two drive units.
A drive unit may be faulty. Take a note of the 7-segment LED contents of each drive unit and contact the Service Center.
Update the drive unit software version.
(Note) When two or more alarms (Y02 0051) occur at the same time, only the alarm which has occurred first is displayed.
Details
A communication error has occurred between controller and drive unit.
Drive unit's software version doesn't support the communication mode that the controller requires.
x: Channel No. (from 0)
y: Station No. (from 0)
Remedy
Take measures against noise.
Check for any failure of the communication cable connectors between controller and drive unit or between two drive units.
Check for any failure of the communication cables between controller and drive unit or between two drive units.
A drive unit may be faulty. Take a note of the 7-segment LED contents of each drive unit and contact the Service Center.
Update the drive unit software version.
(Note) When two or more alarms (Y02 0051) occur at the same time, only the alarm which has occurred first is displayed.
Details
The drive unit is not correctly connected.
Alphabet (axis name): NC axis drive unit not mounted
Pn: PLC axis drive unit not mounted (n = axis No.)
Sn: Spindle axis drive unit not mounted (n = axis No.)
Remedy
Check the drive unit mounting state.
Check the end of the cable wiring.
Check for any broken wires.
Check the connector insertion.
The drive unit input power has not been ON.
The drive unit axis No. switch is illegal.
Y02 SV commu er: Node detect err 0051 xy30
Y02 SV commu er: Commu not support 0051 xy31
Y03 Drive unit unequipped axis name

Details
There is a problem in the value set for the number of axes or the number of part systems.
Remedy
Correct the value set for the following corresponding parameters:
"#1001 SYS_ON (System validation setup)",
"#1002 axisno (Number of axes)",
"#1039 spinno (Number of spindles)", etc.
"#2187 chgPLCax (PLC axis switchover axis No.)", etc.
Make sure that the parameters unavailable for a switchover axis (#1068 slavno, #12800 chgauxno, etc.) are OFF.
Details
The parameter setting of the multiple axis synchronization control is incorrect.
The sub-number is displayed after the error number.
0002:
More than three sets combining the synchronization control and the multiple axis synchronization control are set.
0003:
The slave axis of multiple axis synchronization control overlaps with the synchronization control axis.
0004:
The master axis of multiple axis synchronization control overlaps with the synchronization control axis.
0005:
The master axis is set to the axis which crosses the part system.
0006:
The slave axis setting is also set to the master axis.
0007:
The function which cannot be used with the multiple axis synchronization control is enabled.
Remedy
Correct the parameter setting.
Details
There is a skipped number in the channels.
Remedy
Check the values set for the following parameters.
"#1021 mcp_no (Drive unit I/F channel No. (servo))"
"#3031 smcp_no (Drive unit I/F channel No. (spindle))"
Details
There is a duplicate setting for random layout.
Remedy
Check the values set for the following parameters.
"#1021 mcp_no (Drive unit I/F channel No. (servo))"
"#3031 smcp_no (Drive unit I/F channel No. (spindle))"

Details
The drive unit fixed setting "0000" and random layout setting "****" are both set.
Remedy
Check the values set for the following parameters.
"#1021 mcp_no (Drive unit I/F channel No. (servo))"
"#3031 smcp_no (Drive unit I/F channel No. (spindle))"
Y05 Initial parameter error (Parameter No.)
Y05 Initial parameter error 2674 (Sub-number)
Y06 mcp_no setting error 0001
Y06 mcp_no setting error 0002
Y06 mcp_no setting error 0003

Details
The spindle/C axis "#1021 mcp_no (Drive unit I/F channel No. (servo))" and "#3031 smcp_no (Drive unit I/F channel No. (spindle))" are not set to the same values.
Remedy
Check the values set for the following parameters.
"#1021 mcp_no (Drive unit I/F channel No. (servo))"
"#3031 smcp_no (Drive unit I/F channel No. (spindle))"
Details
A random layout has been set while "#1154 pdoor" has been set to "1" in two-part system.
Remedy
Check the values set for the following parameters.
"#1021 mcp_no (Drive unit I/F channel No. (servo))"
"#3031 smcp_no (Drive unit I/F channel No. (spindle))"
Details
The channel No. parameter is not within the setting range.
Remedy
Check the values set for the following parameters.
"#1021 mcp_no (Drive unit I/F channel No. (servo))"
"#3031 smcp_no (Drive unit I/F channel No. (spindle))"
Details
The drive units more than the number of axes specified with the parameter are connected.
Or the number of axes connected to each channel exceeds the maximum number of connectable axes.
The exceeded number of axes per channel is displayed as alarm No.
x: Exceeded number of axes at drive unit interface channel 2 (0 to F)
y: Exceeded number of axes at drive unit interface channel 1 (0 to F)
This alarm also occurs when the drive unit is connected only with the 2nd channel without connecting with the 1st channel.
Remedy
For the channel whose alarm No. is other than "0", detach the connected axes by the number of indicated alarm No.
The number of connected axes should be less than or equal to the number specified with the parameter or the maximum number of connections.
(Note 1) The number of axes is limited per each drive unit interface channel.
(Note 2) Maximum number of axes that can be connected differs depending on whether or not an expansion unit is available or the setting of "#11012 16 axes for 1ch" (Connecting 16 axes for 1ch).
With the expansion unit, up to eight axes can be connected to a channel. Without the expansion unit, up to eight axes are allowed when "#11012 16 axes for 1ch" (Connecting 16 axes for 1ch) is set to "0", six teen axes when set to "1".
(Note 3) If this alarm occurs, the alarm "Y03 Message: Drive unit unequipped" will not occur.
(Note 4) This alarm is displayed taking precedence over the alarm "Y08 Too many drive units connected" and "Y09 Too many axisno connected".
Y06 mcp_no setting error 0004
Y06 mcp_no setting error 0005
Y06 mcp_no setting error 0006
Y07 Too many axes connected 00xy

Details
The number of drive units connected to each channel exceeds 8.
The exceeded number of drive units per channel is displayed as alarm No.
x: Exceeded number of drive units at drive unit interface channel 2 (0 to F)
y: Exceeded number of drive units at drive unit interface channel 1 (0 to F)
Remedy
Remove drive units from the channel whose alarm No. is other than "0" for the number displayed as the alarm No. Keep the number of connected drive units to 8 or less.
(Note 1) The drive unit is not counted when all the axes connected to it are invalid.
(Note 2) If this alarm occurs, the alarm "Y03 Message: Drive unit unequipped" will not occur.
(Note 3) The alarm "Y07 Too many axes connected" and "Y09 Too many axisno connected" are displayed tak ing precedence over this alarm.
Details
The No. of the axis (drive unit's rotary switch No.) connected to each channel is bigger than the No. allowed.
If the axis No. of each channel is bigger than the No. allowed, "1" is displayed for the alarm No.
x: "1" when the axis No. at drive unit interface channel 2 is too big
y: "1" when the axis No. at drive unit interface channel 1 is too big
Remedy
For the channel whose alarm No. is "1", keep the axis No. (drive unit's rotary switch No.) not bigger than the No. allowed.
(Note 1) The axis No. is limited per each drive unit interface channel.
(Note 2) The biggest allowed connected axis No. differs depending on whether or not an expansion unit is avail able or the setting of "#11012 16 axes for 1ch (Connecting 16 axes for 1ch)". The biggest connectable axis No. is as shown below.
With the expansion unit, axes No. '0' to '7' can be connected.
Without the expansion unit, axes No. '0' to '7' are allowed when '#11012 16 axes for 1ch (Connecting 16 axes for 1ch)' is set to '0', axes No. '0' to 'F' when set to '1'.
(Note 3) If this alarm occurs, the alarm "Y03 Message: Drive unit unequipped" will not occur.
(Note 4) This alarm is displayed taking precedence over the alarm "Y08 Too many drive units connected".

(Note 5) The alarm "Y07 Too many axes connected" is displayed taking precedence over this alarm.
Details
Although the high-speed synchronous tapping option is valid, the connected drive unit doesn't support the op tion.
Remedy
Replace the drive unit with that supports the option.
Set "High-speed synchronous tapping disabled axis" parameter as disabled for the axis to which you don't use the high-speed synchronous tapping.
Details
Although the high-speed synchronous tapping option is valid, the connected drive unit doesn't support the op tion.
Remedy
Replace the drive unit with that supports the option.
Set "High-speed synchronous tapping disabled axis" parameter as disabled for the spindle to which you don't use the high-speed synchronous tapping.
Y08 Too many drive units connected 00xy
Y09 Too many axisno connected 00xy
Y12 No commu. with axis drv unit
Y13 No commu. with sp drv unit

Details
RIO station number is too large
Although a non-RIO2.0 unit is connected, 9 or a greater number is set as a station No.
Remedy
If a non-RIO2.0 unit is connected, set the station No. to be 8 or smaller.
If you use 9 or a greater station No., do not connect a non-RIO2.0 unit.
Details
RIO3 connection error
A non-RIO2.0 unit is connected to RIO3.
Remedy
Connect a RIO2.0-compatible or RIO2.0-dedicated unit.
Details
RIO communication processing time exceeded (PC medium speed)
Due to too short DI/DO refresh cycle, the control may not refresh all the DI/DOs connected to one RIO channel at a time.
Remedy
Correct the setting of "#1334 DI/DO refresh cycl(DI/DO refresh cycle)".
Connect the remote IO units to RIO1, RIO2 and RIO3 dispersedly to reduce the number of RIO stations connected per RIO channel.
Details
RIO communication processing time exceeded (PC high speed)
Due to too short DI/DO refresh cycle, the control may not refresh all the DI/DOs connected to one RIO channel at a time.
Remedy
Connect the remote IO units to RIO1, RIO2 and RIO3 dispersedly to reduce the number of RIO stations (which perform high-speed input/output) per RIO channel.
Details
The speed monitoring parameter in the NC does not correspond to the parameter transmitted to the drive unit.
The name of the axis with an error is displayed.
Remedy
The NC or the servo drive unit may be damaged.
Contact the service center.
Details
The speed exceeding the speed set with the parameter was commanded during the speed monitoring mode.
The name of the axis with an error is displayed.
Remedy
Check the speed monitoring parameter and the sequence program.
Restart the NC.
Details
The commanded position, transmitted to the servo drive unit from NC, is totally different from the feedback po sition received from the servo drive unit during the speed monitoring mode.
The name of the axis with an error is displayed.
Remedy
The NC or the servo drive unit may be damaged.
Contact the service center.
Y15 RIO connection error 0001 (Error channel)
Y15 RIO connection error 0002 (Error channel)
Y15 RIO connection error 0003 (Error channel)
Y15 RIO connection error 0004 (Error channel)
Y20 Parameter compare error 0001 (Axis name)
Y20 Sfty obsrvation: Cmd spd err 0002 (Axis name)
Y20 Sfty obsrvation: FB pos err 0003 (Axis name)

Details
Actual rotation speed of the motor is exceeding the speed that has been set with speed monitoring parameter during the speed monitoring mode.
The name of the axis with an error is displayed.
Remedy
Correct the speed observation parameter and the sequence program.
Restart the NC.
Details
Door state signals on the NC side and the drive side do not match. It may be caused by the followings:
Cable disconnection
Damaged door switch
Damaged NC or servo drive unit
Remedy
Check the cable.

Check the door switch.
Restart the NC.
Details
The door open state was detected when the speed monitoring mode was invalid.
The causes may be same as the ones for 0005 (Door signal: Input mismatch). Also the sequence program may not be correct.
Remedy
Correct the sequence program.
Restart the NC.
Details
Two speed monitoring parameters are not matched at the rising edge of the "speed monitor mode" signal.
The name of the axis with an error is displayed.
Remedy
Correct the relevant parameters so that the two speed monitoring parameters match.
Restart the NC.
Details
Contactor welding was detected.
Displays the bit corresponding to the No. of the abnormal contactor for the contactor information.
Some contactors take a while to be shutdown after the servo ready is turned OFF, and the servo ready was turned ON in the meantime.
Remedy
Make sure that contactor's auxiliary b contact signal is output correctly to the device set on "#1330 MC_dp1(Contactor weld detection device 1)" and "#1331 MC_dp2(Contactor weld detection device 2)".
If welding, replace the contactor.
Restart the NC.
Details
"#2313 SV113 SSF8/bitF (ssc SLS (Safely Limited Speed) function)" and "#13229 SP229 SFNC9/bitF (ssc SLS (Safely Limited Speed) function)" are set for a system with no safety observation option.
Remedy
Disable "#2313 SV113 SSF8/bitF (ssc SLS (Safely Limited Speed) function)" and "#13229 SP229 SFNC9/bitF (ssc SLS (Safely Limited Speed) function)".
Then, restart the NC.
Y20 Sfty obsrvation: FB speed err 0004 (Axis name)
Y20 Door signal: Input mismatch 0005 Door No.
Y20 No speed observation mode in door open 0006 Door No.
Y20 Speed obsv: Para incompatible 0007 (Axis name)
Y20 Contactor welding detected 0008 Contactor info
Y20 No spec: Safety observation 0009

Details
24VDC power is not supplied to SDIO connector correctly. (SDIO 4A pin supply voltage was dropped to 16V or less, or 1ms or more instant power interrupt was detected.)
In this case, "Pw sply:Inst pw interpt(DC24V)" alarm occurs because the contactor control output signal cannot be controlled.
This state remains until restarting the NC even if the cause of the alarm has been removed.
Remedy
Check the wiring. Supply 24VDC power to the SDIO connector.
Restart the NC.
Details
The device set in the parameter "#1353 MC_ct1" (Contactor shutoff output 1 device) does not exist.
The device set in the parameter "#1353 MC_ct1" (Contactor shutoff output 1 device) is used as an output device in PLC program.
Remedy
In the parameter "#1353 MC_ct1" (Contactor shutoff output 1 device), set the device to which a remote I/O is connected. Use the device to control the contactor.
Confirm that the devices set by the parameter "#1353 MC_ct1" (Contactor shutoff output 1 device) are not used as an output device in PLC program.
Restart the NC.
Details
Contactor's operation is not following the NC's commands.
Displays the No. of the abnormal contactor for the contactor information.
Remedy
Check and correct "#1353 MC_ct1" (Contactor shutoff output 1 device) setting.
Check the wiring for contactor shutoff.
Check for contactor's welding.
Restart the NC.
Details
The drive unit's STO function has failed to work properly.
Remedy
If this alarm has occurred alone, a drive unit failure can be suspected.
If other alarms have been generated at the same time, it is also possible that there is communication problem.
Check the optical cable wiring.
Details
The motor power has not been shut down with the STO function when the NC power was turned ON.
Remedy
If this alarm has occurred alone, a drive unit failure can be suspected.
If other alarms have been generated at the same time, it is also possible that there is communication problem.
Check the optical cable wiring.
Details
A setting of #2118 SscDrSel, #3071 SscDrSelSp, #2180 S_DIN, or #3140 S_DINSp is not correct.
Remedy
- Correct the parameter setting.
Y20 SDIO connector input volt err 0010
Y20 Device setting illegal 0011 Contactor info
Y20 Contactor operation abnormal 0012 Contactor info
Y20 STO function operation illegal 0013

Y20 STO function illegal at pwr ON 0014
Y20 Dual signal: parameter setting error 0027

Details
The following parameters are not consistent with the check data.
#2180 S_DIN, #3140 S_DINSp
Remedy
Correct the parameter setting.
Restore the backup data, as the parameter or check data may be corrupted.
Details
The speed exceeds the safety speed limit when the "speed monitor mode" signal is ON.
The name of the axis with an error is displayed.
Remedy
Decelerate the speed to reset the warning and start the speed monitor.
Details
A machine group-based alarm stop has occurred, or the machine group-based PLC interlock signal has been input.
Remedy
Remove the cause of the stop by alarm.Turn OFF the machine group-based PLC interlock signal.
Details
The time constant has not been set or exceeded the setting range.
Remedy
Correct "#2004 G0tL (G0 time constant (linear))".
Details
The time constant has not been set or exceeded the setting range.
Remedy
Correct "#2007 G1tL (G1 time constant (linear))".
Details
The time constant has not been set or exceeded the setting range.
Remedy
Correct "#2005 G0t1 (G0 time constant (primary delay) / Second-step time constant for soft acceleration/de celeration)".
Details
The time constant has not been set or exceeded the setting range.
Remedy
Correct "#2008 G1t1 (G1 time constant (primary delay)/Second-step time constant for soft acceleration/decel eration)".
Details
The grid space is illegal.
Remedy
Correct "#2029 grspc(Grid interval)".
Y20 Safety observation: parameter memory error 0031 (Parameter No.)
Y21 Speed obsv signal: Speed over 0001 (Axis name)
Y40 Machine group-based stop
Y51 Parameter G0tL illegal 0001
Y51 Parameter G1tL illegal 0002
Y51 Parameter G0t1 illegal 0003
Y51 Parameter G1t1 illegal 0004
Y51 Parameter grid space illegal 0009

Details
The time constant has not been set or exceeded the setting range.
Remedy
Correct the parameters from "#3017 stapt1(Tap time constant (Gear: 00))" to "#3020 stapt4(Tap time constant (Gear: 11))".
Details
In the axis synchronization, parameter settings for slave axis have been attempted in different part system from that of master axis.
Remedy
Correct the "#1068 slavno (Slave axis number)" setting.
Details
The time constant has exceeded the setting range.
Remedy
Correct "#2102 skip_tL (Skip time constant linear)".
Details
The time constant has exceeded the setting range.
Remedy
Correct "#2103 skip_t1 (Skip time constant primary delay / Second-step time constant for soft acceleration/de celeration)".
Details
"#1205 G0bdcc (Acceleration and deceleration before G0 interpolation)" for the 2nd part system is set to ac celeration/deceleration before G0 interpolation.
Remedy
Correct "#1205 G0bdcc (Acceleration and deceleration before G0 interpolation)".
Details
An illegal setting was found in the OMR-II-related parameters. OMR-II has been disabled.
Remedy
Correct the related parameter settings.
Details
"#12804 aux_tleng (Linear axis stroke length)" has not been set or exceeded the setting range while the linear axis equal indexing is enabled for the PLC indexing axis.
Remedy
Correct "#12804 aux_tleng (Linear axis stroke length)".
Details
High-accuracy acceleration/deceleration time constant extension option is unavailable.
Remedy
Adjust the setting of "#1207 G1btL" to be within the range of when the high-accuracy control time constant extension option is OFF.

High-accuracy acceleration/deceleration time constant extension option is unavailable for a system con figured with multiple part systems. Change the system to be made up of a single part system, or set the said option to OFF.
Y51 Parameter stapt1-4 illegal 0012
Y51 Slave axis No. illegal 0014
Y51 Parameter skip_tL illegal 0015
Y51 Parameter skip_t1 illegal 0016
Y51 Parameter G0bdcc illegal 0017
Y51 OMR-II parameter error 0018
Y51 PLC indexing stroke length err 0019
Y51 Hi-acc time const unextendable 0020

Details
The time constant has not been set or exceeded the setting range.
Remedy
Check "#2092 plG0tL G0 time constant for superimposition control (linear)".
Details
The time constant has not been set or exceeded the setting range.
Remedy
Check "#2094 plG1tL G1 time constant for superimposition control (linear)".
Details
The time constant has not been set or the set time constant is out of the specified range.
Remedy
Correct "#2093 plG0t1 G0 time constant for superimposition (primary delay)/2nd step of soft acceleration/de celeration".
Details
The time constant has not been set or the set time constant is out of the specified range.
Remedy
Correct "#2095 plG1t1 G1 time constant for superimposition (primary delay)/2nd step of soft acceleration/de celeration".
Details
Setting of "#12051 Jerk_filtG1" is greater than that of "#1568 SfiltG1".
Or setting of "#12052 Jerk_filtG0" is greater than that of "#1569 SfiltG0".
Remedy
Change the setting of "#12051 Jerk_filtG1" to be smaller than "#1568 SfiltG1".
Or change the setting of "#12052 Jerk_filtG0" to be smaller than "#1569 SfiltG0".
Details
The high-accuracy acceleration/deceleration buffer has failed to be allocated.
Remedy
The software or hardware may be damaged. Contact the service center.
Details
The parameter "#8040 High-speed high-accuracy control-enabled part system" is set to 1 for three or more part systems.
Remedy
Set the parameter "#8040 High-speed high-accuracy control-enabled part system" to 1 for up to two part sys tems.
Details
The time constant is out of the specified range.
Remedy
Correct "#2598 G0tL_2 (G0 time constant 2 (linear))".
Y51 Superimpos linear G0 error 0022
Y51 Superimpos linear G1 error 0023
Y51 Primary delay G0time const err 0028
Y51 Primary delay G1time const err 0029
Y51 Jerk filter time constant err 0030
Y51 Unable to alloc. hi-acc buffer 0031
Y51 Too many hi-speed/accu systems 0032
Y51 Parameter G0tL_2 illegal 0033

Details
The time constant is out of the specified range.
Remedy
Correct "#2599 G0t1_2 (G0 time constant 2 (primary delay)/Second-step time constant for soft acceleration/ deceleration)".
Details
The time constant has not been set or the set time constant is out of the specified range.
Remedy
Correct "#2622 pl3G0tL G0 time constant (linear) for 3-axis serial superimposition control".
Details
The time constant has not been set or the set time constant is out of the specified range.
Remedy
Correct "#2624 pl3G1tL G1 time constant (linear) for 3-axis serial superimposition control".
Details
The time constant has not been set or the set time constant is out of the specified range.
Remedy
Correct "#2623 pl3G0t1 G0 time constant (primary delay) for 3-axis serial superimposition control/2nd step of soft acceleration/deceleration".
Details
The time constant has not been set or the set time constant is out of the specified range.
Remedy
Correct "#2625 pl3G1t1 G1 time constant (primary delay) for 3-axis serial superimposition control/2nd step of soft acceleration/deceleration".
Details
The machine group Nos. that are used for the machine groupwise alarm stop function are different among the axes related to inclined axis control and synchronous control.
Remedy
Give an identical machine group No. to all the axes related to inclined axis control and synchronous control.
Details

The machine group-based alarm stop function has been disabled, because both the machine group-based alarm stop and collision detection functions were enabled.

Remedy

Disable the collision detection function if you wish to use the machine group-based alarm stop function.

Details

The 1st letter of name extension axis for 2-letter axis (#1013 axname) is specified to the basic axes I, J, and K (parameter #1026 to #1028).

Remedy

Set the letter other than the 1st letter of name extension axis for 2-letter axis (#1013 axname) to the basic axes I, J and K (parameter #1026 to #1028).

Y51 Parameter G0t1_2 illegal 0034

Y51 3ax line accel G0time const er 0035

Y51 3ax line accel G1time const er 0036

Y51 3ax prim delay G0time const er 0037

Y51 3ax prim delay G1time const er 0038

Y51 Machine group No. discrepancy 0039

Y51 M-group alarm stop disabled 0040

Y51 Basic axes I, J, K error 0045

Details

The PC1 and PC2 settings for the rotary axis are too large.

Remedy

Correct "#2201 SV001 PC1 (Motor side gear ratio)" and "#2202 SV002 PC2 (Machine side gear ratio)".

Details

In the absolute/incremental command method using the axis address (L system and when "#1076 AbsInc" = 1), the axis that the same axis address is set in "#1013 axname" and "#1014 incax" exists.

Remedy

Correct the settings so that the same axis address is not set in "#1013 axname" and "#1014 incax".

Details

The axis address that is out of the setting range (other than X, Y, Z, U, V, W, A, B, C, H) is set in "#1013 ax name" or "#1014 incax".

Remedy

Set the axis address within the setting range to "#1013 axname" and "#1014 incax".

Details

An error was detected in the spindle encoder during spindle control with pulse train output.

Remedy

Check for spindle encoder problems such as disconnection.

Details

There is an error in the spindle encoder signal.

The data transmission to the drive unit is stopped when this error occurs.

Remedy

Check the spindle encoder's feedback cable and the encoder.

Y51 Values of PC1/PC2 too large 0101

Y51 ABS/INC same axis name 0104

Y51 Axis name initial setting err 0105

Y60 Encoder communication error 0001

Y90 No spindle signal 0001-0007

Details

The operation result is illegal.

Remedy

Contact the service center.

Details

A communication error has occurred in the communication that uses a CC-Link IE field network unit.

n1: Indicates the No. of slot to which the expansion unit with the communication error or diagnostic alarm is mounted (in hexadecimal format).

n2: Indicates the alarm No. of the slot where the communication error or diagnostic alarm is occurring (in hexa decimal format).

Remedy

For details of the alarm number, refer to the list of messages in "CC-Link IE field network specification manual".

Details

There is an incorrect parameter setting.

Parameter setting of #[Parameter No.] is incorrect.

Remedy

Correct the setting.

Refer to the list of messages in "CC-Link IE field network specification manual".

Details

H/W test is completed for the CC-Link IE field network unit.

Check the test result.

n1: Indicates the H/W test result of slot 1 (in hexadecimal format).

n2: Indicates the H/W test result of slot 2 (in hexadecimal format).

0: H/W test is normally completed or not performed

2: External self-loopback test is completed with connection error

3: External self-loopback test is completed with communication error

FFFF: H/W test is underway

Remedy

Take the following measures according to the test result.

0: Check the communication mode.

If the mode is H/W test, switch it to online, and turn OFF and ON the NC power.

If a mode other than H/W test is active, check the result of the other slot and take the measures.
2: Make sure the connection of Ethernet cable, or exchange the cable. And then perform the test again.
If the error occurs again, exchange the H/W.
3: Exchange the Ethernet cable, and perform the test again.
If the error occurs again, exchange the H/W.
FFFF: Turn OFF and ON the NC power.
If the result is unchanged, exchange the H/W.
Z02 System error
Z11 CC-L IE F communication error n1 n2
Z13 CC-L IE F parameter error (Parameter No.)
Z14 CC-Link IE F H/W test status n1 n2

Details
A communication error has occurred in the master function of CC-Link IE Field Network communication.
n1: indicates the No. of station where a communication error is occurring (in decimal notation).
0: Local station (master station)
Other than 0: Station No. of communication error
n2: indicates the alarm No. of the station where a communication error is occurring (in hexadecimal notation).
Remedy
For details of the alarm number, refer to the list of messages in "CC-Link IE Field Network Basic specifications manual".
Details
A communication error has occurred in the slave function of CC-Link IE Field Network communication.
n1: indicates the alarm No. (in hexadecimal notation).
Remedy
For details of the alarm number, refer to the list of messages in "CC-Link IE Field Network Basic specifications manual".
Details
There is an incorrect parameter setting.
Parameter setting of #[Parameter No.] is incorrect.
Remedy
Correct the setting.
Refer to the list of messages in "CC-Link IE Field Network Basic specifications manual".
Details
An abnormality has occurred on the field network communication expansion unit.
n1: Error slot No.
n2: Error No.
Remedy
0 99:
Two Fieldbus communication expansion units which cannot be used simultaneously are mounted simultane ously. Remove either of Fieldbus communication expansion unit.
Other than 0 99:
A failure on the hardware can be speculated. Replace the field network communication expansion unit.
Details
The parameter #[Parameter #] is incorrect.
Remedy
Correct the setting.
Details
The axis not extending the address (1 character axis) exists at the back of the axis extending the address (2 character axis) in the same system.
Remedy
Improve the axis composition. The axis not extending the address can not exist at the back of the axis ex tending the address in the same system.
Z15 CC-L IE F Basic(M) comm. error n1 n2
Z16 CC-L IE F Basic(S) comm. error n1
Z17 CC-L IE F Basic parameter err. #[Parameter No.]
Z18 Network expansion card error n1 n2
Z21 PROFIBUS parameter error (Parameter No.)
Z23 AXIS EX-ADR. ERROR

Details
The SLS observation request signal has been turned OFF in any of the following machining modes:
Thread cutting, synchronous tapping, cross machining, superimposition control, tool center point control or SSS control
Remedy
Perform the operation with the SLS observation request signal ON.
Perform the operation with the door closed.
Details
NC unit is replaced to the FCU8-MU541, FCU8-MA541, FCU8-MU501, or FCU8-MU502.
Remedy
Contact to your service center.
Press the reset to cancel the warning and continue the operations.
Details
A functional safety expansion card is mounted to the NC unit (FCU8-MU501 or FCU8-MU50).
Remedy
Contact to your service center.
Press the reset to cancel the warning and continue the operations.
Details
Parameter setting of #[Parameter No.] is incorrect.
Refer to the list of messages in" EtherNet/IP specification manual".
Remedy
Correct the setting.
Details
A communication error has occurred in the communication that uses an EtherNet/IP expansion unit.
[n1: Output the device Number (in hexadecimal format)]
FF: Simultaneously mounting two EtherNet/IP expansion units error

Other than FF: Device No. of the connected device
[n2: Output the position No. (in hexadecimal format)]
FF: Simultaneously mounting two EtherNet/IP expansion units error
Other than FF: Device No. of the connected device
[n3: Output the device communication status (IN) (in hexadecimal format)]
[n4: Output the device communication status (OUT) (in hexadecimal format)]
Remedy
For details, refer to "EtherNet/IP Specifications manual".
Details
Socket open error (socket)
Remedy
Set the parameter then turn the power OFF and ON again.
Details
Socket bind error (bind)
Remedy
Set the parameter then turn the power OFF and ON again.
Z25 Unable to start safe spd clamp
Z26 NC unit replacement illegal
Z27 FnctnlSafetyExpnsCard MountErr
Z28 EtherNet/IP parameter error (Parameter No.)
Z29 EtherNet/IP communication err n1 n2 n3 n4
Z31 Socket open error(socket) 0001
Z31 Socket bind error(bind) 0002

Details
Connection wait queue error (listen)
Remedy
Set the parameter then turn the power OFF and ON again.
Details
Connection request error (accept)
Details
Data receive error (socket error)
Details
Data receive error (data error)
Details
Data send error (socket error)
Details
Data send error (data error)
Details
Socket close error (close)
Remedy
Set the parameter then turn the power OFF and ON again.
Details
Any of the following errors has occurred in the DeviceNet unit.
Master function error (X03 is ON)
Slave function error (X08 is ON)
Message communication error (X05 is ON)
If the errors have occurred in more than one unit, the error No. of the unit with the smallest slot No. is displayed.
If the master function, slave function and message communication errors have occurred at the same time, the
error is displayed in the following priority order.
1. Master function error
2. Slave function error
3. Message communication error
Remedy
Select the [Ext. PLC link control] menu on the maintenance screen to open the unit confirmation screen,
and check the unit in error and details to cancel the error.
Details
Connection has failed.
Five or more clients attempted a connection.
Remedy
Check the connection of the network cables, and check for broken wires and a failure of the network con nection devices such as hub.
When using the Direct Socket communication I/F, connect up to four clients.
Z31 Connection wait queue error(listen) 0003
Z31 Connection request error(accept) 0004
Z31 Data recv error(socket error) 0005
Z31 Data recv error(data error) 0006
Z31 Data send error(socket error) 0007
Z31 Data send error(data error) 0008
Z31 Socket close error(close) 000A
Z34 DeviceNet error
Z35 Direct Socket connection error 0001

Details
Receiving data from a client has failed.
Remedy
Check the connection of the network cables, and check for broken wires and a failure of the network con nection devices such as hub.
Details
Sending data to a client has failed.
Remedy
Check the connection of the network cables, and check for broken wires and a failure of the network con nection devices such as hub.
Details
There was no response from client computers, and a timeout error occurred.
Remedy
Check the connection of the network cables, and check for broken wires and a failure of the network con nection devices such as hub.

Details
The direct Socket communication I/F is OFF.
Remedy
Check the parameter "#11051 Direct Socket ON".
Details
An error has occurred in the communication with EcoMonitorLight.
Remedy
Make sure that the CNC has the same communication settings (station No.,baud rate, parity and stop bit) as
the EcoMonitorLight in error.
Make sure that there are no problems with the serial cable connected to the EcoMonitorLight.
Make sure to place the serial cable in a low-noise environment.
Details
The number of EcoMonitorLight units connected is inconsistent with the setting of the parameter #11061.
Remedy
Make sure that the value set in the parameter #11061 coincides with the number of EcoMonitorLight units con nected to the CNC.
Also make sure all the EcoMonitorLight units connected are powered ON and the station No. is not duplicated.
Z35 Direct Socket receive error 0002
Z35 Direct Socket send error 0003
Z35 Direct Socket timeout error 0004
Z35 Direct Socket comm OFF 0005
Z36 EcoMonitorLight comm. error
Z37 EcoMonitorLight qty discrepant

Details
The motor insulation has been deteriorated.
0001: Motor insulation deterioration: Caution
0002: Motor insulation deterioration: Replacement required
0003: Motor insulation deterioration: Relay welding detected
Remedy
0001: The insulation resistance value of the motor has dropped.
Contact the service center.
0002: The insulation resistance value of the motor is less than or equal to the reference value.
Contact the service center.
When measuring the insulation resistance of the motor and the measured resistance value is less than
or equal to the specified value, the motor may be damaged.
0003: The drive unit may be damaged.
Contact the service center.
Details
E-mail sending with the email notification to operator function failed.
Remedy
Check the e-mail environment setting.
Check the registered e-mail address.
Set "0" in "#8134 E-mail send disabled".
Details
Although SRAM open parameters were changed, formatting has not been performed yet.
Remedy
Perform formatting and restart the NC.
Details
Decryption code for the system lock function is not yet entered, though the encryption key has been entered.
Remedy
If you want to enable system lock, enter the decryption code.
If you do not want, simply turn the power OFF and ON.
Details
An error has occurred in the remote I/O unit.
Remedy
Turn the power ON again.
If this error remains active after the power ON, replace the remote I/O unit.
Details
[Type]
Z51 E2PROM error 0011: Read error
Z51 E2PROM error 0012: Write error
Remedy
If the same alarm is output by the same operation, the cause is an H/W fault. Contact the Service Center.
Z38 Insulation deterioration wrn
Z39 E-mail send error
Z40 Format mismatch
Z41 Decryption code is missing
Z49 RIO watchdog error 0001
Z51 E2PROM error 001x

Details
Battery voltage of the NC unit or the graphic control unit has dropped.
(The battery for retaining internal data)
x: Graphic control unit
y: NC unit
1: Battery warning
2: Battery detecting circuit error
3: Battery alarm
(Note) The message "Battery warning" disappears on NC reset, but the warning status remains until exchange
of the battery.
Remedy
Replace the battery of the NC unit or the graphic control unit.
Check for any disconnection of the battery cable.
After fixing the battery's fault, check the machining program.

Details
The controller or operation board temperature has risen above the designated value.
(Note) Temperature warning
When an overheat alarm is detected, the alarm is displayed and the overheat signal is output simultane ously. Automatic operation will be continued, while restarting after resetting or stopping with M02/M30 is not possible. (Restarting after block stop or feed hold is possible.)
The alarm will be cleared and the overheat signal will turn OFF when the temperature drops below the specified temperature.
Z53 CNC overheat 000x
[000x]
(For all models)
0001: The temperature in the control unit is high.
The ambient temperature must be lowered immediately when a "Z53 CNC overheat" alarm occurs. How ever, if the machining needs to be continued, set "#6449/bit7 Control unit temperature alarm ON" to "0". Then the alarm will be invalidated.
Remedy
Cooling measures are required.
Turn OFF the controller power, or lower the temperature with a cooler, etc.
Z52 Battery fault 00xy
Z53 CNC overheat

Details
An error occurs in the communication between the control unit and remote I/O unit.
Disconnection of a cable
Fault in remote I/O unit
Fault of power supply to remote I/O unit
The communication interrupted station is displayed in hexadecimal for each RIO channel when an error occurs in the communication between the control unit and remote I/O unit.
When the control displays a communication stop station, it divides the RIO channel stations (up to 64 stations) into groups of 8 stations. If any of the 8 stations has the communication stop error, the number is displayed with the alarm.
Z55 RIO communication stop __ __ __ __ __ __ __ __
(a) (b) (c) (d) (e) (f) (g) (h)
(a)(b): RIO1
(c)(d): RIO2
(e)(f): RIO3
(g)(h): "00" fixed
(a)(b), (c)(d), and (e)(f) indicate the following stations in hexadecimal.
bit0: 1st to 8th stations
bit1: 9th to 16th stations
bit2: 17th to 24th stations
bit3: 25th to 32nd stations
bit4: 33rd to 40th stations
bit5: 41st to 48th stations
bit6: 49th to 56th stations
bit7: 57th to 64th stations
(Example) Stations #1 and #8 of RIO1 and stations #24 and #64 of RIO3 have the communication error.
Z55 RIO communication stop 0100 8400
The RIO error status can be monitored through the R registers on the self diagnostic or I/F diagnostic screen.
Remedy
Check and replace the cables.
Replace the remote I/O unit.
Check the power supply (existence of supply and voltage).
Details
Program memory capacity has been set over the value that can be formatted.
An expansion device/expansion cassette has not mounted after formatting.
The mounted expansion device/expansion cassette is different from the one that was mounted at formatting.
Remedy
Check the followings.
Program memory capacity
Mounting of an expansion device/expansion cassette
APLC release option
Details
A machine tool builder macro program has not been written to FROM after being registered/ edited/ copied/ condensed/ merged/ the number changed/ deleted.
Remedy
Write the machine tool builder macro program to FROM.
The program does not need to be written to FROM unless the editing operations and so on need to be valid after the NC power OFF.
Z55 RIO communication stop
Z57 System warning
Z58 ROM write not completed

Details
Acceleration and deceleration time constants are too large.
(This alarm occurs with the stop code (T02 0206).)
Remedy
Set the larger value for "#1206 G1bF(Maximum speed)".
Set the smaller value for "#1207 G1btL(Time constant)".
Set the lower feedrate.
Details
A communication error has occurred on the Fieldbus communication with FCU8-WN563.
[n1: denotes the master station status (in the hexadecimal form).]
00: Offline: In initialization
40: Stop: I/O communication stopped
80: Clear: Resetting the output data of each slave by sending zero data

C0: In operation: In I/O communication
FF: Two Fieldbus expansion units are mounted.
[n2: denotes the error condition (in the hexadecimal form).]
bit0: Control error: Parameter error
bit1: Auto clear error: Communication with all the slave stations was cut because a communication with one slave station had an error.
bit2: Non-exchange error: A slave station has communication error.
bit3: Fatal error: Communication cannot be continued because of severe network failure.
bit4: Not ready: CNC communication is not ready.
bit5: Timeout error: Timeout is detected in communication with each station.
bit6: Not used
bit7: Not used
FF: Two Fieldbus expansion units are mounted.
[n3: denotes the slave station where communication error has occurred(in the hexadecimal form).]
(*) FF is indicated when two Fieldbus expansion units are mounted.
[n4: denotes the error number (in the hexadecimal form).]
This shows the communication state with slave station where error is occurring.
Remedy
For details, refer to "PROFIBUS-DP Specification manual".
Details
The valid term will be expired in less than a week. Remaining valid term is xx days.
Remedy
Obtain a decryption code from the machine tool builder and input it in the NC, then turn the power ON again.
Details
The valid term has been expired with no decryption code input.
Remedy
Obtain a decryption code from the machine tool builder and input it in the NC, then turn the power ON again.
Details
A communication error occurred during CC-Link communication using CC-Link unit.
Remedy
Refer to the list of messages in "CC-Link (Master/Local) Specification manual".
Z59 Acc/dec time cnst too large
Z60 Fieldbus communication error n1 n2 n3 n4
Z64 Valid term soon to be expired xx
Z65 Valid term has been expired
Z67 CC-Link communication error

Details
A cable between CC-Link unit and a device is disconnected or broken.
Remedy
Find the unconnected cable by checking SW0080 to SW0083 and connect it.
Details
A FROM/TO instruction was used while the MELSEC-Q interface expansion module is not installed.
Remedy
Install the MELSEC-Q interface expansion module.
Details
A negative value was set for an I/O No. in the FROM/TO instruction.
Remedy
Correct the I/O No.
Details
A negative value was set for transfer size in the FROM/TO instruction.
Remedy
Correct the transfer size.
Details
The number of FROM/TO instructions within one scan has exceeded 50.
Remedy
Correct the user PLC (ladder sequence) so that the number of FROM/TO instructions per scan is 50 or less.
Details
The access to the buffer memory by the FROM/TO instruction has exceeded 12K words per scan.
Remedy
Correct the user PLC (ladder sequence) so that the buffer memory access by the FROM/TO instruction won't exceed 12K words per scan. (The total size of FROM/TO is up to 12K words.)
Details
A FROM/TO instruction was used in high-speed processing.
Remedy
Delete the FROM/TO instruction from high-speed processing.
Details
The bit device number designated in the FROM/TO instruction is not a multiple of 16.
Remedy
Correct the bit device number designated in the FROM/TO instruction to be a multiple of 16.
Details
With a FROM/TO instruction, a value out of the address range (negative value, or 0x8000 or over) was set as the head address of the buffer memory.
Remedy
Correct the head address of the buffer memory.
Z68 CC-Link unconnected
Z69 External link error 2
Z69 External link error 3
Z69 External link error 4
Z69 External link error 5
Z69 External link error 6
Z69 External link error 7
Z69 External link error 8
Z69 External link error 9

Details
An alarm occurred in the MELSEC module mounted on the extension base.
Remedy
Check for any disconnection of the MELSEC module and the cables on the extension base. Then turn the CNC's power ON again.
Details
The I/O No. designated in the FROM/TO instruction is different from the mounted location of the intelligent func tion module on the extension base (the module's I/O No.).
Remedy
Correct the I/O No. Then turn the CNC's power ON again.
Details
Machine model is not registered.
Remedy
Press RESET to cancel the alarm.
Movement can be resumed after the cancellation. However, the 3D machine interference check will become invalid.
Inform the machine tool builder if an alarm occurs.
Details
Machine model is illegal.
Remedy
Press RESET to cancel the alarm.
Movement can be resumed after the cancellation. However, the 3D machine interference check will become invalid.
Inform the machine tool builder if an alarm occurs.
Details
The calculation of the interference check took time and caused a deceleration.
Remedy
Inform the machine tool builder.
Restart the axis in case of a manual operation.
In case of an automatic operation, the operation will automatically resume when the processing load of the interference check decreases.
Details
The interference check failed.
Remedy
Take a note of the failed status and contact the service center.
Press RESET to cancel the alarm. Invalidate the 3D machine interference check to continue the operation.
Details
The system is unable to store the data due to lack of free space on the internal memory.
Remedy
Ensure sufficient free space on the internal memory.
Z69 External link error 10
Z69 External link error 11
Z82 3D machine interference/No machine model 0001
Z82 3D machine interference/Machine model illegal 0002
Z82 3D machine Interference check load excess 0003
Z82 3D machine Interference check error 0004
Z84 Unable to save all the history

Details
Failed to recognize the connection between the NC unit and operation panel I/O unit.
Remedy
Make sure an operation panel I/O unit is connected.
Make sure an operation panel I/O unit is supplied with power.
Check for disconnection of the cable between the NC unit and operation panel I/O unit.
*If you connect no operation panel I/O unit to the NC unit, set the parameter "#1261 set33/bit1" to "1"."
Details
No display unit is connected to the operation panel I/O unit.
Remedy
Make sure an operation panel I/O unit for M800W Series is connected.
Make sure the display unit is being powered.
Check for any cable disconnection between operation panel I/O and display units.
*If operation panel I/O is not connected to display unit in your system configuration, set the parameter "#1261 set33 /bit2" to "0".
Details
No display unit is connected to the operation panel I/O unit.
Remedy
Make sure an operation panel I/O unit for M800W Series is connected.
Make sure the operation panel I/O unit is being powered.
Check for any cable disconnection between NC and operation panel I/O units.
Make sure the operation panel I/O and display units are connected.
* If operation panel I/O is not connected to display unit in your system configuration, set the parameter "#1261 set33/bit2" to "0".
* If no operation panel I/O is connected in your system configuration, set the parameter "#1261 set33/bit1" to "1", and "#1261 set33/bit2" to "0".
Details
Power OFF sequence has not been executed correctly.
Remedy
Make sure an operation panel I/O unit for M800W Series is connected.
Make sure the operation panel I/O unit is being powered.
Check for any cable disconnection between NC and operation panel I/O units.
Make sure the operation panel I/O and display units are connected.
*If no operation panel I/O is connected in your system configuration, set the parameter "#1261 set33/bit1" to "1", and "#1261 set33/bit2" to "0".
*If operation panel I/O is not connected to display unit in your system configuration, set the parameter "#1261

set33/bit2" to "0"."
Z85 OP panel I/O not connected 0001
Z85 No display conn. to panel I/O 0002
Z85 Power ON sequence error 0003
Z85 Power OFF sequence error 0004

Details
Timeout has occurred during wait for the display power shutdown when automatic power OFF is being execut ed.
Remedy
Make sure an operation panel I/O unit for M800W Series is connected.
Make sure the operation panel I/O unit is being powered.
Check for any cable disconnection between NC and operation panel I/O units.
Make sure the operation panel I/O and display units are connected.
*If no operation panel I/O is connected in your system configuration, set the parameter "#1261 set33/bit1" to "1", and "#1261 set33/bit2" to "0".
* If operation panel I/O is not connected to display unit in your system configuration, set the parameter "#1261 set33/bit2" to "0".
Details
Overvoltage was detected in hardware voltage.
Remedy
If this alarm occurs frequently, check the power supply voltage.
Details
Overvoltage was detected in hardware voltage.
Remedy
Turn OFF and ON the NC power.
If this alarm occurs frequently, check the power supply voltage.
Details
Incorrect data has been read out from the internal memory.
Remedy
Contact the service center.
Details
The setting of #[Parameter No.] is incorrect.
Remedy
Correct the setting.
For details, refer to the list of messages in "FL-net specifications manual".
Details
A communication error has occurred in FL-net communication.
Error code: indicates the status of CNC (FL-net) (in hexadecimal)
Remedy
For details of the alarm number, refer to the list of messages in "FL-net specifications manual".
Details
An error has occurred on the other node that is participating in FL-net.
Node No.: indicates the number of the node in error (in decimal with three digits)
Error code: indicates the status of the node in error (in hexadecimal)
Remedy
For details of the alarm number, refer to the list of messages in "FL-net specifications manual".
Z85 Display unit shutoff timeout 0005
Z86 Overvoltage detection warning 0001
Z86 Overvoltage detection alarm 0002
Z92 Memory ECC error 0004
Z102 FL-net parameter error (Parameter No.)
Z103 FL-net communication error (Error code)
Z104 FL-net node warning (Node No.) (Error code)

Details
The value of end-user parameter is incorrect.
The value is inconsistent with the multi-project parameter of the built-in PLC, or the sum of the initial device number and the quantity of the devices has exceeded the upper limit.
Remedy
Correct the value of the end-user parameter displayed.
Details
Failed to authenticate the vibration cutting expansion unit.
Remedy
Contact the service center.
Press the reset to cancel the warning and continue the operations.
Z105 End-user parameter error
Z106 VCC card authentication error 0001

Absolute Position Detection System
Alarms (Z7*)

6Absolute Position Detection System Alarms (Z7*)
Details
Zero point initialization is incomplete. Otherwise, the spindle was removed.
Remedy
Complete zero point initialization.
Details
The absolute position basic point data saved in the NC has been damaged.

Remedy
Set the parameters. If the basic point data is not restored by setting the parameters, perform zero point initial ization.
Details
Any of the parameters for absolute position detection has been changed.
#1003 iunit
#1017 rot
#1018 ccw
#1040 M_inch
#2049 type
#2201 PC1
#2202 PC2
#2218 PIT
#2219 RNG1
#2220 RNG2
#2225 MTYP
Remedy
Correct the parameter settings. Then turn the power ON again and perform zero point initialization.
Details
The zero point initialization point is not at the grid position.
Remedy
Perform the zero point initialization again.
Details
The data has been restored by inputting the parameters during the alarm No.0001, 0002, and 0003.
Remedy
Turn the power ON again to start the operation.
Details
Deviation of the servo axis with scale when the power is OFF exceeds the set value in "#2051 check" (Check).
Remedy
Search for the factor which led the deviation of the servo axis at the power OFF.
Details
The absolute position data has been lost. An error of the multi-rotation counter data in the encoder and so on
may be the cause. (Liquid penetrates into encoder connector, etc.)
Remedy
Replace the encoder and complete zero point initialization.
Z70 Abs posn base set incomplete 0001 (Axis name)
Z70 Absolute position lost 0002 (Axis name)
Z70 Abs posn param changed 0003 (Axis name)
Z70 Abs posn initial set illegal 0004 (Axis name)
Z70 Abs posn param restored 0005 (Axis name)
Z70 Abs data error 0006
Z70 Abs posn data lost 0080 (Axis name)

Details
The servo alarm No. 25 was displayed and the power was turned ON again.
Remedy
Perform zero point initialization again.
Details
The servo alarm No. E3 was displayed and the power was turned ON again.
Remedy
Perform zero point initialization again.
Details
Backup voltage in the absolute encoder dropped.
Remedy
Replace the battery, check the cable connections, and check the encoder. Turn the power ON again and per form zero point initialization.
Details
Communication with the absolute encoder has been disabled.
Remedy
Check and replace the cables, card or encoder. Turn the power ON again and perform zero point initialization.
Details
Absolute position data has been changed at the absolute position establishment.
Remedy
Check and replace the cables, card or encoder. Turn the power ON again and perform zero point initialization.
Details
An error of the serial data was found in the absolute encoder.
Remedy
Check and replace the cables, card or encoder. Turn the power ON again and perform zero point initialization.
Details
Servo alarm E3
Absolute position counter warning
Remedy
Operation is possible until the power is turned OFF.
Details
Initial communication with the absolute encoder is not possible.
Remedy
Check and replace the cables, card or encoder. Turn the power ON again and perform zero point initialization.
Details
An error is detected at the comparison of encoder's absolute position and controller coordinate values in the
absolute position detection system.
Z70 Abs posn error(servo alm 25) 0101 (Axis name)
Z70 Abs posn error(servo alm E3) 0106 (Axis name)
Z71 AbsEncoder:Backup voltage drop 0001 (Axis name)
Z71 AbsEncoder: Commu error 0003 (Axis name)
Z71 AbsEncoder: Abs data changed 0004 (Axis name)
Z71 AbsEncoder: Serial data error 0005 (Axis name)
Z71 AbsEncoder: Abs/inc posn diffr 0006 (Axis name)
Z71 AbsEncoder: Initial commu er 0007 (Axis name)

Z72 Message: Position check error (Axis name)

6 Absolute Position Detection System Alarms (Z7*)

Details
Low backup battery
Servo alarm 9F
Low battery voltage
Remedy
If the battery voltage is low or the cable is damaged, there is no need to initialize the absolute position.
Z73 Battery for abs data fault 0001
7

Distance-coded Reference Scale Errors
(Z8*)

7 Distance-coded Reference Scale Errors (Z8*)

7Distance-coded Reference Scale Errors (Z8*)
Details
The basic point data saved in the NC has been damaged.
Remedy
Set the parameters. If the basic point data is not restored by setting the parameters, perform zero point initialization.
Details
The basic point data has been restored by setting the parameters.
Remedy
Turn the power ON again to start the operation.
Details
The distance-coded reference scale has been set available although this function is out of the specifications.
Remedy
Check the specifications.
If you do not use this function, correct the encoder type with the servo parameter.
Details
Reference position adjustment value data saved in the CNC has been damaged.
Remedy
Set the parameter. If the data is not restored by setting the parameter, establish the reference position again.
Details
After the 'Z81 R-pos adjustment data lost 0001', the data has been recovered by setting the parameter.
Remedy
Establish the reference position to start the operation.
Details
The NC was started while the spindle was rotating.
Remedy
Turn OFF the power once, and make sure that the spindle is stopped before turning ON the power again.
You can select whether or not to stop the spindle forcibly at the occurrence of this alarm by the setting of the base common parameter "#1284 ext20/bit1" (Spindle control selected in response to Z83 (NC started during SP rotation)).
If this alarm occurs frequently, check the power supply voltage.
Z80 Basic position lost 0001
Z80 Basic position restore 0002
Z80 No spec: Distance-coded scale 0003
Z81 R-pos adjustment data lost 0001
Z81 R-pos adjustment data restored 0002
Z83 NC started during SP rotation 0001
8

Emergency Stop Alarms (EMG)

8 Emergency Stop Alarms (EMG)

8Emergency Stop Alarms (EMG)
Details
The "PLC emergency stop" signal is turned ON during the sequence processing of the user PLC.
Remedy
Check the conditions to turn the "Emergency stop" signal ON and remove the cause of the alarm during the sequence processing of the user PLC.
Details
The "emergency stop" signal is significant (open).
Remedy
Cancel the "emergency stop" signal.
Check for any broken wires.
Details
An alarm occurred in the servo system causing an emergency stop.
Remedy
Investigate and remove the cause of the servo alarm.
Details
The user PLC (ladder sequence) is not running.
Remedy
Check the setting of the control unit rotary switch CS2. Correct it if set to "1".
Check the [RUN/SP] (run/stop) switch on the PLC edit file save screen (onboard function). Turn it OFF if ON.
Details
Spindle drive unit is not mounted.
Remedy
Cancel the causes of the other emergency stop.
Check the "emergency stop" signal input in the spindle drive unit.

Details
Failure in the high-speed PC processing abnormal
Remedy
Correct the sequence program. (To stop monitoring the high-speed PC processing temporarily, set "1" in
"#1219 aux03/bit1 (Stop high-speed PC monitoring function)". Disable the monitoring function only as a
temporary measure.)
Details
Setting of the door open II fixed device is illegal.
Setting of the parameters for dog signal random assignment is illegal.
Remedy
Correct the "#1155 DOOR_m" and "#1156 DOOR_s" settings. (When the door open II fixed device is not
used, set "#1155 DOOR_m" and "#1156 DOOR_s" to "100".)
Correct the "#2073 zrn_dog (Origin dog Random assignment device)", "#2074 H/W_OT+ (H/W OT+ Ran dom assignment device)", "#2075 H/W_OT- (H/W OT- Random assignment device)" and "#1226 aux10/
bit5 (Arbitrary allocation of dog signal)" settings.
EMG Emergency stop PLC
EMG Emergency stop EXIN
EMG Emergency stop SRV
EMG Emergency stop STOP
EMG Emergency stop SPIN
EMG Emergency stop PC_H
EMG Emergency stop PARA

Details
An emergency stop occurs when the FROM/TO instruction is not executed within 500ms.
Remedy
Execute the FROM/TO instruction one or more times every 500ms.
The time in which no interrupt request is issued from MELSEC is measured and stored in the following R reg isters:
R10190: Current timeout counter
R10191: Maximum timeout counter after power ON
R10192: Maximum timeout counter after system is started up (this is backed up)
Details
MELSEC is in error and reset states.
Remedy
Check the MELSEC states.
Details
The contents of MELSEC-specific code area in buffer memory have been damaged.
Remedy
Check the MELSEC states.
Details
PLC serial link communication has stopped.
Remedy
Check the CC-Link card wiring and the external sequencer transmission.
Check the link communication errors shown on the diagnostic screen.
Details
The preparation sequence is not sent from the master station. Otherwise, the contents of the received prepa ration sequence are inconsistent with those of the parameters, so that the usual sequence cannot be started.
Remedy
Check that the CC-Link card switch setting and wiring as well as the external sequencer transmission are
normal.
Check the diagnostic screen for link communication errors.
Details
The CC-Link card is operating incorrectly.
Switch/parameter settings for the CC-Link card are incorrect.
Remedy
Replace the CC-Link card.
Correct the switch/parameter settings for the CC-Link card.
Details
The sequence program has an illegal code.
Remedy
Correct any illegal device Nos. or constants in the sequence program.
Details
The "emergency stop" signal for power supply is significant (open) because the external emergency stop func tion for power supply is enabled.
Remedy
Cancel the "emergency stop" signal.
Check for any broken wires.
EMG Emergency stop LINK
EMG Emergency stop WAIT
EMG Emergency stop XTEN
EMG Emergency stop LAD
EMG Emergency stop CVIN

Details
The contactor shutoff test is being executed.
Remedy
The emergency stop is reset automatically after the contactor shutoff is confirmed.
If the contactor shutoff is not confirmed within 5 seconds after the "contactor shutoff test" signal has been
input, the "contactor welding detected" alarm occurs and the emergency stop status remains.
Make sure that the contactor's auxiliary b contact signal is correctly output to the device that is set in
"#1330 MC_dp1" and "#1331 MC_dp2" (Contactor weld detection device 1 and 2), and then turn the power
ON again.
Details
The data backup for power failure might not have been executed successfully at the previous power failure.
Remedy
If this message appears frequently, the power supply may be deteriorated. Contact the service center.
Details

The encoder replacement operation is in progress.
Remedy
Complete the encoder replacement operation on the "ABS. POSITION SET" screen.
EMG Emergency stop MCT
EMG Emergency stop IPWD
EMG Emergency stop ENC

9 Computer Link Errors (L)

Details
Communication ended with timeout.
(CNC has a 248-byte receive buffer. The time during which CNC receives 248 bytes exceeds the "TIME-OUT" value set in the I/O device parameter.)
Remedy
Set a greater timeout value in the input/output device parameter.
Check the software in HOST and make sure that the HOST transmits data in response to DC1 (data re quest) from CNC.
Set "#9614 START CODE" to "0".
Details
ER signal in HOST (or DR signal in CNC) is not turned ON.
Remedy
Check for any disconnected cable.
Check for any broke wire.
Make sure that the HOST power is turned ON.
Details
Communication ended with parity H.
Remedy
Check the software in HOST and make sure that the data to be transmitted to CNC is ISO code.
Details
Communication ended with parity V.
Remedy
Correct the data to transmit to CNC.
Details
CNC received 10 bytes or more data from HOST in spite of DC3 (request to stop data transfer) transmission from CNC to the HOST, which terminated the communication.
CNC received 10 bytes or more data from HOST during the data transmission from CNC to the HOST.
Remedy
Check the software in HOST and make sure that the HOST stops transmitting data within 10 bytes after receiving DC3.
Correct the software in HOST not to transmit data such as a command or header to CNC during receiving a machining program.
L01 Timeout error 0004
L01 Host ER signal OFF 0010
L01 Parity H error 0015
L01 Parity V error 0016
L01 Overrun error 0017

10 User PLC Alarms (U)

(Note) U10 Illegal PLC (User PLC is illegal)
- "xx" in the lower 16 bits of the sub-status 1 indicates the program No. (0x01 to 0x78(in the hexadecimal form))
- The sub-alarm No. "yy" of sub- status 1 indicates the project No. ("yy" is not displayed when the maximum number of projects is 1)
(Note) For details of user PLC alarms, refer to "PLC Development Manual".
Details
No sequence program is included in the built-in ROM or temporary memory area.
(1) Sequence program is not stored in the built-in ROM.
(2) Sequence program is not written from the GX Developer/GX Works2 or internal PLC edit function.
(3) Sequence program cannot be read due to broken built-in ROM.
(4) No large capacity PLC additional specifications.
Remedy
(1) Write the sequence program from the GX Developer/GX Works2 or internal PLC edit function, and then ex ecute the built-in ROM writing.
(2) Check the presence of additional specification "Large PLC capacity" and reconsider the storable size.
(3) If (1) or (2) does not solve the problem, there is a possibility that built-in ROM is broken.
Details
Software instruction interruption illegal
An error was found in data for the sequence program in execution.
(1) Sequence program stored in the built-in ROM is broken.
(2) Sequence program under development (before writing into F-ROM) is broken.
Remedy
Contact Mitsubishi.
Details
A H/W error was detected during the PLC execution.
Remedy
Contact Mitsubishi.
Details
The PLC system execution preparation failed.
Remedy
Contact Mitsubishi.
Details

Number of ladder over (at PLC system startup)
The total number of "ladder files" stored in built-in ROM exceeded the maximum.
Remedy
Write "sequence program", "comment file", "PLC message file", and "symbolic information file" again.
U01 No user PLC - -
U10 Illegal PLC 0x04xx.yy Step No.
U10 Illegal PLC 0x100* -
U10 Illegal PLC 0x110* -
U10 Illegal PLC 0x120* -

Details
Number of data over (at PLC system startup)
The total number of "comment files", "PLC message files", and "symbolic information files" stored in built-in ROM exceeded the maximum.
Remedy
Remedy the error in either of the following methods.
(1) Select [Format PLC memory] with GX Developer/GX Works2 and format the memory after setting [Target memory] to [Memory card(RAM)]. After that, write "comment file", "PLC message file", and "symbolic infor mation file" again.
(2) Create a ladder with [Add New Data] in built-in PLC editing function and execute "Format". After that, write "sequence program", "comment file", "PLC message file", and "symbolic information file" again.
Details
Label branching error (Before executing PLC)
Occurs only when the bit selection parameter (#6452 bit6) "branch destination label check valid" is set to "1".
(1) The CJ and CALL instructions were placed to a nonexistent label.
(2) The CJ instruction was placed to the global label. (Branching is possible only with the CALL instruction.)
Remedy
Check the branch destination of the CJ and CALL instructions existing in the steps occurred.
Details
Label duplication error (Before executing PLC)
(1) When using the multi-programming method:
- Labels of common pointer are duplicated.
- Labels of local pointer are duplicated within the same file.
(2) When using the independent program method, labels are duplicated.
Remedy
Correct the duplication of the labels existing in the steps occurred.
Details
Local label over (Before executing PLC)
(*) "Local label" is as "labels of local pointer".
The boundary value set with the PC parameter (common pointer boundary value) has been exceeded by the total number of labels of local pointer.
Remedy
(1) Reduce the number of local labels used.
- Use as sequentially as possible from P0.
(2) Reset the PC parameter (common pointer boundary value).
Details
Global label boundary value error (Before executing PLC)
(*) "Global label" is as "labels of common pointer".
The content of PC parameter (common pointer boundary value) is not normal.
(1) When using the multi-programming method, a value greater than the maximum value is set.
(2) When using the independent program method, the label boundary value of common pointer is set.
Remedy
(1) When using the multi-programming method, correct the common pointer boundary value to an appropriate value.
(2) When using the independent program method, delete the common pointer boundary value.
U10 Illegal PLC 0x130* -
U10 Illegal PLC 0x20xx.yy Step No.
U10 Illegal PLC 0x21xx.yy Step No.
U10 Illegal PLC 0x22xx.yy -
U10 Illegal PLC 0x230*.yy -

Details
Reserved label error (Before executing PLC)
(1) When using the multi-programming method, disabled reserved label exists.
(2) When using the independent program method, reserved labels are duplicated.
Remedy
(1) When using the multi-programming method, delete the reserved label.
(2) When using the independent program method:
- Delete the PC parameter program settings.
- Correct the duplication of reserved labels.
Details
Program setting error (Before executing PLC)
(1) When using the multi-programming method, PC parameter setting is not correct.
- PC parameter (program setting) is not set.
- Unstored program name is set.
- The contents of the program name is abnormal.
- More than the maximum number of programs that can be set (120 programs) are set.
(2) When using the independent program method, multiple programs are stored.
(3) When the multi-project is valid, the sum of all projects exceeds the number of the programs which can be set (120 programs).
Remedy
(1) When using the multi-programming method, check the PC parameter program settings.
- Check the program settings.
- Check the program name stored in the NC.
- Review the program name and rename it if necessary.

e.g. The program name and the M device number in the PLC program are overlapped.
- Set the number to 120 or less.
(2) When using the independent program method:
- Store only one program file.
(3) When the multi-project is valid, set the number of programs that can be set to be less than 120 programs
as the sum of all projects.
Details
RET instruction error
(1) RET instruction was not executed at the branch destination of the CALL instruction.
(2) RET instruction was executed without execution of CALL instruction.
Remedy
Check the following matters for the entire sequence program to be executed.
(1) Check if RET instruction is programmed at the end of sub-routine.
(2) Check if diverged to the other operation in the middle of sub-routine and RET instruction is not executed.
(3) Check if jumped to the END reservation label (P4005) in the middle of sub-routine.
(4) Check if there is delimiter (FEND instruction) between adjacent program and sub-routine program.
Details
Ladder code error (Before executing PLC)
An error was found in data for the sequence program to be executed.
(1) Disabled PLC instruction is used.
(2) Sequence program stored in the built-in ROM is broken.
(3) Sequence program under development (before writing into the built-in ROM) is broken.
Remedy
Transferring, storing and F-ROM writing of the sequence program must be re- executed with the GX Developer/
GX Works2 or PLC on-board edit function.
U10 Illegal PLC 0x24xx.yy Step No.
U10 Illegal PLC 0x25xx.yy -
U10 Illegal PLC 0x26xx.yy -
U10 Illegal PLC 0x27xx.yy Step No.

Details
No main processing ladders (Before executing PLC)
Main processing program to be executed cannot be identified.
(1) When using the multi-programming method, main processing "scan" is not set in the PC parameter (pro gram setting).
(2) When using the independent program method, no reservation ladder for the main processing ladder is avail able.
Remedy
(1) When using the multi-programming method, check the PC parameter program settings.
(2) When using the independent program method, add the reservation label (P4002) for the medium speed lad der.
Details
Execution area over (Before executing PLC)
The total number of steps for the ladder to be executed has exceeded the size of PLC processor execution
area.
Remedy
Check the PC parameter (program setting) and set so that the total number of steps for the ladder to be exe cuted does not exceed the PLC processor execution area.
Details
FOR instruction nesting over
17th level of nesting for FOR instruction was executed.
Remedy
Check the number of FOR instruction's nesting depth in the steps to which the error occurred, and limit the num ber to 16 or less.
Details
NEXT instruction error
(1) NEXT instruction was executed before FOR instruction.
(2) After FOR instruction, END (FEND) was executed before NEXT instruction.
Remedy
(1) Check and correct the NEXT instruction in the step to which the error occurred.
(2) Check and correct the ladder circuit of the program to which the error occurred. (Note that the step No. at
the error position is displayed as "0".)
- Check if JMP,CALL,CJ instructions were executed between FOR and NEXT instruction, and NEXT in struction was jumped.
- Check if FOR instruction and NEXT instruction are all paired.
Details
BREAK instruction error
BREAK was executed outside the range between FOR and NEXT instruction.
Remedy
Check and correct the BREAK instruction in the step to which the error occurred.
Details
PLC system error
Remedy
Contact Mitsubishi.
U10 Illegal PLC 0x280* -
U10 Illegal PLC 0x29xx.yy -
U10 Illegal PLC 0x30xx.yy Step No.
U10 Illegal PLC 0x31xx.yy Step No.
U10 Illegal PLC 0x32xx.yy Step No.
U10 Illegal PLC 0x400* -

Details
Maximum project No. illegal (at PLC system startup)
Multi-project parameter setting is illegal (due to the following reason).
The value outside the setting range (1 to number of usable project) was detected.
Remedy
(1) Check the presence of the expansion project additional specification and reconsider the setting range.
(2) The multi-project parameter (maximum project No.) setting is illegal. Set the multi-project parameter again.
(3) If (1) or (2) does not solve the problem, there is a possibility that the NC system is broken. Contact Mitsub ishi.
Details

Project ratio illegal
Multi-project parameter setting is illegal (due to the following reason).
It was detected that the total of ratios of all projects was outside the range from 0 to 100.
Remedy
(1) The multi-project parameter (project ratio) setting is illegal. Set the multi- project parameter again.
(2) If (1) does not solve the problem, there is a possibility that the NC system is broken. Contact Mitsubishi.
Details
Temporary memory area over (at the PLC system startup)
Multi-project parameter setting is illegal (due to the following reason).
The ratio to which the area after the project ratio setting is smaller than the size of ladder stored in the
temporary memory area was detected.
Remedy
(1) Check the presence of the large-capacity PLC additional specification and reconsider the size that can be
stored.
(2) The multi-project parameter (project ratio) setting is illegal. Set the multi- project parameter again.
(3) If (1) or (2) does not solve the problem, there is a possibility that the NC system is broken. Contact Mitsub ishi.
Details
Built-in ROM area over (at the PLC system startup)
Multi-project parameter setting is illegal (due to the following reason).
The ratio to which the area after the project ratio setting is smaller than the size of ladder stored in the built in ROM area was detected.
Remedy
(1) Check the presence of the large-capacity PLC additional specification and reconsider the size that can be
stored.
(2) The multi-project parameter (project ratio) setting is illegal. Set the multi- project parameter again.
(3) If (1) or (2) does not solve the problem, there is a possibility that the NC system is broken. Contact Mitsub ishi.
Details
Comment area over (at the PLC system startup)
Multi-project parameter setting is illegal (due to the following reason).
The ratio to which the area after the project ratio setting is smaller than the size of comment and message
stored in the built-in ROM area.
Remedy
(1) The multi-project parameter (project ratio) setting is illegal. Set the multi- project parameter again.
(2) If (1) does not solve the problem, there is a possibility that the NC system is broken. Contact Mitsubishi.
U10 Illegal PLC 0x500* -
U10 Illegal PLC 0x510* -
U10 Illegal PLC 0x520* -
U10 Illegal PLC 0x530* -
U10 Illegal PLC 0x540* -

Details
Execution project illegal (at the PLC system startup)
Multi-project parameter setting is illegal (due to the following reasons).
The value outside the setting range (ON/OFF) was detected.
All execution projects are OFF.
Remedy
(1) The multi-project parameter (execution project) setting is illegal. Set the multi-project parameter again.
(2) If (1) does not solve the problem, there is a possibility that the NC system is broken. Contact Mitsubishi.
Details
Project execution order illegal (at the PLC system startup)
Multi-project parameter setting is illegal (due to the following reasons).
The value outside the setting range (1 to 6) was detected.
The redundant project execution order number was detected.
Remedy
(1) The multi-project parameter (project execution order) setting is illegal. Set the multi-project parameter
again.
(2) If (1) does not solve the problem, there is a possibility that the NC system is broken. Contact Mitsubishi.
Details
Parameter setting illegal for the number of common device points (at PLC system startup)
Multi-project parameter setting is illegal (due to the following reasons).
The value outside the setting range (0 to the minimum number of points in all projects) was detected.
It was detected that the number of points was not a multiple of 16.
Remedy
(1) Check the presence of the expansion project additional specification and reconsider the setting range.
(2) The multi-project parameter setting is illegal. Set the multi-project parameter again.
(3) If (1) or (2) does not solve the problem, there is a possibility that the NC system is broken. Contact Mitsub ishi.
Details
Parameter setting illegal for number of device points (at PLC system startup)
The parameter setting for the number of device points is illegal (due to the following reasons).
The total number of points in one project 29K or more was set.
The illegal value (-1 point or less, or 61441 points or more) for the number of device points was detected.
It was detected that the number of device points was not a multiple of 16.
The number outside the usable number of device points in whole projects was detected.
Remedy
(1) The parameter setting for the number of device points is illegal. Set the parameter of the number of device
points again and reboot the system.
(2) If (1) does not solve the problem, there is a possibility that the NC system is broken. Contact Mitsubishi.
Details
Caution; Ladder program writing during RUN is disabled (In independent program method)
With RUN write ON, sequence program is operated in independent program method. Run write is not available
with this condition.
Remedy
The ladder program writing (RUN write) can not be used in independent program method.
Disable RUN write, or change the method into multi-program one.
U10 Illegal PLC 0x550* -
U10 Illegal PLC 0x560* -
U10 Illegal PLC 0x570* -

U10 Illegal PLC 0x580*.yy -
U10 Illegal PLC 0x700*.yy -

Details
Caution; Ladder program writing during RUN is disabled (common pointer is used in high-speed processing)
With RUN write is ON, high-speed program with common pointer is running. RUN write is not available with this condition.
Remedy
RUN write is not available when high-speed processing with common pointer is running. Change the high speed processing program to the one without common pointer.
Details
Caution; Ladder program writing during RUN is disabled (high-speed processing size is exceeding)
With RUN write ON, the execution size of high-speed processing program has exceeded 4000 steps. RUN write is not available with this condition.
Remedy
RUN write is not available when execution size of high-speed processing program exceeds 4000 steps. Edit the high-speed processing program to reduce the execution size to 4000 steps or less.
(When multi-project is valid, edit the program to reduce the execution size to 4000 steps or less in total of all the project.)
Details
Caution; Ladder program writing during RUN is disabled (number of labels in high-speed processing is beyond the capacity)
(*) "Local label" is as "labels of local pointer".
With RUN write ON, the number of labels of local pointer in high-speed processing program has exceeded 256.
RUN write is not available with this condition.
Remedy
RUN write is not available when the number of labels of local pointer in high-speed processing program ex ceeds 256. Edit the high-speed program to reduce the number of labels of local pointer to less than 256.
(When multi-project is valid, edit the program to reduce the number of labels of local pointer to less than 256 per project.)
Details
Software exceptional interruption (BCD instruction error) has occurred.
With BCD and DBCD instructions, BIN value outside its input range was attempted to be converted into BCD.
Remedy
Check the usage of BCD, DBCD instructions existing in the steps occurred.
Details
Software exceptional interruption (BIN instruction error) has occurred.
With BIN and DBIN instructions, BCD value outside its input range was attempted to be converted into BIN.
Remedy
Check the usage of BIN, DBIN instructions existing in the steps occurred.
Details
Software exceptional interruption (Bus error) has occurred.
Remedy
Contact Mitsubishi.
U10 Illegal PLC 0x71xx.yy Step No.
U10 Illegal PLC 0x720* -
U10 Illegal PLC 0x730*.yy -
U10 Illegal PLC 0x80xx.yy Step No.
U10 Illegal PLC 0x81xx.yy Step No.
U10 Illegal PLC 0x82xx.yy Step No.

Details
Software exceptional interruption (Unmounted instruction error) has occurred.
(1) When the bit selection parameter (#6452 bit6) "branch destination label check valid" is set to "0", jumped to an undefined label.
(2) Sequence program in execution is broken.
Remedy
(1) Set the bit selection parameter (#6452 bit6) "branch destination label check valid" to "1" and check the branching step to the undefined label.
(2) Contact Mitsubishi.
Details
Software exceptional interruption (Instruction format error) has occurred.
Remedy
Contact Mitsubishi.
Details
Software exceptional interruption (Instruction bus error) has occurred.
(1) When the bit selection parameter (#6452 bit6) "branch destination label check valid" is set to "0", jumped to an undefined label.
(2) Sequence program in execution is broken.
Remedy
(1) Set the bit selection parameter (#6452 bit6) "branch destination label check valid" to "1" and check the branching step to the undefined label.
(2) Contact Mitsubishi.
Details
Software exceptional interruption (CALL/RET instruction error) has occurred.
Remedy
Contact Mitsubishi.
Details
Software exceptional interruption (memory area error) has occurred.
Remedy
Contact Mitsubishi.
Details
Software exceptional interruption (ASYNC BUS error) has occurred.
Remedy
Contact Mitsubishi.
Details

The ladder is stopped.
Remedy
Run the PLC.
U10 Illegal PLC 0x83xx.yy Step No.
U10 Illegal PLC 0x84xx.yy Step No.
U10 Illegal PLC 0x85xx.yy Step No.
U10 Illegal PLC 0x86xx.yy Step No.
U10 Illegal PLC 0x87xx.yy Step No.
U10 Illegal PLC 0x8Bxx.yy Step No.
U50 PLC stopped

Details
The ladder is stopped and the edited sequence program is not stored in the built-in ROM.
(The contents of temporary memory area and sequence program in the built-in ROM are mismatched.)
Remedy
Run the PLC.
Use GX Developer/GX Works2 or the built-in PLC edit function to perform write to the built-in ROM.
Details
The edited sequence program is not stored in the built-in ROM.
(The contents of temporary memory area and sequence program in the built-in ROM are mismatched.)
Remedy
Use GX Developer/GX Works2 or the built-in PLC edit function to perform write to the built-in ROM.
U55 PLC stopped / is not saved
U60 Ladder is not saved

Network Service Errors (N)

11Network Service Errors (N)
Details
An error occurred in the modem connection at the power ON.
Remedy
Check the connection between the NC and modem, connection port and power supply to modem.
Details
The number of redials exceeded due to the dial transmission failure.
Remedy
Wait a while, and then dial again.
Details
The phone line is not connected.
Remedy
Check for any disconnection in the modem's phone line.
Details
An error other than the above occurred during communication.
Remedy
Note down how the error occurred and contact the service center.
Details
The modem connection port is being used for another function such as input/output.
The modem connection port settings are incorrect.
Remedy
Stop using the modem connection port with the other function, and then turn the power ON again.
Correct the settings of the modem connection port.
Details
A diagnosis data file has been received.
Remedy
Clear the message.
Details
A file larger than Anshin-net server capacity (64Kbyte) has been transmitted in machining data sharing.
Remedy
Reduce the size of machining program file so that it won't exceed the capacity of Anshin-net server.
Details
The file reception failed in machining data sharing because no file exists on Anshin-net server.
Remedy
Confirm that a machining program file exists on Anshin-net server before receiving it.
N001 Modem initial error
N002 Redial over
N003 TEL unconnect
N004 Net communication error
N005 Invalid net communication
N006 Received result of diagnosis
N007 Send data size over
N008 No file on server

Details
The file reception failed in machining data sharing due to a wrong password.
Remedy
Input the password again.
Details
The file reception failed in machining data sharing due to a wrong customer number.
Remedy
Input the customer number again.
Details
The file reception failed in machining data sharing because the size of the file to be received is bigger than

free space in the NC.
Remedy
Ensure sufficient free space in the NC.
Details
A file on Anshin-net server cannot be deleted in machining data sharing.
Remedy
Confirm that the file exists on Anshin-net server.
Note down how the error occurred and contact the service center.
N009 Password error
N010 Customer number error
N011 Storage capacity over
N012 File deletion error

Program Errors (P)

12Program Errors (P)
These alarms occur during automatic operation and the causes of these alarms are mainly program errors which occur for instance when mistakes have been made in the preparation of the machining programs or when programs which conform to the specification have not been prepared.
Details
The number of axis addresses programmed in a block exceeds the specified maximum.
Remedy
Divide the command programmed in the block into two blocks.
Check the specifications.
Details
The axis address commanded by the program does not match any of the ones set by the parameter.
Remedy
Correct the axis names in the program.
Details
The issued axis command cannot be divided by the command unit.
A cutting feed command has been issued to the index table indexing axis when the parameter "#2580 in dex_ Gcmd" is set to "1".
Remedy
Correct the program.
Details
The command has been issued when it is impossible.
The normal line control command (G40.1, G41.1, G42.1) has been issued during the modal in which the normal line control is not acceptable.
The command has been issued during the modal in which the two-part system simultaneous thread cutting is not acceptable.
A workpiece coordinate system preset command (G92.1) has been issued during tool length compensa tion, nose R compensation or tool radius compensation.
Remedy
Correct the program.
Details
The number of holes per character on the paper tape is even for EIA code and odd for ISO code.
Remedy
Check the paper tape.
Check the tape puncher and tape reader.
Details
The number of characters per block on the paper tape is odd.
Remedy
Make the number of characters per block on the paper tape even.
Set the parameter parity V selection OFF.
P10 No. of simultaneous axes over
P11 Illegal axis address
P20 Division error
P29 Not accept command
P30 Parity H error
P31 Parity V error

Details
An address not listed in the specifications has been used.
Remedy
Correct the program address.
Correct the parameter settings.
Check the specifications.
Details
The command format in the program is not correct.
Remedy
Correct the program.
Details
The commanded G code is not in the specifications.
An illegal G code was commanded during the coordinate rotation command.
G51.2 or G50.2 was commanded when the rotary tool axis No. (the parameter "#1501polyax") was set to "0".
G51.2 or G50.2 was commanded when the tool axis was set to the linear axis (the parameter "#1017 rot" = 0).
Remedy
Check and correct the G code address in the program.
Check the parameter setting values.
Details

The setting range for the addresses has been exceeded.
Remedy
Correct the program.
Details
"EOR" has been read during tape and memory mode.
Remedy
Enter the M02 and M30 command at the end of the program.
Enter the M99 command at the end of the subprogram.
Details
"0" has been specified for program or sequence No.
Remedy
Designate program Nos. within a range from 1 to 99999999.
Designate sequence Nos. within a range from 1 to 99999999.
Details
"/n" has been issued while the optional block skip addition is not in the specifications.
Remedy
Check the specifications.
P32 Illegal address
P33 Format error
P34 Illegal G code
P35 Setting value range over
P36 Program end error
P37 O, N number zero
P38 No spec: Add. Op block skip

Details
A non-specified G code was commanded.
The selected operation mode is out of the option setting.
The selected operation mode is out of the parameter setting.
Remedy
Check the specifications.
Check the parameter setting values.
Details
When tool radius compensation is executed, there is an error in the pre-read block and so the interference check is disabled.
Remedy
Reconsider the program.
Details
The combination of G codes in a block is inappropriate.
A part of unmodal G codes and modal G codes cannot be commanded in a same block.
Remedy
Correct the combination of G codes.
Separate the incompatible G codes into different blocks.
Details
A travel command other than G00 (positioning) was issued when all the following conditions were met.
Parameter "#1247 set19/bit0" (Movement by tool length compensation command) is "1"
Multiple-axis synchronization control is active
Tool length compensation is not yet applied after G43 H** command (without axis position command)
Remedy
When using tool length compensation during Multiple-axis synchronization control, issue a positioning command (G00) before performing cutting.
Details
A travel command was issued before the execution of the block that had been restart-searched.
Remedy
Carry out program restart again.
Travel command cannot be executed before the execution of the block that has been restart-searched.
Details
Restart search was attempted for a block that comes after any of the following command blocks:
3-dimensional circular interpolation, cylindrical interpolation, polar coordinate interpolation, milling interpola tion, tool center point control, simple tool center point control, inclined surface machining, simple inclined sur face machining, workpiece installation error compensation, axis name switch, mixed control, machining condition selection I, sub part system control I, sub part system control II, or direct command mode.
Remedy
Reconsider the restart search position.
Details
Inch/Metric changeover (G20/G21) command was issued while the function is out of specifications.
Remedy
Check the specifications.
P39 No specifications
P40 Pre-read block error
P45 G code combination error
P46 Cutting command invalid
P48 Restart pos return incomplete
P49 Invalid restart search
P50 No spec: Inch/Metric change

Details
The commanded movement distance is excessive (over 231).
Remedy
Correct the command range for the axis address.
Details
Unidirectional positioning (G60) was commanded while the function is out of specifications.
Remedy
Check the specifications.
Details

No feed rate command has been issued.
There is no F command in the cylindrical interpolation or polar coordinate interpolation immediately after
the G95 mode is commanded.
Remedy
The default movement modal command at power ON is G01. This causes the machine to move without
a G01 command if a movement command is issued in the program, and an alarm results. Use an F com mand to specify the feed rate.
Specify F with a thread lead command.
Details
High-speed mode III (G05 P3) was commanded while the function is out of specifications.
Remedy
Check whether the specifications are provided for the high-speed mode III.
Details
F's value in an F or ",F" command is exceeding the command range.
Remedy
Check and correct F or ",F" command in the program.
Details
There is an error in the arc start and end points as well as in the arc center.
The difference of the involute curve through the start point and the end point is large.
When arc was commanded, one of the two axes configuring the arc plane was a scaling valid axis.
Remedy
Correct the numerical values of the addresses that specify the start and end points, arc center as well as
the radius in the program.
Correct the "+" and "-" directions of the address numerical values.
Check for the scaling valid axis.
Details
An arc center cannot be obtained in R-specified circular interpolation.
A curvature center of the involute curve cannot be obtained.
Remedy
Correct the numerical values of the addresses in the program.
Correct the start and end points if they are inside of the base circle for involute interpolation. When carrying
out tool radius compensation, make sure that the start and end points after compensation will not be inside
of the base circle for involute interpolation.
Correct the start and end points if they are at an even distance from the center of the base circle for involute
interpolation.
P60 Compensation length over
P61 No spec: Unidirectional posit.
P62 No F command
P65 No spec: High speed mode 3
P67 F value is exceeding the limit
P70 Arc end point deviation large
P71 Arc center error

Details
A helical command has been issued though it is out of specifications.
Remedy
Check whether the specifications are provided for the helical cutting.
An Axis 3 command has been issued by the circular interpolation command. If there is no helical specifi cation, move the linear axis to the next block.
Details
A spiral command was issued though it is out of specifications.
Remedy
Issue the G02.1 and G03.1 commands for circular interpolation.
Check whether the specifications are provided for the spiral cutting.
Details
The 3-dimension circular cannot be obtained because the end block was not specified during 3-dimension cir cular interpolation supplementary modal.
The 3-dimension circular cannot be obtained due to an interruption during 3-dimension circular interpolation
supplementary modal.
Remedy
Correct the program.
Details
An illegal G code was issued during 3-dimension circular interpolation modal.
Otherwise, 3-dimension circular interpolation command was issued during a modal for which a 3-dimension cir cular interpolation command cannot be issued.
Remedy
Correct the program.
Details
G02.4/G03.4 was commanded though there is no 3-dimension circular interpolation specification.
Remedy
Check the specifications.
Details
A thread cutting command was issued though it is out of specifications.
Remedy
Check the specifications.
Details
An illegal thread lead (thread pitch) was specified at the thread cutting command.
Remedy
Correct the thread lead for the thread cutting command.
Details
A cylindrical interpolation command was issued though it is out of specifications.
Remedy
Check the specifications.
P72 No spec: Herical cutting
P73 No spec: Spiral cutting
P74 Can't calculate 3DIM arc
P75 3DIM arc illegal
P76 No spec: 3DIM arc interpolat
P90 No spec: Thread cutting
P93 Illegal pitch vaule

P100 No spec: Cylindric interpolat

Details
Plane selection (G17/G18/G19) was commanded during figure rotation.
Remedy
Correct the machining program.
Details
Plane selection commands (G17, G18, G19) were issued during a coordinate rotation was being commanded.
Remedy
Always command coordinate rotation cancel after the coordinate rotation command, and then issue a plane selection command.
Details
Plane selection commands (G17, G18, G19) were issued while tool radius compensation (G41, G42) and nose R compensation (G41, G42, G46) commands were being issued.
Plane selection commands were issued after completing nose R compensation commands when there were no further axis movement commands after G40, and compensation has not been cancelled.
Remedy
Issue plane selection commands after completing (axis movement commands issued after G40 cancel command) tool radius compensation and nose R compensation commands.
Details
The circular command axis does not correspond to the selected plane.
Remedy
Select a correct plane before issuing a circular command.
Details
The axis specified in the fixed cycle for turning machining does not coincide with the selected plane.
One or both of the selected plane axes have no travel when the fixed cycle for turning machining is com manded.
Remedy
Correct the plane selection before issuing the fixed cycle for turning machining.
Correct the program so that the two axes of the selected plane are involved in the movement of the fixed cycle for turning machining.
Details
Feed per rotation (G95) was commanded though it is out of specifications.
Remedy
Check the specifications.
Details
F0 (F 1-digit feed) was commanded during the arc modal (G02/G03).
Remedy
Correct the machining program.
Details
An auto corner override command (G62) was issued though it is out of specifications.
Remedy
Check the specifications.
Delete the G62 command from the program.
P110 Plane select during figure rot
P111 Plane selected while coord rot
P112 Plane selected while R compen
P113 Illegal plane select
P114 Plane axis command error
P120 No spec: Feed per rotation
P121 F0 command during arc modal
P122 No spec: Auto corner override

Details
High-accuracy control command was issued though it is out of specifications.
Remedy
Check the specifications.
Details
The inverse time option is not provided.
Remedy
Check the specifications.
Details
The issued G code command is illegal during G93 mode.
G93 command was issued during a modal for which inverse time feed cannot be performed.
Remedy
Correct the program.
Details
An illegal command was issued during the high-accuracy control mode.
A G code group 13 command was issued during the high-accuracy control mode.
Milling, cylindrical interpolation or pole coordinate interpolation was commanded during the high-accuracy control mode.
Remedy
Correct the program.
Details
The SSS control valid parameter has been set although there is no SSS control specification.
Remedy
Check the specifications. Set "#8090 SSS ON" to "0" when there is no SSS control specification.
Details
Machining condition selection I was commanded during the mode where the selection command is unavailable.
Remedy
Check the program and see whether any unavailable mode is included during machining condition selec tion I. If any, cancel that mode.
Details
Both the high-accuracy control mode and high-speed machining mode are commanded simultaneously in a part system where the simultaneous use of the two modes is disabled.
Remedy

Correct the setting of "#8040 High-speed high-accuracy control-enabled part system".
Correct the machining program so that the high-accuracy control mode is not used together with high speed machining mode.
Details
The 2nd miscellaneous function address, commanded in the program, differs from the address set in the pa rameters.
Remedy
Correct the 2nd miscellaneous function address in the program.
P123 No spec: High-accuracy control
P124 No spec: Inverse time feed
P125 G93 mode error
P126 Invalid cmnd in high-accuracy
P127 No spec: SSS Control
P128 Machin condtn select I disable
P129 Hi-speed Hi-accuracy both ON
P130 2nd M function code illegal

Details
A constant surface speed control command (G96) was issued though it is out of specifications.
Remedy
Check the specifications.
Issue a rotation speed command (G97) instead of the constant surface speed control command (G96).
Details
No spindle rotation speed command has been issued.
Remedy
Correct the program.
Details
The illegal No. was specified for the constant surface speed control axis.
Remedy
Correct the parameter settings and program that specify the constant surface speed control axis.
Details
The constant surface speed control command (G96) was issued without commanding the spindle speed clamp
(G92/G50).
Remedy
Press the reset key and carry out the remedy below.
Check the program.
Issue the G92/G50 command before the G96 command.
Command the constant surface speed cancel (G97) to switch to the rotation speed command.
Details
The position compensation command (G45 to G48) is out of specifications.
Remedy
Check the specifications.
Details
Position compensation was commanded during the figure rotation or coordinate rotation command.
Remedy
Correct the program.
Details
Position compensation cannot be executed with the issued arc command.
Remedy
Correct the program.
Details
Tool radius compensation commands (G41 and G42) were issued though they are out of specifications.
Nose R compensation commands (G41, G42, and G46) were issued though they are out of specifications.
Remedy
Check the specifications.
P131 No spec: Cnst surface ctrl G96
P132 Spindle rotation speed S=0
P133 Illegal P-No. G96
P134 G96 Clamp Err.
P140 No spec: Pos compen cmd
P141 Pos compen during rotation
P142 Pos compen invalid arc
P150 No spec: Nose R compensation

Details
A compensation command (G40, G41, G42, G43, G44, or G46) has been issued in the arc modal (G02 or G03).
Remedy
Issue the linear command (G01) or rapid traverse command (G00) in the compensation command block
or cancel block.
(Set the modal to linear interpolation.)
Details
In interference block processing during execution of a tool radius compensation (G41 or G42) or nose R
compensation (G41, G42, or G46) command, the intersection point after one block is skipped cannot be
determined.
The 3-dimensional tool radius compensation value (tool vertical direction compensation) (G41.2 or G42.2)
cannot be determined.
Remedy
Correct the program.
Details
An interference error has occurred while the tool radius compensation command (G41 or G42) or nose R com pensation command (G41, G42 or G46) was being executed.
Remedy
Correct the program.
Details
A three-dimensional compensation command was issued though it is out of specifications.
Remedy
Check the specifications.

Details
A fixed cycle command has been issued in the radius compensation mode.
Remedy
Issue a radius compensation cancel command (G40) to cancel the radius compensation mode that has been applied since the fixed cycle command was issued.
Details
A shift vector with undefined compensation direction was found at the start of G46 nose R compensation.
Remedy
Change the vector to that which has the defined compensation direction.
Change the tool to that which has a different tip point No.
Details
During G46 nose R compensation, the compensation direction is reversed.
Remedy
Change the G command to that which allows the reversed compensation direction (G00, G28, G30, G33, or G53).
Change the tool to that which has a different tip point No.
Enable "#8106 G46 NO REV-ERR".
P151 Radius compen during arc mode
P152 No intersection
P153 Compensation interference
P154 No spec: 3D compensation
P155 Fixed cyc exec during compen
P156 R compen direction not defined
P157 R compen direction changed

Details
An illegal tip point No. (other than 1 to 8) was found during G46 nose R compensation.
Remedy
Correct the tip point No.
Details
3-dimensional tool radius compensation (tool vertical direction compensation) is not included in the specifica tions.
Remedy
Check the specifications.
Details
A command (G or T command, etc.) was issued during 3-dimensional tool radius compensation (tool vertical direction compensation), although it is disabled during the compensation.
Remedy
Cancel 3-dimensional tool radius compensation (tool vertical direction compensation).
Details
3-dimensional tool radius compensation (tool vertical direction compensation) was commanded in a mode where the command is disabled.
Remedy
Cancel the mode that disables the command.
Details
No compensation No. (DOO, TOO or HOO) command was given when the radius compensation (G41, G42, G43 or G46) command was issued. Otherwise, the compensation No. is larger than the number of sets in the specifications.
H99 or D99 is commanded with the parameter "#1227 aux11/bit1" enabled when the length compensation method and radius compensation method are set to "1" or "2" for the M system tool life management II.
Remedy
Add the compensation No. command to the compensation command block.
Check the number of sets for the tool compensation Nos. and correct the compensation No. command to be within the number of sets.
H99 and D99 commands cannot be used when the length compensation method and radius compensation are set to "1" or "2". Set the length compensation method and radius compensation method to "0".
Details
Compensation data input by program (G10) was commanded though it is out of specifications.
Remedy
Check the specifications.
Details
An address of G10 command is not correct.
Remedy
Correct the address L No. of the G10 command.
P158 Illegal tip point
P161 No spec: 3D tool R comp
P162 Disable Cmd in 3D tool R comp
P163 3D tool R comp is disabled
P170 No offset number
P171 No spec:Comp input by prog G10
P172 G10 L number error

Details
The compensation No. at the G10 command is not within the permitted number of sets in the specifications.
Remedy
Check the number of sets for the tool compensation Nos. and correct the address P designation to be with in the number of sets.
Details
Compensation data input by program cancel (G11) was commanded though there is no specification of com pensation data input by program.
Remedy
Check the specifications.
Details
Registration of tool life management data with G10 was attempted when the "usage data count valid" signal was ON.
Remedy
The tool life management data cannot be registered during the usage data count. Turn the "usage data

count valid" signal OFF.
Details
The number of registration groups, total number of registered tools or the number of registrations per group
exceeded the range in the specifications.
Remedy
Correct the number of registrations.
Details
A duplicate group No. was found at the registration of the tool life management data with G10.
A group No. that was not registered was designated during the T****99 command.
An M code command, which must be issued as a single command, coexists in the same block as that of
another M code command.
The M code commands set in the same group exist in the same block.
Remedy
Register the estimated tool life data/cumulative usage data once for one group: commanding with a dupli cate group No. is not allowed.
Correct to the group No.
Details
A fixed cycle command (G72 - G89) was issued though it is out of specifications.
Remedy
Check the specifications.
Correct the program.
Details
Spindle rotation speed (S) has not been commanded in synchronous tapping.
Remedy
Command the spindle rotation speed (S) in synchronous tapping.
When "#8125 Check Scode in G84" is set to "1", enter the S command in the same block where the syn chronous tapping command is issued.
P173 G10 P number error
P174 No spec:Comp input by prog G11
P177 Tool life count active
P178 Tool life data entry over
P179 Illegal group No.
P180 No spec: Drilling cycle
P181 No spindle command (Tap cycle)

Details
Connection to the main spindle unit was not established.
The synchronous tapping was attempted with the spindle not serially connected under the multiple-spindle
control I.
Synchronous tapping command was given to the analog spindle while analog spindle synchronous tapping
was unavailable.
Punch Tap cycle command was given with no-load operation mode during manual arbitrary reverse run
mode.
Remedy
Check connection to the main spindle.
Check that the main spindle encoder exists.
Set 1 to the parameter #3024 (sout).
Correct the program.
Enable actual cutting mode to command Punch Tap cycle with manual arbitrary reverse run mode.
Details
The pitch or number of threads has not been commanded in the tap cycle of a fixed cycle for drilling command.
Remedy
Specify the pitch data and the number of threads by F or E command.
Details
The pitch or the number of threads per inch is illegal in the tap cycle of the fixed cycle for drilling command.
The pitch is too small for the spindle rotation speed.
The thread number is too large for the spindle rotation speed.
Remedy
Correct the pitch or the number of threads per inch.
Details
Synchronous tapping cycle (G84/G74) was commanded though it is out of specifications.
Remedy
Check the specifications.
Details
S command was issued during synchronous tapping modal.
Remedy
Cancel the synchronous tapping before issuing the S command.
Details
A G185 command was issued when one of the following conditions was true, which disables a hole edge cham fering command.
The selected plane is not G19 plane.
The configuration of parameters "#1026 base_ I" through "#1031 aux_K" is one that does not allow hole
edge chamfering cycle.
The "Longitudinal hole drilling axis selection" signal (YCD4) is ON.
The axis name switch (G111) modal is active.
Remedy
Ensure that G19 plane is selected when G185 is issued.
Turn off the "Longitudinal hole drilling axis selection" signal (YCD4).
Cancel axis name switch (G111) before issuing G185.
P182 Synchronous tap error
P183 No pitch/thread number
P184 Pitch/thread number error
P185 No spec: Sync tapping cycle
P186 Illegal S cmnd in synchro tap
P188 Hole edge chamfering invalid

Details

A lathe cutting cycle command was issued though it is out of specifications.
Remedy
Check the specification.
Delete the lathe cutting cycle command.
Details
In the lathe cutting cycle, the specified length of taper section is illegal.
Remedy
Set the smaller radius value than the axis travel amount in the lathe cycle command.
Details
Chamfering in the thread cutting cycle is illegal.
Remedy
Set a chamfering amount not exceeding the cycle.
Details
A turning tool shape compensation was commanded while a tool other than turning tool has been selected.
Remedy
Select "Lathing" for tool type in tool management data before giving the turning tool shape compensation command.
Details
The compound type fixed cycle for turning machining I (G70 to G73) was commanded though it is out of spec ifications.
Remedy
Check the specifications.
Details
The subprogram, called with a compound type fixed cycle for turning machining I command, has at least one of the following commands: reference position return command (G27, G28, G29, G30); thread cutting (G33, G34); fixed cycle skip-function (G31, G31.n).
An arc command was found in the first movement block of the finished shape program in compound type fixed cycle for turning machining I.
Remedy
Delete G27, G28, G29, G30, G31, G33, G34, and fixed cycle G codes from the subprogram called with the compound type fixed cycle for turning machining I commands (G70 to G73).
Delete G02 and G03 from the first movement block of the finished shape program in compound type fixed cycle for turning machining I.
Details
The number of blocks in the shape program of the compound type fixed cycle for turning machining I is over 50 or 200 (the maximum number differs according to the model).
Remedy
Set a 50/200 or less value for the number of blocks in the shape program called by the compound type fixed cycle for turning machining I commands (G70 to G73). (The maximum number differs according to the model).
P190 No spec: Turning cycle
P191 Taper length error
P192 Chamfering error
P199 Tool selection is incorrect
P200 No spec: MRC cycle
P201 Program error (MRC)
P202 Block over (MRC)

Details
A proper shape will not obtained by executing the shape program for the compound type fixed cycle for turning machining I (G70 to G73).
Remedy
Correct the shape program for the compound type fixed cycle for turning machining I (G70 to G73).
Details
A command value of the compound type fixed cycle for turning machining (G70 to G76) is illegal.
Remedy
Correct the command value of the compound type fixed cycle for turning machining (G70 to G76).
Details
A compound type fixed cycle for turning machining II (G74 to G76) command was commanded though it is out of specifications.
Remedy
Check the specifications.
Details
There are no special fixed cycle specifications.
Remedy
Check the specifications.
Details
"0" has been specified for the number of holes in special fixed cycle mode.
Remedy
Correct the program.
Details
A G36 command specifies "0" for angle intervals.
Remedy
Correct the program.
Details
The radius value specified with a G12 or G13 command is below the compensation amount.
Remedy
Correct the program.
Details
There are no circular cutting specifications.
Remedy
Check the specifications.
Details
Over 10 times of subprogram calls have been done in succession from a subprogram.
A M198 command was found in the program in the data server.
Remedy
Correct the program so that the number of subprogram calls does not exceed 10 times.

P203 D cmnd figure error (MRC)
P204 E cmnd fixed cycle error
P210 No spec: Pattern cycle
P220 No spec: Special fixed cycle
P221 No. of special fixed holes = 0
P222 G36 angle error
P223 G12/G13 radius error
P224 No spec: Circular (G12/G13)
P230 Subprogram nesting over

Details
The sequence No., commanded at the return from the subprogram or by GOTO in the subprogram call, was not set.
Remedy
Specify the sequence Nos. in the call block of the subprogram.
Details
The machining program has not been found when the machining program is called.
Remedy
Enter the machining program.
Check the subprogram storage destination parameters.
Ensure that the external device (including SD card/USB memory) that contains the file is mounted.
Details
Operation was attempted for the file under program editing.
Remedy
Execute the program again after completion of program editing.
Details
A variable command (with #) was issued though it is out of specifications.
Remedy
Check the specifications.
Details
The variable No. commanded is out of the range specified in the specifications.
Remedy
Check the specifications.
Correct the program variable No.
Details
The "=" sign has not been commanded when a variable is defined.
Remedy
Designate the "=" sign in the variable definition of the program.
Details
An invalid variable has been specified in the left or right side of an operation expression.
Assignment to a write-protected variable has been commanded.
Remedy
Correct the program.
Details
Date or time was set earlier than current date or time in the system variables (#3011, #3012) when the system lock was valid.
Remedy
Date or time cannot be changed.
Correct the program.
P231 No sequence No.
P232 No program No.
P235 Program editing
P240 No spec: Variable commands
P241 No variable No.
P242 = not defined at vrble set
P243 Can't use variables
P244 Invalid set date or time

Details
Tool data read/write command has been executed without selecting the tool command method.
Tool command method (#68000) or tool selection No. (#68001) is incorrect.
(1) The tool specified as "Tool in use" is not installed.
(2) Any unregistered tool No. has been designated.
(3) Tool selection No. (#68001) has not been designated.
Write of "Tool No." has been commanded using #68001 while tool No. is being designated.
Write of "Tool No." has been commanded for an already registered tool No.
Remedy
Check the program to make sure that the tool command method (#68000) and tool selection No. (#68001) are correct.
Make sure, if you wish to designate a tool in use, that the said tool No. is nonzero and is already registered on the tool management screen.
Make sure, if you wish to designate a tool No., that the tool No. registered on the tool management screen has been commanded using #68001.
#68001 is unable to write the same tool No. as that already registered on the tool management screen.
Details
An attempt was made to pre-read a system variable (position data) that cannot be read during travel with out waiting for the end point of the previous block to be reached.
Remedy
Use position data that can be pre-read.
Program the reading of the system variable (position data) and a travel command in separate blocks.
Details
Figure rotation (M98 I_J_P_H_L_) was commanded though it is out of specifications.
Remedy
Check the specifications.
Details

Figure rotation command was issued during figure rotation.
Remedy
Correct the program.
Details
A coordinate rotation related command (G68, G69) was issued during figure rotation.
Remedy
Correct the program.
Details
A coordinate rotation command was issued though it is out of specifications.
Remedy
Check the specifications.
Details
Another G code or a T command has been issued in the block of coordinate rotation command.
Remedy
Correct the program.
P245 Tool No. error
P249 Position data unreadable
P250 No spec: Figure rotation
P251 Figure rotation overlapped
P252 Coord rotate in fig. rotation
P260 No spec: Coordinates rotation
P261 G code illegal (Coord rot)

Details
A coordinate rotation command has been issued during modal in which coordinate rotation is not allowed.
Remedy
Correct the program.
Details
A macro specification was commanded though it is out of specifications.
Remedy
Check the specifications.
Details
A macro interruption command has been issued though it is out of specifications.
Remedy
Check the specifications.
Details
An executable statement and a macro statement exist together in the same block.
Remedy
Place the executable statement and macro statement in separate blocks in the program.
Details
The number of macro call nests exceeded the limit imposed by the specifications.
Remedy
Correct the program so that the macro calls do not exceed the limit imposed by the specifications.
Details
The number of argument sets in the macro call argument type II has exceeded the limit.
Remedy
Correct the program.
Details
A G67 command was issued though it was not during the G66 command modal.
Remedy
Correct the program.
Issue G66 command before G67 command, which is a call cancel command.
Details
An alarm command has been issued in #3000.
Remedy
Refer to the operator messages on the diagnosis screen.
Refer to the instruction manual issued by the machine tool builder.
Details
Over five times have the parentheses "[" or "]" been used in a single block.
Remedy
Correct the program so that the number of "[" or "]" is five or less.
P262 Illegal modal (Coord rot)
P270 No spec: User macro
P271 No spec: Macro interrupt
P272 NC and macro texts in a block
P273 Macro call nesting over
P275 Macro argument over
P276 Illegal G67 command
P277 Macro alarm message
P280 Brackets [ ] nesting over

Details
A single block does not have the same number of commanded parentheses "[" as that of "]".
Remedy
Correct the program so that "[" and "]" parentheses are paired up properly.
Details
The arithmetic formula is incorrect.
Remedy
Correct the formula in the program.
Details
The denominator of the division is zero.
Remedy
Correct the program so that the denominator for division in the formula is not zero.
Details

The multiplicity of the IF statement exceeded 10 times.
Remedy
The program is reviewed so that the multiplicity of the IF statement does not exceed 10 times.
Details
IF and ENDIF are not in pairs.
THEN/ELSE is ordered in the absence of IF command.
Remedy
The program is reviewed so that IF and ENDIF become pairs.
Before THEN/ELSE command, IF[<conditional expression>]command is given.
Details
There is an error in the "IF[<conditional>]GOTO(" statement.
Remedy
Correct the program.
Details
There is an error in the "WHILE[<conditional>]DO(-END(" statement.
Remedy
Correct the program.
Details
There is an error in the "SETVN(" statement when the variable name setting was made.
Remedy
Correct the program.
The number of characters in the variable name of the SETVN statement must be 7 or less.
Details
The number of DO-END nesting levels in the "WHILE[<conditional>]DO(-END(" statement has exceeded 27.
Remedy
Correct the program so that the nesting levels of the DO-END statement does not exceed 27.
P281 Brackets [ ] not paired
P282 Calculation impossible
P283 Divided by zero
P288 IF EXCESS
P289 IF-ENDIF MMC.
P290 IF sentence error
P291 WHILE sentence error
P292 SETVN sentence error
P293 DO-END nesting over

Details
The DOs and ENDs are not paired off properly.
Remedy
Correct the program so that the DOs and ENDs are paired off properly.
Details
There is a WHILE or GOTO statement on the tape during tape operation.
Remedy
Apply memory mode operation instead of tape mode that does not allow the execution of the program with
a WHILE or GOTO statement.
Details
A required address has not been specified in the user macro.
Remedy
Correct the program.
Details
The user macro does not use address A as a variable.
Remedy
Correct the program.
Details
User macro G200, G201, or G202 was specified during tape or MDI mode.
Remedy
Correct the program.
Details
The variable names have not been commanded properly.
Remedy
Correct the variable names in the program.
Details
A duplicate variable name was found.
Remedy
Correct the program so that no duplicate name exists.
Details
G, M, S, T, or B macro code was called during fixed cycle.
Remedy
Correct the program.
Correct the parameter settings.
Details
The scaling command (G50, G51) was issued though it is out of specifications.
Remedy
Check the specifications.
P294 DO and END not paired
P295 WHILE/GOTO in tape
P296 No address (macro)
P297 Address-A error
P298 G200-G202 cmnd in tape
P300 Variable name illegal
P301 Variable name duplicated
P310 Not use GMSTB macro code
P350 No spec: Scaling command

Details
A mirror image command (G50.1 or G51.1) has been issued though the programmable mirror image specifica tions are not provided.
Remedy
Check the specifications.
Details
The facing turret mirror image specifications are not provided.
Remedy
Check the specifications.
Details
Mirror image for facing tool posts was commanded to an axis in external mirror image or parameter mirror image.
The commanded mirror image for facing tool posts enables the mirror image for a rotary axis.
Remedy
Correct the program.
Correct the parameter settings.
Details
The corner R/C was issued though it is out of specifications.
Remedy
Check the specifications.
Delete the corner chamfering/corner rounding command in the program.
Details
Corner chamfering II or corner rounding II was commanded in the arc interpolation block though it is out of specifications.
Remedy
Check the specifications.
Details
The block next to corner chamfering/ corner rounding is not a travel command.
Remedy
Replace the block succeeding the corner chamfering/ corner rounding command by G01 command.
Details
The travel distance in the corner chamfering/corner rounding command was shorter than the value in the corner chamfering/corner rounding command.
Remedy
Set the smaller value for the corner chamfering/corner rounding than the travel distance.
Details
The travel distance in the following block in the corner chamfering/corner rounding command was shorter than the value in the corner chamfering/corner rounding command.
Remedy
Set the smaller value for the corner chamfering/corner rounding than the travel distance in the following block.
P360 No spec: Program mirror
P370 No spec: Facing t-post MR
P371 Facing t-post MR illegal
P380 No spec: Corner R/C
P381 No spec: Arc R/C
P382 No corner movement
P383 Corner movement short
P384 Corner next movement short

Details
A block with corner chamfering/corner rounding was given during G00 or G33 modal.
Remedy
Correct the program.
Details
A geometric command was issued though it is out of specifications.
Remedy
Check the specifications.
Details
There are no geometric IB specifications.
Remedy
Check the specifications.
Details
The angular difference between the geometric line and line is 1 or less.
Remedy
Correct the geometric angle.
Details
The second geometric block has a command with an incremental value.
Remedy
Issue a command with an absolute value in the second geometric block.
Details
The second geometric block contains no linear command.
Remedy
Issue the G01 command.
Details
The geometric format is invalid.
Remedy
Correct the program.
Details
A plane switching command was issued during geometric command processing.
Remedy
Complete the plane switching command before geometric command processing.
Details
In geometric IB, the arc end point does not contact or intersect the start point of the next block.
Remedy
Correct the first and second commands containing a circular arc command for geometric.
P385 Corner during G00/G33

P390 No spec: Geometric
P391 No spec: Geometric arc
P392 Angle < 1 degree (GEOMT)
P393 Inc value in 2nd block (GEOMT)
P394 No linear move command (GEOMT)
P395 Illegal address (GEOMT)
P396 Plane selected in GEOMT ctrl
P397 Arc error (GEOMT)

Details
A geometric command was issued though the geometric IB specifications are not provided.
Remedy
Check the specifications.
Details
G111 was issued during milling mode.
G111 was issued during nose R compensation mode.
G111 was issued during constant surface speed.
G111 was issued during mixed control (cross axis control).
G111 was issued during fixed cycle.
G111 was issued during polar coordinate interpolation.
G111 was issued during cylindrical interpolation mode.
Remedy
Before commanding G111, cancel the following commands.
Milling mode
Nose R compensation
Constant surface speed
Mixed control (cross axis control)
Fixed cycle
Polar coordinate interpolation
Cylindrical interpolation
Details
Axis name switch (G111) was issued though it is out of specifications.
Remedy
Check the specifications.
Details
Parameter input by program (G10) was commanded though it is out of specifications.
Remedy
Check the specifications.
Details
The specified parameter No. or set data is illegal.
An illegal G command address was input in parameter input mode.
A parameter input command was issued during fixed cycle modal or nose R compensation.
G10 L50, G10 L70, G10 L100, G11 were not commanded in independent blocks.
Remedy
Correct the program.
Details
G10 L100, G10 L101 or G11 has been given together with any other command in a block.
Address P or T has been omitted from G10 L100.
Address C has been omitted from G10 L101.
Remedy
Correct the program.
P398 No spec: Geometric1B
P411 Illegal modal G111
P412 No spec: Axis name switch
P420 No spec: Para input by program
P421 Parameter input error
P422 Tool/Work shape input error

Details
G10 L110, G10 L111 or G11 has been given together with any other command in a block.
Address Q has been omitted from G10 L110.
Address P, Q or D has been omitted from G10 L111.
Machining surface parameter input command has been issued for an undefined workpiece.
An index angle command has been given to any axis other than Z when using the coordinate axis direction setting method.
Neither the workpiece registration No. nor surface registration No. has been selected when setting a ma chining surface.
Remedy
Correct the program.
Correct the setting of workpiece to machine.
Details
A command was issued to move an axis, which has not returned to the reference position, away from that reference position.
A command was issued to an axis removal axis.
Remedy
Execute reference position return manually.
Disable the axis removal on the axis for which the command was issued.
Details
A command for second, third or fourth reference position return was issued though there are no such command specifications.
Remedy
Check the specifications.
Details
Start position return (G29) was commanded though it is out of specifications.
Remedy

Check the specifications.
Details
Reference position check (G27) was commanded though it is out of specifications.
Remedy
Check the specifications.
Details
One of the axes did not return to the reference position when the reference position check command (G27) was executed.
Remedy
Correct the program.
Details
An M command was issued simultaneously in the G27 command block.
Remedy
Place the M code command, which cannot be issued in a G27 command block, in separate block from G27 command block.
P423 R-Navi input error
P430 R-pnt return incomplete
P431 No spec: 2,3,4th R-point ret
P432 No spec: Start position return
P433 No spec: R-position check
P434 Compare error
P435 G27 and M commands in a block

Details
An M command was issued simultaneously in the G29 command block.
Remedy
Place the M code command, which cannot be issued in a G29 command block, in separate block from G29 command block.
Details
A local coordinate system command was issued during execution of the G54.1 command.
Remedy
Correct the program.
Details
The chuck barrier on command (G22) was specified although the chuck barrier is out of specifications.
Remedy
Check the specifications.
Details
Stroke check before travel (G22/G23) was commanded though it is out of specifications.
Remedy
Check the specifications.
Details
An illegal command, which places the axis travel start/end point in the prohibited area or moves the axis through the prohibited area, was detected when Stroke check before travel (G22) was commanded.
Remedy
Correct the coordinate values of the axis address commanded in the program.
Details
An error has occurred in the tape reader. Otherwise an error has occurred in the printer during macro printing.
Remedy
Check the power and cable of the connected devices.
Correct the I/O device parameters.
Details
A file of the machining program cannot be read.
Remedy
In memory mode, the programs stored in memory may have been destroyed. Output all of the programs and tool data and then format the system.
Ensure that the external device (including SD card/USB memory) that contains the file is mounted.
Correct the parameter settings for HD operation, SD card operation or USB memory operation.
Details
A communication error occurred during the BTR operation.
Remedy
"L01 Computer link error" is displayed simultaneously. Take the remedy corresponding to the error No.
P436 G29 and M commands in a block
P438 G52 invalid during G54.1
P450 No spec: Chuck barrier
P451 No spec: Stroke chk bef travel
P452 Limit before travel exists
P460 Tape I/O error
P461 File I/O error
P462 Computer link commu error

Details
Any of the following commands has been given during 3D machine interference check.
Program format switch (G188/G189)
Diameter/Radius designation switch (G10.9)
Remedy
Before the command, correct the program or disable interference check.
Use the PLC I/F method to switch the program format.
Details
Milling was commanded though it is out of specifications.
Polar coordinate interpolation was commanded though it is out of specifications.
Remedy
Check the specifications.
Details
An illegal G code was used during the milling mode.

An illegal G code was used during cylindrical interpolation or polar coordinate interpolation.
The G07.1 command was issued during the tool radius compensation.
Remedy
Correct the program.
Details
A rotary axis was commanded during the milling mode.
Milling was executed though an illegal value was set for the milling axis No.
Cylindrical interpolation or polar coordinate interpolation was commanded during mirror image.
Cylindrical interpolation or polar coordinate interpolation was commanded before the tool compensation
was completed after the T command.
G07.1 was commanded when cylindrical interpolation was not possible (there is no rotary axis, or external
mirror image is ON).
An axis other than a cylindrical coordinate system axis was commanded during cylindrical interpolation.
Remedy
Correct the machining program, parameters and PLC interface signals.
Details
Movement was commanded to an axis that had not completed reference position return during the milling
mode.
Movement was commanded to an axis that had not completed reference position return during cylindrical
interpolation or polar coordinate interpolation.
Remedy
Carry out manual reference position return.
P470 Invalid cmd in 3D interf check
P480 No spec: Milling
P481 Illegal G code (mill)
P482 Illegal axis (mill)
P484 R-pnt ret incomplete (mill)

Details
The milling mode was turned ON during nose R compensation or constant surface speed control.
A T command was issued during the milling mode.
The mode was switched from milling to cutting during tool compensation.
Cylindrical interpolation or polar coordinate interpolation was commanded during the constant surface
speed control mode (G96).
The command unacceptable in the cylindrical interpolation was issued.
A T command was issued during the cylindrical interpolation or polar coordinate interpolation mode.
A movement command was issued when the plane was not selected just before or after the G07.1 com mand.
A plane selection command was issued during the polar coordinate interpolation mode.
Cylindrical interpolation or polar coordinate interpolation was commanded during tool radius compensa tion.
The G16 plane in which the radius value of a cylinder is "0" was specified.
A cylindrical interpolation or polar coordinate interpolation command was issued during coordinate rotation
by program.
Remedy
Correct the program.
Issue G40 or G97 before issuing G12.1.
Issue a T command before issuing G12.1.
Issue G40 before issuing G13.1.
Specify the radius value of a cylinder other than "0", or specify the X axis's current value other than "0"
before issuing G12.1/G16.
Details
The milling command was issued during the mirror image (when parameter or external input is turned ON).
Polar coordinate interpolation, cylindrical interpolation or milling interpolation was commanded during mir ror image for facing tool posts.
The start command of the cylindrical interpolation or polar coordinate interpolation was issued during the
normal line control.
Remedy
Correct the program.
P485 Illegal modal (mill)
P486 Milling error

Details
Mixed control command (G110), Arbitrary axis exchange command (G140), Arbitrary axis exchange return
command (G141) or Base axis configuration restore command (G142) has been given to a part system that is
under any of the following state.
Cylindrical interpolation mode
Polar coordinate interpolation mode
Milling interpolation mode
Constant surface speed control mode
Polygon cut mode
Hob machining mode
Nose R compensation mode
Tool radius compensation mode
During axis name switch
Fixed cycle for drilling
Fixed cycle for lathe turning
Compound-type fixed cycle mode
Special fixed cycle mode
Facing turret mirror image mode
Balance cut mode
Chuck barrier/Tailstock barrier
Stroke check before travel
During Macro modal call (G66.1)
Hypothetical axis interpolation mode
Figure rotation mode
During scaling

Coordinate rotation by parameter mode
Polar coordinate command mode
Normal line control mode
Circular cutting mode
Tool direction tool length compensation mode
Remedy
Correct the program.
Details
Any of the following commands was given to an axis that is under the following conditions: Mixed control com mand, Arbitrary axis exchange command, Arbitrary axis exchange return command or Basic axis configuration return command.
The commanded axis does not exist.
The command caused the maximum number of axes per part system to be exceeded.
The command was given to an axis for which axis exchange is disabled.
Remedy
Correct the program.
Details
Two or more synchronization M codes were commanded in the same block.
The synchronization M code and "!" code were commanded in the same block.
Synchronization with the M code was commanded in 3rd part system or more. (Synchronization with the M code is valid only in 1st part system or 2nd part system.)
Remedy
Correct the program.
Details
The axis designated as the reference or superimposed axis is not available for superimposition.
Remedy
Correct the program.
P501 Cross (G110) impossible
P503 Illegal G110 axis
P511 Synchronization M code error
P520 Control axis superimposition/Designated axis illegal

Details
The axis specified as the reference or synchronized axis of synchronization between part systems cannot be synchronized.
Remedy
Correct the program.
Details
The main axis for the simple synchronous control has been designated as tap axis for synchronous tapping.
Remedy
Correct the program.
Details
G54.2 was commanded when workpiece position offset for rotary axis was OFF.
Remedy
Check the workpiece position offset for rotary axis.
Details
The workpiece installation error compensation function is out of the specifications.
Remedy
Check the specifications.
Details
During workpiece installation error compensation, a command impossible to issue (such as G command) was issued.
Remedy
Check the program. If you wish to issue a command impossible to issue (such as G command) during workpiece installation error compensation, cancel workpiece installation error compensation once.
Details
Workpiece installation error compensation was commanded in a G modal in which commanding it is not allowed.
An illegal G command was issued in the block that has a workpiece installation error compensation com mand.
Remedy
Check the program. Also check the G modals which were issued at commanding the workpiece installation error compensation, and cancel illegal ones.
Issue the G command in a separate block.
Details
A command in which the rotary axis's travel distance exceeds 180 degrees was issued.
Remedy
Divide the travel command so that the rotary axis's travel distance per block is less than 180 degrees.
Details
There is no NURBS interpolation option.
Remedy
Check the specifications.
P521 Illegal synchronization axis
P522 Simple sync ax setting invalid
P540 No spec: G54.2
P544 No spec: Wk instl err cmp
P545 Invld cmd in wk instl err cmp
P546 Wk instl err cmp cmd invalid
P547 Illegal wk instl err cmp cmd
P550 No spec: G06.2(NURBS)

Details
The knot (k) command value is smaller than the value for the previous block.
Remedy
Correct the program.
Specify the knot by monotone increment.

Details
The block end point immediately before the G06.2 command and the G06.2 first block command value do not
match.
Remedy
Match the G06.2 first block coordinate command value with the previous block end point.
Details
Manual interruption was executed in a block that applies the G06.2 mode.
Remedy
Execute the manual interruption in the block that does not apply the G06.2 mode.
Details
Restart was attempted from the block that applies G06.2 mode.
Remedy
Restart from the block other than in G06.2 mode.
Details
A command to enable the fairing function was given while the smooth fairing function was ON.
A command to enable the smooth fairing function was given while the fairing function was ON.
Remedy
Correct the program.
Details
The option "selection of axis (axes) for feedrate command" is invalid.
Remedy
Check the specifications.
Details
The command "selection of axis (axes) for feedrate command" has been issued while the mode that dis ables the command is active.
Remedy
Correct the program.
Details
The command issued is invalid while selection of axis (axes) for feedrate command is ON.
Remedy
Correct the program.
P551 G06.2 knot error
P552 Start point of 1st G06.2 err
P554 Invld manual interrupt in G6.2
P555 Invalid restart during G06.2
P560 Fairing changeover disabled
P580 No spec: Axis selection for F
P581 Axis selection for F invalid
P582 Invalid cmd in F ax selection

Details
No axis or more than 2 axes was/were issued to torque limitation skip command block.
An axis during synchronous control was issued as the skip axis.
An axis during inclined axis control was issued as the skip axis.
Geometric command, corner R, or corner chamfering was issued in the same block as torque limitation
skip command.
A torque skip was commanded to the axis which is in the constant torque control or the proportional torque
stopper control.
Remedy
Issue only an axis to the skip axis.
Review the program.
Details
An automatic tool length measurement command (G37) was issued though it is out of specifications.
Remedy
Check the specifications.
Details
A skip command (G31) was issued though it is out of specifications.
Remedy
Check the specifications.
Details
A multiple skip command (G31.1, G31.2, G31.3 or G31 Pn) was issued though it is out of specifications.
Remedy
Check the specifications.
Details
The skip speed is "0".
Remedy
Specify the skip speed.
Details
No axis was specified in the automatic tool length measurement block. Otherwise, two or more axes were spec ified.
Remedy
Specify only one axis.
Details
The T code is in the same block as the automatic tool length measurement block.
Remedy
Specify the T code before the automatic tool length measurement block.
Details
The T code was not yet specified in automatic tool length measurement.
Remedy
Specify the T code before the automatic tool length measurement block.
P595 Skip axis illegal
P600 No spec: Auto TLM
P601 No spec: Skip
P602 No spec: Multi skip
P603 Skip speed 0
P604 TLM illegal axis
P605 T & TLM command in a block
P606 T cmnd not found before TLM

Details
The measurement position arrival signal turned ON before the area specified by the D command or "#8006 ZONE d". Otherwise, the signal remained OFF to the end.
Remedy
Correct the program.
Details
A skip command was issued during radius compensation processing.
Remedy
Issue a radius compensation cancel (G40) command or remove the skip command.
Details
The parameter setting is not correct.
- G114.1 was commanded while the spindle synchronization was selected with the PLC interface signal.
- G110 was commanded while the mixed control (cross axis control) was selected with the PLC interface signal.
- G125 was commanded while the control axis synchronization between part systems was selected with the PLC interface signal.
- G126 was commanded while the control axis superimposition was selected with the PLC interface signal.
Remedy
Correct the settings of "#1514 expLinax (Exponential function interpolation linear axis)" and "#1515 ex pRotax (Exponential function interpolation rotary axis)".
- Correct the program.
- Correct the parameter settings.
Details
There is no specification for the exponential interpolation.
Remedy
Check the specifications.
Details
A travel command for exponential interpolation was issued during mirror image for facing tool posts.
Remedy
Correct the program.
Details
The identification No. specified in the address B of G122 or G144 is that of the part system where G122 is given.
The identification No. specified in the sub part system control I command (G122) is not set in the parameter #12049 SBS_no.
Remedy
Change the address B of G122 or G144 to be any identification No. other than that of the part system where G122 is given.
Select the identification No. for the sub part system control I command (G122) from among the available Nos.
Specify the identification No. you wish to use for the sub part system control I command (G122) in the pa rameter #12049 SBS_no.
P607 TLM illegal signal
P608 Skip during radius compen
P610 Illegal parameter
P611 No spec: Exponential function
P612 Exponential function error
P650 Sub sys identification # error

Details
G122 or G144 has been given together with any other G code command in a block.
Remedy
Do not command G122 or G144 together with any other G code command in a block.
Details
G122 or G144 has been commanded in any of the following modes.
User macro modal call (G66, G66.1)
Fixed cycle mode
High-speed mode (G5, G5.1)
Remedy
Cancel the following modes before commanding G122 or G144.
User macro modal call (G66, G66.1)
Fixed cycle mode
High-speed mode (G5, G5.1)
Details
High-speed mode command (G5, G5.1) has been given in a sub part system.
Remedy
Do not use the high-speed mode (G5, G5.1) in a sub part system.
Details
Specified the device other than R register/D register.
Specified the odd numbered device when 4 byte is specified.
Specified the device number that is out of the command range.
Specified the data length that is out of the command range.
Specified the bit number that is out of the command range.
Omitted the device number.
Omitted the project number after ",P".
Omitted the data length after ",".
Omitted the bit number after ".".
Remedy
Check the program.
Details
Multiple assignment expressions which include the PLC direct interface command are commanded to the same block.
Remedy
Command the assignment command using PLC direct interface by itself.
Details

Spindle synchronization was commanded to a spindle that is not connected serially.
Remedy
Correct the program.
Correct the parameter settings.
Details
G10.9 was commanded during a modal in which diameter/radius designation selection is not available.
Remedy
Check the program.
P651 Other G code in sub sys block
P652 Illegal mode (sub part system)
P653 Illegal G code (sub part sys)
P656 Illegal PLC device
P657 PLC Device too much
P700 Illegal command value
P705 Dia/Rad selection cmd invalid

Details
A G code impossible to command was issued during switching between diameter and radius using the diame ter/radius designation selection.
Remedy
Check the program.
Details
The following commands were executed while there is no option for Rapid traverse block overlap.
G0.5 command
Reference position return command while "#1443 G28ol" (Enable G28 rapid traverse block overlap) is en abled
G0 command while "#12056 I_G0ol" (Enable G00 initial rapid traverse block overlap) is enabled
Remedy
Check the specification.
Disable the parameter.
Details
G26 (Return to selected point) has been given in a program other than a machining interruption program.
Remedy
Correct the program.
Details
The command order of the selected point is incorrect.
Remedy
Correct the program.
Details
The executed command is unavailable in a machining interruption program.
Remedy
Correct the program.
Details
The command in the retraction program cannot be executed prior to the tap retraction command (G26).
Remedy
Place the command after the tap retraction (G26) block.
Details
The position (end point) given to the drill axis in the tap retraction command (G26) is lower than the R-point
(closer to the hole bottom).
Remedy
Correct the coordinates of the drill axis command.
Details
The issued command is disabled during multiple-axis synchronization control.
Remedy
Cancel the multiple-axis synchronization control before issuing the command.
P706 Invld cmd in dia/rad selection
P709 No Rapid block overlap
P721 No selected point for return
P727 Selected point error
P728 Invalid cmnd in mach interrupt
P729 Invalid cmd before tap retract
P730 Invalid end pt for tap retract
P740 Invalid cmd in multi-axis sync

Details
The issued command cannot be used during the vibration cutting mode.
Remedy
Correct the program.
Details
Vibration cutting mode start command has been given although the command is disabled during the currently
active mode.
Remedy
Correct the program.
Details
Any of the following commands has been given during the G43.7 mode.
Mirror image by G code
Mirror image by parameter setting
Mirror image by external input
Tool length compensation along the tool axis
Automatic tool length measurement
A G43.7 command has been given in any of the following modes.
Mirror image by G code
Mirror image by parameter setting
Mirror image by external input
Fixed cycle for drilling
Remedy

Check the program. If you use the mirror image, tool length compensation along the tool axis, automatic
tool length measurement or fixed cycle for drilling, use a G49 command to cancel the tool position offset.
Details
Any of the following commands has been given during nose R compensation for machining center system.
Mirror image by G code
Mirror image by parameter setting
Mirror image by external input
Nose R compensation for machining center system has been executed in any of the following modes.
Mirror image by G code
Mirror image by parameter setting
Mirror image by external input
Remedy
Check the program. If you use the mirror image, use a G40 command to cancel the nose R compensation
for machining center system.
Details
The commanded G code has disabled the program check.
Remedy
Delete the G code that disables the program check, and then retry the program check.
(Note that deleting the G code may affect the operation of the subsequent blocks.)
Details
A normal line control command (G40.1, G41.1, or G42.1) was issued though it is out of specifications.
Remedy
Check the specifications.
P790 Illegal command in VCC mode
P791 VCC mode command illegal
P801 Turning tool offset disabled
P802 Nose R compensation disabled
P803 Proceed of prog check disabled
P900 No spec: Normal line control

Details
A coordinate system preset command (G92) was issued to a normal line control axis during normal line control.
Remedy
Correct the program.
Details
The normal line control axis was set to a linear axis.
The normal line control axis was set to the linear type rotary axis II axis.
The normal line control axis has not been set.
The normal line control axis is the same as the plane selection axis.
Remedy
Correct the normal line control axis setting.
Details
The plane selection command (G17, G18, or G19) was issued during normal line control.
Remedy
Delete the plane selection command (G17, G18, or G19) from the program of the normal line control.
Details
There is no specification for 3-dimensional coordinate conversion.
Remedy
Check the specifications.
Details
The commanded G code cannot be performed during 3-dimensional coordinate conversion modal.
Remedy
Refer to "Programming Manual" for usable G commands.
When the parameter "#8158 Init const sur spd" is enabled, disable the parameter or issue the constant
surface speed control cancel (G97) command.
Details
A 3-dimensional coordinate conversion command was issued during a modal for which 3-dimensional coordi nate conversion cannot be performed.
Remedy
Refer to "Programming Manual" for usable G commands.
Details
A G code and G68 was commanded in a block though the G code cannot be commanded with G68.
Remedy
Refer to "Programming Manual" for usable G commands.
Details
An incorrect travel command has been given during the 3D coordinate conversion mode.
Remedy
Correct the program.
P901 Normal line control axis G92
P902 Normal line control axis error
P903 Plane chg in Normal line ctrl
P920 No spec: 3D coord conv
P921 Illegal G code at 3D coord
P922 Illegal mode at 3D coord
P923 Illegal addr in 3D coord blk
P924 Travel cmd error in 3Dconvert

Details
The end point of a travel command given during "G68.1 ,E1" is not on the tool path.
Remedy
Correct the program.
Details
There is an error in the 3-dimensional coordinate conversion command.
Check the following:
Not all IJK commands are described in the 3-dimensional coordinate conversion command block.

Remedy
Correct the program.
Details
A tool length compensation along the tool axis command was issued though it is out of specifications.
Remedy
Check the specifications.
Details
There is a G code that cannot be commanded during tool length compensation along the tool axis.
Remedy
Correct the program.
Details
There is an invalid orthogonal axis name or rotary axis name set in the rotary axis configuration parame ters.
There is an invalid setting related to axis configuration in the rotary axis configuration parameters.
Remedy
Set the correct value and reboot.
Details
The function cannot be executed under the axis configuration of the part system.
An unavailable G code was given when "Select specifications of rotation direction parameter" is enabled
(#1450/bit3 = 1), and the left-hand screw direction is selected by the rotation direction parameter (#7923,
#7933, #7943, #7953 = 1).
Remedy
Correct the program.
Check and correct the rotary axis configuration parameters so that the function can be executed in the axis
configuration.
Details
There is no specification for tool tip center control.
Remedy
Check the specifications.
P925 End point err in 3D conversion
P926 3D coordinate cnv format error
P930 No spec: Tool axis compen
P931 Executing tool axis compen
P932 Rot axis parameter error
P934 Invalid axis configuration
P940 No spec: Tool tip control

Details
A tool tip center control command was issued during a modal for which a tool tip center control command can not be issued.
Remedy
Correct the program.
Details
A G code that cannot be commanded was issued during tool tip center control.
Remedy
Correct the program.
Details
In tool tip center control type 1, if the signs at the tool-side rotary axis or table base-side rotary axis start and
finish points differ, a tool base-side rotary axis or table workpiece-side rotary axis rotation exists for the same
block, and does not pass a singular point.
In tool tip center control type 2, the posture vector command is incorrect.
Remedy
Correct the program.
Details
Inclined surface machining option is not supported.
Remedy
Check the specifications.
Details
A forbidden command (G command, etc.) was issued during inclined surface machining.
Remedy
Check the program. If you want to execute a command (G command, etc.) that is unavailable during in clined surface machining, cancel the inclined surface machining.
Details
Inclined surface machining was commanded during the mode where the machining is unavailable.
Inclined surface machining was commanded during interruption.
Remedy
Check the program and see whether any unavailable mode is included during inclined surface machining
command. If any, cancel that mode.
Details
Tool axis direction control was commanded during the mode where the control is unavailable.
Remedy
Check the program and see whether any unavailable mode is included during tool axis direction control. If
any, cancel that mode.
Details
The address to issue the inclined surface machining command is incorrect.
Remedy
Check the program.
P941 Invalid T tip control command
P942 Invalid cmnd during T tip ctrl
P943 Tool posture command illegal
P950 No spec: Tilt face machining
P951 Ill cmd in tilt face machining
P952 Inclined face cut prohibited
P953 Tool axis dir cntrl prohibited
P954 Inclined face command error

Details

Impossible to define an inclined surface with the values you specified.
Remedy
Check the program.
Details
The coordinate system for the machining surface selected with G68.2P10 has not been defined.
Remedy
Set the machining surface so that the coordinate system can be defined.
Details
When the tool axis direction control type 2 (G53.6) was commanded, a tool length compensation No. whose compensation amount is 0 was commanded.
Remedy
Correct the program. Set the tool length compensation amount, or command a tool length compensation No. whose compensation amount is not 0.
Details
The command was issued with an angle with which tool axis direction control of 4-axis configuration is not avail able.
Remedy
Check the feature coordinate system defined in inclined surface machining command.
Details
Simple inclined surface machining is not included in the specifications.
Remedy
Check the specifications.
Details
G05 P4 was commanded while direct command mode option is OFF.
Remedy
Check the specifications.
Details
A G code other than G05 P0 was commanded in direct command mode.
A sequence No. command, F code command, MSTB command or variable command was issued.
A corner chamfering command or corner R command was issued.
A travel command was issued to an axis that had not been command in the G05 P4 block.
Remedy
Check the program.
Details
G05 P4 was commanded in a modal where direct command mode is not available.
Remedy
Check the program.
P955 Inclined face coord illegal
P956 G68.2P10 surface not defined
P957 Tool axis dir ctrl cmp amt 0
P958 Tool axis dir ctrl axis illeg
P959 No spec: Simple inclined face
P960 No spec: Direct command mode
P961 Invalid during dir cmnd mode
P962 Dir cmnd mode cmnd invalid

Details
The commanded coordinate value was beyond the maximum travel distance in direct command mode.
Remedy
Correct the coordinate value in direct command mode.
Details
Combining commands that required pre-reading (nose R offset, corner chamfering/corner rounding, geometric I, geometric IB, and compound type fixed cycle for turning machining) resulted in eight or more pre-read blocks.
Remedy
Delete some or all of the combinations of commands that require pre-reading.
P963 Illegal direct cmnd mode cmnd
P990 PREPRO error

13Smart Safety Observation Alarm (V)
13.1 Smart Safety Observation Error (V01/V02/V03/V04/V05/V06/V07)
Details
Safety function is not carried out in specified cycle.
Remedy
CPU may be faulty. Contact our service center.
Details
Each operation result of redundant CPU is different value.
Remedy
CPU may be faulty. Contact our service center.
Details
An error has occurred in the NCs internal process during execution of a safety function.
The screen displays which safety function has been executed at the time of error, using the following numbers.
0001: Safely-limited speed (SLS)
0002: Safely-limited position (SLP)
0003: Safe speed monitor (SSM)
0004: Safe cam (SCA)
0005: Safe operating stop (SOS)
0006: Safe stop 1 (SS1)
0007: Safe stop 2 (SS2)
0008: Safe torque off (STO)
0009: Safe brake control (SBC)
000A: Diagnostic function
000B: Safety I/O-related observation

Remedy
CPU may be faulty. Contact our service center.
Details
Safety parameter (for internal processing) which is saved in the memory is illegal value.
Remedy
Input Safety parameter file and turn power ON again.
Clear the memory. (All data on the memory will be initialized. Back up the data as needed.)
When the above action does not help restoring, memory may be faulty. Contact our service center.
Details
Safety parameter which is saved in the memory is illegal value.
Remedy
Input Safety parameter file and turn power ON again.
Clear the memory. (All data on the memory will be initialized. Back up the data as needed.)
When the above action does not help restoring, memory may be faulty. Contact our service center.
Details
The initialization process of the safety function at power ON is not completed within specified time.
Remedy
CPU may be faulty. Contact our service center.
V01 Safety watchdog error 0001
V01 Cross-check error 0002
V01 Safe sys internal process err 0003 Function No.
V01 Safe para storage memory err 1 0004
V01 Safe para storage memory err 2 0005
V01 Safety initial process timeout 0006

Details
The initial communication between NC unit and drive unit is incorrect. Displays the name of axis with error.
Remedy
Check if there is no contact failure or no cable fracture after NC/Drive power OFF.
NC unit or drive unit may be faulty. Contact our service center.
Details
The safety I/O initialization process at power-up has not completed within the specified time.
Displays the information of the unit with an error.
bit24-27: Unit No.
(*) The unit No. indicates the unit in which an alarm occurs.
The channel No. and station No. to which the unit is connected can be confirmed by the following parame ters.
Channel No.: #51501 + 10 (Unit No. - 1)
Station No.: #51502 + 10 (Unit No. - 1)
Remedy
Safety I/O unit may be faulty. Exchange the safety I/O unit.
Details
The feedback position received from drive unit is incorrect.
Displays the name of axis with error.
Remedy
Encoder may be faulty. Contact our service center.
Details
The communication between NC unit and drive unit is incorrect.
Displays the name of axis with error.
Remedy
Check if there is no contact failure or no cable fracture after NC/Drive power OFF.
NC unit or drive unit may be faulty. Contact our service center.
Details
[Saved position at power shut OFF] and [restored position at power ON] are inconsistent in SLP/SCA encoder
diagnosis during power OFF.
Displays the name of axis with error.
Remedy
There are two causes of this alarm; one is "the axis being moved during power OFF" and the other is "the in correct restoring of the position at power ON".
When it is likely with the cause "the axis being moved during power OFF", the alarm can be cancelled by
turning ON the Safety reset signal while the Special safety alarm cancel signal is ON.
When it is likely with the cause "the incorrect restoring of the position at power ON", encoder may be faulty.
Contact our service center.
V01 NC-DRV initial safe comm error 0007 Axis name
V01 Safe IO init. process timeout 0008 Unit info
V02 Encoder error 0001 Axis name
V02 NC-DRV safe communication err 0004 Axis name
V02 Excess movement during pwr OFF 0005 Axis name

Details
The data received by the safety I/O unit is incorrect.
Displays the information of the unit with an error.
bit24-27: Unit No.
Safety observation target axes are stopped, and all the DOs of the safety I/O unit concerned are turned OFF.
(*) The unit No. indicates the unit in which an alarm occurs.
The channel No. and station No. to which the unit is connected can be confirmed by the following parame ters.
Channel No.: #51501 + 10 (Unit No. - 1)
Station No.: #51502 + 10 (Unit No. - 1)
Remedy
NC unit or safety I/O unit may be faulty. Exchange the NC unit or safety I/O unit.
Details
The data received by the safety I/O unit is incorrect.
Displays the information of the unit with an error.
bit24-27: Unit No.
Safety observation target axes are stopped, and all the DOs of the safety I/O unit concerned are turned OFF.
(*) The unit No. indicates the unit in which an alarm occurs.

The channel No. and station No. to which the unit is connected can be confirmed by the following parame ters.
Channel No.: #51501 + 10 (Unit No. - 1)
Station No.: #51502 + 10 (Unit No. - 1)
Remedy
NC unit or safety I/O unit may be faulty. Exchange the NC unit or safety I/O unit.
Details
The data received by the safety I/O unit is incorrect.
Displays the information of the unit with an error.
bit24-27: Unit No.
Safety observation target axes are stopped, and all the DOs of the safety I/O unit concerned are turned OFF.
(*) The unit No. indicates the unit in which an alarm occurs.
The channel No. and station No. to which the unit is connected can be confirmed by the following parame ters.
Channel No.: #51501 + 10 (Unit No. - 1)
Station No.: #51502 + 10 (Unit No. - 1)
Remedy
NC unit or safety I/O unit may be faulty. Exchange the NC unit or safety I/O unit.
V03 Slave station comm. error 1 0001 Unit info
V03 Slave station comm. error 2 0002 Unit info
V03 Slave station comm. error 3 0003 Unit info
M800/M80/E80 Series Alarm/Parameter Manual
13 Smart Safety Observation Alarm (V)
175 IB-1501279-S
Details
The data received by the safety I/O unit is inconsistent.
Displays the information of the unit with an error.
bit24-27: Unit No.
Safety observation target axes are stopped, and all the DOs of the safety I/O unit concerned are turned OFF.
(*) The unit No. indicates the unit in which an alarm occurs.
The channel No. and station No. to which the unit is connected can be confirmed by the following parame ters.
Channel No.: #51501 + 10 (Unit No. - 1)
Station No.: #51502 + 10 (Unit No. - 1)
Remedy
Check the user safety sequence circuit to see if the output signal control circuit is correct.
Data corruption may have been caused due to noise. Take anti-noise measures on the connection be tween the NC unit and safety I/O unit.
NC unit or safety I/O unit may be faulty. Exchange the NC unit or safety I/O unit.
Details
Output signal of the safety I/O unit fails to be OFF.
Displays the information of the unit with an error.
bit24-27: Unit No.
bit0-15: Signal BIT
Safety observation target axes are stopped.
(*) The unit No. indicates the unit in which an alarm occurs.
The channel No. and station No. to which the unit is connected can be confirmed by the following parame ters.
Channel No.: #51501 + 10 (Unit No. - 1)
Station No.: #51502 + 10 (Unit No. - 1)
Remedy
NC unit or safety I/O unit may be faulty. Exchange the NC unit or safety I/O unit.
Details
Loop-back signals of the outputs from the safety I/O unit are inconsistent between PLC1 and PLC2.
Displays the information of the unit with an error.
bit24-27: Unit No.
bit0-15: Signal BIT
Safety observation target axes are stopped.
(*) The unit No. indicates the unit in which an alarm occurs.
The channel No. and station No. to which the unit is connected can be confirmed by the following parame ters.
Channel No.: #51501 + 10 (Unit No. - 1)
Station No.: #51502 + 10 (Unit No. - 1)
Remedy
Check the user safety sequence circuit to see if the output signal control circuit is correct.
NC unit or safety I/O unit may be faulty. Exchange the NC unit or safety I/O unit.
V03 Slave station data compare err 0004 Unit info
V03 Output OFF check error 0005 Unit info
V03 Output signal cross-check err 0006 Unit info
M800/M80/E80 Series Alarm/Parameter Manual
13 Smart Safety Observation Alarm (V)
IB-1501279-S 176
Details
Output signals are inconsistent between the user safety sequence and safety I/O unit.
Displays the information of the unit with an error.
bit24-27: Unit No.
bit0-15: Signal BIT
Safety observation target axes are stopped.
(*) The unit No. indicates the unit in which an alarm occurs.
The channel No. and station No. to which the unit is connected can be confirmed by the following parame ters.
Channel No.: #51501 + 10 (Unit No. - 1)
Station No.: #51502 + 10 (Unit No. - 1)
Remedy
Check the user safety sequence circuit to see if the output signal control circuit is correct.
NC unit or safety I/O unit may be faulty. Exchange the NC unit or safety I/O unit.
Details
Input signals from the safety I/O unit are inconsistent between PLC1 and PLC2.
Displays the information of the unit with an error.
bit24-27: Unit No.
bit0-15: Signal BIT
Safety observation target axes are stopped.
(*) The unit No. indicates the unit in which an alarm occurs.
The channel No. and station No. to which the unit is connected can be confirmed by the following parame ters.
Channel No.: #51501 + 10 (Unit No. - 1)

Station No.: #51502 + 10 (Unit No. - 1)
Remedy
Any input device (emergency stop button, for example) connected to the safety I/O unit may be faulty.
Check the input devices.
NC unit or safety I/O unit may be faulty. Exchange the NC unit or safety I/O unit.
Details
The data received from the safety I/O unit is incorrect.
Displays the information of the unit with an error.
bit24-27: Unit No.
Safety observation target axes are stopped.
(*) The unit No. indicates the unit in which an alarm occurs.
The channel No. and station No. to which the unit is connected can be confirmed by the following parame ters.
Channel No.: #51501 + 10 (Unit No. - 1)
Station No.: #51502 + 10 (Unit No. - 1)
Remedy
Data corruption may have been caused due to noise. Take anti-noise measures on the connection be tween the NC unit and safety I/O unit.
NC unit or safety I/O unit may be faulty. Exchange the NC unit or safety I/O unit.
V03 Transmission cross-check error 0007 Unit info
V03 Reception cross-check error 0008 Unit info
V03 Host station comm. error 1 0009 Unit info

Details
The data received from the safety I/O unit is incorrect.
Displays the information of the unit with an error.
bit24-27: Unit No.
Safety observation target axes are stopped.
(*) The unit No. indicates the unit in which an alarm occurs.
The channel No. and station No. to which the unit is connected can be confirmed by the following parame ters.
Channel No.: #51501 + 10 (Unit No. - 1)
Station No.: #51502 + 10 (Unit No. - 1)
Remedy
NC unit or safety I/O unit may be faulty. Exchange the NC unit or safety I/O unit.
Details
The data received from the safety I/O unit is incorrect.
Displays the information of the unit with an error.
bit24-27: Unit No.
Safety observation target axes are stopped.
(*) The unit No. indicates the unit in which an alarm occurs.
The channel No. and station No. to which the unit is connected can be confirmed by the following parame ters.
Channel No.: #51501 + 10 (Unit No. - 1)
Station No.: #51502 + 10 (Unit No. - 1)
Remedy
The cable connecting between the NC unit and safety I/O unit may be disconnected or loosened. Check
the cable.
NC unit or safety I/O unit may be faulty. Exchange the NC unit or safety I/O unit.
Details
The input signals from the drives safety function are inconsistent.
The screen displays the No. of device ZR with an error.
Safety observation target axes are stopped.
Remedy
NC unit may be faulty. Exchange the NC unit.
Details
An error has occurred in User safety sequence 1.
The screen displays the error cause by the number.
Safety observation target axes are stopped.
User safety sequences 1 and 2 are both stopped.
All the DOs of the connected safety I/O unit are turned OFF.
Remedy
Refer to the list of user safety sequence error details in Smart safety observation Specification manual.
Cancel the error based on the displayed error cause, and then turn OFF and ON the NC power.
Details
An error has occurred in User safety sequence 2. The screen displays the error cause.
Safety observation target axes are stopped.
User safety sequences 1 and 2 are both stopped.
All the DOs of the connected safety I/O unit are turned OFF.
Remedy
Refer to the list of user safety sequence error details in Smart safety observation Specification manual.
Cancel the error based on the displayed error cause, and then turn OFF and ON the NC power.
V03 Host station comm. error 2 0010 Unit info
V03 Host station comm. error 3 0011 Unit info
V03 Drv safe receive crosscheck er 0012 ZR device No.
V03 User safety sequence 1 error 0013 Error cause number
V03 User safety sequence 2 error 0014 Error cause number

Details
The signals output to the safety I/O unit are unmatched between PLC1 and PLC2.
Displays the information of the unit with an error.
bit24-27: Unit No.
bit0-15: Signal BIT
The axes covered by safety function come to a standstill.
(*) The unit No. indicates the unit in which an alarm occurs.
The channel No. and station No. to which the unit is connected can be confirmed by the following parame ters.
Channel No.: #51501 + 10 (Unit No. - 1)
Station No.: #51502 + 10 (Unit No. - 1)

Remedy
Check the user safety sequence to make sure the output signal control circuit is correct.
Set tolerable time more than 300ms, when an output signal is controlled with 100ms timer.
NC unit may be faulty. Replace the NC unit.
Details
The system has both an axis for which Safety observation is enabled (the parameter "#2313 SV113(SSF8)/bitF" or "#13229 SP229(SFNC9)/bitF" is "1") and an axis for which Smart safety observation is enabled (the parameter "#51101 SF_Disable" or "#51301 SF_SDisable" is "0").
Remedy
Disable Safety observation for all the axes (Set the parameters "#2313 SV113(SSF8)/bitF" and "#13229 SP229(SFNC9)/bitF" to "0"), and turn ON the NC reset signal.
Disable Smart safety observation for all the axes (Set the parameters "#51101 SF_Disable" and "#51301 SF_SDisable" to "1"), and turn the power OFF and ON.
Details
A safety I/O unit has been connected with the smart safety observation option OFF or with the parameters "#51101 SF_Disable" and "#51301 SF_SDisable" set to "1" for all the axes.The screen displays the channel to which the safety I/O unit is connected by the bit number.
bit0: Operation panel
bit1: RIO 1CH
bit2: RIO 2CH
bit3: RIO 3CH
Remedy
Disconnect the safety I/O unit, and then turn OFF and ON the power.
If you wish to use Smart safety observation, implement the following and then turn the power OFF and ON.
- Enable the option.
- Turn "0" the axis parameter of Smart safety observation ("#51101 SF_Disable" / "#51301 SF_SDisable").
V03 Output sig. cross check error 0015 Unit info
V04 Safety observation & Smart both ON 0001
V04 Safety IO device unconnectable 0002 Safety I/O unit-connect ed channel

Details
A safety I/O unit has been connected to the I/O connection channel where RIO1.0 unit is connected.
The screen displays the I/O connection channel to which the safety I/O unit is connected using a bit number.
bit0: Operation panel
bit1: RIO 1CH
bit2: RIO 2CH
bit3: RIO 3CH
Remedy
For the I/O connection channel where the safety signal input/output is conducted, no devices other than RIO2.0 unit or safety I/O unit can be connected.
If you are unable to change the I/O device configuration immediately, set the parameters "#51101 SF_Dis able" and "#51301 SF_SDisable" to "1" for all the axes, and turn OFF and ON the power. This prevents occurrence of this alarm.
Details
None of the I/O connection channels is connected to a safety I/O unit.
Remedy
Connect a safety I/O unit to the I/O connection channel through which the safety signals are input/output.
If you are unable to change the I/O device configuration immediately, set the parameters "#51101 SF_Dis able" and "#51301 SF_SDisable" to "1" for all the axes, and turn OFF and ON the power. This prevents occurrence of this alarm.
Details
Safety PLC has not been written.
Remedy
Write safety PLC and turn the power OFF and ON.
If safety PLC is not ready, set the parameters "#51101 SF_Disable" and "#51301 SF_SDisable" to "1" for all the axes, and then turn the power OFF and ON. This prevents occurrence of this alarm.
Details
The optical channel connected to an axis for which the parameter "#51101 SF_Disable" or "#51301 SF_SDis able" is set to "0" is configured with any drive unit other than MDS-E Series. (MDS-D Series drive unit is con nected to the said channel.)
The screen displays the No. of optical communication channel of this error.
Remedy
Do not connect any drive unit other than MDS-E Series to the optical channel of the axis for which the pa rameter "#51101 SF_Disable" or "#51301 SF_SDisable" is set to "0".
If an MDS-E Series drive unit is not ready, set the parameters "#51101 SF_Disable" / "#51301 SF_SDis able" to "1" for all the axes of the said channel, and then turn OFF and ON the power.
This prevents occurrence of this alarm.
V04 Safe IO disabled: connect err 0003 Safety I/O unit-connect ed channel
V04 Safe IO disabled: no safe I/Os 0004
V04 Safety PLC is not yet written 0005
V04 NC-DRV safety comm. Disabled 0006 Optical channel No.

Details
The channel No. or station No. of the emergency stop signal device (set by parameters) does not coincide with any contact point (channel/station No. specified by the safety I/O assignment parameters RIO CH No and RIO Station No.) of the safety I/O unit. The screen displays the index No. of the incorrectly set emergency stop sig nal device.
0001: EMG_Dev1_ch to EMG_Dev1_bit
0002: EMG_Dev2_ch to EMG_Dev2_bit
Remedy
Change the channel, station or bit No. of emergency stop signal device to be one of the contact points of the safety I/O unit. And then turn OFF and ON the power.
When you change the setting of emergency stop signal device channel No. (EMG_Dev1_ch / EMG_Dev2_ch) to 0, and turn OFF and ON the power, the designation of emergency stop signal device is disabled, so this alarm is cleared.
Details
Safety I/O device assignment parameter is incorrect.
The safety I/O device assignment parameter of the connected safety I/O unit is not set.
The safety I/O device assignment parameter is set for any disconnected safety I/O unit.
The set channel No. or station No. is overlapped.

Remedy
Make sure which safety I/O unit is connected, set the safety I/O device assignment parameters, and then turn OFF and ON the power.
Details
During SLS observation, the command/FB speed has exceeded the safely-limited speed(*) and has not dropped below the speed limit within the SLS detection delay time (set by parameter).
The screen displays the name of axis of this error.
(*)Safely-limited speed = SLS speed tolerance x SLS speed override / 100
Remedy
This error can be cancelled by the safety reset signal while motor speed is under SLS limit.
If the SLS speed tolerance or SLS speed override (set by parameter) is lower than the assumption, change the parameter setting and turn OFF and ON the power.
If the SLS detection delay time (set by parameter) is shorter than the assumption, change the parameter setting.
Check the safety ladder to make sure that SLS speed tolerance and SLS speed override are changed in a timely manner.
Details
The command/FB speed has failed to decelerate to the safely-limited speed(*) or lower within a period of SLS deceleration observation time (set by parameter) after start of SLS observation.
The screen displays the name of axis of this error.
(*)Safely-limited speed = SLS speed tolerance x SLS speed override / 100
Remedy
This error can be cancelled by the safety reset signal while motor speed is under SLS limit.
If the SLS speed tolerance or SLS speed override (set by parameter) is lower than the assumption, change the parameter setting and turn OFF and ON the power.
If the SLS deceleration observation time (set by parameter) is shorter than the assumption, change the parameter setting.
V04 EMG stop signal device illegal 0007 Emergency stop device index No.
V04 Safe IO assign para setting er 0009 Channel No.
V05 SLS speed error 0001 Axis name
V05 SLS deceleration error 0002 Axis name

Details
The command position/FB position has gone out of the SLP position tolerance range (set by parameter) during the SLP observation, and failed to return to the tolerance range within the SLP detection delay time (set by parameter).
The screen displays the name of axis of this error.
Remedy
This error can be cancelled by the safety reset signal while the axis is in the SLP position range.
If the axis is out of the SLP position range, deactivate SLP observation, cancel this error using the safety reset signal, and then move the axis to a safe position in a manual mode.
If the safely-limited position range (specified by the SLP position tolerance parameters) is smaller than the assumption, change the parameter settings and turn OFF and ON the power.
If the SLP detection delay time (set by parameter) is shorter than the assumption, change the parameter setting.
Check the safety ladder to make sure that SLP position tolerance is changed in a timely manner.
Details
The command/FB speed, which had exceeded the SOS stop speed (set by parameter) during SOS, has failed to drop to the SOS stop speed or lower within the SOS_V detection delay time (set by parameter).
The screen displays the name of axis of this error.
*If the conditions of two or more SOS-related alarms are met at a time, the notification priority order is as fol lows: SOS position deviation error > SOS travel distance error > SOS speed error.
Remedy
This error can be cancelled by the safety reset signal while In SOS stop is ON.
If In SOS stop is OFF, deactivate SOS, cancel this error using the safety reset signal, and then move the axis to a safe position in a manual mode.
If the parameter of SOS stop speed is lower than the assumption, change the setting and turn OFF and ON the power.
If the SOS_V detection delay time (set by parameter) is shorter than the assumption, change the param eter setting.
Details
The position deviation (difference between the command and FB positions), which had exceeded the SOS po sition deviation tolerance (set by parameter) during SOS, has failed to reduce to the SOS position deviation tolerance or smaller within the SOS_PD detection delay time (set by parameter).
The screen displays the name of axis of this error.
*If the conditions of two or more SOS-related alarms are met at a time, the notification priority order is as fol lows: SOS position deviation error > SOS travel distance error > SOS speed error.
Remedy
Refer to the corrective actions of "SOS speed error" for how to cancel this error.
If the SOS position deviation tolerance (set by parameter) is smaller than the assumption, change the set ting and turn OFF and ON the power.
If the SOS_PD detection delay time (set by parameter) is shorter than the assumption, change the param eter setting.
V05 SLP position error 0003 Axis name
V05 SOS speed error 0004 Axis name
V05 SOS position deviation error 0005 Axis name

Details
The command/FB travel distance, which had exceeded the SOS travel distance tolerance (+/-) (set by param eter) during SOS, has failed to reduce to the SOS travel distance tolerance (+/-) or smaller within the SOS_P detection delay time (set by parameter).
The screen displays the name of axis of this error.
*If the conditions of two or more SOS-related alarms are met at a time, the notification priority order is as fol lows: SOS position deviation error > SOS travel distance error > SOS speed error.
Remedy
Refer to the corrective actions of "SOS speed error" for how to cancel this error.
If the SOS travel distance tolerance (+/-) (set by parameter) is smaller than the assumption, change the setting and turn OFF and ON the power.
If the SOS_P detection delay time (set by parameter) is shorter than the assumption, change the param eter setting.
Details
The SS1 deceleration observation time (set by parameter) has elapsed with the command/FB speed exceeding

the SOS stop speed (set by parameter) since the start of SS1.
The screen displays the name of axis of this error.
Remedy
This error can be cancelled by the safety reset signal while In SS1 stop is ON.
If the SS1 deceleration observation time (set by parameter) is shorter than the assumption, change the
parameter setting.
Details
The command/FB speed has been exceeding the SOS stop speed (set by parameter) for a period of SS2 de celeration observation time (set by parameter) since the start of SS2.
The screen displays the name of axis of this error.
Remedy
Deactivate SS2, cancel this error using the safety reset signal, and then move the axis to a safe position
in a manual mode.
If the SS2 deceleration observation time (set by parameter) is shorter than the assumption, change the
parameter setting.
Details
Emergency stop signal is OFF (open status), although Safety external emergency stop is enabled.
Remedy
Ensure the safety of the machine, and then turn the emergency stop signal ON (close status).
Details
The drive unit's internal safety circuit has caused abnormal operation.
The error number corresponding to the contents of abnormal operation appears.
Remedy
Drive unit may be damaged. Replace the drive unit.
V05 SOS travel distance error 0006 Axis name
V05 SS1 deceleration error 0007 Axis name
V05 SS2 deceleration error 0008 Axis name
V06 Safety external EMG stop is ON 0001
V07 DRV safe circuit error Error No. Axis name

13.2 Smart Safety Observation Warning (V50/V51/V52/V53/V54)
Details
The SSM hysteresis width (set by parameter) is greater than the SSM speed (set by parameter).
The screen displays the name of axis of this error.
Remedy
Change the SSM hysteresis width parameter to be a smaller value than the SSM speed.
Details
After enabling SLP/SCA (Parameter SLP_Enable/SCA_Enable is 1), the Safety absolute position has nev er been established.
In SLP/SCA encoder diagnosis during power OFF, [saved position at power shut OFF] and [restored po sition at power ON] are inconsistent.
While this alarm is ON, SLP/SCA will not operate. Displays the name of axis of this error.
Remedy
This alarm can be cancelled by turning ON the Safety absolute position check signal. Before turning ON
the Safety absolute position check signal, however, move the axis by manual operation to the position
where the coordinate value is clear (the position that is marked or the reference position etc.) (When in the
relative position detection system, it requires to operate reference position return to establish the reference
position.) then compare the actual position and the displayed position to confirm the both position is corre sponding.
Details
When turning ON the SBT start signal (SBTSTEXm / SBTSTMOm), the test start condition are not met.
Displays the factor why the brake test start is impossible
* When there are multiple factors, the smaller item is shown.
0001: part systems in automatic operation
0002: not in in-position
0003: in servo OFF state.
0004: in current limit
0005: the secondary axis in the synchronous control
0006: in superimposition control
0007: in arbitrary axis exchange control
0008: in mixed control
0009: Parameter for SBT error
000A: reference position establishment incomplete
000B: applies exclusive control of SBT
000C: the secondary axis SBT disabled
000D: the secondary axis SBT start disabled
000E: the secondary axis in single method
Remedy
Check the start-enabled condition of the brake test. Eliminate the cause of the alarm, then enable the SBT
start signal to start the brake test.
Details
The axis movement amount exceeded the tolerable value in external brake test pattern 1.
Displays the name of axis with the error.
Remedy
Move the axis to safe position by manual operation. Take corrective action to the brake after the power
OFF. Then turn power ON and carry out the brake test again. This alarm will be cancelled when the test
completes normally.
This alarm can be cancelled with the safety reset signal. The external brake SBT incomplete signal (SBT NFEXm), however, remains ON.
V50 SSM hysteresis setting error 0001 Axis name
V50 Safe absol. posn unestablished 0002 Axis name
V51 SBT start disabled 0001 Factor No.
V51 SBT warning 1 0002 Axis name

Details
The axis movement amount exceeded the tolerable value in the test pattern 1 of motor brake test.
Displays the name of axis with the error.
Remedy
Move the axis to safe position by manual operation. Take corrective action to the brake after the power

OFF. Then turn power ON and carry out the brake test again. This alarm will be cancelled when the test
completes normally.
This alarm can be cancelled with the safety reset signal. The external brake SBT incomplete signal (SBT NFEXm), however, remains ON.
When this alarm is cancelled with the safety reset signal, however, the motor brake SBT incomplete signal
(SBTNFMOm) remains ON.
Details
The axis movement amount exceeded the tolerable value in the test pattern 2 of motor brake test.
Displays the name of axis with the error.
Remedy
Move the axis to safe position by manual operation. Take corrective action to the brake after the power
OFF. Then turn power ON and carry out the brake test again. This alarm will be cancelled when the test
completes normally.
This alarm can be cancelled with the safety reset signal. The external brake SBT incomplete signal (SBT NFEXm), however, remains ON.
When this alarm is cancelled with the safety reset signal, however, the motor brake SBT incomplete signal
(SBTNFMOm) remains ON.
Details
The axis movement amount exceeded the tolerable value in the test pattern 3 of motor brake test.
Displays the name of axis with the error.
Remedy
Move the axis to safe position by manual operation. Take corrective action to the brake after the power
OFF. Then turn power ON and carry out the brake test again. This alarm will be cancelled when the test
completes normally.
This alarm can be cancelled with the safety reset signal. The external brake SBT incomplete signal (SBT NFEXm), however, remains ON.
When this alarm is cancelled with the safety reset signal, however, the motor brake SBT incomplete signal
(SBTNFMOm) remains ON.
Details
A PLC input signal "Safe stop 1 request" or "Safe torque off request" is OFF (normal close).
The screen displays the name of axis for which the said signal is OFF.
Remedy
Ensure the safety of the machine, and then turn ON either Safe stop 1 request signal or Safe torque off
request signal.
V51 SBT warning 4 0005 Axis name
V51 SBT warning 5 0006 Axis name
V51 SBT warning 6 0007 Axis name
V52 PLC safety stop is active 0001 Axis name

Details
Output signal of the safety I/O unit has been kept ON for 24 hours or longer.
Displays the information of the unit which is subject to the warning.
bit24-27: Unit No.
bit0-15: Signal BIT
(*) The unit No. indicates the unit in which an alarm occurs.
The channel No. and station No. to which the unit is connected can be confirmed by the following parame ters.
Channel No.: #51501 + 10 (Unit No. - 1)
Station No.: #51502 + 10 (Unit No. - 1)
Remedy
Turn OFF the output signal concerned through the user safety sequence, or use the output OFF check
function to make sure that the output signal turns OFF.
Details
Smart safety observation target axis (the parameters "#51101 SF_Disable" = 0 / "#51301 SF_SDisable" =
0) is defined as a hypothetical axis (the parameter "#51015 safe_drv_test" = 1). In this case some alarms
fail to occur, thus avoid this setting while a drive unit is being connected.
NC system is set to a simulation mode (the parameter "#1168 test" = 1). During this mode some alarms
fail to occur, thus do not use this mode while a safety I/O unit is connected.
Remedy
Connect MDS-E Series drive to all the axes subject to safety observation, set the parameter ("#51015
safe_drv_test" = 0) and then turn OFF and ON the power.
Connect a safety I/O unit, set the parameter ("#1168 test" = 0) and then turn OFF and ON the power.
V53 Warning on 24Hr continuous ON 0001 Unit info
V54 Simple test mode is active 0001

Parameter

14
189 IB-1501279-S
User Parameters

14User Parameters
The parameters with "(PR)" requires the CNC to be turned OFF after the settings. Turn the power OFF and ON to
enable the parameter settings.
14.1 Machining Parameters
Set the names of the basic axes that compose the plane.
Set the axis name set in "#1013 axname".
If all three items ("base_I", "base_J" and "base_K") do not need to be set, such as for 2-axis specifications,
input "0", and the parameter will be blank.
Normally, when X, Y and Z are specified respectively for base_I, _J, _K, the following relation will be estab lished:
G17: X-Y
G18: Z-X
G19: Y-Z
Or specify any other axis name desired.

---Setting range---
Axis names such as X, Y or Z
Set the names of the basic axes that compose the plane.
Set the axis name set in "#1013 axname".
If all three items ("base_I", "base_J" and "base_K") do not need to be set, such as for 2-axis specifications,
input "0", and the parameter will be blank.
Normally, when X, Y and Z are specified respectively for base_I, _J, _K, the following relation will be estab lished:
G17: X-Y
G18: Z-X
G19: Y-Z
Or specify any other axis name desired.
---Setting range---
Axis names such as X, Y or Z
Set the names of the basic axes that compose the plane.
Set the axis name set in "#1013 axname".
If all three items ("base_I", "base_J" and "base_K") do not need to be set, such as for 2-axis specifications,
input "0", and the parameter will be blank.
Normally, when X, Y and Z are specified respectively for base_I, _J, _K, the following relation will be estab lished:
G17: X-Y
G18: Z-X
G19: Y-Z
Or specify any other axis name desired.
---Setting range---
Axis names such as X, Y or Z
Set the axis name when there is an axis parallel to "#1026 base_I".
---Setting range---
Axis names such as X, Y or Z
#1026 base_I Base axis I
#1027 base_J Base axis J
#1028 base_K Base axis K
#1029 aux_I Flat axis I

Set the axis name when there is an axis parallel to "#1027 base_J".
---Setting range---
Axis names such as X, Y or Z
Set the axis name when there is an axis parallel to "#1028 base_K".
---Setting range---
Axis names such as X, Y or Z
Set the tolerable error range when the end point deviates from the center coordinate in the circular command.
---Setting range---
0 to 1.000 (mm)
Set the tap return override value for the synchronous tapping.
When "0" is set, it will be regarded as 100%.
---Setting range---
0 to 100 (%)
Set the feedrate for the F command in the F 1-digit command ("#1079 F1digit" is set to "1").
Feedrate when F1 is issued (mm/min).
When "#1246 set08/bit6" is set to "1" and F 1-digit feed is commanded, the feedrate can be increased/de creased by operating the manual handle.
---Setting range---
0 to 1000000 (mm/min)
Set the feedrate for the F command in the F 1-digit command ("#1079 F1digit" is set to "1").
Feedrate when F2 is issued (mm/min).
When "#1246 set08/bit6" is set to "1" and F 1-digit feed is commanded, the feedrate can be increased/de creased by operating the manual handle.
---Setting range---
0 to 1000000 (mm/min)
Set the feedrate for the F command in the F 1-digit command ("#1079 F1digit" is set to "1").
Feedrate when F3 is issued (mm/min).
When "#1246 set08/bit6" is set to "1" and F 1-digit feed is commanded, the feedrate can be increased/de creased by operating the manual handle.
---Setting range---
0 to 1000000 (mm/min)
Set the feedrate for the F command in the F 1-digit command ("#1079 F1digit" is set to "1").
Feedrate when F4 is issued (mm/min).
When "#1246 set08/bit6" is set to "1" and F 1-digit feed is commanded, the feedrate can be increased/de creased by operating the manual handle.
---Setting range---
0 to 1000000 (mm/min)
#1030 aux_J Flat axis J
#1031 aux_K Flat axis K
#1084 RadErr Arc error
#1171 taprov Tap return override
#1185 spd_F1 F1 digit feedrate F1
#1186 spd_F2 F1 digit feedrate F2
#1187 spd_F3 F1 digit feedrate F3
#1188 spd_F4 F1 digit feedrate F4

Set the feedrate for the F command in the F 1-digit command ("#1079 F1digit" is set to "1").
Feedrate when F5 is issued (mm/min).
When "#1246 set08/bit6" is set to "1" and F 1-digit feed is commanded, the feedrate can be increased/de creased by operating the manual handle.
---Setting range---
0 to 1000000 (mm/min)
Set the maximum value up to which the F 1-digit feedrate can be changed.
---Setting range---
0 to 1000000 (mm/min)
Set the constant that determines the speed change rate per manual handle graduation in F 1-digit feedrate
change mode.

---Setting range---
0 to 32767
Set the M code for counting the number of the workpiece repeated machining.
The number of the M-codes set by this parameter is counted.
The No. will not be counted when set to "0".
---Setting range---
0 to 999
Set the initial value of the number of workpiece machining. The number of current workpiece machining is displayed.
---Setting range---
0 to 999999
Set the maximum number of workpiece machining.
A signal will be output to PLC when the number of machining times is counted to this limit.
---Setting range---
0 to 999999
Set the feedrate during automatic tool length measurement.
---Setting range---
1 to 1000000 (mm/min)
Set the distance between the measurement point and deceleration start point.
---Setting range---
0 to 99999.999 (mm)
Set the tolerable range of the measurement point.
An alarm will occur when the sensor signal turns ON before the range, set by this parameter, has not been reached from the measurement point, or when the signal does not turn ON after the range is passed.
---Setting range---
0 to 99999.999 (mm)
#1189 spd_F5 F1 digit feedrate F5
#1506 F1_FM Upper limit of F 1-digit feedrate
#1507 F1_K F 1-digit feedrate change constant
#8001 WRK COUNT M
#8002 WRK COUNT
#8003 WRK COUNT LIMIT
#8004 SPEED
#8005 ZONE r
#8006 ZONE d

Set the override value for automatic corner override.
---Setting range---
0 to 100 (%)
Set the maximum corner opening angle where deceleration should start automatically.
When the angle is larger than this value, deceleration will not start.
---Setting range---
0 to 180 ()
Set the position where deceleration starts at the corner.
Designate at which length point before the corner deceleration should start.
---Setting range---
0 to 99999.999 (mm)
Set the maximum value when inputting the tool compensation amount.
A value exceeding this setting value cannot be set.
Absolute value of the input value is set.
(If a negative value is input, it is treated and set as a positive value.)
When "0" is set, this parameter is disabled.
---Setting range---
0 to 9999.999 (mm)
(Input setting increment applies)
Set the maximum value for when inputting the tool compensation amount in the incremental mode.
A value exceeding this setting value cannot be set.
Absolute value of the input value is set.
(If a negative value is input, it is treated and set as a positive value.)
When "0" is set, this parameter is disabled.
---Setting range---
0 to 9999.999 (mm)
(Input setting increment applies)
Path recognition range
Specify the range to recognize the tool paths adjoining to the command position when the smooth fairing function is ON.
If "0" is set, the range will be 1.000 (mm).
---Setting range---
0 to 100.000 (mm)
Compensation distance tolerance
Specify the upper limit of the distance between the command position and compensation position when the smooth fairing function is ON.
If you specify a negative value, operation is conducted with no tolerance limit.
If "0" is set, the tolerance will be 0.005 (mm).
---Setting range---
-1.000 to 100.000 (mm)
#8007 OVERRIDE
#8008 MAX ANGLE
#8009 DSC. ZONE
#8010 ABS. MAX.
#8011 INC. MAX.
#8038 Path recog. range
#8039 Comp. range limit

Set the length from the center of the normal line control axis to the tool tip. This is used to calculate the turning speed at the block joint.
This is enabled during the normal line control type II.
---Setting range---
0.000 to 99999.999 (mm)
Set the radius of the arc to be automatically inserted into the corner during normal line control.
This is enabled during the normal line control type I.
---Setting range---
0.000 to 99999.999 (mm)
Set the length from the tool holder to the tool tip.
---Setting range---
0.000 to 99999.999 (mm)
Set the command increment scale.
The scale will be "1" when "0" is set.
---Setting range---
0 to 10000 (fold)
0: One fold
Select whether to enable the variable speed thread cutting function.
0: Disable
1: Enable
Set the minimum cutting amount for compound type thread cutting cycle (G76).
The value set in this parameter will be applied when the cutting amount in compound thread cutting cycle (G76) without Q command is smaller than that in this parameter.
This parameter is valid only when "#1222 aux06/bit4" is set to "1".
---Setting range---
0.000 to 99999.999 (mm)
Not used. Set to "0.000".
1: If a zero-travel distance block is given during turning cycle mode (G90, G92 or G94), the turning cycle is executed again.
0: If a zero-travel distance block is given during turning cycle mode (G90, G92 or G94), the turning cycle is not executed.
Set the value of the denominator constants for 3-dimensional tool radius compensation.
Set the value of "p" in the following formula.
Vx = i x r/p, Vy = j x r/p, Vz = k x r/p
Vx, Vy, Vz: X, Y, and Z axes or vectors of horizontal axes
i, j, k: Program command value
r: Offset
p =(i2 + j2 + k2) when the set value is "0".
---Setting range---
0 to 99999.999
#8041 C-rot.R
#8042 C-ins.R
#8043 Tool HDL FD OFS
#8044 UNIT*10
#8045 Varying spd thread
#8061 G76 THICK
#8069 G76G78in-posn wdt.
#8070 Turning cycle mode
#8071 3-D CMP (for M system only)

Set the scale factor for reduction or magnification in the machining program specified by G50 or G51 com mand.
This parameter will be valid when the program specifies no scale factor.
---Setting range---
-99.999999 to 99.999999
Set the tolerable error range (absolute value) when the end point position, commanded by the spiral or con ical interpolation command with the command format type 2, differs from the end point position obtained from the speed and increment/decrement amount.
---Setting range---
0 to 99999.999 (mm)
Set the tolerable error between the involute curve through the start point and the involute curve through the end point.
---Setting range---
0.000 to 99999.999 (mm)
Set the period of time before turn-OFF of the display unit backlight.
When "0" is set, the backlight is not turned OFF.
It is possible to turn OFF the backlight of the monitor screen as well by using the [SHIFT] + [C.B] keys, unless its window is displayed.
---Setting range---
1 to 60 (min)
0: The backlight is not turned OFF
Set the rotation angle when the coordinate rotation by program is commanded.
This parameter is enabled when "1" is set in "#1270 ext06/bit5" (Coordinate rotation angle without com mand).
This parameter is set as absolute command regardless of the "#8082 G68.1 R INC" setting. If the rotation angle is designated by an address R in G68.1 command, the designation by program will be applied.
---Setting range---
-360.000 to +360.000 ()
Select absolute command or incremental command to use for the rotation angle command R at L-system coordinate rotation.
0: Use absolute command in G90 modal, incremental command in G91 modal
1: Always use incremental command
(Note) If G91 does not exist in the G code system, the command type is decided by this parameter only.
Set the plane (horizontal axis) for coordinate rotation control.
Usually, set the name of the 1st axis.
When this parameter is not set, the coordinate rotation function will not work.
---Setting range---
Axis name
Set the plane (vertical axis) for coordinate rotation control.

Usually, set the name of the 2nd axis.
When this parameter is not set, the coordinate rotation function will not work.
---Setting range---
Axis name
#8072 SCALING P (for M system only)
#8075 SpiralEndErr (for M system only)
#8077 Invlute error
#8078 Screen Saver Timer
#8081 Gcode Rotat (for L system only)
#8082 G68.1 R INC (for L system only)
#8621 Coord rot plane (H)
#8622 Coord rot plane (V)

Set the center coordinates (horizontal axis) for coordinate rotation control.
---Setting range---
-999999.999 to 999999.999 (mm)
Set the center coordinates (vertical axis) for coordinate rotation control.
---Setting range---
-999999.999 to 999999.999 (mm)
Set the vector components (horizontal axis) for coordinate rotation control.
When this parameter is set, the coordinate rotation control angle (#8627) will be automatically calculated.
---Setting range---
-999999.999 to 999999.999 (mm)
Set the vector components (vertical axis) for coordinate rotation control.
When this parameter is set, the coordinate rotation control angle (#8627) will be automatically calculated.
---Setting range---
-999999.999 to 999999.999 (mm)
Set the rotation angle for coordinate rotation control.
When this parameter is set, the coordinate rotation vector (#8625, #8626) will be "0".
---Setting range---
-360.000 to 360.000 ()
Specify the name of base axis for the graphics.
Select an alphabetical letter from A to Z.
When there is no need to set all three parameters (GraphicsBaseAxis_I, GraphicsBaseAxis_J and Graphics BaseAxis_K) (e.g. for two-axis specifications), enter "0" to leave the parameter blank.
Normally, when X, Y and Z are specified in "GraphicsBaseAxis_I", "GraphicsBaseAxis_J" and "GraphicsBa seAxis_K" respectively, the following relationship will be established:
G17: X-Y
G18: Z-X
G19: Y-Z
Or specify any other axis name desired.
---Setting range---
0 or from A to Z
Specify the name of base axis for the graphics.
Select an alphabetical letter from A to Z.
When there is no need to set all three parameters (GraphicsBaseAxis_I, GraphicsBaseAxis_J and Graphics BaseAxis_K) (e.g. for two-axis specifications), enter "0" to leave the parameter blank.
Normally, when X, Y and Z are specified in "GraphicsBaseAxis_I", "GraphicsBaseAxis_J" and "GraphicsBa seAxis_K" respectively, the following relationship will be established:
G17: X-Y
G18: Z-X
G19: Y-Z
Or specify any other axis name desired.
---Setting range---
0 or from A to Z
#8623 Coord rot centr (H)
#8624 Coord rot centr (V)
#8625 Coord rot vctr (H)
#8626 Coord rot vctr (V)
#8627 Coord rot angle
#8631 GraphicsBaseAxis_I
#8632 GraphicsBaseAxis_J

Specify the name of base axis for the graphics.
Select an alphabetical letter from A to Z.
When there is no need to set all three parameters ("GraphicsBaseAxis_I", "GraphicsBaseAxis_J" and "GraphicsBaseAxis_K") (e.g. for two-axis specifications), enter "0" to leave the parameter blank.
Normally, when X, Y and Z are specified in "GraphicsBaseAxis_I", "GraphicsBaseAxis_J" and "GraphicsBa seAxis_K" respectively, the following relationship will be established:
G17: X-Y
G18: Z-X
G19: Y-Z
Or specify any other axis name desired.
---Setting range---
0 or from A to Z
Set the length to the touch tool tip.
---Setting range---
-99999.999 to 99999.999 (mm)
Set the diameter of the sphere at the touch tool tip.
---Setting range---
-99999.999 to 99999.999 (mm)
This sets the deviation amount (X direction) from the touch tool center to the spindle center.
---Setting range---
-99999.999 to 99999.999 (mm)
Set the deviation amount (Y direction) from the touch tool center to the spindle center.
---Setting range---
-99999.999 to 99999.999 (mm)
Set the one-time return distance for contacting again.
---Setting range---

0 to 99999.999 (mm)
Set the feedrate when contacting again.
---Setting range---
1 to 60000 (mm/min)
Set the difference (horizontal axis direction) between the skip read value and actual skip position.
---Setting range---
-99999.999 to 99999.999 (mm)
Set the difference (vertical axis direction) between the skip read value and actual skip position.
---Setting range---
-99999.999 to 99999.999 (mm)
#8633 GraphicsBaseAxis_K
#8701 Tool length
#8702 Tool Dia
#8703 OFFSET X
#8704 OFFSET Y
#8705 RETURN
#8706 FEED
#8707 Skip past amout (H)
#8708 Skip past amout (V)

Reverse the sign of external workpiece coordinate.
Select when using the external workpiece coordinate system with Z shift.
0: External workpiece offset without sign reversal
1: External workpiece offset with sign reversal
Set whether to enable external workpiece offset subtraction when setting the workpiece coordinate offset.
0: Not subtract the external workpiece offset. (Conventional specification)
1: Subtract the external workpiece offset.
Set the tool length measurement axis.
Set the "#1022 axname2" axis name.
---Setting range---
Axis name
(Note) If the axis name is illegal or not set, the 3rd axis name will be set as default.
Set the tool diameter measurement axis.
Set the "#1022 axname2" axis name.
---Setting range---
Axis name
(Note) If the axis name is illegal or not set, the 1st axis name will be set as default.
Select the coordinate system for reading skip coordinate value.
Select whether to read the skip coordinate in the workpiece coordinate system or in the feature coordinate system during inclined surface machining command.
Select whether to read the skip coordinate in the workpiece coordinate system or in the workpiece installation coordinate system during workpiece installation error compensation.
0: Workpiece coordinate system
1: Feature coordinate system/Workpiece installation coordinate system
Specify the name of lead axis that performs thread recutting.
If any nonexistent axis name is specified, the 1st axis of the part system is used as a lead axis for thread recutting.
If the parameter "#8714 Thrdrecut lead ax" is unspecified, Z axis is set as the parameter value at power ON.
---Setting range---
A,B,C,U,V,W,X,Y,Z
Specify the No. or name of spindle that performs thread recutting.
If 0 or any nonexistent spindle No. or name is specified, the 1st spindle is used for thread recutting.
---Setting range---
Spindle No. method: 0 to 8
Spindle name method: 0 to 9
(Default: 0)
Set this parameter to "1" if you wish to disable the external workpiece coordinate system offset.
This parameter is enabled when "#11056 Workshift invalid (worksft invalid)" is "0".
0: Use the external work coordinate offset (EXT) to implement compensation
1: Implement compensation without using the external work coordinate offset (EXT)
#8709 EXT work sign rvs
#8710 EXT work ofs invld
#8711 TLM L meas axis
#8712 TLM D meas axis
#8713 Skip coord. Switch (For M system only)
#8714 Thrdrecut lead ax
#8715 Thread recut SP#
(PR) #8716 EXT/Wrksft Share (for L system only)

Specify the workpiece zero position that is used for measuring the workpiece installation error.
0: Workpiece center
1: Apex in X-, Y- direction
2: Apex in X+, Y- direction
3: Apex in X+, Y+ direction
4: Apex in X-, Y+ direction
Specify the workpiece coordinate system in which you input the workpiece coordinates for workpiece instal lation error measurement.
Set the number part of the coordinate system modal. (54, 54.1, 55, 56, 57, 58 or 59)
---Setting range---
0, 54 to 59
If workpiece installation error measurement is performed in the extended workpiece coordinate system, specify the address P value of G54.1.
If "#8718 WE meas. wk coord" is not 54.1, there is no need for setting this parameter.
---Setting range---
0 to 300

Specify the X direction width of the rectangular workpiece for which workpiece installation error measurement is performed.
If the sensor's accessible range is small due to jig etc., specify the width of the portion that is stuck out of the jig.
---Setting range---
0.000 to 99999.999 (mm)
Specify the Y direction width of the rectangular workpiece for which workpiece installation error measurement is performed.
If the sensor's accessible range is small due to jig etc., specify the width of the portion that is stuck out of the jig.
---Setting range---
0.000 to 99999.999 (mm)
Specify the Z direction width of the rectangular workpiece for which workpiece installation error measurement is performed.
If the sensor's accessible range is small due to jig etc., specify the width of the portion that is stuck out of the jig.
---Setting range---
0.000 to 99999.999 (mm)
Specify the workpiece installation error No. for write during the workpiece installation error measurement.
Set "1" for G54.4 P1.
---Setting range---
0 to 7
#8717 WE measure wk zero
#8718 WE meas. wk coord
#8719 WE meas. ext wk No
#8720 WE mea. wk X-width
#8721 WE mea. wk Y-width
#8722 WE mea. wk Z-width
#8723 WK inst. err comp#

Specify the tool length compensation No. of the touch probe to be used for measurement of rotation center error and workpiece installation error.
Set the touch probe offset in the said number before measurement.
If the specified offset is significantly large, the probe may be damaged.
---Setting range---
0 to 999
Select whether to enable the tolerance control.
0: Disable
1: Enable
(Note) Tolerance control is available only under SSS control.
To enable this function, set "#8090 SSS ON" to "1".
Set the compensation coefficient to adjust a path error or clamp speed in the corner while tolerance control is ON.
This parameter is enabled during tolerance control. Thus set this parameter if you wish to use different clamp speed according to ON/OFF of tolerance control.
When "0" is set in this parameter, the standard value (100%) is applied.
---Setting range---
0 to 2000 (%)
Spline interpolation 2: Smoothing range
Normally set "0" in this parameter.
If you run a program with micro segments and its reciprocating paths are uneven, set the parameter to about 3 to 5 times the length of the programmed segments.
---Setting range---
0.000 to 10.000 (mm)
Tolerance control: Corner recognition angle
Specify the corner recognition angle. Normally set to "0".
---Setting range---
0.000 to 180.000 ()
0: Retain the spindle speed (,S) in synchronous tap return
1: Cancel the spindle speed (,S) in synchronous tap return with G80
The same value as "#1223 aux07/bit6" will be reflected. When either setting changes, the other will change accordingly.
Select the position for displaying the zero point mark in the graphic trace and 2D check.
0: Machine coordinates zero point (same as conventional method)
1: Workpiece coordinate zero point
The same value as "#1231 set03/bit4" will be reflected. When either setting changes, the other will change accordingly.
Select the start point of the first travel command after coordinate rotation by program is commanded.
0: Calculate the end position using the current position on the local coordinate system before rotating, with out rotating the start point in accordance with the coordinates rotation.
1: Calculate the end position, assuming that the start point rotates in accordance with the coordinates ro tation.
#8724 Sensor T L comp No
#12066 Tolerance ctrl ON
#12067 Tolerance spd coef
#12068 Smoothing range
#12069 Corner angle
#19001 Syn.tap(,S)cancel
#19002 Zero-point mark
#19003 PRG coord rot type

Set the upper limit of the cutting feed rate in synchronous tapping.
---Setting range---
0 to 1000 (mm/rev)
(Note) Setting "0" disables this parameter.
When the commanded cutting feed rate in synchronous tapping exceeds this setting, a program error

(P184) will occur.
Set a clamp speed coefficient (%) for manual speed command 2.
The feed rate is clamped at the command feed rate or rapid traverse rate for automatic operation, which was multiplied by this parameter's value.
(Note) This setting is valid only for manual speed command 2.
---Setting range---
0 to 1000 (%)
0: 100% (Default value)
Set whether to handle an EOR(%) in machining program as the end of program in automatic operation, graphic check, program transfer to NC memory, program editing, and buffer correction. Tape operation, Computer Link B, and serial input/output are not included.
0: An EOR(%) is handled as the end of machining program.
1: An EOR(%) is not handled as the end of machining program. The program will be read to the end of file.
Set the speed constant to be used for the program check operation function.
---Setting range---
0 to 60000
Select the start point of the initial travel command after parameter coordinate rotation.
0: Calculate the end position, assuming that the start point rotates in accordance with the coordinates ro tation.
1: Calculate the end position using the current position on the local coordinate system before rotating, with out rotating the start point in accordance with the coordinates rotation.
Corner deceleration check angle
Specify the internal angle formed by two blocks, at or below which the block joint is determined as a corner and the latter block's start timing is controlled accordingly while the automatic error detect is ON.
---Setting range---
0 to 180 ()
#19004 Tap feedrate limit
#19005 manual Fcmd2 clamp
(PR) #19006 EOR Disable
#19007 Prg check constant
#19008 PRM coord rot type
#19009 Corner check angle
N002
N001

Corner deceleration check width
When deceleration of the currently executed block has started and a position error width between the pro grammed end point and machine position has reduced to this parameter or less, the control starts execution of the next block.
---Setting range---
0 to 99.999 (mm)
Analog spindle synch tap: Voltage output magnification (at cutting)
Specify the spindle speed magnification to be applied during cutting in analog spindle synchronous tapping.
When 0 is set, the magnification is taken as 100%.
If the spindle fails to rotate as commanded due to such as cutting load, set this parameter to correct the speed.
---Setting range---
0 to 200 (%)
Analog spindle synch tap: Voltage output magnification (at retract)
Specify the spindle speed magnification to be applied during retract in analog spindle synchronous tapping.
When 0 is set, the magnification is taken as 100%.
If the spindle fails to rotate as commanded due to such as cutting load, set this parameter to correct the speed.
---Setting range---
0 to 200 (%)
The value of address P of G04 with no decimals is multiplied by the value determined by this parameter.
This parameter is only relevant only when "#8112 DECIMAL PNT-P" is "0", or when "#1078 Decpt2" is "0".
The value is determined as 10n (n = -3 to 3).
-3: 1/1000
-2: 1/100
-1: 1/10
0: 1
1: 10
2: 100
3: 1000
Select whether to enable the setting of "#19014 G04 P factor" for G04 commands in a fixed cycle subpro gram.
0: Disable
1: Enable
Specify the diameter of stylus sphere that is used for measurement of rotation center error or workpiece in stallation error.
If the set value is significantly different from the actual diameter, the sensor may be damaged.
---Setting range---
0.000, 0.100 to 10.000 (mm)
#19010 Corner check width
#19012 Ana-Tap-Voltage1
#19013 Ana-Tap-Voltage2
#19014 G04 P factor
#19019 fixpro G04P factor Fixed cycle G04 P factor valid
#19101 Stylus sphere dia.
N002
N001 Machine position

Specify the length of stylus that is used for workpiece installation error measurement.
If the set value is significantly different from the actual length, the sensor may be damaged.
---Setting range---
0.000 to 99999.999 (mm)
Specify the over-travel distance of the sensor that is used for measurement of rotation center error or work piece installation error. (allowable excess of sensor, over-stroke)
Set the smallest over-travel distance among all the axes.

The initial approaching speed to the reference sphere is determined according to the over-travel distance.
If the set over-travel distance is greater than the actual distance, the sensor may be damaged.
---Setting range---
0.000 to 100.000 (mm)
Select whether to retain the rotation direction of C axis when circular interpolation takes place near the work piece zero during milling interpolation or during polar coordinate interpolation.
0: Not retain (the direction requiring the smaller amount of rotation)
1: Retain the rotation direction
Specify the range to be determined as workpiece zero when #19104 is set to "1".
---Setting range---
0 to 1.000 (mm)
Not used.
Specify this parameter to draw a path of C axis (rotary axis) according to its rotation in the graphic trace and
2D graphic trace.
When "#1013 axname" is set to "C", the axis is handled as a rotary axis.
By setting this parameter to "C", a rotation path around the Z axis on actual workpiece can be expressed.
When the Graphic check rotary axis drawing option or Graphic trace rotary axis drawing option is disabled,
this parameter is ignored.
C: Enable this function
0: Disable this function
(Setting is cleared when "0" is set)
Select whether to enable the retract at an alarm during hobbing.
0: Disable
1: Enable
(Standard value: 0)
Select whether to disable the acceleration/deceleration of a retract.
0: Enable
1: Disable
(Standard value: 0)
#19102 Stylus length
#19103 Sensor over-travel
#19104 G12.1 no reversal
#19105 G12.1 zero range
#19401 G33.n chamfer spd
#19405 Rotary ax drawing
#19406 Hob retract ON at alarm
#19407 Hob retract acceleration deceleration OFF

This is enabled when #1253 set25 bit2 is 1.
The operation at the hole bottom and the hole drilling stop position is as below.
0: Perform no deceleration check.
1: Perform command deceleration check.
2: Perform in-position check.
<Target fixed cycles>
Machining center: G81, G82, G83, G73
Lathe: G83, G87, G83.2
Set the minimum value of arc inside override.
R1/R2 come close to zero and the tool feed stops when the radius of tool center path(R1) is very smaller than
the radius of program path (R2).
When this parameter is set and R1/R2<=(parameter setting value), tool feed is F* (parameter setting value).
When this parameter is "0" or "100", the arc inside override is disabled.
---Setting range---
0 to 100 (%)
Specify the counterpart part system for timing synchronization or for balance cut when the part system No.
is omitted.
Set the part system No. in a way that reflects the combination of two part systems as follows.
(Example) Timing synchronization between Part systems 1 and 3
Enter 3 for the 1st part system, and enter 1 for the 3rd part system.
(Note) When 0 is set, timing synchronization is carried out between Part systems 1 and 2.
---Setting range---
0 to 8
Select the enable conditions for the arc inside override.
0: Enable during tool radius compensation
1: Enable during tool radius compensation and automatic corner override
(Note) When M2 format is in use, the arc inside override enables during tool radius compensation, regardless
of the setting value of this parameter.
Specify the type of arc inside override.
0: Type 1
Arc inside override during circular cutting is invalid.
1: Type 2
Arc inside override during circular cutting is valid.
This parameter specifies the factor (%) for calculating the pick feed amount that is used when address A (pick
feed amount) and address E (number of chamfering cycles) are omitted from G185 (hole edge chamfering
cycle).
The pick feed amount is calculated through the following formula.
Tool radius (mm) * G185 factor (%)
---Setting range---
0 to 100 (%)
0: 20% (default value)
#19417 Hole dec check 2
#19418 Arc inside min ovr (for M system only)
#19419 Timing sync system
#19420 Arc inside ovr ON (for M system only)
#19421 Arc inside ovr typ (for M system only)
#19424 G185 factor

Set a radius used as standard for the rotary axis speed.
When the setting value of #19425 is larger than that of "#19427 ManualB Std R2", #19425 setting will be used as surface speed control standard radius 2: #19427 setting will be used as surface speed control standard radius 1.
---Setting range---
0 to 99999.999 (mm)
This sets the rotary axis speed for surface speed control standard radius 1 (ManualB Std R1).
When the setting value of #19426 is larger than that of "#19428 ManualB Std F2", #19426 setting will be used as surface speed control standard speed 2: #19427 setting will be used as surface speed control standard speed 1.
---Setting range---
1 to 1000000 (/min)
Set a radius used as standard for the rotary axis speed.
When the same value is set as "#19425 ManualB Std R1", the surface speed control standard speed 1 (Man ualB Std F1) will be selected as the rotary axis speed if the radius is less than that value. The surface speed control standard speed 2 (ManualB Std F2) is selected if larger than the set value.
---Setting range---
0 to 99999.999 (mm)
Set the rotary axis speed for surface speed control standard radius 2 (ManualB Std R2).
---Setting range---
1 to 1000000 (/min)
Specify whether to execute roughing along finishing shape in roughing cycle (G71, G72) when pocket ma chining is OFF.
0: Execute roughing along finishing shape
1: Not execute roughing along finishing shape
Specify whether to execute roughing along finishing shape in roughing cycle (G71, G72) when pocket ma chining is ON.
0: Not execute roughing along finishing shape
1: Execute roughing along finishing shape
When roughing along finishing shape is enabled in roughing cycle (G71,G72), select the path to move to the cycle command point after the completion of roughing along finishing shape.
0: Move to the cycle command point without passing through the start point of roughing.
1: Move to the cycle command point via the start point of roughing.
For ZX plane, the move to the start point of roughing is performed with one axis at a time in the following order:
G71: in the order of Z axis and X axis
G72: in the order of X axis and Z axis
Specify whether to retract after roughing along finishing shape when roughing along finishing shape is en abled in rough cutting cycle (G71, G72).
0: Not retract
1: Retract
This parameter is valid when "#19442 Path at G71 comp." is set to "1".
#19425 ManualB Std R1
#19426 ManualB Std F1
#19427 ManualB Std R2
#19428 ManualB Std F2
#19437 Skip fin in rough1
#19438 Skip fin in rough2
#19442 Path at G71 comp.
#19443 Retract aft rough

14.2 Fixed Cycle Parameters
Set the return amount for G73 (step cycle).
---Setting range---
0 to 99999.999 (mm)
Set the return amount for G83 (deep hole drilling cycle).
---Setting range---
0 to 99999.999 (mm)
Set the chamfering amount for G76, G78 (thread cutting cycle).
---Setting range---
0 to 127 (0.1 lead)
Set the chamfering angle for G76, G78 (thread cutting cycle).
---Setting range---
0 to 89 ()
Set the minimum value of the last cutting amount by the rough cutting cycle (G71, G72).
The cutting amount of the last cutting will be the remainder. When the remainder is smaller than this param eter setting, the last cycle will not be executed.
---Setting range---
0 to 999.999 (mm)
Set the change amount of the rough cutting cycle.
The rough cutting cycle (G71, G72) cutting amount repeats x+dx, x, x-dx using the value (x) commanded with D as a reference. Set the change amount dx.
---Setting range---
0 to 999.999 (mm)
Set the retract amount m in a G84/G74/G88 pecking tapping cycle.
(Note) In the case of a normal tapping cycle, set to "0".
---Setting range---
0 to 999.999 (mm)
Set the amount of cut-in by the rough cutting cycle (G71, G72)
---Setting range---
0 to 99999.999 (mm)
Set the amount of pull-up when returning to the cutting start point for the rough cutting cycle (G71. G72).
---Setting range---
0 to 99999.999 (mm)
Set the X-axis cutting margin of the forming rough cutting cycle (G73).
---Setting range---
-99999.999 to 99999.999 (mm)
#8012 G73n (for M system only)
#8013 G83 n
#8014 CDZ-VALE (for L system only)

#8015 CDZ-ANGLE (for L system only)
#8016 G71 MINIMUM (for L system only)
#8017 G71 DELTA-D (for L system only)
#8018 G84/G74 n
#8051 G71 THICK
#8052 G71 PULL UP
#8053 G73 U

Set the Z-axis cutting margin of the forming rough cutting cycle (G73).
---Setting range---
-99999.999 to 99999.999 (mm)
Set how many times cutting will be performed in the forming rough cutting cycle (G73).
---Setting range---
0 to 99999 (times)
Set the amount of retract in the cut-off cycle (G74, G75).
---Setting range---
0 to 999.999 (mm)
Set the amount of final cut-in by the compound type thread cutting (G76).
---Setting range---
0 to 999.999 (mm)
Set how many times the amount of final cut-in cycle (G76 finish margin) will be divided in the compound type thread cutting (G76).
---Setting range---
0 to 99 (times)
Set the angle (thread angle) of the tool nose in the compound type thread cutting (G76).
---Setting range---
0 to 99 ()
Set the M command code for changing to the small diameter deep hole drilling cycle mode.
---Setting range---
1 to 99999999
Set the clearance amount for the small diameter deep hole drilling cycle (G83).
---Setting range---
0 to 999.999 (mm)
Set the feedrate from the R point to the cutting start position in the small diameter deep hole drilling cycle (G83).
---Setting range---
0 to 99999 (mm/min)
Set the speed for returning from the hole bottom during the small diameter deep hole drilling cycle (G83).
---Setting range---
0 to 99999 (mm/min)
#8054 G73 W
#8055 G73 R
#8056 G74 RETRACT
#8057 G76 LAST-D
#8058 G76 TIMES
#8059 G76 ANGLE
#8083 G83S modeM (for M system only)
#8084 G83S Clearance (for M system only)
#8085 G83S Forward F (for M system only)
#8086 G83S Back F (for M system only)

14.3 Control Parameters 1
Select the unit system for the program travel amount when the power is turned ON or reset and for position display.
0: Metric system
1: Inch system
(Note) The units of the following data are converted by "#1041 I_inch".
- Command unit at power ON and reset (Inch/metric command mode)
But under the following conditions, the unit will follow G20/G21 command modal even at reset.
When reset modal is retained ("#1151 rstint"="0")
When G code group 06 reset modal is retained ("#1210 RstGmd/bit5" ON)
- Unit system for position display (counter, user parameter, tool, work offset)
- User parameter I/O unit
- Parameter unit of user parameters concerning length and speed
- Arc error parameter (#1084 RadErr)
Select the increment of position commands that do not have a decimal point.
0: Minimum input command unit (follows "#1015 cunit")
1: 1mm (or 1inch) unit (For the dwell time, 1s unit is used.)
Select a fixed cycle hole drilling axis.
0: Use an axis vertical to the selected plane as hole drilling axis.
1: Use the Z axis as the hole drilling axis regardless of the selected plane.
Select how to handle the middle point during G28 and G30 reference position return.
0: Pass the middle point designated in the program and move to the reference position.
1: Ignore the middle point designated in the program and move straight to the reference position.
Select whether to use the tool life management.
0: Not use tool life management.
1: Use tool life management.
Select how to handle the tool command in the program when "#1103 T_Life" is set to "1".
0: Handle the command as group No.
1: Handle the command as tool No.
(Note) In the case of the tool life management III, the program tool command will be handled as the tool No. regardless of the setting.
Select the tool selection method when "#1103 T_Life" is set to "1".
0: Select in order of registered No. from the tools used in the same group.

1: Select the tool with the longest remaining life from the tools used or unused in the same group.
Select the input method when address N is omitted in inputting the data (G10 L3 command) for tool life man agement function II.
0: Time specified input
1: Number of times specified input
(PR) #1041 I_inch Initial state (inch)
#1078 Decpt2 Decimal point type 2
#1080 Dril_Z Drilling Z fixed
#1091 Mpoint Ignore middle point
#1103 T_Life Validate life management
#1104 T_Com2 Tool command method 2
#1105 T_sel2 Tool selection method 2
#1106 Tcount Life management (for L system only)

Select the method to command the playback travel amount in the playback editing.
0: Incremental value
1: Absolute value
Select how to handle the common variables when resetting.
0: Common variables won't change after resetting.
1: Common variables will be cleared #100 to #199 by resetting.
Select how to handle the common variables when the power is turned ON.
0: The common variables are in the same state as before turning the power OFF.
1: Common variables will be cleared #100 to #199 when the power is turned ON.
Select the method to move to the restart position when restarting the program.
0: Move the system to the restart position manually.
1: For program restarting, the first activation automatically moves the system to the restart position.
Select how to control the blocks where the user macro command continues.
0: Do not stop while macro blocks continue.
1: Stop every block during signal block operation.
Select the interference control to the workpiece from the tool diameter during tool radius compensation and
nose R compensation.
0: An alarm will be output and operation stops when an interference is judged.
1: Changes the path to avoid interference.
Select the interference control to the workpiece from the tool diameter during tool radius compensation and
nose R compensation.
0: Performs interference check.
1: Does not perform interference check.
Select the edit lock for program Nos. 8000 to 9999 in the memory.
0: Editing possible
1: Prohibit the editing of above programs.
When "1" is set, the file cannot be opened.
Select the control for the compensation direction reversal in G46 (nose R compensation).
0: An alarm will be output and operation will stop when the compensation direction is reversed (G41 ->
G42' G42 -> G41).
1: An alarm won't occur when the compensation direction is reversed, and the current compensation direc tion will be maintained.
Select whether to move to the inside because of a delay in servo response to a command during arc cutting
mode.
0: Move to the inside, making the arc smaller than the command value.
1: Compensate the movement to the inside.
#1126 PB_G90 Playback G90
#1128 RstVCl Clear variables by resetting
#1129 PwrVCl Clear variables by power-ON
#1302 AutoRP Automatic return by program restart
#8101 MACRO SINGLE
#8102 COLL. ALM OFF
#8103 COLL. CHK OFF
#8105 EDIT LOCK B
#8106 G46 NO REV-ERR (for L system only)
#8107 R COMPENSATION

Select the arc radius error compensation target.
0: Perform compensation over all axes.
1: Perform compensation axis by axis.
(Note) This parameter is effective only when "#8107 R COMPENSATION" is "1".
Select whether to enable computer link B instead of the RS-232C port.
0: Disable (Enable normal RS-232C communication.)
1: Enable (Disable normal RS-232C communication.)
Select whether to enable the pocket machining when there is a dimple (pocket) in the rough cutting cycle
(G71, G72) finishing program.
0: OFF
1: ON
Select the diameter and radius of the linear axis for milling (cylindrical/pole coordinate) interpolation.
0: All axes radius command
1: Each axis setting (follows "#1019 dia")
(Note) This parameter is valid only in the milling (cylindrical/polar coordinate) interpolation mode.
Select whether to enable the decimal point command for G04 address P.
0: Disable
1: Enable
Set which plane to execute for milling machining after the power is turned ON or reset.
#8113: 0, #8114: 0 ---> G17 plane
#8113: 0, #8114: 1 ---> G19 plane
#8113: 1, #8114: 0 ---> G16 plane
#8113: 1, #8114: 1 ---> G16 plane
0: Not G16 plane
1: G16 plane

(Note) This parameter is valid for the G code system 2, 3, 4 or 5 ("#1037 cmdtyp"="3", "4", "5" or "6").
Set which plane to execute for milling machining after the power is turned ON or reset.
#8113: 0, #8114: 0 ---> G17 plane
#8113: 0, #8114: 1 ---> G19 plane
#8113: 1, #8114: 0 ---> G16 plane
#8113: 1, #8114: 1 ---> G16 plane
0: Not G19 plane
1: G19 plane
(Note) This parameter is valid for the G code system 2, 3, 4 or 5 ("#1037 cmdtyp"="3", "4", "5" or "6").
#8108 R COMP Select
#8109 HOST LINK
#8110 G71/G72 POCKET
#8111 Milling Radius
#8112 DECIMAL PNT-P
#8113 Milling Init G16
#8114 Milling Init G19

Select the operation upon the completion of each step in deep hole drilling cycle (G83, G87).
0: Returns to R point before performing next step.
1: Returns by the amount of d (parameter setting) setting value before performing next step.
Select whether to enable the coordinate rotation by the parameters.
0: Enable
1: Disable
Select tool radius or tool diameter compensation amount to be specified.
0: Tool radius compensation amount
1: Tool diameter compensation amount
Select the setting unit of compensation amount that has no decimal point.
0: 1mm (or 1inch) unit
1: The minimum command unit (follows "#1003 iunit")
Select the font when Simplified Chinese is selected for "#1043 lang".
0: MITSUBISHI CNC GOTHIC font
1: Standard Windows font
*This parameter is available for M800W only.
Select whether to enable the screen capture function.
0: Invalid
1: Valid (Screenshots are saved on USB memory or on front-side SD card)
2: Valid (Screenshots are saved on back-side SD card)
(Note 1) By setting this parameter to "1" or "2", and by keeping pushing the [SHIFT] key, screen capture will be executed.
(Note 2) This parameter is valid for M800S, M80, E80, and M800W/M80W equipped with non-Windows based display. The setting value "2" (back-side SD) is valid for M800S, M80 and E80.
(Note 3) If an USB memory is inserted, it takes precedence over other devices.
(*) This parameter is reset to "0" (Invalid) when the power is turned ON again.
Select whether to keep the tool length offset by high speed manual reference position return during tool length offset.
0: Will not be kept (Cancel)
1: Hold
Select whether to enable high-speed retract while fixed cycle for drilling is running.
0: Disable
1: Enable
Select the operation type of the mirror image by parameter setting and the mirror image by external input.
0: The current mirror image is canceled, and new mirror image will start with the machine position at reset as the mirror center.
1: The mirror center is kept to continue the mirror image.
Select how to operate when there is no S command in synchronous tapping block.
0: Use the spindle function modal value as S-command value.
1: Output a program error (P181).
#8115 G83/87 RAPID
#8116 CoordRotPara invd
#8117 OFS Diam DESIGN
#8119 Comp. unit switch
(PR) #8120 FONT SELECTION
#8121 Screen Capture
#8122 Keep G43 MDL M-REF
#8123 H-spd retract ON
#8124 Mirr img at reset
#8125 Check Scode in G84

Disable operation tones when operating the keyboard/touch panel.
0: Enable the operation tones
1: Disable the operation tones
Select the initial value of the coordinate system for a manual feed while a machining surface is selected in the R-Navi function.
0: Feature coordinate system
1: Machine coordinate system
Select the subprogram No. to be called preferentially in subprogram control.
0: Commanded program No.
1: Four-digit program No. beginning with O No.
2: Eight-digit program No. beginning with O No.
(Note) The program to be called in user macro, figure rotation, macro interruption and compound type fixed cycle also follows this setting.
Select the type of dwell for G04.
0: Dwell time is specified in seconds, irrespective of the synchronous feed mode (G95) or the asynchro nous feed mode (G94). For G04D, the dwell specified in spindle revolutions is applied.
1: Dwell time is specified in spindle revolutions while the synchronous feed mode (G95) is ON, whereas it is specified in seconds while the asynchronous feed mode (G94) is ON.

Select how to treat high-speed high-accuracy II and III commands.
0: As specified in G05P command
1: Treat G05 P2 during high-accuracy mode or G05P10000 as high-speed high-accuracy control III com mand (G05P20000).
2: Treat G05P20000 as high-speed high-accuracy control II command (G05P10000).
Select whether to execute a single block stop at the completion of rotation of each axis when G53.6 is given
with the number of simultaneous contour control axes limited to 4.
0: Not execute a single block stop
1: Execute a single block stop
Specify the interactive macro to call from the cycle of interactive cycle insertion.
0: Call standard interactive macro
1: Call interactive macro in the machining program area
When a program, whose name is same as standard interactive macro, exists in the machining program area,
the program in the machining program area is called preferentially if "1" is set to this parameter.
When a program, whose name is same as standard interactive macro, does not exist in the machining pro gram area, standard interactive macro is called even if "1" is set to this parameter.
E-mail sending by the email notification to operator can be disabled.
0: Enable
1: Disable
Single block stop is disabled during direct command mode.
0: Not disable single block stop
1: Disable single block stop
#8126 Disable op tone
#8127 R-Navi manu F coor
#8129 Subpro No. select
#8130 Dwell in rev.
#8131 High speed/accu 3
#8132 G53.6 block stop
#8133 Intrctv macro call
#8134 Email send disable
#8135 G5P4 single block

Select whether to enable the turning-tool shape compensation in compound type fixed cycle for turning ma chining I.
0: Disable
1: Enable
Select whether to display the pre-compensation finish shape of the turning-tool shape compensation for com pound type fixed cycle for turning machining I in 2D graphic check.
0: Display
1: Not display
Select whether to temporarily cancel the interpolation of orthogonal axes that is accompanied with the rota tion of table, when G00 command is issued under tool center point control.
0: Not temporarily cancel the interpolation
1: Temporarily cancel the interpolation
(Note 1) This parameter is valid for a machine equipped with a rotary axis on the table side.
(Note 2) This parameter is valid when "#7908 SLCT_PRG_COORD" = 1 (when programming is done with
respect to the workpiece coordinate system).
This parameter enables the tool wear compensation amounts to be reserved with the machining being per formed.
The reserved tool wear compensation values can be written and executed using the PLC signal.
With this function, the following five types of tool wear compensation amounts can be reserved:
Tool nose wear compensation amount for the 1st axis (normally X axis)
Tool nose wear compensation amount for the 2nd axis (normally Z axis)
Tool wear compensation amount for the additional axis
Tool wear compensation amount for the 2nd additional axis
Tool nose radius wear compensation amount
0: Disable the reserved memory for tool wear compensation.
1: Enable the reserved memory for tool wear compensation.
Select the type of Restart search to be performed when Restart search is executed with specified ONBP No.
in the multi-part system program management.
0: Restart search through a program individually for each part system.
1: Restart search through a program for all part systems at once.
(Program No., sequence No., block No. and number of repetitions will be common to all part systems.)
(Note) This parameter is only valid when "#1285 ext21/bit0" (Multi-part system program management) is set
to "1" and "#1285 ext21/bit1" (program search is performed for all part systems) is set to "1".
Select whether to search only the displayed part systems or search through for all part systems at once when
operation/check search is executed with specified NB No. in the Multi-part system program management.
0: Search through NB No. only for displayed part systems.
1: Search through NB No. for all part systems at once.
(Note) This parameter is enabled only when "#1285 ext21/bit0" (Multi-part system program management)
and "#1285 ext21/bit1" (Switching of program search type) are set to "1".
Select whether to execute the F command with a 1-digit code command or with a direct numerical command.
(The same value as "#1079 F1digt" will be reflected. When either setting changes, the other will change ac cordingly.)
0: Direct numerical command (command feedrate during feed per minute or rotation)
1: 1-digit code command (with the feedrate specified by the parameters "#1185 spd_F1" to "#1189 sp d_F5")
#8137 T. tool shape comp
#8138 Pre-compens. shape
#8139 TCP G0 temp.cancel
(PR) #8140 Reserve T wear com
#8141 Restart srch ONBP
#8144 OP srch NB all Operation/check search with specified NB No. for all
part systems at once
#8145 Validate F1 digit

Select the type of the user macro interrupt.
(The same value as "#1229 set01/bit0" will be reflected. When either setting changes, the other will change
accordingly.)
0: The user macro interrupt of macro type
1: The user macro interrupt of sub-program type
Select what is to be specified with the address E.

(The same value as "#1229 set01/bit1" will be reflected. When either setting changes, the other will change
accordingly.)
0: Specify the number of threads per inch for inch screw cutting.
1: Specify the precision lead for inch screw cutting.
For M system
Select the method of the arithmetic processing for the intersection point when the start-up or cancel com mand is operated during radius compensation.
(The same value as "#1229 set01/bit2" will be reflected. When either setting changes, the other will change
accordingly.)
0: The processing does not handle the start-up or cancel command block: handle the offset vector in the
direction vertical to that of the command instead.
1: The processing is executed for the intersection point between the command block and the next block.
For L system
Select the method of the arithmetic processing for the intersection point when the start-up or cancel com mands are operated during nose R or radius compensation.
(The same value as "#1229 set01/bit2" will be reflected. When either setting changes, the other will change
accordingly.)
0: The processing does not handle the start-up or cancel command block: handle the offset vector in the
direction vertical to that of the command instead.
1: The processing is executed for the intersection point between the command block and the next block.
Select the initial state after the power-ON.
(The same value as "#1229 set01/bit3" will be reflected. When either setting changes, the other will change
accordingly.)
0: Constant surface speed control cancel mode
1: Constant surface speed control mode.
Select whether to use the floating tap chuck in G74 and G84 tap cycles.
(The same value as "#1229 set01/bit4" will be reflected. When either setting changes, the other will change
accordingly.)
0: With a floating tapping chuck
1: Without a floating tapping chuck
Select an operation when the operation start point cannot be found while moving to the next block of G117.
(The same value as "#1229 set01/bit5" will be reflected. When either setting changes, the other will change
accordingly.)
0: The auxiliary function is enabled after the block for the movement has finished.
1: The program error (P33) occurs.
Not used. Set to "0".
Not used. Set to "0".
Not used. Set to "0".
#8155 Sub-pro interrupt
#8156 Fine thread cut E
#8157 Radius comp type B (M system) / Nose R comp type B (L system)
#8158 Init const sur spd
#8159 Synchronous tap
#8160 Start point alarm
#8166 operation mode 1
#8167 operation mode 2
#8168 operation mode 3

Not used. Set to "0".
#8169 operation mode 4

14.4 Control Parameters 2
Select the plane to be selected when the power is turned ON or reset.
When 0 is specified, 1 is assumed (X-Y plane).e model and specifications.
1: X-Y plane (G17 command state)
2: Z-X plane (G18 command state)
3: Y-Z plane (G19 command state)
Set the G code list and compensation type for programs.
1: List1 (for M) Type I (one compensation amount for one compensation No.)
2: List1 (for M) Type II (shape and wear compensation amounts for one comp. No.)
3: List2 (for L) Type III (shape and wear compensation amounts for one comp. No.)
4: List3 (for L) Ditto
5: List4 (for special L) Ditto
6: List5 (for special L) Ditto
7: List6 (for special L) Ditto
8: List7 (for special L) Ditto
9: List8 (for M) M2 form at type Type I
(one compensation amount for one compensation No.)
10: List8 (for M) M2 form at type Type II
(shape and wear compensation amounts for one compensation No.)
There are some items in the specifications that can be used or cannot be used according to the value set in
this parameter.
The file structure may also change depending on the compensation data type.
(Note) When this parameter is changed, the file system will be changed after the power is turned ON.
So always execute format.
The new format will be enabled after turning the power ON again.
Setting order
(1) cmdtyp changeover -> (2) Turn power ON again -> (3) Format -> (4) Turn power ON again
(Note) Compensation type III can be selected for M system by setting #1046.
Select the mode (absolute or incremental) at turning ON the power or reset.
0: Incremental setting
1: Absolute setting
Select the feedrate mode at turning ON the power or reset.
0: Asynchronous feed (feed per minute)
1: Synchronous feed (feed per revolution)
Select the linear command mode at turning ON the power or reset.

0: Linear interpolation (G01 command state)
1: Positioning (G00 command state)
Select the command method for the absolute and incremental commands.
The absolute command/incremental command can be issued by using the absolute command address and
incremental command address for the same axis.
0: Use G command for the absolute and incremental commands.
1: Use axis name for the absolute and incremental commands.
(The axis name in "#1013 axname" will be the absolute command, "#1014 incax" will be the incremental
command.)
#1025 I_plane Initial plane selection
(PR) #1037 cmdtyp Command type
#1073 I_Absm Initial absolute setting
#1074 I_Sync Initial synchronous feed
#1075 I_G00 Initial G00
#1076 AbsInc ABS/INC address (for L system only)

Select whether to apply dry run (feed at manual setting speed instead of command feedrate) to the G00 com mand.
0: Not apply to G00. (move at rapid traverse rate)
1: Apply to G00. (move at manual setting speed)
Select the G00 travel path type.
0: Move linearly toward the end point. (interpolation type)
1: Move to the end point of each axis at the rapid traverse feedrate for each axis. (non-interpolation)
(Note) If this parameter is set to "1", neither of the following functions will be available: rapid traverse con stant-gradient acceleration/deceleration and rapid traverse constant-gradient multi-step acceleration/decel eration.
Select the modal state at power ON from among the following: high-accuracy control mode, high-speed high accuracy control I mode, high-speed high-accuracy control II mode or high-speed high-accuracy control III
mode.
0: G08P0/G64 (cutting) mode
1: G08P1/G61.1 (high-accuracy control) mode
2: G05.1Q1 (high-speed high-accuracy control I) mode
3: G05P10000 (high-speed high-accuracy control II) mode
4: G05P20000 (high-speed high-accuracy control III) mode
Select whether to clear or hold the interruption amount after the "NC reset 1 (or 2)" signal is ON when the
manual ABS switch is OFF.
0: Clear (Reset the coordinate deviation due to the interruption)
1: Hold
Select the measurement operation for mirror-imaged axes during the manual tool length measurement 1 or 2.
0: Set the measurement result as the tool length.
1: Reverse the sign of measurement result and set it as the tool length.
Select when the stroke limit before travel function should determine a command as entering the forbidden
area set by the stored stroke limit.
0: Operation stops by the stroke check before travel function only when the end point of the command is
in the forbidden area.
1: Operation stops by the stroke check before travel function when the command path passes through the
forbidden area. For a command other than given below, the operation stops only when the end point is
in the forbidden area.
Corresponding commands: G00, G01, G02, G03, G28, G30, G33 and G53
Set the modal state to Spline interpolation2 when power is turned ON.
0: Disable
1: Enable
(Note) This function is only valid while SSS control and Tolerance control are enabled.
To enable the setting, set "#8090 SSS ON" and "#12066 Tolerance ctrl ON" to "1".
#1085 G00Drn G00 dry run
#1086 G0Intp G00 non-interpolation
#1148 I_G611 Initial hi-precis
#8173 Hold intr amount
#8174 T meas. in mirror
#8179 Stroke_prechkTYPE
#8180 Ini spline intrpl2

14.5 I/O Parameters
Select the port for inputting the data such as machine program and parameters.
1: ch1
2: ch2
Select the device No. for inputting the data. (The device Nos. correspond to the input/output device param eters.)
---Setting range---
0 to 4
Select the port for outputting the data such as machine program and parameters.
1: ch1
2: ch2
Select the device No. for outputting the data. (The device Nos. correspond to the input/output device param eters.)
---Setting range---
0 to 4
Select the input port for running with the tape mode.
1: ch1
2: ch2
Select the device No. to be run with the tape mode. (The device Nos. correspond to the input/output device
parameters.)
---Setting range---
0 to 4
Select the output port used for the user macro DPRINT command.
1: ch1
2: ch2
9: Memory card
Select the device No. used for the DPRINT command. (The device Nos. correspond to the input/output de vice parameters.)
---Setting range---

0 to 4
Select the port for inputting/outputting various data with PLC.
1: ch1
2: ch2
Select the device No. used for the PLC input/output. (The device Nos. correspond to the input/output device parameters.)
---Setting range---
0 to 4
#9001 DATA IN PORT
#9002 DATA IN DEV.
#9003 DATA OUT PORT
#9004 DATA OUT DEV.
#9005 TAPE MODE PORT
#9006 TAPE MODE DEV.
#9007 MACRO PRINT PORT
#9008 MACRO PRINT DEV.
#9009 PLC IN/OUT PORT
#9010 PLC IN/OUT DEV.

Select the port for inputting remote programs.
1: ch1
2: ch2
Select the device No. used to input remote programs. (The device Nos. correspond to the input/output device parameters.)
---Setting range---
0 to 4
Select the port for communication with an external unit.
1: ch1
2: ch2
Select the unit No. used for communication with an external unit (The device Nos. correspond to the input/output device parameters.)
---Setting range---
0 to 4
Select the port for communication with a handy terminal.
1: ch1
2: ch2
Select the device No. used for communication with a handy terminal. (The device Nos. correspond to the input/output device parameters.)
---Setting range---
0 to 4
Not used.
Set the file name to save the output data to a memory card with the DRPNT command for the user macro.
If this parameter is not set, the data will be output under the following name.
dprt$-MMDDhhmmssff
$ is the part system No. in which DPRNT is commanded, MMDDhhmmssff is the current date. (MM: month, DD: day, hh: hour, mm: minute, ss: second, ff: millisecond)
(Note) This parameter is enabled when "#9007 Macro print directory" is set to "9".
---Setting range---
Program name or file name (up to 32 characters)
Set the device name corresponding to the device No.
Set a simple name for quick identification.
---Setting range---
Use three or less characters consisting of alphabet characters, numerals and symbols.
#9011 REMOTE PRG IN PORT
#9012 REMOTE PRG IN DEV.
#9013 EXT UNIT PORT
#9014 EXT UNIT DEV.
#9017 HANDY TERMINAL PORT
#9018 HANDY TERMINAL DEV.
#9053 M2 macro converter
#9054 MACRO PRINT FILE
#9101 DEV0 DEVICE NAME

Select the serial communication speed.
0: 19200 (bps)
1: 9600
2: 4800
3: 2400
4: 1200
5: 600
6: 300
7: 110
Select the stop bit length used in the start-stop system.
Refer to "#9104 DEV0 PARITY CHECK". At the output of data, the number of characters is always adjusted for the parity check.
1: 1 (bit)
2: 1.5
3: 2
Select whether to add a parity check bit to the data.
Set this parameter in accordance with the I/O device specifications.
0: Not add a parity bit at the input/output
1: Add a parity bit at the input/output
Select odd or even when parity is added to the data. This parameter is ignored when no parity is added.
0: Odd parity

1: Even parity
Set the length of the data bit.
Refer to "#9104 DEV0 PARITY CHECK".
0: 5 (bit)
1: 6
2: 7 (NC connection not supported)
3: 8
Select the code to terminate data reading.
0, 3: EOR
1, 2: EOB or EOR
Select the transmission control method.
No handshaking will be used when a value except 1 to 3 is set.
1: RTS/CTS method
2: No handshaking
3: DC code method
#9102 DEV0 BAUD RATE
#9103 DEV0 STOP BIT
#9104 DEV0 PARITY CHECK
#9105 DEV0 EVEN PARITY
#9106 DEV0 CHR. LENGTH
#9107 DEV0 TERMINATR TYP
#9108 DEV0 HAND SHAKE
Start bit Data bit Parity bit Stop bit
1character ON
OFF b1 b2 b3 b4 b5 b6 bn

Select the DC code type when the DC code method is selected.
0: Not add parity to DC code. (DC3 = 13H)
1: Add parity to DC code. (DC3 = 93H)
Select the DC code handling when outputting data to the output device.
DC2 / DC4
0: None / None
1: Yes / None
2: None / Yes
3: Yes / Yes
Select whether to add the (CR) code just before the EOB (L/F) code during output.
0: Not add
1: Add
Select ISO or EIA code for data output.
In data input mode, the ISO and EIA codes are identified automatically.
0: ISO code output
1: EIA code output
Set the length of the tape feed to be output at the start and end of the data during tape output.
---Setting range---
0 to 999 (characters)
Select whether to perform the parity check for the number of characters in a block at the input of data.
At the output of data, the number of characters is always adjusted for the parity check.
0: Not perform parity V check
1: Perform parity V check
Set the time out time to detect an interruption in communication.
Time out check will not be executed when set to "0".
---Setting range---
0 to 30 (s)
Select whether to enable the DR data check in data I/O mode.
0: Enable
1: Disable
Select the code of the output data.
0: ISO/EIA code
(Depends on whether #9113, #9213, #9313, #9413 or #9513 EIA output parameter is set up.)
1: ASCII code
Select the mode for input (verification).
0: Standard input (Data from the very first EOB is handled as significant information.)
1: EOBs following the first EOB of the input data are skipped until data other than EOB is input.
#9109 DEV0 DC CODE PRTY
#9111 DEV0 DC2/4 OUTPUT
#9112 DEV0 CR OUTPUT
#9113 DEV0 EIA OUTPUT
#9114 DEV0 FEED CHR.
#9115 DEV0 PARITY V
#9116 DEV0 TIME-OUT (sec)
#9117 DEV0 DR OFF
#9118 DEV0 DATA ASCII
#9119 DEV0 INPUT TYPE

Select the buffer size of the output data which is output to output device using NC side serial port.
If the output device has a transmission error (overrun error), decrease the buffer size with this parameter.
If the buffer size is decreased, output time will prolong according to the size.
0: 250 bytes (default)
1: 1 byte
2: 4 bytes
3: 8 bytes
4: 16 bytes
5: 64 bytes
Set the code in hexadecimal, which does not duplicate the existing EIA codes, for the special code " [".

When output with EIA code, data can be output using the alternate code in which the special ISO code, not included in EIA, is specified.
---Setting range---
0 to FF (hexadecimal)
Set the code in hexadecimal, which does not duplicate the existing EIA codes, for the special code "] ".
When output with EIA code, data can be output using the alternate code in which the special ISO code, not included in EIA, is specified.
---Setting range---
0 to FF (hexadecimal)
Set the code in hexadecimal, which does not duplicate the existing EIA codes, for the special code "#".
When output with EIA code, data can be output using the alternate code in which the special ISO code, not included in EIA, is specified.
---Setting range---
0 to FF (hexadecimal)
Set the code in hexadecimal, which does not duplicate the existing EIA codes, for the special code "*".
When output with EIA code, data can be output using the alternate code in which the special ISO code, not included in EIA, is specified.
---Setting range---
0 to FF (hexadecimal)
Set the code in hexadecimal, which does not duplicate the existing EIA codes, for the special code "=".
When output with EIA code, data can be output using the alternate code in which the special ISO code, not included in EIA, is specified.
---Setting range---
0 to FF (hexadecimal)
Set the code in hexadecimal, which does not duplicate the existing EIA codes, for the special code ":".
When output with EIA code, data can be output using the alternate code in which the special ISO code, not included in EIA, is specified.
---Setting range---
0 to FF (hexadecimal)
#9120 DEV0 OUT BUFFER
#9121 DEV0 EIA CODE [
#9122 DEV0 EIA CODE]
#9123 DEV0 EIA CODE #
#9124 DEV0 EIA CODE *
#9125 DEV0 EIA CODE =
#9126 DEV0 EIA CODE:

Set the code in hexadecimal, which does not duplicate the existing EIA codes, for the special code "$".
When output with EIA code, data can be output using the alternate code in which the special ISO code, not included in EIA, is specified.
---Setting range---
0 to FF (hexadecimal)
Set the code in hexadecimal, which does not duplicate the existing EIA codes, for the special code "!".
When output with EIA code, data can be output using the alternate code in which the special ISO code, not included in EIA, is specified.
---Setting range---
0 to FF (hexadecimal)
Set the device name corresponding to the device No.
Set a simple name for quick identification.
---Setting range---
Use three or less characters consisting of alphabet characters, numerals and symbols.
Select the serial communication speed.
0: 19200 (bps)
1: 9600
2: 4800
3: 2400
4: 1200
5: 600
6: 300
7: 110
Select the stop bit length used in the start-stop system.
Refer to "#9204 DEV1 PARITY CHECK". At the output of data, the number of characters is always adjusted for the parity check.
1: 1 (bit)
2: 1.5
3: 2
Select whether to add a parity check bit to the data.
Set this parameter in accordance with the I/O device specifications.
0: Not add a parity bit at the input/output
1: Add a parity bit at the input/output
Select odd or even when parity is added to the data. This parameter is ignored when no parity is added.
0: Odd parity
1: Even parity
#9127 DEV0 EIA CODE $
#9128 DEV0 EIA CODE !
#9201 DEV1 DEVICE NAME
#9202 DEV1 BAUD RATE
#9203 DEV1 STOP BIT
#9204 DEV1 PARITY CHECK
#9205 DEV1 EVEN PARITY
Start bit Data bit Parity bit Stop bit
1character ON
OFF b1 b2 b3 b4 b5 b6 bn

Set the length of the data bit.
Refer to "#9204 DEV1 PARITY CHECK".
0: 5 (bit)
1: 6
2: 7 (NC connection not supported)
3: 8
Select the code to terminate data reading.
0, 3: EOR
1, 2: EOB or EOR
* When M800W display side serial port is selected
0: No terminator
1: EOR
2: EOB
3: EOB or EOR
Select the transmission control method.
No handshaking will be used when a value except 1 to 3 is set.
1: RTS/CTS method
2: No handshaking
3: DC code method
Select the DC code type when the DC code method is selected.
0: Not add parity to DC code. (DC3 = 13H)
1: Add parity to DC code. (DC3 = 93H)
Select the DC code handling when outputting data to the output device.
DC2 / DC4
0: None / None
1: Yes / None
2: None / Yes
3: Yes / Yes
Select whether to add the (CR) code just before the EOB (L/F) code during output.
0: Not add
1: Add
Select ISO or EIA code for data output.
In data input mode, the ISO and EIA codes are identified automatically.
0: ISO code output
1: EIA code output
Set the length of the tape feed to be output at the start and end of the data during tape output.
---Setting range---
0 to 999 (characters)
#9206 DEV1 CHR. LENGTH
#9207 DEV1 TERMINATR TYP
#9208 DEV1 HAND SHAKE
#9209 DEV1 DC CODE PRTY
#9211 DEV1 DC2/4 OUTPUT
#9212 DEV1 CR OUTPUT
#9213 DEV1 EIA OUTPUT
#9214 DEV1 FEED CHR.

Select whether to perform the parity check for the number of characters in a block at the input of data.
At the output of data, the number of characters is always adjusted for the parity check.
0: Not perform parity V check
1: Perform parity V check
Set the time out time to detect an interruption in communication.
Time out check will not be executed when set to "0".
---Setting range---
0 to 30 (s)
Select whether to enable the DR data check in data I/O mode.
0: Enable
1: Disable
Select the code of the output data.
0: ISO/EIA code
(Depends on whether #9113, #9213, #9313, #9413 or #9513 EIA output parameter is set up.)
1: ASCII code
Select the mode for input (verification).
0: Standard input (Data from the very first EOB is handled as significant information.)
1: EOBs following the first EOB of the input data are skipped until data other than EOB is input.
Select the buffer size of the output data which is output to output device using NC side serial port.
If the output device has a transmission error (overrun error), decrease the buffer size with this parameter.
If the buffer size is decreased, output time will prolong according to the size.
0: 250 bytes (default)
1: 1 byte
2: 4 bytes
3: 8 bytes
4: 16 bytes
5: 64 bytes
Set the code in hexadecimal, which does not duplicate the existing EIA codes, for the special code " [".
When output with EIA code, data can be output using the alternate code in which the special ISO code, not included in EIA, is specified.
---Setting range---
0 to FF (hexadecimal)
Set the code in hexadecimal, which does not duplicate the existing EIA codes, for the special code "] ".
When output with EIA code, data can be output using the alternate code in which the special ISO code, not included in EIA, is specified.
---Setting range---
0 to FF (hexadecimal)
#9215 DEV1 PARITY V
#9216 DEV1 TIME-OUT (sec)

#9217 DEV1 DR OFF
#9218 DEV1 DATA ASCII
#9219 DEV1 INPUT TYPE
#9220 DEV1 OUT BUFFER
#9221 DEV1 EIA CODE [
#9222 DEV1 EIA CODE]

Set the code in hexadecimal, which does not duplicate the existing EIA codes, for the special code "#". When output with EIA code, data can be output using the alternate code in which the special ISO code, not included in EIA, is specified.
---Setting range---
0 to FF (hexadecimal)
Set the code in hexadecimal, which does not duplicate the existing EIA codes, for the special code "*". When output with EIA code, data can be output using the alternate code in which the special ISO code, not included in EIA, is specified.
---Setting range---
0 to FF (hexadecimal)
Set the code in hexadecimal, which does not duplicate the existing EIA codes, for the special code "=". When output with EIA code, data can be output using the alternate code in which the special ISO code, not included in EIA, is specified.
---Setting range---
0 to FF (hexadecimal)
Set the code in hexadecimal, which does not duplicate the existing EIA codes, for the special code ":". When output with EIA code, data can be output using the alternate code in which the special ISO code, not included in EIA, is specified.
---Setting range---
0 to FF (hexadecimal)
Set the code in hexadecimal, which does not duplicate the existing EIA codes, for the special code "$". When output with EIA code, data can be output using the alternate code in which the special ISO code, not included in EIA, is specified.
---Setting range---
0 to FF (hexadecimal)
Set the code in hexadecimal, which does not duplicate the existing EIA codes, for the special code "!". When output with EIA code, data can be output using the alternate code in which the special ISO code, not included in EIA, is specified.
---Setting range---
0 to FF (hexadecimal)
Set the device name corresponding to the device No.
Set a simple name for quick identification.
---Setting range---
Use three or less characters consisting of alphabet characters, numerals and symbols.
#9223 DEV1 EIA CODE #
#9224 DEV1 EIA CODE *
#9225 DEV1 EIA CODE =
#9226 DEV1 EIA CODE:
#9227 DEV1 EIA CODE $
#9228 DEV1 EIA CODE !
#9301 DEV2 DEVICE NAME

Select the serial communication speed.
0: 19200 (bps)
1: 9600
2: 4800
3: 2400
4: 1200
5: 600
6: 300
7: 110
Select the stop bit length used in the start-stop system.
Refer to "#9304 DEV2 PARITY CHECK". At the output of data, the number of characters is always adjusted for the parity check.
1: 1 (bit)
2: 1.5
3: 2
Select whether to add a parity check bit to the data.
Set this parameter in accordance with the I/O device specifications.
0: Not add a parity bit at the input/output
1: Add a parity bit at the input/output
Select odd or even when parity is added to the data. This parameter is ignored when no parity is added.
0: Odd parity
1: Even parity
Set the length of the data bit.
Refer to "#9304 DEV2 PARITY CHECK".
0: 5 (bit)
1: 6
2: 7 (NC connection not supported)
3: 8
Select the code to terminate data reading.
0, 3: EOR
1, 2: EOB or EOR
* When M800W display side serial port is selected
0: No terminator
1: EOR
2: EOB

3: EOB or EOR
#9302 DEV2 BAUD RATE
#9303 DEV2 STOP BIT
#9304 DEV2 PARITY CHECK
#9305 DEV2 EVEN PARITY
#9306 DEV2 CHR. LENGTH
#9307 DEV2 TERMINATR TYP
Start bit Data bit Parity bit Stop bit
1character ON
OFF b1 b2 b3 b4 b5 b6 bn

Select the transmission control method.
No handshaking will be used when a value except 1 to 3 is set.
1: RTS/CTS method
2: No handshaking
3: DC code method
Select the DC code type when the DC code method is selected.
0: Not add parity to DC code. (DC3 = 13H)
1: Add parity to DC code. (DC3 = 93H)
Select the DC code handling when outputting data to the output device.
DC2 / DC4
0: None / None
1: Yes / None
2: None / Yes
3: Yes / Yes
Select whether to add the (CR) code just before the EOB (L/F) code during output.
0: Not add
1: Add
Select ISO or EIA code for data output.
In data input mode, the ISO and EIA codes are identified automatically.
0: ISO code output
1: EIA code output
Set the length of the tape feed to be output at the start and end of the data during tape output.
---Setting range---
0 to 999 (characters)
Select whether to perform the parity check for the number of characters in a block at the input of data.
At the output of data, the number of characters is always adjusted for the parity check.
0: Not perform parity V check
1: Perform parity V check
Set the time out time to detect an interruption in communication.
Time out check will not be executed when set to "0".
---Setting range---
0 to 30 (s)
Select whether to enable the DR data check in data I/O mode.
0: Enable
1: Disable
Select the code of the output data.
0: ISO/EIA code
(Depends on whether #9113, #9213, #9313, #9413 or #9513 EIA output parameter is set up.)
1: ASCII code
#9308 DEV2 HAND SHAKE
#9309 DEV2 DC CODE PRTY
#9311 DEV2 DC2/4 OUTPUT
#9312 DEV2 CR OUTPUT
#9313 DEV2 EIA OUTPUT
#9314 DEV2 FEED CHR.
#9315 DEV2 PARITY V
#9316 DEV2 TIME-OUT (sec)
#9317 DEV2 DR OFF
#9318 DEV2 DATA ASCII

Select the mode for input (verification).
0: Standard input (Data from the very first EOB is handled as significant information.)
1: EOBs following the first EOB of the input data are skipped until data other than EOB is input.
Select the buffer size of the output data which is output to output device using NC side serial port.
If the output device has a transmission error (overrun error), decrease the buffer size with this parameter.
If the buffer size is decreased, output time will prolong according to the size.
0: 250 bytes (default)
1: 1 byte
2: 4 bytes
3: 8 bytes
4: 16 bytes
5: 64 bytes
Set the code in hexadecimal, which does not duplicate the existing EIA codes, for the special code " [".
When output with EIA code, data can be output using the alternate code in which the special ISO code, not included in EIA, is specified.
---Setting range---
0 to FF (hexadecimal)
Set the code in hexadecimal, which does not duplicate the existing EIA codes, for the special code "] ".
When output with EIA code, data can be output using the alternate code in which the special ISO code, not included in EIA, is specified.
---Setting range---
0 to FF (hexadecimal)
Set the code in hexadecimal, which does not duplicate the existing EIA codes, for the special code "#".

When output with EIA code, data can be output using the alternate code in which the special ISO code, not included in EIA, is specified.
---Setting range---
0 to FF (hexadecimal)
Set the code in hexadecimal, which does not duplicate the existing EIA codes, for the special code "*".
When output with EIA code, data can be output using the alternate code in which the special ISO code, not included in EIA, is specified.
---Setting range---
0 to FF (hexadecimal)
Set the code in hexadecimal, which does not duplicate the existing EIA codes, for the special code "=".
When output with EIA code, data can be output using the alternate code in which the special ISO code, not included in EIA, is specified.
---Setting range---
0 to FF (hexadecimal)
Set the code in hexadecimal, which does not duplicate the existing EIA codes, for the special code ":".
When output with EIA code, data can be output using the alternate code in which the special ISO code, not included in EIA, is specified.
---Setting range---
0 to FF (hexadecimal)
#9319 DEV2 INPUT TYPE
#9320 DEV2 OUT BUFFER
#9321 DEV2 EIA CODE [
#9322 DEV2 EIA CODE]
#9323 DEV2 EIA CODE #
#9324 DEV2 EIA CODE *
#9325 DEV2 EIA CODE =
#9326 DEV2 EIA CODE:

Set the code in hexadecimal, which does not duplicate the existing EIA codes, for the special code "$".
When output with EIA code, data can be output using the alternate code in which the special ISO code, not included in EIA, is specified.
---Setting range---
0 to FF (hexadecimal)
Set the code in hexadecimal, which does not duplicate the existing EIA codes, for the special code "!".
When output with EIA code, data can be output using the alternate code in which the special ISO code, not included in EIA, is specified.
---Setting range---
0 to FF (hexadecimal)
Set the device name corresponding to the device No.
Set a simple name for quick identification.
---Setting range---
Use three or less characters consisting of alphabet characters, numerals and symbols.
Select the serial communication speed.
0: 19200 (bps)
1: 9600
2: 4800
3: 2400
4: 1200
5: 600
6: 300
7: 110
Select the stop bit length used in the start-stop system.
Refer to "#9404 DEV3 PARITY CHECK". At the output of data, the number of characters is always adjusted for the parity check.
1: 1 (bit)
2: 1.5
3: 2
Select whether to add a parity check bit to the data.
Set this parameter in accordance with the I/O device specifications.
0: Not add a parity bit at the input/output
1: Add a parity bit at the input/output
Select odd or even when parity is added to the data. This parameter is ignored when no parity is added.
0: Odd parity
1: Even parity
#9327 DEV2 EIA CODE $
#9328 DEV2 EIA CODE !
#9401 DEV3 DEVICE NAME
#9402 DEV3 BAUD RATE
#9403 DEV3 STOP BIT
#9404 DEV3 PARITY CHECK
#9405 DEV3 EVEN PARITY
Start bit Data bit Parity bit Stop bit
1character ON
OFF b1 b2 b3 b4 b5 b6 bn

Set the length of the data bit.
Refer to "#9404 DEV3 PARITY CHECK".
0: 5 (bit)
1: 6
2: 7 (NC connection not supported)
3: 8
Select the code to terminate data reading.
0, 3: EOR
1, 2: EOB or EOR

Select the transmission control method.
No handshaking will be used when a value except 1 to 3 is set.
1: RTS/CTS method
2: No handshaking
3: DC code method
Select the DC code type when the DC code method is selected.
0: Not add parity to DC code. (DC3 = 13H)
1: Add parity to DC code. (DC3 = 93H)
Select the DC code handling when outputting data to the output device.
DC2 / DC4
0: None / None
1: Yes / None
2: None / Yes
3: Yes / Yes
Select whether to add the (CR) code just before the EOB (L/F) code during output.
0: Not add
1: Add
Select ISO or EIA code for data output.
In data input mode, the ISO and EIA codes are identified automatically.
0: ISO code output
1: EIA code output
Set the length of the tape feed to be output at the start and end of the data during tape output.
---Setting range---
0 to 999 (characters)
Select whether to perform the parity check for the number of characters in a block at the input of data.
At the output of data, the number of characters is always adjusted for the parity check.
0: Not perform parity V check
1: Perform parity V check
#9406 DEV3 CHR. LENGTH
#9407 DEV3 TERMINATR TYP
#9408 DEV3 HAND SHAKE
#9409 DEV3 DC CODE PRTY
#9411 DEV3 DC2/4 OUTPUT
#9412 DEV3 CR OUTPUT
#9413 DEV3 EIA OUTPUT
#9414 DEV3 FEED CHR.
#9415 DEV3 PARITY V

Set the time out time to detect an interruption in communication.
Time out check will not be executed when set to "0".
---Setting range---
0 to 30 (s)
Select whether to enable the DR data check in data I/O mode.
0: Enable
1: Disable
Select the code of the output data.
0: ISO/EIA code
(Depends on whether #9113, #9213, #9313, #9413 or #9513 EIA output parameter is set up.)
1: ASCII code
Select the mode for input (verification).
0: Standard input (Data from the very first EOB is handled as significant information.)
1: EOBs following the first EOB of the input data are skipped until data other than EOB is input.
Select the buffer size of the output data which is output to output device using NC side serial port.
If the output device has a transmission error (overrun error), decrease the buffer size with this parameter.
If the buffer size is decreased, output time will prolong according to the size.
0: 250 bytes (default)
1: 1 byte
2: 4 bytes
3: 8 bytes
4: 16 bytes
5: 64 bytes
Set the code in hexadecimal, which does not duplicate the existing EIA codes, for the special code " [".
When output with EIA code, data can be output using the alternate code in which the special ISO code, not included in EIA, is specified.
---Setting range---
0 to FF (hexadecimal)
Set the code in hexadecimal, which does not duplicate the existing EIA codes, for the special code "] ".
When output with EIA code, data can be output using the alternate code in which the special ISO code, not included in EIA, is specified.
---Setting range---
0 to FF (hexadecimal)
Set the code in hexadecimal, which does not duplicate the existing EIA codes, for the special code "#".
When output with EIA code, data can be output using the alternate code in which the special ISO code, not included in EIA, is specified.
---Setting range---
0 to FF (hexadecimal)
#9416 DEV3 TIME-OUT (sec)
#9417 DEV3 DR OFF
#9418 DEV3 DATA ASCII
#9419 DEV3 INPUT TYPE
#9420 DEV3 OUT BUFFER
#9421 DEV3 EIA CODE [
#9422 DEV3 EIA CODE]
#9423 DEV3 EIA CODE #

Set the code in hexadecimal, which does not duplicate the existing EIA codes, for the special code "*".
When output with EIA code, data can be output using the alternate code in which the special ISO code, not included in EIA, is specified.
---Setting range---
0 to FF (hexadecimal)
Set the code in hexadecimal, which does not duplicate the existing EIA codes, for the special code "=".
When output with EIA code, data can be output using the alternate code in which the special ISO code, not included in EIA, is specified.
---Setting range---
0 to FF (hexadecimal)
Set the code in hexadecimal, which does not duplicate the existing EIA codes, for the special code ":".
When output with EIA code, data can be output using the alternate code in which the special ISO code, not included in EIA, is specified.
---Setting range---
0 to FF (hexadecimal)
Set the code in hexadecimal, which does not duplicate the existing EIA codes, for the special code "$".
When output with EIA code, data can be output using the alternate code in which the special ISO code, not included in EIA, is specified.
---Setting range---
0 to FF (hexadecimal)
Set the code in hexadecimal, which does not duplicate the existing EIA codes, for the special code "!".
When output with EIA code, data can be output using the alternate code in which the special ISO code, not included in EIA, is specified.
---Setting range---
0 to FF (hexadecimal)
Set the device name corresponding to the device No.
Set a simple name for quick identification.
---Setting range---
Use three or less characters consisting of alphabet characters, numerals and symbols.
Select the serial communication speed.
0: 19200 (bps)
1: 9600
2: 4800
3: 2400
4: 1200
5: 600
6: 300
7: 110
#9424 DEV3 EIA CODE *
#9425 DEV3 EIA CODE =
#9426 DEV3 EIA CODE:
#9427 DEV3 EIA CODE $
#9428 DEV3 EIA CODE !
#9501 DEV4 DEVICE NAME
#9502 DEV4 BAUD RATE

Select the stop bit length used in the start-stop system.
Refer to "#9504 DEV4 PARITY CHECK". At the output of data, the number of characters is always adjusted for the parity check.
1: 1 (bit)
2: 1.5
3: 2
Select whether to add a parity check bit to the data.
Set this parameter in accordance with the I/O device specifications.
0: Not add a parity bit at the input/output
1: Add a parity bit at the input/output
Select odd or even when parity is added to the data. This parameter is ignored when no parity is added.
0: Odd parity
1: Even parity
Set the length of the data bit.
Refer to "#9504 DEV4 PARITY CHECK".
0: 5 (bit)
1: 6
2: 7 (NC connection not supported)
3: 8
Select the code to terminate data reading.
0, 3: EOR
1, 2: EOB or EOR
Select the transmission control method.
No handshaking will be used when a value except 1 to 3 is set.
1: RTS/CTS method
2: No handshaking
3: DC code method
Select the DC code type when the DC code method is selected.
0: Not add parity to DC code. (DC3 = 13H)
1: Add parity to DC code. (DC3 = 93H)
#9503 DEV4 STOP BIT
#9504 DEV4 PARITY CHECK
#9505 DEV4 EVEN PARITY
#9506 DEV4 CHR. LENGTH
#9507 DEV4 TERMINATR TYP
#9508 DEV4 HAND SHAKE
#9509 DEV4 DC CODE PRTY
Start bit Data bit Parity bit Stop bit
1character ON

OFF b1 b2 b3 b4 b5 b6 bn

Select the DC code handling when outputting data to the output device.
DC2 / DC4
0: None / None
1: Yes / None
2: None / Yes
3: Yes / Yes
Select whether to add the (CR) code just before the EOB (L/F) code during output.
0: Not add
1: Add
Select ISO or EIA code for data output.
In data input mode, the ISO and EIA codes are identified automatically.
0: ISO code output
1: EIA code output
Set the length of the tape feed to be output at the start and end of the data during tape output.
---Setting range---
0 to 999 (characters)
Select whether to perform the parity check for the number of characters in a block at the input of data.
At the output of data, the number of characters is always adjusted for the parity check.
0: Not perform parity V check
1: Perform parity V check
Set the time out time to detect an interruption in communication.
Time out check will not be executed when set to "0".
---Setting range---
0 to 30 (s)
Select whether to enable the DR data check in data I/O mode.
0: Enable
1: Disable
Select the code of the output data.
0: ISO/EIA code
(Depends on whether #9113, #9213, #9313, #9413 or #9513 EIA output parameter is set up.)
1: ASCII code
Select the mode for input (verification).
0: Standard input (Data from the very first EOB is handled as significant information.)
1: EOBs following the first EOB of the input data are skipped until data other than EOB is input.
#9511 DEV4 DC2/4 OUTPUT
#9512 DEV4 CR OUTPUT
#9513 DEV4 EIA OUTPUT
#9514 DEV4 FEED CHR.
#9515 DEV4 PARITY V
#9516 DEV4 TIME-OUT (sec)
#9517 DEV4 DR OFF
#9518 DEV4 DATA ASCII
#9519 DEV4 INPUT TYPE

Select the buffer size of the output data which is output to output device using NC side serial port.
If the output device has a transmission error (overrun error), decrease the buffer size with this parameter.
If the buffer size is decreased, output time will prolong according to the size.
0: 250 bytes (default)
1: 1 byte
2: 4 bytes
3: 8 bytes
4: 16 bytes
5: 64 bytes
Set the code in hexadecimal, which does not duplicate the existing EIA codes, for the special code " [".
When output with EIA code, data can be output using the alternate code in which the special ISO code, not included in EIA, is specified.
---Setting range---
0 to FF (hexadecimal)
Set the code in hexadecimal, which does not duplicate the existing EIA codes, for the special code "] ".
When output with EIA code, data can be output using the alternate code in which the special ISO code, not included in EIA, is specified.
---Setting range---
0 to FF (hexadecimal)
Set the code in hexadecimal, which does not duplicate the existing EIA codes, for the special code "#".
When output with EIA code, data can be output using the alternate code in which the special ISO code, not included in EIA, is specified.
---Setting range---
0 to FF (hexadecimal)
Set the code in hexadecimal, which does not duplicate the existing EIA codes, for the special code "*".
When output with EIA code, data can be output using the alternate code in which the special ISO code, not included in EIA, is specified.
---Setting range---
0 to FF (hexadecimal)
Set the code in hexadecimal, which does not duplicate the existing EIA codes, for the special code "=".
When output with EIA code, data can be output using the alternate code in which the special ISO code, not included in EIA, is specified.
---Setting range---
0 to FF (hexadecimal)
Set the code in hexadecimal, which does not duplicate the existing EIA codes, for the special code ":".
When output with EIA code, data can be output using the alternate code in which the special ISO code, not included in EIA, is specified.
---Setting range---

0 to FF (hexadecimal)
#9520 DEV4 OUT BUFFER
#9521 DEV4 EIA CODE [
#9522 DEV4 EIA CODE]
#9523 DEV4 EIA CODE #
#9524 DEV4 EIA CODE *
#9525 DEV4 EIA CODE =
#9526 DEV4 EIA CODE:

Set the code in hexadecimal, which does not duplicate the existing EIA codes, for the special code "$".
When output with EIA code, data can be output using the alternate code in which the special ISO code, not included in EIA, is specified.
---Setting range---
0 to FF (hexadecimal)
Set the code in hexadecimal, which does not duplicate the existing EIA codes, for the special code "!".
When output with EIA code, data can be output using the alternate code in which the special ISO code, not included in EIA, is specified.
---Setting range---
0 to FF (hexadecimal)
#9527 DEV4 EIA CODE $
#9528 DEV4 EIA CODE !

14.6 Axis Parameters
Select the manual reference position return method for the second return (after the coordinate system is es tablished) and later.
The initial reference position return after the power ON is performed with dog-type return, and the coordinate system will be established.
(This setting is not required when the absolute position detection is used.)
0: High speed return
1: Dog-type
Select the function to remove the control axis from the control target.
0: Control as normal.
1: Remove from control target.
Select whether to enable the stored stroke limit II function set in #8204 and #8205.
0: Enable
1: Disable
When the simple absolute position method ("#2049 type" is "9") is selected, the stored stroke limits I, II (or IIB) and IB can be disabled until the first reference position return is executed after the power is turned ON.
0: Enable (according to #8202)
1: Temporarily cancel
(Note) "#8203 OT-CHECK-CANCEL" affects all the stored stroke limits.
Set the coordinates of the (-) direction in the movable range of the stored stroke limit II or the lower limit co ordinates of the prohibited range of stored stroke limit IIB.
If the sign and value are the same as #8205, the stored stroke limit II (or IIB) will be invalid.
If the stored stroke limit IIB function is selected, the prohibited range will be between two points even when #8204 and #8205 are set in reverse. When II is selected, the entire range will be prohibited if #8204 and #8205 are set in reverse.
---Setting range---
-99999.999 to 99999.999 (mm)
Set the coordinates of the (+) direction in the movable range of the stored stroke limit II or the upper limit coordinates of the prohibited range of stored stroke limit IIB.
---Setting range---
-99999.999 to 99999.999 (mm)
Set the coordinates of the tool change position for G30. n (tool change position return).
Set with coordinates in the basic machine coordinate system.
---Setting range---
-99999.999 to 99999.999 (mm)
Select whether to enable the shift operation at G76 (fine boring) and G87 (back boring).
0: Shift effective
1: No shift
#1063 mandog Manual dog-type
#8201 AX. RELEASE
#8202 OT-CHECK OFF
#8203 OT-CHECK-CANCEL
#8204 OT-CHECK-N
#8205 OT-CHECK-P
#8206 TOOL CHG. P
#8207 G76/87 IGNR (for M system only)

Select the shift direction at G76 and G87.
0: Shift to (+) direction
1: Shift to (-) direction
Set the last positioning direction and distance for a G60 (unidirectional positioning) command.
---Setting range---
-99999.999 to 99999.999 (mm)
Select whether the stored stoke limit function set by #8204 and #8205 prevents the machine from moving to the inside or outside of the specified range.
0: Inhibits outside area (Select stored stroke limit II.)
1: Inhibits inside area (Select stored stroke limit IIB.)
Select whether to enable the parameter mirror image function.
0: Disable
1: Enable
Select the rotation type (short-cut valid/invalid) or linear type (workpiece coordinate linear type/all coordinate linear type).

This parameter is enabled only when "#1017 rot" is set to "1". (Note)
0: Short-cut invalid
1: Short-cut valid
2: Workpiece coordinate linear type
3: All coordinate linear type
(Note) The movement method is as follows by the specified rotation axis type.
<Workpiece coordinate value>
0, 1: Display range 0 to 359.999
2, 3: Display range 0 to 99999.999
<Machine coordinate value/relative position>
0, 1, 2: Display range 0 to 359.999
3: Display range 0 to 99999.999
<ABS command>
0: The incremental amount from the end point to the current position is divided by 360, and the axis moves by the remainder amount according to the sign.
1: Moves with a short-cut to the end point.
2, 3: In the same manner as the normal linear axis, moves according to the sign by the amount obtained by subtracting the current position from the end point.
<INC command>
0, 1, 2, 3: Moves in the direction of the commanded sign by the commanded incremental amount starting at the current position.
<Reference position return>
0, 1, 2: The movement to the middle point applies to the ABS command or the INC command.
Returns with movement within 360 degrees from the middle point to reference position.
3: The movement to the middle point applies to the ABS command or the INC command.
Moves and returns in the reference position direction for the difference from the current position to the ref erence position.
#8208 G76/87 (-) (for M system only)
#8209 G60 SHIFT (for M system only)
#8210 OT INSIDE
#8211 MIRR. IMAGE
(PR) #8213 Rotation axis type

Set the TLM standard length.
TLM standard length is the distance from a tool replacement point (reference position) to the measurement basic point (surface) which is used to measure the tool length.
(The same value as "#2016 tlml+" will be reflected. When either setting changes, the other will change ac cordingly.)
---Setting range---
-99999.999 to 99999.999 (mm)
Select the performance after establishing the reference position in reference position return command.
0: Moves to the reference position.
1: Won't move to the reference position.
Set a drawing start position in graphic check of each axis.
Set a distance from actual machine position by an incremental value.
When "0" is set, an actual machine position will be regarded as a start point in graphic check.
---Setting range---
-99999.999 to 99999.999 (mm)
Set in which direction and how much the tool escapes when the operation is halted during direct command mode. (Radius value)
The tool does not escape when "0" is set.
---Setting range---
-99999.999 to 99999.999 (mm)
Set the retract amount using the radius value when the Hob retract amount selection signal is OFF. (Radius value)
Retract is carried out in the negative direction if a negative value is set.
---Setting range---
-99999.999 to 99999.999 (mm)
Set the retract amount using the radius value when the Hob retract amount selection signal is ON. (Radius value)
Retract is carried out in the negative direction if a negative value is set.
---Setting range---
-99999.999 to 99999.999 (mm)
Set the retract speed during hobbing.
---Setting range---
1 to 1000000 (mm/min)
Current position display range
Select the display range of the current position.
0: 0 to 359.999 deg
1: -99999.999 to 99999.999 deg
Workpiece coordinate position displayed right after automatic reference position return
Select whether to apply a range of 0 to 360 degrees to the workpiece coordinate position displayed right after automatic reference position return if the said position is out of the range of 0 to 360 degrees.
0: Display the position in a range of 0 to 360 degrees
1: Not display the position in a range of 0 to 360 degrees
#8215 TLM std length
#8216 Type in G28 return
#8217 Check start point
#8218 Dir cmd retrct amt
#8219 Hob retract amount 1
#8220 Hob retract amount 2
#8221 Hob retract speed
(PR) #8224 Posn display range
(PR) #8225 Wk coord at R ret.

Workpiece position check

Select whether to check a difference of workpiece coordinate position between when NC is reset and when
program operation is started, when both High-speed simple program check mode ON (X712) and High speed simple program check: Coordinate position check ON (X713) are set to ON.
0: Disable the check
1: Enable the check
Machine position check
Select whether to check a difference of machine coordinate command position between when NC is reset
and when program operation is started, when both High-speed simple program check mode ON (X712) and
High-speed simple program check: Coordinate position check ON (X713) are set to ON.
0: Disable the check
1: Enable the check
#8226 Wk position check
#8227 Machine posn check

14.7 Ethernet Parameters
Set the main CPU's IP address.
Set the NC IP address seen from an external source.
---Setting range---
Set these parameters in accordance with the network rules in the connection environment.
Set the subnet mask for the IP address.
---Setting range---
Set these parameters in accordance with the network rules in the connection environment.
Set the IP address for the gateway.
---Setting range---
Set these parameters in accordance with the network rules in the connection environment.
Set the HMI side CPU's IP address.
---Setting range---
Set these parameters in accordance with the network rules in the connection environment.
Set the HMI side CPU's subnet mask.
---Setting range---
Set these parameters in accordance with the network rules in the connection environment.
Specify the IP address of the file server (NFS server).
If "0.0.0.0" is set in this parameter, network drive (NET1) cannot be used (disabled).
---Setting range---
0.0.0.0 to 255.255.255.255
Specify the IP address of the file server (NFS server).
If "0.0.0.0" is set in this parameter, network drive (NET2) cannot be used (disabled).
---Setting range---
0.0.0.0 to 255.255.255.255
Specify the IP address of the file server (NFS server).
If "0.0.0.0" is set in this parameter, network drive (NET3) cannot be used (disabled).
---Setting range---
0.0.0.0 to 255.255.255.255
Specify the IP address of the file server (NFS server).
If "0.0.0.0" is set in this parameter, network drive (NET4) cannot be used (disabled).
---Setting range---
0.0.0.0 to 255.255.255.255
(PR) #1926 Global IP address IP address
(PR) #1927 Global Subnet mask Subnet mask
(PR) #1928 Global Gateway Gateway
(PR) #1934 Local IP address
(PR) #1935 Local Subnet mask
(PR) #1937 NET1 IP Address NET1 IP address
(PR) #1938 NET2 IP Address NET2 IP address
(PR) #1939 NET3 IP Address NET3 IP address
(PR) #1940 NET4 IP Address NET4 IP address

Files stored on file server are managed based on the system time (GMT: Greenwich Mean Time).
This parameter is used to specify the correction time for converting the time obtained through custom API
library from the system time basis to local time basis.
When this parameter is set to 0, the NC determines the correction time based on the language selected by
"#1043 lang".
---Setting range---
-12 to 12 [hour]
Specify the IP address on the non-Windows-based display unit (LAN1) side.
---Setting range---
Set these parameters in accordance with the network rules in the connection environment.
Specify the IP address of subnet mask on the non-Windows-based display unit (LAN1) side.
---Setting range---
Set these parameters in accordance with the network rules in the connection environment.
Specify the gateway IP address on the non-Windows-based display unit (LAN1) side.
---Setting range---
Set these parameters in accordance with the network rules in the connection environment.
The IP address is automatically assigned from the server.
0: Manual setting
1: Automatic setting
(Note) When the automatic setting is selected, "#11005 PC IP address, PC Subnet, PC Gateway" will be in valid.
Select the No. of the host to be used from host 1 to host 4.
---Setting range---
1 to 4: Host No.
Set the host computer name.
This parameter allows the NC to easily recognize the host computer on the network. Set the host computer's
name (name registered in C:\windows\hosts) or the IP address.
<Setting example>
For host name: mspc160

For IP address: 150.40.0.111
(Note) Set the host computer's TCP/IP address if communication is not carried out correctly.
---Setting range---
15 characters (alphanumeric) or less
Set the user name when logging into the host computer.
---Setting range---
15 characters (alphanumeric) or less
#1941 Local time compen Local time correction
(PR) #1953 Intra IP address IP address on non-Windows-based display unit (LAN1)
side
(PR) #1954 Intra Subnet mask Subnet mask on non-Windows-based display unit
(LAN1) side
(PR) #1955 Intra Gateway Gateway on non-Windows-based display unit (LAN1)
side
(PR) #9701 IP addr auto set
#9706 Host No.
#9711 Host1 host name
#9712 Host1 user name

Set the password when logging into the host computer.
---Setting range---
15 characters (alphanumeric) or less
Set the directory name of the host computer.
The directory released to the client (NC unit) with the host computer's server is handled as the root directory
by the NC unit.
---Setting range---
31 characters (alphanumeric) or less
Select the type of the host computer.
0: UNIX/PC automatic judgment
1: UNIX
2: PC (DOS)
(Note) When "0" is set, the settings for the following parameters will be invalid.
- #9716 Wrd pos: name
- #9717 Wrd pos: size
- #9718 Wrd pos: Dir
- #9719 Wrd pos: cmnt
- #9720 Wrd num: cmnt
Set the file name display position (nth word from left) of the list displayed when the ftp command "dir" is ex ecuted.
(Note) One word designates a character string divided by one or more spaces.
---Setting range---
0 to 100
0: Default value
Set the size display position (nth word from left) of the list displayed when the ftp command "dir" is executed.
(Note) One word designates a character string divided by one or more spaces.
---Setting range---
0 to 100
0: Default value
Set the <DIR> display position (nth word from left) of the list displayed when the ftp command "dir" is execut ed.
(Note) One word designates a character string divided by one or more spaces.
---Setting range---
0 to 100
0: Default value
#9713 Host1 password
#9714 Host1 directory
#9715 Host1 host type
#9716 Host 1 Wrd pos: name
#9717 Host 1 Wrd pos: size
#9718 Host 1 Wrd pos: Dir

Set the comment (date, time, etc.) display position (nth word from left) of the list displayed when the ftp com mand "dir" is executed.
(Note) One word designates a character string divided by one or more spaces.
---Setting range---
0 to 100
0: Default value
Set the number of words to be displayed as a comment.
(Note) One word designates a character string divided by one or more spaces.
---Setting range---
0 to 100
0: Default value
Set whether to display the total number of characters registered in the machining programs of host1 when
displaying the file list.
If there are many files in the directory to be referred to, the list can be updated quickly by setting "1".
0: Display
1: Not display
Set the host computer name.
This parameter allows the NC to easily recognize the host computer on the network. Set the host computer's
name (name registered in C:\windows\hosts) or the IP address.
<Setting example>
For host name: mspc160
For IP address: 150.40.0.111
(Note) Set the host computer's TCP/IP address if communication is not carried out correctly.
---Setting range---
15 characters (alphanumeric) or less
Set the user name when logging into the host computer.

---Setting range---
15 characters (alphanumeric) or less
Set the password when logging into the host computer.
---Setting range---
15 characters (alphanumeric) or less
Set the directory name of the host computer.
The directory released to the client (NC unit) with the host computer's server is handled as the root directory
by the NC unit.
---Setting range---
31 characters (alphanumeric) or less
#9719 Host 1 Wrd pos: cmnt
#9720 Host 1 Wrd num: cmnt
#9721 Host 1 no total siz
#9731 Host2 host name
#9732 Host2 user name
#9733 Host2 password
#9734 Host2 directory

Select the type of the host computer.
0: UNIX/PC automatic judgment
1: UNIX
2: PC (DOS)
(Note) When "0" is set, the settings for the following parameters will be invalid.
- #9736 Wrd pos: name
- #9737 Wrd pos: size
- #9738 Wrd pos: Dir
- #9739 Wrd pos: cmnt
- #9740 Wrd num: cmnt
Set the file name display position (nth word from left) of the list displayed when the ftp command "dir" is ex ecuted.
(Note) One word designates a character string divided by one or more spaces.
---Setting range---
0 to 100
0: Default value
Set the size display position (nth word from left) of the list displayed when the ftp command "dir" is executed.
(Note) One word designates a character string divided by one or more spaces.
---Setting range---
0 to 100
0: Default value
Set the <DIR> display position (nth word from left) of the list displayed when the ftp command "dir" is execut ed.
(Note) One word designates a character string divided by one or more spaces.
---Setting range---
0 to 100
0: Default value
Set the comment (date, time, etc.) display position (nth word from left) of the list displayed when the ftp com mand "dir" is executed.
(Note) One word designates a character string divided by one or more spaces.
---Setting range---
0 to 100
0: Default value
Set the number of words to be displayed as a comment.
(Note) One word designates a character string divided by one or more spaces.
---Setting range---
0 to 100
0: Default value
#9735 Host2 host type
#9736 Host 2 Wrd pos: name
#9737 Host 2 Wrd pos: size
#9738 Host 2 Wrd pos: Dir
#9739 Host 2 Wrd pos: cmnt
#9740 Host 2 Wrd num: cmnt

Set whether to display the total number of characters registered in the machining programs of host1 when
displaying the file list.
If there are many files in the directory to be referred to, the list can be updated quickly by setting "1".
0: Display
1: Not display
Set the host computer name.
This parameter allows the NC to easily recognize the host computer on the network. Set the host computer's
name (name registered in C:\windows\hosts) or the IP address.
<Setting example>
For host name: mspc160
For IP address: 150.40.0.111
(Note) Set the host computer's TCP/IP address if communication is not carried out correctly.
---Setting range---
15 characters (alphanumeric) or less
Set the user name when logging into the host computer.
---Setting range---
15 characters (alphanumeric) or less
Set the password when logging into the host computer.
---Setting range---
15 characters (alphanumeric) or less
Set the directory name of the host computer.
The directory released to the client (NC unit) with the host computer's server is handled as the root directory
by the NC unit.
---Setting range---

31 characters (alphanumeric) or less
Select the type of the host computer.
0: UNIX/PC automatic judgment
1: UNIX
2: PC (DOS)
(Note) When "0" is set, the settings for the following parameters will be invalid.
- #9756 Wrd pos: name
- #9757 Wrd pos: size
- #9758 Wrd pos: Dir
- #9759 Wrd pos: cmnt
- #9760 Wrd num: cmnt
Set the file name display position (nth word from left) of the list displayed when the ftp command "dir" is ex ecuted.
(Note) One word designates a character string divided by one or more spaces.
---Setting range---
0 to 100
0: Default value
#9741 Host 2 no total siz
#9751 Host3 host name
#9752 Host3 user name
#9753 Host3 password
#9754 Host3 directory
#9755 Host3 host type
#9756 Host 3 Wrd pos: name

Set the size display position (nth word from left) of the list displayed when the ftp command "dir" is executed.
(Note) One word designates a character string divided by one or more spaces.
---Setting range---
0 to 100
0: Default value
Set the <DIR> display position (nth word from left) of the list displayed when the ftp command "dir" is execut ed.
(Note) One word designates a character string divided by one or more spaces.
---Setting range---
0 to 100
0: Default value
Set the comment (date, time, etc.) display position (nth word from left) of the list displayed when the ftp com mand "dir" is executed.
(Note) One word designates a character string divided by one or more spaces.
---Setting range---
0 to 100
0: Default value
Set the number of words to be displayed as a comment.
(Note) One word designates a character string divided by one or more spaces.
---Setting range---
0 to 100
0: Default value
Set whether to display the total number of characters registered in the machining programs of host1 when
displaying the file list.
If there are many files in the directory to be referred to, the list can be updated quickly by setting "1".
0: Display
1: Not display
Set the host computer name.
This parameter allows the NC to easily recognize the host computer on the network. Set the host computer's
name (name registered in C:\windows\hosts) or the IP address.
<Setting example>
For host name: mspc160
For IP address: 150.40.0.111
(Note) Set the host computer's TCP/IP address if communication is not carried out correctly.
---Setting range---
15 characters (alphanumeric) or less
Set the user name when logging into the host computer.
---Setting range---
15 characters (alphanumeric) or less
#9757 Host 3 Wrd pos: size
#9758 Host 3 Wrd pos: Dir
#9759 Host 3 Wrd pos: cmnt
#9760 Host 3 Wrd num: cmnt
#9761 Host 3 no total siz
#9771 Host4 host name
#9772 Host4 user name

Set the password when logging into the host computer.
---Setting range---
15 characters (alphanumeric) or less
Set the directory name of the host computer.
The directory released to the client (NC unit) with the host computer's server is handled as the root directory
by the NC unit.
---Setting range---
31 characters (alphanumeric) or less
Select the type of the host computer.
0: UNIX/PC automatic judgment
1: UNIX
2: PC (DOS)
(Note) When "0" is set, the settings for the following parameters will be invalid.
- #9776 Wrd pos: name
- #9777 Wrd pos: size

- #9778 Wrd pos: Dir
- #9779 Wrd pos: cmnt
- #9780 Wrd num: cmnt

Set the file name display position (nth word from left) of the list displayed when the ftp command "dir" is ex ecuted.
(Note) One word designates a character string divided by one or more spaces.
---Setting range---
0 to 100
0: Default value

Set the size display position (nth word from left) of the list displayed when the ftp command "dir" is executed.
(Note) One word designates a character string divided by one or more spaces.
---Setting range---
0 to 100
0: Default value

Set the <DIR> display position (nth word from left) of the list displayed when the ftp command "dir" is execut ed.
(Note) One word designates a character string divided by one or more spaces.
---Setting range---
0 to 100
0: Default value

#9773 Host4 password
#9774 Host4 directory
#9775 Host4 host type
#9776 Host 4 Wrd pos: name
#9777 Host 4 Wrd pos: size
#9778 Host 4 Wrd pos: Dir

Set the comment (date, time, etc.) display position (nth word from left) of the list displayed when the ftp com mand "dir" is executed.
(Note) One word designates a character string divided by one or more spaces.
---Setting range---
0 to 100
0: Default value

Set the number of words to be displayed as a comment.
(Note) One word designates a character string divided by one or more spaces.
---Setting range---
0 to 100
0: Default value

Set whether to display the total number of characters registered in the machining programs of host1 when
displaying the file list.
If there are many files in the directory to be referred to, the list can be updated quickly by setting "1".
0: Display
1: Not display

Set the IP address of the connection destination database.
---Setting range---
0.0.0.0 to 255.255.255.255

Set the service port No. of the connection destination database connector.
---Setting range---
1024 to 65535

Set the communication timeout time (in seconds) with the connection destination database. When "0" is set,
the time will be regarded as 60 seconds.
---Setting range---
0 to 3600

Select the type of the connection destination database.
0: Oracle or none specified
1: Microsoft SQL Server
2: Microsoft Access
---Setting range---
0 to 2

Set the name of the connection destination database.
---Setting range---
Up to 15 characters including alphanumeric characters and '_' (underscore)

Set the user name for connecting the database.
(The omission of the user name is possible in MS Access. Enter "0" if omitted.)
---Setting range---
Up to 15 characters including alphanumeric characters and '_' (underscore)

#9779 Host 4 Wrd pos: cmnt
#9780 Host 4 Wrd num: cmnt
#9781 Host 4 no total siz
(PR) #9800 MES-IF DB IP addr DB IP address
(PR) #9801 MES-IF DB Port No DB PORT No.
(PR) #9802 MES-IF DB timeout DB communication time-out (sec)
(PR) #9803 MES-IF DB Type DB type
(PR) #9804 MES-IF DB Name Database name
(PR) #9805 MES-IF DB User User name

Set the password for the user name.
(The omission of the user name is possible in MS Access. Enter "0" if omitted.)
---Setting range---
Up to 15 characters including alphanumeric characters and '_' (underscore)

Set the table name registered by the registration function of each database. Register the table name to which
the following suffix is added in the database.
_FIN: Machining information database registration
_ALM: Alarm information database registration
_USR: User arbitrary information database registration
---Setting range---
Up to 15 characters including alphanumeric characters and '_' (underscore)

Select whether to pass or reject access from an IP address in the range specified in the LAN1 network.
When not using IP address filtering, enter "0".
0: Disable the filtering function
1: Pass
2: Reject
Specify the starting IP address of the 1st address group to be filtered in LAN1.
---Setting range---
0.0.0.0 to 255.255.255.255
Specify the ending IP address of the 1st address group to be filtered in LAN1.
---Setting range---
0.0.0.0 to 255.255.255.255
Specify the starting IP address of the 2nd address group to be filtered in LAN1.
---Setting range---
0.0.0.0 to 255.255.255.255
Specify the ending IP address of the 2nd address group to be filtered in LAN1.
---Setting range---
0.0.0.0 to 255.255.255.255
Specify the starting IP address of the 3rd address group to be filtered in LAN1.
---Setting range---
0.0.0.0 to 255.255.255.255
Specify the ending IP address of the 3rd address group to be filtered in LAN1.
---Setting range---
0.0.0.0 to 255.255.255.255
Specify the starting IP address of the 4th address group to be filtered in LAN1.
---Setting range---
0.0.0.0 to 255.255.255.255
(PR) #9806 MES-IF DB Password Password
(PR) #9807 MES-IF DB Table DB table name
(PR) #9810 IP Filter for LAN1
(PR) #9811 StartFiltIP LAN1-1
(PR) #9812 EndFilterIP LAN1-1
(PR) #9813 StartFiltIP LAN1-2
(PR) #9814 EndFilterIP LAN1-2
(PR) #9815 StartFiltIP LAN1-3
(PR) #9816 EndFilterIP LAN1-3
(PR) #9817 StartFiltIP LAN1-4

Specify the ending IP address of the 4th address group to be filtered in LAN1.
---Setting range---
0.0.0.0 to 255.255.255.255
Specify the starting IP address of the 5th address group to be filtered in LAN1.
---Setting range---
0.0.0.0 to 255.255.255.255
Specify the ending IP address of the 5th address group to be filtered in LAN1.
---Setting range---
0.0.0.0 to 255.255.255.255
Specify the starting IP address of the 6th address group to be filtered in LAN1.
---Setting range---
0.0.0.0 to 255.255.255.255
Specify the ending IP address of the 6th address group to be filtered in LAN1.
---Setting range---
0.0.0.0 to 255.255.255.255
Specify the starting IP address of the 7th address group to be filtered in LAN1.
---Setting range---
0.0.0.0 to 255.255.255.255
Specify the ending IP address of the 7th address group to be filtered in LAN1.
---Setting range---
0.0.0.0 to 255.255.255.255
Specify the starting IP address of the 8th address group to be filtered in LAN1.
---Setting range---
0.0.0.0 to 255.255.255.255
Specify the ending IP address of the 8th address group to be filtered in LAN1.
---Setting range---
0.0.0.0 to 255.255.255.255
Select whether to pass or reject access from an IP address in the range specified in the LAN2 network.
When not using IP address filtering, enter "0".
0: Disable the filtering function
1: Pass
2: Reject
Specify the starting IP address of the 1st address group to be filtered in LAN2.
---Setting range---
0.0.0.0 to 255.255.255.255
(PR) #9818 EndFilterIP LAN1-4
(PR) #9819 StartFiltIP LAN1-5
(PR) #9820 EndFilterIP LAN1-5
(PR) #9821 StartFiltIP LAN1-6
(PR) #9822 EndFilterIP LAN1-6
(PR) #9823 StartFiltIP LAN1-7
(PR) #9824 EndFilterIP LAN1-7
(PR) #9825 StartFiltIP LAN1-8
(PR) #9826 EndFilterIP LAN1-8
(PR) #9830 IP Filter for LAN2
(PR) #9831 StartFiltIP LAN2-1

Specify the ending IP address of the 1st address group to be filtered in LAN2.
---Setting range---
0.0.0.0 to 255.255.255.255
Specify the starting IP address of the 2nd address group to be filtered in LAN2.
---Setting range---
0.0.0.0 to 255.255.255.255
Specify the ending IP address of the 2nd address group to be filtered in LAN2.
---Setting range---
0.0.0.0 to 255.255.255.255
Specify the starting IP address of the 3rd address group to be filtered in LAN2.
---Setting range---
0.0.0.0 to 255.255.255.255
Specify the ending IP address of the 3rd address group to be filtered in LAN2.
---Setting range---
0.0.0.0 to 255.255.255.255
Specify the starting IP address of the 4th address group to be filtered in LAN2.
---Setting range---
0.0.0.0 to 255.255.255.255
Specify the ending IP address of the 4th address group to be filtered in LAN2.
---Setting range---
0.0.0.0 to 255.255.255.255
Specify the starting IP address of the 5th address group to be filtered in LAN2.
---Setting range---
0.0.0.0 to 255.255.255.255
Specify the ending IP address of the 5th address group to be filtered in LAN2.
---Setting range---
0.0.0.0 to 255.255.255.255
Specify the starting IP address of the 6th address group to be filtered in LAN2.
---Setting range---
0.0.0.0 to 255.255.255.255
Specify the ending IP address of the 6th address group to be filtered in LAN2.
---Setting range---
0.0.0.0 to 255.255.255.255
(PR) #9832 EndFilterIP LAN2-1
(PR) #9833 StartFiltIP LAN2-2
(PR) #9834 EndFilterIP LAN2-2
(PR) #9835 StartFiltIP LAN2-3
(PR) #9836 EndFilterIP LAN2-3
(PR) #9837 StartFiltIP LAN2-4
(PR) #9838 EndFilterIP LAN2-4
(PR) #9839 StartFiltIP LAN2-5
(PR) #9840 EndFilterIP LAN2-5
(PR) #9841 StartFiltIP LAN2-6
(PR) #9842 EndFilterIP LAN2-6

Specify the starting IP address of the 7th address group to be filtered in LAN2.
---Setting range---
0.0.0.0 to 255.255.255.255
Specify the ending IP address of the 7th address group to be filtered in LAN2.
---Setting range---
0.0.0.0 to 255.255.255.255
Specify the starting IP address of the 8th address group to be filtered in LAN2.
---Setting range---
0.0.0.0 to 255.255.255.255
Specify the ending IP address of the 8th address group to be filtered in LAN2.
---Setting range---
0.0.0.0 to 255.255.255.255
Set the IP address of the display unit or the PC in which machining programs are stored (or the IP address of the IPC for M80).
Set the IP address of the display unit which is powered OFF with the Auto power OFF function.
When the 3D machine interference check function is enabled, set the IP address of the display unit to be used for the 3D machine interference check (for M800W only).
(Note) When "0.0.0.0" is entered, "192.168.100.2" is automatically assigned.
PC Subnet
Set the subnet mask for the display unit or PC in which machining programs are stored.
PC Gateway
Set the gateway for the display unit or PC in which machining programs are stored.
---Setting range---
0.0.0.0 to 255.255.255.255
(PR) #9843 StartFiltIP LAN2-7
(PR) #9844 EndFilterIP LAN2-7
(PR) #9845 StartFiltIP LAN2-8
(PR) #9846 EndFilterIP LAN2-8
(PR) #11005 PC IP address IP address setting

14.8 Computer Link Parameters
Select the rate at which data is transferred.
0: 19200 (bps)
1: 9600
2: 4800
3: 2400
4: 1200
5: 600
6: 300

7: 110
8: 38400
Select the stop bit length used in the start-stop system.
Refer to "#9603 PARITY EFFECTIVE". At the output of data, the number of characters is always adjusted for the parity check.
1: 1 (bit)
2: 1.5
3: 2
Select whether to add the parity bit to the data.
The parameter is set when using a parity bit separately from the data bit.
Set this parameter in accordance with the I/O device specifications.
0: Not add a parity bit at the input/output
1: Add a parity bit at the input/output
Select odd or even when parity is added to the data. This parameter is ignored when no parity is added.
0: Odd parity
1: Even parity
Set the length of the data bit.
Refer to "#9603 PARITY EFFECTIVE".
0: 5 (bit)
1: 6
2: 7 (NC connection not supported)
3: 8
Select the transmission control method.
"3" (DC code method) should be set for computer link B.
0: No control
1: RTS/CTS method
2: No handshaking
3: DC code method
#9601 BAUD RATE
#9602 STOP BIT
#9603 PARITY EFFECTIVE
#9604 EVEN PARITY
#9605 CHR. LENGTH
#9606 HAND SHAKE
Start bit Data bit Parity bit Stop bit
1character ON
OFF b1 b2 b3 b4 b5 b6 bn

Set the time-out time at which an interruption of data transfer during data input/output should be detected.
"0" means infinite time-out.
---Setting range---
0 to 999 (1/10s)
Set the code to be used for the data description.
Refer to "#9603 PARITY EFFECTIVE".
0: ASCII code
1: ISO code
bit1: DC1 output after NAK or SYN
Select whether to output the DC1 code after the NAK or SYN code is output.
0: Not output the DC1 code.
1: Output the DC1 code.
bit7: Enable/disable resetting
Select whether to enable the resetting in the computer link.
0: Enable
1: Disable
bit2: Specify the control code parity (even parity for the control code).
Select whether to add an even parity to the control code, in accordance with the I/O device specifications.
0: Not add a parity bit to the control code
1: Add a parity bit to the control code
bit3: Parity V
Select whether to enable checking of parity V in one block at the input of the data.
0: Disable
1: Enable
Not used. Set to "0".
Not used. Set to "0".
Not used. Set to "0".
Select the code used to command the first transfer of file data.
This parameter is used for a specific user. Normally set "0".
0: DC1 (11H)
1: BEL (07H)
#9607 TIME-OUT SET
#9608 DATA CODE
#9609 LINK PARAM. 1
#9610 LINK PARAM. 2
#9611 Link PARAM. 3
#9612 Link PARAM. 4
#9613 Link PARAM. 5
#9614 START CODE

bit0: NAK output
Select whether to send the NAK code to the host if a communication error occurs in computer link B.
0: Not output the NAK code
1: Output the NAK code.
bit1: SYN output
Select whether to send the SYN code to the host if NC resetting or an emergency stop occurs in computer

link B.
0: Not output the SYN code.
1: Output the SYN code.
bit3: DC3 output
Select whether to send the DC3 code to the host when the communication ends in computer link B.
0: Not output the DC3 code.
1: Output the DC3 code.
Not used. Set to "0".
Not used. Set to "0".
Not used. Set to "0".
Not used. Set to "0".
Not used. Set to "0".
Not used. Set to "0".
Not used. Set to "0".
Not used. Set to "0".
Not used. Set to "0".
#9615 CTRL. CODE OUT
#9616 CTRL. INTERVAL
#9617 WAIT TIME
#9618 PACKET LENGTH
#9619 BUFFER SIZE
#9620 START SIZE
#9621 DC1 OUT SIZE
#9622 POLLING TIMER
#9623 TRANS. WAIT TMR
#9624 RETRY COUNTER

14.9 Subprogram Storage Location Parameters
If ",D1" to ",D4" is designated in a subprogram call, the called program will be searched from the storage (de vice and directory) set by this parameter.
(Example) When "M98 P (program No.), D0" is commanded, the device and directory below will be searched.
[Device] "#8880 Subpro stor D0: dev"
[Directory] "#8881 Subpro stor D0: dir"
(Note 1) If the called subprogram is not found, a program error will occur.
(Note 2) If there is no designation of D0 to D4, search is done according to the settings #8890 to #8894.
(Note 3) The setting of G (HD) is available for M800W/M80W equipped with the Windows-based display unit,
or for M80 when a program stored in the IPC is run on the NC connected to the same network.
G (HD) is not available for M800W/M80W equipped with the non-Windows-based display unit, or for E80.
---Setting range---
M: Memory
G: HD
R: Memory card
D: Data server
N: USB Memory
Select the storage destination (directory) for the subprogram.
When D0 is designated at a subprogram call, the subprogram to be called will be searched from the directory
selected with this parameter.
Refer to "#8880 Subpro stor D0: dev".
---Setting range---
Directory 48 characters
If ",D1" to ",D4" is designated in a subprogram call, the called program will be searched from the storage (de vice and directory) set by this parameter.
(Example) When "M98 P (program No.), D0" is commanded, the device and directory below will be searched.
[Device] "#8880 Subpro stor D0: dev"
[Directory] "#8881 Subpro stor D0: dir"
(Note 1) If the called subprogram is not found, a program error will occur.
(Note 2) If there is no designation of D0 to D4, search is done according to the settings #8890 to #8894.
(Note 3) The setting of G (HD) is available for M800W/M80W equipped with the Windows-based display unit,
or for M80 when a program stored in the IPC is run on the NC connected to the same network.
G (HD) is not available for M800W/M80W equipped with the non-Windows-based display unit, or for E80.
---Setting range---
M: Memory
G: HD
R: Memory card
D: Data server
N: USB Memory
Select the storage destination (directory) for the subprogram.
When D1 is designated at a subprogram call, the subprogram to be called will be searched from the directory
selected with this parameter.
Refer to "#8882 Subpro stor D1: dev".
---Setting range---
Directory 48 characters
#8880 Subpro stor D0: dev
#8881 Subpro stor D0: dir
#8882 Subpro stor D1: dev
#8883 Subpro stor D1: dir

If ",D1" to ",D4" is designated in a subprogram call, the called program will be searched from the storage (de vice and directory) set by this parameter.
(Example) When "M98 P (program No.), D0" is commanded, the device and directory below will be searched.
[Device] "#8880 Subpro stor D0: dev"
[Directory] "#8881 Subpro stor D0: dir"
(Note 1) If the called subprogram is not found, a program error will occur.
(Note 2) If there is no designation of D0 to D4, search is done according to the settings #8890 to #8894.
(Note 3) The setting of G (HD) is available for M800W/M80W equipped with the Windows-based display unit,
or for M80 when a program stored in the IPC is run on the NC connected to the same network.
G (HD) is not available for M800W/M80W equipped with the non-Windows-based display unit, or for E80.

---Setting range---
M: Memory
G: HD
R: Memory card
D: Data server
N: USB Memory
Select the storage destination (directory) for the subprogram.
When D2 is designated at a subprogram call, the subprogram to be called will be searched from the directory
selected with this parameter.
Refer to "#8884 Subpro stor D2: dev".
---Setting range---
Directory 48 characters
If ",D1" to ",D4" is designated in a subprogram call, the called program will be searched from the storage (de vice and directory) set by this parameter.
(Example) When "M98 P (program No.), D0" is commanded, the device and directory below will be searched.
[Device] "#8880 Subpro stor D0: dev"
[Directory] "#8881 Subpro stor D0: dir"
(Note 1) If the called subprogram is not found, a program error will occur.
(Note 2) If there is no designation of D0 to D4, search is done according to the settings #8890 to #8894.
(Note 3) The setting of G (HD) is available for M800W/M80W equipped with the Windows-based display unit,
or for M80 when a program stored in the IPC is run on the NC connected to the same network.
G (HD) is not available for M800W/M80W equipped with the non-Windows-based display unit, or for E80.
---Setting range---
M: Memory
G: HD
R: Memory card
D: Data server
N: USB Memory
Select the storage destination (directory) for the subprogram.
When D3 is designated at a subprogram call, the subprogram to be called will be searched from the directory
selected with this parameter.
Refer to "#8886 Subpro stor D3: dev".
---Setting range---
Directory 48 characters
#8884 Subpro stor D2: dev
#8885 Subpro stor D2: dir
#8886 Subpro stor D3: dev
#8887 Subpro stor D3: dir

If ",D1" to ",D4" is designated in a subprogram call, the called program will be searched from the storage (de vice and directory) set by this parameter.
(Example) When "M98 P (program No.), D0" is commanded, the device and directory below will be searched.
[Device] "#8880 Subpro stor D0: dev"
[Directory] "#8881 Subpro stor D0: dir"
(Note 1) If the called subprogram is not found, a program error will occur.
(Note 2) If there is no designation of D0 to D4, search is done according to the settings #8890 to #8894.
(Note 3) The setting of G (HD) is available for M800W/M80W equipped with the Windows-based display unit,
or for M80 when a program stored in the IPC is run on the NC connected to the same network.
G (HD) is not available for M800W/M80W equipped with the non-Windows-based display unit, or for E80.
---Setting range---
M: Memory
G: HD
R: Memory card
D: Data server
N: USB Memory
Select the storage destination (directory) for the subprogram.
When D4 is designated at a subprogram call, the subprogram to be called will be searched from the directory
selected with this parameter.
Refer to "#8888 Subpro stor D4: dev".
---Setting range---
Directory 48 characters
Specify the search order of D0 to D4 (devices and directories storing subprograms) when ",D0" to ",D4" are
omitted from subprogram call.
Search is performed in the order from 1 to 5. When "0" is set, the device is excluded from search.
If the same value is set for more than one device, search is carried out in the order from the one with a smaller
parameter number.
If "0" is set for all the devices, the memory is searched.
---Setting range---
0 to 5
#8888 Subpro stor D4: dev
#8889 Subpro stor D4: dir
#8890-8894 Subpro srch odr D0 to D4

14.10 Barrier Data (for L system only)
Set the reference X-coordinates of the chuck and the tail stock barrier.
Set the center coordinate of workpiece by the basic machine coordinate system. (radius value)
---Setting range---
-99999.999 to 99999.999 (mm)
Set the area of the chuck and tail stock barrier.
X axis: Set the coordinate from the workpiece center (P0). (radius value)
Z axis: Set the coordinates in the basic machine coordinate system.
---Setting range---
-99999.999 to 99999.999 (mm)
Set the area of the chuck and tail stock barrier.
X axis: Set the coordinate from the workpiece center (P0). (radius value)
Z axis: Set the coordinates in the basic machine coordinate system.

---Setting range---
-99999.999 to 99999.999 (mm)
Set the area of the chuck and tail stock barrier.
X axis: Set the coordinate from the workpiece center (P0). (radius value)
Z axis: Set the coordinates in the basic machine coordinate system.
---Setting range---
-99999.999 to 99999.999 (mm)
Set the area of the chuck and tail stock barrier.
X axis: Set the coordinate from the workpiece center (P0). (radius value)
Z axis: Set the coordinates in the basic machine coordinate system.
---Setting range---
-99999.999 to 99999.999 (mm)
Set the area of the chuck and tail stock barrier.
X axis: Set the coordinate from the workpiece center (P0). (radius value)
Z axis: Set the coordinates in the basic machine coordinate system.
---Setting range---
-99999.999 to 99999.999 (mm)
Set the area of the chuck and tail stock barrier.
X axis: Set the coordinate from the workpiece center (P0). (radius value)
Z axis: Set the coordinates in the basic machine coordinate system.
---Setting range---
-99999.999 to 99999.999 (mm)
Select whether to enable the chuck and tailstock barrier.
0: Disable (Setting from special display unit will be enabled)
1: Enable
#8300 P0 (for L system only)
#8301 P1 (for L system only)
#8302 P2 (for L system only)
#8303 P3 (for L system only)
#8304 P4 (for L system only)
#8305 P5 (for L system only)
#8306 P6 (for L system only)
#8310 Barrier ON (for L system only)

Set the area of the left spindle section.
X axis: Set the coordinate from the workpiece center (P0). (radius value)
Z axis: Set the coordinates in the basic machine coordinate system.
---Setting range---
-99999.999 to 99999.999 (mm)
Set the area of the left spindle section.
X axis: Set the coordinate from the workpiece center (P0). (radius value)
Z axis: Set the coordinates in the basic machine coordinate system.
---Setting range---
-99999.999 to 99999.999 (mm)
Set the area of the right spindle section.
X axis: Set the coordinate from the workpiece center (P0). (radius value)
Z axis: Set the coordinates in the basic machine coordinate system.
---Setting range---
-99999.999 to 99999.999 (mm)
Set the area of the right spindle section.
X axis: Set the coordinate from the workpiece center (P0). (radius value)
Z axis: Set the coordinates in the basic machine coordinate system.
---Setting range---
-99999.999 to 99999.999 (mm)
Select the shape of the left chuck and tailstock barrier.
0: No area
1: Chuck
2: Tailstock
Select the shape of the right chuck and tailstock barrier.
0: No area
1: Chuck
2: Tailstock
Set the name of the delivery axis when the right chuck and tailstock barrier is movable.
When using the multi-part system method and the delivery axis is an axis in the other part system, designate the axis including the part system as 1A, 1B or 2A, 2B. If the part system is not designated as A and B, the set part system will be used.
---Setting range---
A/B/.. (axis name)
1A/1B/..
2A/2B/.. (with part system designated)
0: Cancel
#8311 P7 (for L system only)
#8312 P8 (for L system only)
#8313 P9 (for L system only)
#8314 P10 (for L system only)
#8315 Barrier Type (L) (for L system only)
#8316 Barrier Type (R) (for L system only)
#8317 ELIV. AX. Name (for L system only)

Set the angle for the left tailstock end section.
The angle will be interpreted as 90 if there is no setting (when "0" is set).
---Setting range---
0 to 180 ()
0: 90 (default)

Set the angle for the right tailstock end section.
The angle will be interpreted as 90 if there is no setting (when "0" is set).
---Setting range---
0 to 180 ()
0: 90 (default)
#8318 Stock Angle (L) (for L system only)
#8319 Stock Angle (R) (for L system only)

14.11 High-accuracy Control Parameters
Select whether to decelerate at the arc entrance or exit.
0: Not decelerate
1: Decelerate
0: Post-interpolation acceleration/deceleration is applied to G00.
1: Pre-interpolation acceleration/deceleration is applied to G00 even in the high accuracy control mode.
2: Rapid traverse constant-gradient multi-step acceleration/deceleration is enabled.
When the multi-part system simultaneous high-accuracy control option is enabled, "1" can be set for the 2nd part system and the following.
Set a cutting feedrate when applying pre-interpolation acceleration/deceleration.
When high-accuracy control time constant expansion is valid, set the maximum of cutting feed clamp speed of each axis.
---Setting range---
1 to 999999 (mm/min)
Set a cutting feed time constant when applying pre-interpolation acceleration/deceleration.
When set to "0", the time constant will be clamped at 1ms.
---Setting range---
Without high-accuracy control time constant expansion: 1 to 5000 (ms)
With high-accuracy control time constant expansion: 1 to 30000 (ms)
Cutting feed Acc Cutting feed acceleration
Displays cutting feed acceleration.
Set the deceleration speed at the arc entrance or exit.
---Setting range---
1 to 999999 (mm/min)
Set the filter time constant for smoothly changing the acceleration rate for the cutting feed acceleration/de celeration in pre-interpolation acceleration/deceleration.
- Notch frequency Hz
Displays the notch frequency (Hz) for the S-pattern filter set in "#1568 SfiltG1" (G01 soft acceleration/decel eration filter).
---Setting range---
0 to 200 (ms)
#1149 cireft Arc deceleration speed change
#1205 G0bdcc Acceleration and deceleration before G0 interpolation
#1206 G1bF Maximum speed
#1207 G1btL Time constant
#1209 cirdcc Arc deceleration speed
#1568 SfiltG1 G01 soft acceleration/deceleration filter
G1btL
G1bF
Time
Speed

Set the filter time constant for smoothly changing the acceleration rate for the rapid traverse acceleration/ deceleration in pre-interpolation acceleration/deceleration.
---Setting range---
0 to 200 (ms)
Set the filter time constant for smoothly changing the acceleration rate in pre-interpolation acceleration/de celeration.
This will be disabled when "0" or "1" is set.
- Notch frequency Hz
Displays the notch frequency (Hz) for the S-shape filter set in "#1570 Sfilt2" (Soft acceleration/deceleration filter 2).
---Setting range---
0 to 200 (ms)
Fix the shape recognition range for SSS control.
---Setting range---
0/1
Set the time constant for rotary axis prefilter.
Setting this parameter can smoothen the tool angle change (rotary axis' motion) under tool center point con trol.
Possible to do this setting on [High-accuracy parameter] screen, which you can reach by going to [Setup] Screen and selecting [User parameter].
When set to "0", "Rotary axis prefiltering" will be disabled.
---Setting range---
0 to 200 (ms)
#1569 SfiltG0 G00 soft acceleration/deceleration filter
#1570 Sfilt2 Soft acceleration/deceleration filter 2
#1571 SSSdis SSS control adjustment coefficient fixed value selec tion
#7914 ROT_PREFILT Rotary axis prefilter time constant

Set a compensation coefficient for reducing a control error in the reduction of a corner roundness and arc radius.
The larger the set value is, the smaller the theoretical error will be. However, since the speed at the corner goes down, the cycle time will be extended.
Coefficient = 100 - setting value
(Note) This function will be enabled when "#8021 COMP_CHANGE" is set to "0".
---Setting range---
0 to 99 (%)

Theoretical radius decrease error amount
Displays the theoretical radius decrease error amount, R(mm), from the automatic calculation by NC.
Theoretical radius decrease amount in arc
R5mm arc deceleration speed
Displays a deceleration speed (mm/min) along an arc of 5 (mm) radius.
R1mm arc deceleration speed
Displays a deceleration speed(mm/min) along an arc of 1 (mm) radius.
#8019 R COMP
+
R
F
Command path
Path after servo control

Set the minimum value of an angle (external angle) that should be assumed to be a corner.
When an inter-block angle (external angle) in high-accuracy mode is larger than the set value, it will be de termined as a corner and the speed will go down to sharpen the edge.
(Note) If "0" is set, it will be handled as "5" degrees.
---Setting range---
0 to 89 ()
0: 5 degree (Equals to setting "5")
Theoretical corner dull amount
Displays the corner dull amount c(mm) in respect to the corner's angle (external angle) ().
ca(mm): Error () caused by the soft acceleration/deceleration 2
cs(mm): Error () caused by the servo system
Corner deceleration speed
Display corner deceleration speed c (mm/min) for the corner of the angle (external angle) with ().
Theoretical dull amount at 90 degree
Display corner dull amount when the angle is 90 degree.
Corner deceleration speed at 90 degree
Display corner deceleration speed when the angle is 90 degree.
Select whether to share or separate the compensation coefficient at the corner/curve during the high-accu racy control mode.
0: Share ("#8019 R COMP" is applied.)
1: Separate
* Corner: #8022 CORNER COMP
* Curve: #8023 CURVE COMP
(Note) Set "1" when using SSS/EasySSS control.
#8020 DCC ANGLE
#8021 COMP_CHANGE
If the set value is smaller than , the speed goes down to optimize
the corner.
F
ca
cs
Path after servo control
Path after soft acceleration/ Command path
deceleration 2
Theoretical roundness amount at corner

Set the compensation coefficient to further reduce or increase the roundness at the corner during the high accuracy control mode.
Coefficient = 100 - setting value
(Note) This is valid when "#8021 COMP CHANGE" is set to "1".
Reference to "#8020 Corner decreasing speed "for theoretical corner roundness amount, corner decreasing
speed, theoretical 90 degree dull amount, 90 degree corner decreasing speed.
---Setting range---
-1000 to 99 (%)
Set the compensation coefficient to further reduce or increase the radius reduction amount at the curve (arc,
involute, spline) during the high-accuracy control mode.
Coefficient = 100 - setting value
(Note) This is valid when "#8021 COMP CHANGE" is set to "1".
For theoretical radius reduction error amount, R5mm arc deceleration speed and R1mm arc deceleration
speed, refer to "#8019 R COMP".
---Setting range---
-1000 to 99 (%)
For M system only.
Specify whether to enable the fine spline function.
0: Disable the fine spline function.
1: Enable the fine spline function.
Spline interpolation will be valid during G61.2 modal regardless of this setting.
Set the angle where the spline interpolation is temporarily canceled.
When the angle made by blocks exceeds this parameter setting value, spline interpolation will be canceled
temporarily. In consideration of the pick feed, set a value a little smaller than the pick feed angle.
---Setting range---
0 to 180 ()
0: 180 ()
Set the maximum chord error (tolerance) in a block that includes an inflection point. Set the tolerance appli cable when the applicable block is developed to fine segments by CAM. (normally about 10 m)
When "0.000" is set, the applicable block will be linear.
---Setting range---
0.000 to 100.000 (mm)
Set the maximum chord error (tolerance) in a block that includes no inflection point. Set the tolerance appli cable when the applicable block is developed to fine segments by CAM. (normally about 10 m)
When "0.000" is set, the applicable block will be linear.
---Setting range---
0.000 to 100.000 (mm)
Set the length of the block subject to fairing.
(Enabled when "#8033 Fairing ON" is set to "1".)

---Setting range---
0 to 100.000 (mm)
#8022 CORNER COMP
#8023 CURVE COMP
#8025 SPLINE ON
#8026 CANCEL ANG. (for M system only)
#8027 Toler-1 (for M system only)
#8028 Toler-2 (for M system only)
#8029 FairingL (for M system only)

Set the fine-segment length where the spline interpolation is temporarily canceled.
When the length of one block exceeds this parameter setting value, spline interpolation is canceled tempo rarily and linear interpolation is performed. Set a value a little smaller than one block length of the program.
If "-1" is set, spline interpolation will be performed regardless of block length.
---Setting range---
-1 to 127 (mm)
0: 1 (mm)
Select whether or not to use the fairing or smooth fairing function.
0: Use neither of them
1: Use the fairing function
2: Use the smooth fairing function
Select the method for clamping the cutting speed.
0: Clamp with parameter "#2002 clamp" or the corner deceleration function.
1: Clamp the cutting speed with acceleration judgment. (Enabled when "#8033 Fairing ON" is set to "1".)
Select the condition to decide a corner.
0: A corner is decided from the angle of the neighboring block.
1: A corner is decided from the angle of the neighboring block, excluding minute blocks.
(Enabled when "#8033 Fairing ON" is set to "1".)
Set the length of the block to be excluded when deciding a corner.
(Enabled when "#8036 CordecJudge" is set to "1".)
---Setting range---
0 to 99999.999 (mm)
Path recognition range
Specify the range to recognize the tool paths adjoining to the command position when the smooth fairing function is ON.
If "0" is set, the range will be 1.000 (mm).
---Setting range---
0 to 100.000 (mm)
Compensation distance tolerance
Specify the upper limit of the distance between the command position and compensation position when the smooth fairing function is ON.
If you specify a negative value, operation is conducted with no tolerance limit.
If "0" is set, the tolerance will be 0.005 (mm).
---Setting range---
-1.000 to 100.000 (mm)
High-speed high-accuracy control-enabled part system
Select whether to enable the simultaneous use of the high-accuracy control and high-speed machining mode (including the high-speed high-accuracy control I and II) for each part system.
0: Not enable
1: Enable
"1" can be set for up to two part systems. If you set "1" for three or more part systems, the alarm (Y51 0032) will result.
#8030 MINUTE LENGS (for M system only)
#8033 Fairing ON (for M system only)
#8034 AccClamp ON (for M system only)
#8036 CordecJudge (for M system only)
#8037 CorJudgeL (for M system only)
#8038 Path recog. range
#8039 Comp. range limit
(PR) #8040 High-SpeedAcc

Set whether to enable the SSS control with G05 P10000.
0: Disable
1: Enable
Set the maximum value of the range for recognizing the shape.
To eliminate the effect of steps or errors, etc., set a large value. To enable sufficient deceleration, set a small value.
If "0.000" is set, the standard value (1.000mm) will be applied.
---Setting range---
0 to 100.000 (mm)
Set the clamp speed at the curved section configured of fine segments.
Coefficient = setting value
---Setting range---
1 to 100
Set the width of the step at which the speed is not to be decelerated. (Approximately the same as the CAM path difference [Tolerance].)
If "0" is set, the standard value (5m) will be applied.
If a minus value is set, the speed will decelerate at all minute steps.
---Setting range---
-1.000 to 0.100 (mm)
Set the time to wait for deceleration when the speed FB does not drop to the clamp speed.
---Setting range---
0 to 100 (ms)
Deceleration coefficient for SSS control ON
Select whether to enable the speed coefficients ("#8097 Corner deceleration coefficient for SSS control",

"#8098 Arc clamp speed coefficient for SSS control") that are used for compensating for a path error and
clamp speed under SSS control.
0: Disable
1: Enable
Corner deceleration coefficient for SSS control
Specify the compensation coefficient to be used for adjusting a path error and clamp speed at a corner under
SSS control. This parameter is enabled during SSS control. Thus set this parameter if you wish to use differ ent compensation coefficients according to ON/OFF of SSS control (If you wish to adjust a path error and clamp speed at a corner, use "#8022 CORNER COMP").
If the setting value is smaller, the theoretical path error will decrease, but the cycle time may be longer be cause the corner deceleration speed will slow down.
Note that this parameter is enabled when "#8096 Deceleration coefficient for SSS control ON" is "1".
When "0" is set in this parameter, the standard value (300%) is applied.
---Setting range---
0 to 2000 (%)
#8090 SSS ON (for M system only)
#8091 StdLength (for M system only)
#8092 ClampCoeff (for M system only)
#8093 StepLeng (for M system only)
#8094 DccWaitAdd (for M system only)
#8096 Deceler. coeff. ON
#8097 Corner decel coeff
M800/M80/E80 Series Alarm/Parameter Manual
14 User Parameters
271 IB-1501279-S
Arc clamp speed coefficient for SSS control
Specify the compensation coefficient to be used for adjusting a path error and clamp speed on an arc under
SSS control. This parameter is enabled during SSS control. Thus set this parameter if you wish to use differ ent compensation coefficients according to ON/OFF of SSS control (If you wish to adjust a path error and clamp speed on an arc, use "#8023 CURVE COMP").
If the setting value is smaller, the theoretical path error will decrease, but the cycle time may be longer be cause the arc clamp speed will slow down.
Note that this parameter is enabled when "#8096 Deceleration coefficient for SSS control ON" is "1".
When "0" is set in this parameter, the standard value (100%) is applied.
---Setting range---
0 to 2000 (%)
Specify the time constant of filter that is used for smoothing the change of jerk when pre-interpolation accel eration/deceleration is performed in cutting feed.
This filter causes no path error, as the filter is applied to the resultant speed calculated before interpolation.
If you specify the jerk filter time constant, the time constants of each filter will be as follows:
- S-shape filter time constant
"#1568 SfiltG1" - "Jerk_filtG1"
- Jerk filter time constant
"Jerk_filtG1"
---Setting range---
0 to 50 (ms)
Specify the time constant of filter that is used for smoothing the change of jerk when pre-interpolation accel eration/deceleration is performed in cutting feed.
This filter causes no path error, as the filter is applied to the resultant speed calculated before interpolation.
If you specify the jerk filter time constant, the time constants of each filter will be as follows:
- S-shape filter time constant
"#1569 SfiltG0" - "Jerk_filtG0"
- Jerk filter time constant
"Jerk_filtG0"
---Setting range---
0 to 50 (ms)
Select how to calculate the deceleration speed for a corner between the blocks where the high-accuracy con trol is enabled.
0: Optimal corner deceleration
(calculate the deceleration speed using the acceleration tolerance common for all the axes determined by
G1bF and G1btL)
1: Axis-specific acceleration tolerance control
(calculate the deceleration speed using acceleration tolerances of each axis determined by G1bFx and
G1btLx)
Select whether to enable variable-acceleration pre-interpolation acceleration/deceleration control while high accuracy control is ON.
0: Pre-interpolation acceleration/deceleration
(Apply the acceleration rate that is determined by G1bF and G1btL and is common for all the axes)
1: Variable-acceleration pre-interpolation acceleration/deceleration
(Apply the acceleration rate that is determined by G1bFx and G1btLx for each axis)
(Note) Variable-acceleration pre-interpolation acceleration/deceleration is a function available under
SSS control. To enable this function, set "#8090 SSS ON" to "1".
#8098 Arc clamp spd coef
#12051 Jerk_filtG1 G01 jerk filter
#12052 Jerk_filtG0 G00 jerk filter
#12053 EachAxAccCntrl Enable axis-specific acceleration tolerance control
#12060 VblAccPreInt Variable-acceleration pre-interpolation acceleration/de celeration ON
M800/M80/E80 Series Alarm/Parameter Manual
14 User Parameters
IB-1501279-S 272
Select whether to enable the tolerance control.
0: Disable
1: Enable
(Note) Tolerance control is available only under SSS control.
To enable this function, set "#8090 SSS ON" to "1".
Set the compensation coefficient to adjust a path error or clamp speed in the corner while tolerance control
is ON.
This parameter is enabled during tolerance control. Thus set this parameter if you wish to use different clamp
speed according to ON/OFF of tolerance control.
When "0" is set in this parameter, the standard value (100%) is applied.
---Setting range---
0 to 2000 (%)
Spline interpolation 2: Smoothing range
Normally set "0" in this parameter.
If you run a program with micro segments and its reciprocating paths are uneven, set the parameter to about
3 to 5 times the length of the programmed segments.

---Setting range---
0.000 to 10.000 (mm)
Tolerance control: Corner recognition angle
Specify the corner recognition angle. Normally set to "0".
---Setting range---
0.000 to 180.000 ()
Specify the time constant of the filter that smoothes out fluctuations in acceleration under the tolerance con trol.
Basically set to 0.
---Setting range---
0 to 200 (ms)
#12066 Tolerance ctrl ON
#12067 Tolerance spd coef
#12068 Smoothing range
#12069 Corner angle
#12070 Sfilt2_tol Tolerance control: Soft acceleration/deceleration filter

14.12 High-accuracy Control Axis Parameters
Set the rapid traverse feedrate for each axis.
(Note) The maximum value to be set depends on the machine specifications.
---Setting range---
1 to 1000000 (mm/min)
Set the maximum cutting feedrate for each axis.
Even if the feedrate in G01 exceeds this value, the clamp will be applied at this feedrate.
---Setting range---
1 to 1000000 (mm/min)
Set a feed forward gain for pre-interpolation acceleration/deceleration.
The larger the set value, the smaller the theoretical control error will be. However, if a machine vibration oc curs, set the smaller value.
---Setting range---
0 to 200 (%)
Set a feed forward gain for G00 pre-interpolation acceleration/deceleration.
The larger the setting value, the shorter the positioning time during in-position checking.
If a machine vibration occurs, set the smaller value.
---Setting range---
0 to 200 (%)
Set the minimum clamp speed for corner deceleration in the high-accuracy control mode. Normally set "0".
(Note) This parameter is invalid during SSS control.
---Setting range---
0 to 1000000 (mm/min)
Set the rapid traverse rate for each axis in the high-accuracy control mode. When 0 is set, "#2001 rapid" is
used.
---Setting range---
0 to 1000000 (mm/min)
Set the cutting feed maximum speed for each axis in the high-accuracy control mode. When 0 is set, "#2002
clamp" is used.
---Setting range---
0 to 1000000 (mm/min)
#2001 rapid Rapid traverse rate
#2002 clamp Cutting feedrate for clamp function
#2010 fwd_g Feed forward gain
#2068 G0fwdg G00 feed forward gain
#2096 crncsp Minimum corner deceleration speed
#2109 Rapid (H-precision) Rapid traverse rate for high-accuracy control mode
#2110 Clamp (H-precision) Cutting feed clamp speed for high-accuracy control
mode

When axis-specific acceleration tolerance control is ON:
Specify the maximum speed to be used for calculating each axis' acceleration tolerance. When "0" is set,
"#2001 rapid" is used.
When variable-acceleration pre-interpolation acceleration/deceleration is ON:
Specify the maximum speed to be used for calculating each axis' acceleration. When "0" is set, "#1206
G1bF" is used.
When both axis-specific acceleration tolerance control and variable-acceleration pre-interpolation accelera tion/deceleration are ON:
Specify the maximum speed to be used for calculating each axis' acceleration. When "0" is set, "#1206
G1bF" is used.
When neither axis-specific acceleration tolerance control nor variable-acceleration pre-interpolation acceler ation/deceleration is ON:
This parameter is disabled.
---Setting range---
0 to 999999 (mm/min)
When axis-specific acceleration tolerance control is ON:
Specify the time constant (a time to be taken until reaching the maximum speed) to be used for calculating
each axis' acceleration tolerance. When "0" is set, "#2004 G0tL" is used.
When variable-acceleration pre-interpolation acceleration/deceleration is ON:
Specify the time constant (a time to be taken until reaching the maximum speed) to be used for calculating
each axis' acceleration. When "0" is set, "#1207 G1btL" is used.
When both axis-specific acceleration tolerance control and variable-acceleration pre-interpolation accelera tion/deceleration are ON:
Specify the time constant (a time to be taken until reaching the maximum speed) to be used for calculating
each axis' acceleration. When "0" is set, "#1207 G1btL" is used.
When neither axis-specific acceleration tolerance control nor variable-acceleration pre-interpolation acceler ation/deceleration is ON:
This parameter is disabled.
---Setting range---
0 to 5000 (ms)
Specify the compensation coefficient to be used for adjusting a path error and clamp speed at a corner for
each axis during the high-accuracy control mode. If the setting value is larger, the edge accuracy will im prove, but the cycle time may be longer because the corner speed will slow down.

This parameter is disabled when the axis-specific acceleration tolerance control is OFF.
---Setting range---
-1000 to 99 (%)
#2157 G1bFx Maximum axis-specific pre-interpolation cutting feed
rate
#2158 G1btLx Axis-specific pre-interpolation cutting feed time con stant
#2159 compx Accuracy coefficient for each axis

14.13 Operation Parameters
Select the type of the following counters on the Monitor screen.
Normal display: Upper-left counter
2-, 3- or 4-part system simultaneous display (four counters): Upper-left counter
2-, 3- or 4-part system simultaneous display (two counters): Upper counter
2-, 3- or 4-part system simultaneous display (one counter): Counter
Either relative position or tip work position is displayed by default.
(Note 1) 3- or 4-part system simultaneous display is enabled for a 15- or 19-type display unit only.
(Note 2) Tip work position is displayed when 5-axis-related option is ON.
(Note 3) PLC axis position is displayed when "#11091 PLC counter valid" is "1".
1: Current position
2: Workpiece coordinate position
3: Machine position
4: Program position
8: Remain command
9: Manual interrupt amount
10: Next command
11: Restart position
12: Remain distance
16: Tip workpiece coordinate position
18: Tool axis movement
19: Tip machine position
20: Relative position
21: Table coordinate position
22: Workpiece installation position
23: Inclined surface coordinate position
27: PLC axis position
---Setting range---
1 to 27
#8901 Counter type 1

Select the type of the following counters on the Monitor screen.
Normal display: Lower-left counter
2-, 3- or 4-part system simultaneous display (four counters): Lower-left counter
2-, 3- or 4-part system simultaneous display (two counters): Lower counter
Programmed position is displayed by default.
(Note 1) 3- or 4-part system simultaneous display is enabled for a 15- or 19-type display unit only.
(Note 2) PLC axis position is displayed when "#11091 PLC counter valid" is "1".
1: Current position
2: Workpiece coordinate position
3: Machine position
4: Program position
8: Remain command
9: Manual interrupt amount
10: Next command
11: Restart position
12: Remain distance
16: Tip workpiece coordinate position
18: Tool axis movement
19: Tip machine position
20: Relative position
21: Table coordinate position
22: Workpiece installation position
23: Inclined surface coordinate position
27: PLC axis position
---Setting range---
1 to 27
#8902 Counter type 2

Select the type of the following counters on the Monitor screen.
Normal display: Upper-right counter
2-, 3- or 4-part system simultaneous display (four counters): Upper-right counter
Remaining command is displayed by default.
(Note 1) 3- or 4-part system simultaneous display is enabled for a 15- or 19-type display unit only.
(Note 2) PLC axis position is displayed when "#11091 PLC counter valid" is "1".
1: Current position
2: Workpiece coordinate position
3: Machine position
4: Program position
8: Remain command
9: Manual interrupt amount
10: Next command
11: Restart position
12: Remain distance

16: Tip workpiece coordinate position
18: Tool axis movement
19: Tip machine position
20: Relative position
21: Table coordinate position
22: Workpiece installation position
23: Inclined surface coordinate position
27: PLC axis position
---Setting range---
1 to 27
#8903 Counter type 3

Select the type of the following counters on the Monitor screen.
Normal display: Lower-right counter
2-, 3- or 4-part system simultaneous display (four counters): Lower-right counter
Next command is displayed by default.
(Note 1) 3- or 4-part system simultaneous display is enabled for a 15- or 19-type display unit only.
(Note 2) PLC axis position is displayed when "#11091 PLC counter valid" is "1".
1: Current position
2: Workpiece coordinate position
3: Machine position
4: Program position
8: Remain command
9: Manual interrupt amount
10: Next command
11: Restart position
12: Remain distance
16: Tip workpiece coordinate position
18: Tool axis movement
19: Tip machine position
20: Relative position
21: Table coordinate position
22: Workpiece installation position
23: Inclined surface coordinate position
27: PLC axis position
---Setting range---
1 to 27
Select the type of counter on the Monitor screen (Simple display).
Either relative position or tip work position is displayed by default.
(Note 1) Tip work position is displayed when 5-axis-related option or program format switch option is ON.
(Note 2) PLC axis position is displayed when "#11091 PLC counter valid" is "1".
1: Current position
2: Workpiece coordinate position
3: Machine position
4: Program position
8: Remain command
9: Manual interrupt amount
10: Next command
11: Restart position
12: Remain distance
16: Tip workpiece coordinate position
18: Tool axis movement
19: Tip machine position
20: Relative position
21: Table coordinate position
22: Workpiece installation position
23: Inclined surface coordinate position
27: PLC axis position
---Setting range---
1 to 27
#8904 Counter type 4
#8905 Counter type 5

Not used. Set to "0".
Set whether to enable the Undo function during program edit on the Monitor screen or Edit screen.
0: Disable
1: Enable
(Note) This parameter is valid for M800W/M800S Series.
Select whether or not to display a confirmation message upon rewrite of common variable in NAVI operation.
0: Not display a confirming message
1: Display a confirming message
Select the NAVI operation during automatic operation.
0: NAVI is unable to start during automatic operation.
1: NAVI is able to start during automatic operation. (An operation involving common variable rewrite is dis abled.)
Set the sensibility of the touch panel.
The smaller the setting value is, the more sensitive the panel will be. (1: sensitive, 4: insensitive)
When set to "0", the sensibility will be the same as when the standard setting of 2 is applied.
---Setting range---
0 to 4
Select the operation method for restart search type 2.
0: It is necessary to set the top search position arbitrarily.
1: The restart search is executed from O No. that is designated as head.
The automatic backup is executed when the CNC power is turned ON for the first time after the designated
date of the month.

When "-1" is set in this parameter, the automatic backup is executed every time the CNC power is turned ON (a maximum of once per day).
---Setting range---
-1: Everyday
0: Disabled
1 to 31: Designated date of a month
The automatic backup is executed when the CNC power is turned ON for the first time after the designated date of the month.
---Setting range---
0: Disabled
1 to 31: Designated date of a month
The automatic backup is executed when the CNC power is turned ON for the first time after the designated date of the month.
---Setting range---
0: Disabled
1 to 31: Designated date of a month
#8906 Counter type 6
#8910 Edit undo
#8911 NAVI-Message ON
#8912 NAVI operate type
#8913 Touch panel sense
#8914 Auto Top search
#8915 Auto backup day 1
#8916 Auto backup day 2
#8917 Auto backup day 3

The automatic backup is executed when the CNC power is turned ON for the first time after the designated date of the month.
---Setting range---
0: Disabled
1 to 31: Designated date of a month
Select the automatic backup target device.
[M800W/M80W with Windows-based display]
0: DS
1: HD
2: Memory card
3: USB Memory
[M800S/M80 Series and E80]
[M800W/M80W with non-Windows-based display]
0: DS
2: Memory card
3: USB Memory
(Note) The setting range differs according to the model.
Select the method to calculate the drawing position when drawing a solid.
With 3D drawing, the drawing position (tool tip position) is calculated with the method designated with this parameter, and the image is drawn.
0: For tool radius compensation, use the tool compensation amount set in tool compensation screen. For tool length, use the value in tool set window. (for tool length measurement type I)
1: Use the tool compensation amount set in tool compensation screen for both tool radius and tool length compensation. (for tool length measurement type II)
2: Use the value set in tool set window for both tool radius and tool length compensation. (for tool length measurement type I)
3: Use the value set in tool set window for both tool radius and tool length compensation. (for tool length measurement type II)
Select the editing mode for the machining programs saved in HD, memory card, DS or USB memory.
0: Regular editing mode
If the program size is 1.0 MB (When "#8910 Edit undo" is invalid, 2.0 MB) or more, mass-editing will be applied.
(For M80/E80 Series, mass-editing is applied to 0.5 MB or greater capacity.)
1: Mass-editing mode
Set whether to enable the duplication check in registering tools to magazine pots, and in setting tool Nos. for spindle/standby.
0: Duplication check valid for all valid magazines
1: Duplication check invalid
2: Duplication check valid only for the selected magazine
Set whether to enable the edit-in/out menu.
When disabled, the edit-input/output menu won't appear.
However, the maintenance-in/out menu is always enabled regardless of this parameter setting.
0: Enable
1: Disable
#8918 Auto backup day 4
#8919 Auto backup device
#8920 3D tool ofs select
#8921 Mass Edit select
#8922 T-reg-dup check
(PR) #8923 Hide Edit-IO menu

Select whether to display a confirming message when attempting to write compensation data for tool mea surement, or coordinate system data for workpiece measurement.
However, the confirmation message will not appear in L system tool measurement simple mode "#8957 T meas (L)-Simple".
0: Not display a confirming message
1: Display a confirming message
Select which spindle to display in the 1st part system window for the 2-, 3- or 4-part system simultaneous display.

(Note 1) If you select "00" for the 2-, 3- or 4-part system simultaneous display, the default display is used (1st spindle on the upper side and 2nd spindle on the lower side).
(Note 2) If you set the same number as, or a greater number than the setting of "#1039 spinno", or if the high or low-order setting is "0", the 1st spindle is displayed.
(Note 3) If you set the low-order to F, the screen shows the actual rotation speed, command speed and load meter of the high-order spindle.
Note that for the 4-counter display in 4-part system simultaneous display, even if the low-order is not F, the screen shows the actual rotation speed, command speed and load meter of the high-order and low-order spindles.
(Note 4) 3- or 4-part system simultaneous display is enabled for a 15- or 19-type display unit only.
---Setting range---
High-order (Select an upper side spindle.) : 0 to 8
Low-order (Select a lower side spindle.) : 0 to 8, F
Select which spindle to display in the 2nd part system window for the 2-, 3- or 4-part system simultaneous display.
(Note 1) If you select "00" for the 2-, 3- or 4-part system simultaneous display, the default display is used (1st spindle on the upper side and 2nd spindle on the lower side).
(Note 2) If you set the same number as, or a greater number than the setting of "#1039 spinno", or if the high or low-order setting is "0", the 1st spindle is displayed.
(Note 3) If you set the low-order to F, the screen shows the actual rotation speed, command speed and load meter of the high-order spindle.
Note that for the 4-counter display in 4-part system simultaneous display, even if the low-order is not F, the screen shows the actual rotation speed, command speed and load meter of the high-order and low-order spindles.
(Note 4) 3- or 4-part system simultaneous display is enabled for a 15- or 19-type display unit only.
---Setting range---
High-order (Select an upper side spindle.) : 0 to 8
Low-order (Select a lower side spindle.) : 0 to 8, F
Select which spindle to display in the 3rd part system window for the 2-, 3- or 4-part system simultaneous display.
(Note 1) If you select "00" for the 2-, 3- or 4-part system simultaneous display, the default display is used (1st spindle on the upper side and 2nd spindle on the lower side).
(Note 2) If you set the same number as, or a greater number than the setting of "#1039 spinno", or if the high or low-order setting is "0", the 1st spindle is displayed.
(Note 3) If you set the low-order to F, the screen shows the actual rotation speed, command speed and load meter of the high-order spindle.
Note that for the 4-counter display in 4-part system simultaneous display, even if the low-order is not F, the screen shows the actual rotation speed, command speed and load meter of the high-order and low-order spindles.
(Note 4) 3- or 4-part system simultaneous display is enabled for a 15- or 19-type display unit only.
---Setting range---
High-order (Select an upper side spindle.) : 0 to 8
Low-order (Select a lower side spindle.) : 0 to 8, F
#8924 Meas. confirm msg
#8925 SP on 1st part sys
#8926 SP on 2nd part sys
#8927 SP on 3rd part sys

Select which spindle to display in the 4th part system window for the 2-, 3- or 4-part system simultaneous display.
(Note 1) If you select "00" for the 2-, 3- or 4-part system simultaneous display, the default display is used (1st spindle on the upper side and 2nd spindle on the lower side).
(Note 2) If you set the same number as, or a greater number than the setting of "#1039 spinno", or if the high or low-order setting is "0", the 1st spindle is displayed.
(Note 3) If you set the low-order to F, the screen shows the actual rotation speed, command speed and load meter of the high-order spindle.
Note that for the 4-counter display in 4-part system simultaneous display, even if the low-order is not F, the screen shows the actual rotation speed, command speed and load meter of the high-order and low-order spindles.
(Note 4) 3- or 4-part system simultaneous display is enabled for a 15- or 19-type display unit only.
---Setting range---
High-order (Select an upper side spindle.) : 0 to 8
Low-order (Select a lower side spindle.) : 0 to 8, F
Disable [=INPUT] menu for tool compensation and workpiece coordinate offset values. Fix the setting meth od to the incremental value input.
0: Enable
1: Disable
Disable [=INPUT] menu for common variables.
0: Enable
1: Disable
Select the restriction of the connected NC's screen display/settings on/from the remote control tool (NC Mon itor2).
0: Permit the screen display/settings
1: Permit the screen display only
2: Restrict the connection
Select whether to display the tool measurement screen and workpiece measurement screen.
0: Display
1: Not display
(Note) If the "#11056 Workpiece coordinate system shift OFF" is "0" for the L system, the screen is displayed as the workpiece coordinate system shift screen even when this parameter is set to "1".
Set whether to disable the setting of tool shape compensation amount.
0: Enable the setting
1: Disable the setting
The shape compensation amount covers the following data according to the tool compensation type.
Compensation type I ("1" in "#1037 cmdtyp(command type)")
... Compensation amount (the sum of shape compensation and wear compensation amount)
Compensation type II ("2" in "#1037 cmdtyp(command type)")
... Length dimension and radius dimension
Compensation type III ("3" in "#1037 cmdtyp(command type)")
... Tool length and tool nose R
#8928 SP on 4th part sys
#8929 Disable=INPUT:comp

#8930 Disable=INPUT:var
#8931 Display/Set limit
(PR) #8932 Hide measure scrn
#8933 Disable lngth comp

Select whether to disable the setting of tool wear compensation amount.
0: Enable the setting
1: Disable the setting
The wear compensation amount covers the following data according to the tool compensation type.
Compensation type I ("1" in "#1037 cmdtyp(command type)")
... This parameter is disabled.
Compensation type II ("2" in "#1037 cmdtyp(command type)")
... Length wear and radius wear
Compensation type III ("3" in "#1037 cmdtyp(command type)")
... Tool wear and tool nose wear
Select whether to display confirmation message when setting workpiece coordinate system offset in [Easy setting] menu.
0: Not display
1: Display
In creating a file, or in transferring a file, if the file name of the new file, or the file name of the transfer desti nation consists only of numerical figures, 0 of the file name head will be deleted from the name.
0: Designated file name (0 remains in the file name)
1: 0 will be deleted from the file name
Set the maximum number of files to sort in the memory card, USB memory and DS lists.
If the setting is large, update of the list may take longer.
---Setting range---
64 to 1000 (M800W/M80W with Windows-based display)
64 to 250 (M800S, or M800W/M80W with non-Windows-based display)
64 to 128 (M80 Series and E80)
Standard: 128
Select whether to enable the automatic display on the Edit screen, when selected, of the programs searched by operation/check search or the MDI programs in MDI mode.
0: Enable the automatic display
1: Disable the automatic display
Display a confirming message when operating the [Undo] menu.
0: Not display a confirming message
1: Display a confirming message
Select what to display in the selectable display area.
0: Common variable
1: Local variable
2: Workpiece coordinate system offset
3: All spindles' rotation speed
4: Expanded counters
5: Tool center coordinate display
6: Tool compensation amount
(Note1) Tool center coordinate display is available only when any of the 5-axis related options is enabled.
#8934 Disable wear comp
#8935 W COORD CONFIRM
#8936 Delete leading 0
#8937 File sort volume
#8938 Edit-Not show Prg
#8939 Undo confirm msg
#8940 Set select display

Enable switching the method to set tool compensation data (absolute/incremental value) with INPUT key.
0: Fix it to the absolute value input.
1: Enable to switch between absolute and incremental value input.
Set the color to be shown on the top-left of screen and window title for the 1st part system. This enables switching the color patterns for each part system.
When set to the values "1" to "8", the part system name is shown in the form of button image.
When set to "0", the settings between #8943 (#8962) and #8945 (#8965) is disabled and the screen is shown by the default color pattern for all the part systems.
(Note) When set to "0" or "1", the color is determined by the setting of "#11060 Screen theme color".
0: Theme color (no button image) (default)
1: Theme color
2: Pink
3: Light blue
4: Orange
5: Green
6: Fuchsia
7: YellowGreen
8: Brown
Set the color to be shown on the top-left of screen and window title for the 2nd part system. This enables switching the color patterns for each part system.
When set to the values "1" to "8", the part system name is shown in the form of button image.
(Note 1) Enabled when "#8942 $1 color" is set to the values "1" to "8".
(Note 2) When set to "1", the color is determined by the setting of "#11060 Screen theme color".
1: Theme color (default)
2: Pink
3: Light blue
4: Orange
5: Green
6: Fuchsia
7: YellowGreen
8: Brown

Set the color to be shown on the top-left of screen and window title for the 3rd part system. This enables
switching the color patterns for each part system.
When set to the values "1" to "8", the part system name is shown in the form of button image.
(Note 1) Enabled when "#8942 $1 color" is set to the values "1" to "8".
(Note 2) When set to "1", the color is determined by the setting of "#11060 Screen theme color".
1: Theme color (default)
2: Pink
3: Light blue
4: Orange
5: Green
6: Fuchsia
7: YellowGreen
8: Brown
(PR) #8941 ABS/INC for T-ofs
(PR) #8942 $1 color
(PR) #8943 $2 color
(PR) #8944 $3 color

Set the color to be shown on the top-left of screen and window title for the 4th part system. This enables
switching the color patterns for each part system.
When set to the values "1" to "8", the part system name is shown in the form of button image.
(Note 1) Enabled when "#8942 $1 color" is set to the values "1" to "8".
(Note 2) When set to "1", the color is determined by the setting of "#11060 Screen theme color".
1: Theme color (default)
2: Pink
3: Light blue
4: Orange
5: Green
6: Fuchsia
7: YellowGreen
8: Brown
Select whether to enable switching of program displayed in the edit window on Monitor screen according to
the displayed part system when part system switch is performed.
0: Not switch
1: Switch
Select how to switch the part system to display when the 2-, 3- or 4-part system simultaneous display is en abled.
0, 1: The No. of part system to display is incremented by one. The operation target is switched when the
part system displayed in the non-active area is selected.
2: The operation target on the left side is fixed to $1. When $1 is selected for the part system switch, the
left side is the operation target. When $2 or after is selected, the displayed part system on the right side
is incremented by one.
(Note) 3- or 4-part system simultaneous display is enabled for a 15- or 19-type display unit only.
Select the default setting of the coordinate axis direction designation method to be displayed on the [Surface
detail] screen of R-Navi.
0,1: Point (+) on the axis
2: Latitude/Longitude
3: Latitude/Projection angle
4: Start point/End point
5: Index angle
Select the default coordinate axis combination to be displayed on the [Surface detail] screen of R-Navi.
0,1: Z/X
2: Z/Y
3: X/Y
(PR) #8945 $4 color
#8952 Edit-win $ switch
(PR) #8953 2$ disp switch typ
#8954 Initial type
#8955 Init axis pair

Select the definition type of the user-defined keys.
There are two user-defined keys.
Type 1:
It is the same as the conventional specification. A line feed between "[ ]" is not dealt as ";".
It is dealt as an upper case/lower case letter depending on the CapsLock status.
A symbolic character may be converted into a specific character.
Type 2:
A line break inside square brackets "[ ]" is dealt as ";".
Regardless of the CapsLock status, the defined character is input.
A symbolic character is also input as defined.
0: Type 1 (conventional specification)
1: Type 2
Select the operation mode of the manual tool length measurement 1 for L system.
0: Normal operation mode (Conventional specification)
Select an axis to measure using the cursor position.
1: Simple operation mode
Select an axis to measure using an axis address key or menu. More than one axis can be selected.
Select which spindle to display in the 5th part system window for the 2-, 3- or 4-part system simultaneous
display.
(Note 1) If you select "00" for the 2-, 3- or 4-part system simultaneous display, the default display is used (1st
spindle on the upper side and 2nd spindle on the lower side).
(Note 2) If you set the same number as, or a greater number than the setting of "#1039 spinno", or if the high or low-order setting is "0", the 1st spindle is displayed.
(Note 3) If you set the low-order to F, the screen shows the actual rotation speed, command speed and load
meter of the high-order spindle.
Note that for the 4-counter display in 4-part system simultaneous display, even if the low-order is not

F, the screen shows the actual rotation speed, command speed and load meter of the high-order and
low-order spindles.
(Note 4) 3- or 4-part system simultaneous display is enabled for a 15- or 19-type display unit only.
---Setting range---
High-order (Select an upper side spindle.) : 0 to 8
Low-order (Select a lower side spindle.) : 0 to 8, F
Select which spindle to display in the 6th part system window for the 2-, 3- or 4-part system simultaneous
display.
(Note 1) If you select "00" for the 2-, 3- or 4-part system simultaneous display, the default display is used (1st
spindle on the upper side and 2nd spindle on the lower side).
(Note 2) If you set the same number as, or a greater number than the setting of "#1039 spinno", or if the high or low-order setting is "0", the 1st spindle is displayed.
(Note 3) If you set the low-order to F, the screen shows the actual rotation speed, command speed and load
meter of the high-order spindle.
Note that for the 4-counter display in 4-part system simultaneous display, even if the low-order is not
F, the screen shows the actual rotation speed, command speed and load meter of the high-order and
low-order spindles.
(Note 4) 3- or 4-part system simultaneous display is enabled for a 15- or 19-type display unit only.
---Setting range---
High-order (Select an upper side spindle.) : 0 to 8
Low-order (Select a lower side spindle.) : 0 to 8, F
(PR) #8956 User key type
(PR) #8957 T meas (L)-Simple
#8958 SP on 5th part sys
#8959 SP on 6th part sys

Select which spindle to display in the 7th part system window for the 2-, 3- or 4-part system simultaneous
display.
(Note 1) If you select "00" for the 2-, 3- or 4-part system simultaneous display, the default display is used (1st
spindle on the upper side and 2nd spindle on the lower side).
(Note 2) If you set the same number as, or a greater number than the setting of "#1039 spinno", or if the high or low-order setting is "0", the 1st spindle is displayed.
(Note 3) If you set the low-order to F, the screen shows the actual rotation speed, command speed and load
meter of the high-order spindle.
Note that for the 4-counter display in 4-part system simultaneous display, even if the low-order is not
F, the screen shows the actual rotation speed, command speed and load meter of the high-order and
low-order spindles.
(Note 4) 3- or 4-part system simultaneous display is enabled for a 15- or 19-type display unit only.
---Setting range---
High-order (Select an upper side spindle.) : 0 to 8
Low-order (Select a lower side spindle.) : 0 to 8, F
Select which spindle to display in the 8th part system window for the 2-, 3- or 4-part system simultaneous
display.
(Note 1) If you select "00" for the 2-, 3- or 4-part system simultaneous display, the default display is used (1st
spindle on the upper side and 2nd spindle on the lower side).
(Note 2) If you set the same number as, or a greater number than the setting of "#1039 spinno", or if the high or low-order setting is "0", the 1st spindle is displayed.
(Note 3) If you set the low-order to F, the screen shows the actual rotation speed, command speed and load
meter of the high-order spindle.
Note that for the 4-counter display in 4-part system simultaneous display, even if the low-order is not
F, the screen shows the actual rotation speed, command speed and load meter of the high-order and
low-order spindles.
(Note 4) 3- or 4-part system simultaneous display is enabled for a 15- or 19-type display unit only.
---Setting range---
High-order (Select an upper side spindle.) : 0 to 8
Low-order (Select a lower side spindle.) : 0 to 8, F
Set the color to be shown on the top-left of screen and window title for the 5th part system. This enables
switching the color patterns for each part system.
When set to the values "1" to "8", the part system name is shown in the form of button image.
(Note 1) Enabled when "#8942 $1 color" is set to the values "1" to "8".
(Note 2) When set to "1", the color is determined by the setting of "#11060 Screen theme color".
---Setting range---
1: Theme color (default)
2: Pink
3: Light blue
4: Orange
5: Green
6: Fuchsia
7: YellowGreen
8: Brown
#8960 SP on 7th part sys
#8961 SP on 8th part sys
(PR) #8962 $5 color

Set the color to be shown on the top-left of screen and window title for the 6th part system. This enables
switching the color patterns for each part system.
When set to the values "1" to "8", the part system name is shown in the form of button image.
(Note 1) Enabled when "#8942 $1 color" is set to the values "1" to "8".
(Note 2) When set to "1", the color is determined by the setting of "#11060 Screen theme color".
---Setting range---
1: Theme color (default)
2: Pink
3: Light blue
4: Orange
5: Green
6: Fuchsia
7: YellowGreen

8: Brown
Set the color to be shown on the top-left of screen and window title for the 7th part system. This enables switching the color patterns for each part system.
When set to the values "1" to "8", the part system name is shown in the form of button image.
(Note 1) Enabled when "#8942 $1 color" is set to the values "1" to "8".
(Note 2) When set to "1", the color is determined by the setting of "#11060 Screen theme color".
---Setting range---
1: Theme color (default)
2: Pink
3: Light blue
4: Orange
5: Green
6: Fuchsia
7: YellowGreen
8: Brown
Set the color to be shown on the top-left of screen and window title for the 8th part system. This enables switching the color patterns for each part system.
When set to the values "1" to "8", the part system name is shown in the form of button image.
(Note 1) Enabled when "#8942 $1 color" is set to the values "1" to "8".
(Note 2) When set to "1", the color is determined by the setting of "#11060 Screen theme color".
---Setting range---
1: Theme color (default)
2: Pink
3: Light blue
4: Orange
5: Green
6: Fuchsia
7: YellowGreen
8: Brown
Select whether to insert or overwrite during edit. Insert or overwrite mode can also be changed temporarily using the INS key.
0: Overwrite mode
1: Insert mode
(PR) #8963 $6 color
(PR) #8964 $7 color
(PR) #8965 $8 color
(PR) #8966 Edit: INS or OVR

Select the [DELETE] key operation during edit.
0: The key serves as a Delete key. (erases the character after the cursor)
1: The key serves as a Back Space key. (erases the character before the cursor)
Tool shape radius designation
Select the tool shape designation method.
0: Diameter designation
1: Radius designation
Specify the display item for the 1st column (type) and 2nd column (compensation amount) on the right side of the tool management screen list display.
The setting value and display item are specified as follows.
(Setting value): (1st column) / (2nd column)
Tool compensation type I
0-11: H (Compensation No.) / Length compensation
Tool compensation type II
0, 5-11: H (Compensation No.) / Length compensation
1: H (Compensation No.) / Length compensation
2: D (Compensation No.) / Radius compensation
3: +H (Compensation No.) / Length wear
4: +D (Compensation No.) / Radius wear
Tool compensation type III
0: (Axis name (1st axis))(Compensation No.) / 1st axis tool length
1: (Axis name (1st axis))(Compensation No.) / 1st axis tool length
2: (Axis name (2nd axis))(Compensation No.) / 2nd axis tool length
3: (Axis name (Additional axis))(Compensation No.) / Additional axis tool length
4: +(Axis name (1st axis))(Compensation No.) / 1st axis wear
5: +(Axis name (2nd axis))(Compensation No.) / 2nd axis wear
6: +(Axis name (Additional axis))(Compensation No.) / Additional axis wear
7: R / Nose R
8: +R / R wear
9: P / Point
10: (Axis name (2nd additional axis))(Compensation No.) / 2nd additional axis tool length
11: +(Axis name (2nd additional axis))(Compensation No.) / 2nd additional axis wear
---Setting range---
0 to 11
(PR) #8967 Delete key action
#8968 Tool shape radius
#8969 Tool offset type 1

Specify the display item for the 3rd column (type) and 4th column (compensation amount) on the right side of the tool management screen list display.
The setting value and display item are specified as follows.
(Setting value): (3rd column) / (4th column)
Tool compensation type I
0-11: Set to blank / Set to blank
Tool compensation type II
0, 5-11: D (Compensation No.) / Radius compensation

1: H (Compensation No.) / Length compensation
2: D (Compensation No.) / Radius compensation
3: +H (Compensation No.) / Length wear
4: +D (Compensation No.) / Radius wear
Tool compensation type III
0: (Axis name (2nd axis))(Compensation No.) / 2nd axis tool length
1: (Axis name (1st axis))(Compensation No.) / 1st axis tool length
2: (Axis name (2nd axis))(Compensation No.) / 2nd axis tool length
3: (Axis name (Additional axis))(Compensation No.) / Additional axis tool length
4: +(Axis name (1st axis))(Compensation No.) / 1st axis wear
5: +(Axis name (2nd axis))(Compensation No.) / 2nd axis wear
6: +(Axis name (Additional axis))(Compensation No.) / Additional axis wear
7: R / Nose R
8: +R / R wear
9: P / Point
10: (Axis name (2nd additional axis))(Compensation No.) / 2nd additional axis tool length
11: +(Axis name (2nd additional axis))(Compensation No.) / 2nd additional axis wear
---Setting range---
0 to 11
Select whether to enable the alarm display window.
0: Disable the alarm display window
1: Enable the alarm display window
For L system only
Select whether to display tool offset data with the address T's offset No. at the head when the tool offset screen is opened after a manual value command.
<Monitor screen>
* Open the tool offset screen (window)
<Setup screen>
* Display the tool offset screen
(Note) The display is unchanged if you change a tool offset No. with the tool offset screen displayed.
0: Not display tool offset data with the address T's offset No. at the head
1: Display tool offset data with the address T's offset No. at the head
Select whether to enable selective display on an 8.4- or 10.4-type display terminal.
0: Disable selective display
1: Enable selective display. Select what to display using the parameter "#8940 Set select display".
#8970 Tool offset type 2
#8971 Alarm window ON
#8972 T code offset disp
(PR) #8973 Selective display

Select whether to enable ON/OFF of PLC switch without a press of the [Setting valid] menu.
0: Enable ON/OFF of PLC switch after a press of the [Setting valid] menu.
1: Enable ON/OFF of PLC switch without a press of the [Setting valid] menu.
Select how the [XXX No search] menu works on screens including the parameter and tool offset screens.
0: When you press [No search], enter the No. to display and then press [INPUT], the data on the display is ordered to start from the designated No.
1: When you enter the No. to display and then press [No. search], the data on the display is ordered to start from the designated No.
Select whether to disable animated graphics of the menus.
0: Enable the animation
1: Disable the animation
Select whether to open the same named programs of different part systems simultaneously for each editing area upon a press of Open on Edit screen while Multi-part system program management is enabled.
0: Disable (Not open the programs simultaneously for each editing area)
1: Enable (Open the programs simultaneously for each editing area)
Set the noise tolerance of touch operation.
The larger setting value gives the higher noise tolerance, but the operation response becomes dull.
0: Select this when the motions are normal at one and two points in the stable environment of the power supply.
1 to 4: If the touch detection position is unstable, increase the setting value according to the cursor blur level.
(Note) Do not execute touch operation for two seconds after changing this parameter.
Specify the coordinate system direction of the workpiece graphics (machining surface graphics) to be dis played on the R-Navi surface list screen or surface selection screen.
(Note) The angle (degrees) is a CCW rotation when viewed from the positive end of the height axis.
---Setting range---
0: XYZ 0
1: YZX 0
2: ZXY 0
3: XYZ 90
4: YZX 90
5: ZXY 90
6: XYZ 180
7: YZX 180
8: ZXY 180
9: XYZ 270
10: YZX 270
11: ZXY 270
Specify the display items when displaying the updated time and date of the file on the "Date / Comment" if NC memory is selected on the program list display.
0: Displays the program comment. (Conventional operation)
1: Displays the updated time and date.
(Note) When multi-part system program management is valid, program comment display is specified, regard less of this setting.
#8974 Simple PLC switch
#8975 No. search process
#8976 Menu animation OFF
#8977 Multi-$ simul edit

#8979 Touch op noise res
#8980 R-Navi graphic dir
#8981 NCmemory date disp

In the check method 2 of graphic check, checking for 1st part system is invalid.
0: Enable the check. (The part system is the check target)
1: Disable the check. (The part system is not the check target)
In the check method 2 of graphic check, checking for 2nd part system is invalid.
0: Enable the check. (The part system is the check target)
1: Disable the check. (The part system is not the check target)
In the check method 2 of graphic check, checking for 3rd part system is invalid.
0: Enable the check. (The part system is the check target)
1: Disable the check. (The part system is not the check target)
In the check method 2 of graphic check, checking for 4th part system is invalid.
0: Enable the check. (The part system is the check target)
1: Disable the check. (The part system is not the check target)
In the check method 2 of graphic check, checking for 5th part system is invalid.
0: Enable the check. (The part system is the check target)
1: Disable the check. (The part system is not the check target)
In the check method 2 of graphic check, checking for 6th part system is invalid.
0: Enable the check. (The part system is the check target)
1: Disable the check. (The part system is not the check target)
In the check method 2 of graphic check, checking for 7th part system is invalid.
0: Enable the check. (The part system is the check target)
1: Disable the check. (The part system is not the check target)
In the check method 2 of graphic check, checking for 8th part system is invalid.
0: Enable the check. (The part system is the check target)
1: Disable the check. (The part system is not the check target)
At the time of normal edit, specify the operation with up and down cursor keys in the block on the several lines.
0: Moves by line number
1: Moves by line on display
(Note) For mass-editing, the operation is always as "1" setting.
Select whether to enable the interactive cycle insertion function.
0: Disable
1: Enable
Switch the selectable cycle type.
0: Standard/Extended cycle
1: Not used
2: Not used
#8982 CheckSmltns$1Invld
#8983 CheckSmltns$2Invld
#8984 CheckSmltns$3Invld
#8985 CheckSmltns$4Invld
#8986 CheckSmltns$5Invld
#8987 CheckSmltns$6Invld
#8988 CheckSmltns$7Invld
#8989 CheckSmltns$8Invld
(PR) #8990 Edit-up/down keys
#8991 Interactive cycle
(PR) #8992 Cycle switch

Select whether to highlight the program cycle (from the cycle header to the footer) inserted through the inter active cycle insertion.
0: Not highlight
1: Highlight
Select whether to disable the [=Input] menu for interactive cycle insertion.
Fix the setting method to the incremental value input.
0: Enable [=Input] menu
1: Disable [=Input] menu
Set the time until recognized as long press (long tap).
When releasing a finger within the set time, it is recognized as tap.
0: 800 (ms)
1: 1000
2: 1500
3: 2000
Select whether to enable the simple programming function.
0: Disable
1: Enable
Select whether to increase the graphic check speed.
When you select 1 to 3, graphic check becomes faster.
Note however that the workpiece shape is drawn more inward than the programmed path.
The greater the setting value, the faster the graphic check will be.
0: Disable
1: Level 1
2: Level 2
3: Level 3
High-speed graphic check is enabled for the check method 1 only.
Select whether to enable the finished shape display.
0: Disable
1: Enable
Select the display format for simultaneous program edit (3 or 4 Edit), which can be selected with the [Display setting] menu.
0: [2 Edit] and [3 Edit] are selectable.
1: [2 Edit] and [4 Edit] are selectable.

Select whether to restrain the VNC client from connecting to the NC, displaying the NC screen or performing
setting to the NC.
Menu selection may be disabled depending on the set value.
0: Disable the VNC server function.
1: Enable the VNC server function, and allow the VNC client to display the NC screen and to perform set ting operation.
2: Enable the VNC server function, and allow the VNC client to display the NC screen, but the available
setting operation is INPUT key only.
#8993 Cycle highlight
#8994 =InputOFF:Interact
#8995 Touchop longtaptim
(PR) #8996 Simple program ON
#8997 Hi-speed grph chck
#8998 Finish shape view
(PR) #8999 Simul edit - View
(PR) #19701 Restrain VNCserver

Specify the password for connecting to the VNC server.
The password is needed for VNC client of an external PC to connect to the server.
---Setting range---
Up to 8 characters including alphanumeric characters and '_' (underscore)
Specify the port number for connecting to the VNC server.
The recommended value is "5901".
(Note) If you use the remote desktop function, do not set "5900".
---Setting range---
0 to 65535
Specify the color depth of the screen displayed by the VNC client via VNC server connection.
0: 16-bit color depth
1: 8-bit color depth
Specify the transmission cycle for the VNC server to send screen data to the VNC client.
0: Standard transmission cycle
1: Increase the cycle two-fold.
2: Increase the cycle four-fold.
(Note) If you increase the transmission cycle, the NC screen refresh may be delayed.
Enable upward search for the text search function in the edit window and edit screen.
0: Search downward from the cursor position.
1: Enable upward and downward search from the cursor position.
Switch the unit of feedrate display for Feedrate per revolution.
0: Display the feedrate in mm/rev unit.
1: Display the feedrate in mm/min unit.
Switch the behavior of the system variables (position data) that cannot be read during travel.
0: Conventional operation
1: Program error that is generated because of read during travel is discarded and recalculation is per formed.
Select where to output a cycle created with the interactive cycle insertion.
0: Output to the main program
1: Output to a subprogram stored in NC memory
2: Output to a subprogram stored in the directory "#8880/8881 Subpro stor D0"
3: Output to a subprogram stored in the directory "#8882/8883 Subpro stor D1"
4: Output to a subprogram stored in the directory "#8884/8885 Subpro stor D2"
5: Output to a subprogram stored in the directory "#8886/8887 Subpro stor D3"
6: Output to a subprogram stored in the directory "#8888/8889 Subpro stor D4"
Select where the cursor is located after data entry on the workpiece coordinate system offset screen.
0: Cursor moves to the next line. If the original cursor position is in the last line, it moves to the top of the
next data.
1: Cursor moves to the next line. If the original cursor position is in the last line, the position is unchanged.
2: Unchanged from the original position.
#19702 VNC password
(PR) #19703 VNC server port
#19704 VNC color depth
#19705 VNC transmit cycle
#19710 Edit-Upward search
#19711 Unit of feed disp
#19712 Sys var pre-read
#19715 Cycle output dest.
#19717 W coord: cursor

Switch the behavior of the repeat key (page switch key/cursor key).
0: Screen stop time depends on the length of time the button is pressed
1: The screen stops as soon as the button is released
(Note) This parameter is valid for M800S, M80, M800W/M80W non-Windows-based display unit and E80.
#19724 Repeat key switch

14.14 Machining Condition Selection Parameters
(Note) The machining condition parameter groups which can be set through the machining condition setting screen are
stored according to the application. The guidance display and parameter input/output on the screen follow the ma chining condition parameter numbers in the following table. These parameters can only be set through the machin ing condition setting screen.
Set a cutting feedrate when applying pre-interpolation acceleration/deceleration.
When high-accuracy control time constant expansion is valid, set the maximum of cutting feed clamp speed
of each axis.
---Setting range---
1 to 999999 (mm/min)
Nos. on the machining
condition setting

screen
Machining Condition Pa rameters (Application 1)
Machining Condition Pa rameters (Application 2)
Machining Condition Pa rameters (Application 3)
#1207 #42001 #42301 #42601
#1568 #42002 #42302 #42602
#1570 #42003 #42303 #42603
#2010 #42007 #42307 #42607
#8019 #42004 #42304 #42604
#8020 #42008 #42308 #42608
#8022 #42005 #42305 #42605
#8023 #42006 #42306 #42606
#8026 #42009 #42309 #42609
#8027 #42010 #42310 #42610
#8028 #42011 #42311 #42611
#8030 #42012 #42312 #42612
#8033 #42013 #42313 #42613
#8029 #42014 #42314 #42614
#8037 #42015 #42315 #42615
#8090 #42016 #42316 #42616
#8091 #42017 #42317 #42617
#8093 #42018 #42318 #42618
#2659 #42019 #42319 #42619
#1206 #42020 #42320 #42620
#12070 #42021 #42321 #42621
#1206 G1bF Maximum speed

Set a cutting feed time constant when applying pre-interpolation acceleration/deceleration.
When set to "0", the time constant will be clamped at 1ms.
---Setting range---
Without high-accuracy control time constant expansion: 1 to 5000 (ms)
With high-accuracy control time constant expansion: 1 to 30000 (ms)
Cutting feed Acc Cutting feed acceleration
Displays cutting feed acceleration.
Set the filter time constant for smoothly changing the acceleration rate for the cutting feed acceleration/de celeration in pre-interpolation acceleration/deceleration.
- Notch frequency Hz
Displays the notch frequency (Hz) for the S-pattern filter set in "#1568 SfiltG1" (G01 soft acceleration/decel eration filter).
---Setting range---
0 to 200 (ms)
Set the filter time constant for smoothly changing the acceleration rate in pre-interpolation acceleration/de celeration.
This will be disabled when "0" or "1" is set.
- Notch frequency Hz
Displays the notch frequency (Hz) for the S-shape filter set in "#1570 Sfilt2" (Soft acceleration/deceleration
filter 2).
---Setting range---
0 to 200 (ms)
Set a feed forward gain for pre-interpolation acceleration/deceleration.
The larger the set value, the smaller the theoretical control error will be. However, if a machine vibration oc curs, set the smaller value.
---Setting range---
0 to 200 (%)
Specify a tolerance (tolerable error) to be used under tolerance control.
Set a tolerable error for fine segment program created by CAM. (Usually around 0.01(mm))
If 0.000 is set, it is operated with the tolerance of 0.01(mm).
When designating the tolerance amount with the ", K address", this parameter is not used.
---Setting range---
0.000 to 100.000 (mm)
#1207 G1btL Time constant
#1568 SfiltG1 G01 soft acceleration/deceleration filter
#1570 Sfilt2 Soft acceleration/deceleration filter 2
#2010 fwd_g Feed forward gain
#2659 tolerance Tolerance
G1btL
G1bF
Time
Speed

Set a compensation coefficient for reducing a control error in the reduction of a corner roundness and arc
radius.
The larger the set value is, the smaller the theoretical error will be. However, since the speed at the corner
goes down, the cycle time will be extended.
Coefficient = 100 - setting value
(Note) This function will be enabled when "#8021 COMP_CHANGE" is set to "0".
---Setting range---
0 to 99 (%)
Theoretical radius decrease error amount
Displays the theoretical radius decrease error amount, R(mm), from the automatic calculation by NC.
Theoretical radius decrease amount in arc
R5mm arc deceleration speed
Displays a deceleration speed (mm/min) along an arc of 5 (mm) radius.
R1mm arc deceleration speed
Displays a deceleration speed(mm/min) along an arc of 1 (mm) radius.
#8019 R COMP
+
R

F
Command path
Path after servo control

Set the minimum value of an angle (external angle) that should be assumed to be a corner.
When an inter-block angle (external angle) in high-accuracy mode is larger than the set value, it will be de termined as a corner and the speed will go down to sharpen the edge.
(Note) If "0" is set, it will be handled as "5" degrees.
---Setting range---
0 to 89 ()
0: 5 degree (Equals to setting "5")
Theoretical corner dull amount
Displays the corner dull amount c(mm) in respect to the corner's angle (external angle) ().
ca(mm): Error () caused by the soft acceleration/deceleration 2
cs(mm): Error () caused by the servo system
Corner deceleration speed
Display corner deceleration speed c (mm/min) for the corner of the angle (external angle) with ().
Theoretical dull amount at 90 degree
Display corner dull amount when the angle is 90 degree.
Corner deceleration speed at 90 degree
Display corner deceleration speed when the angle is 90 degree.
Select whether to share or separate the compensation coefficient at the corner/curve during the high-accu racy control mode.
0: Share ("#8019 R COMP" is applied.)
1: Separate
* Corner: #8022 CORNER COMP
* Curve: #8023 CURVE COMP
(Note) Set "1" when using SSS/EasySSS control.
#8020 DCC ANGLE
#8021 COMP_CHANGE
If the set value is smaller than , the speed goes down to optimize
the corner.
F
ca
cs
Path after servo control
Path after soft acceleration/ Command path
deceleration 2
Theoretical roundness amount at corner

Set the compensation coefficient to further reduce or increase the roundness at the corner during the high accuracy control mode.
Coefficient = 100 - setting value
(Note) This is valid when "#8021 COMP CHANGE" is set to "1".
Reference to "#8020 Corner decreasing speed "for theoretical corner roundness amount, corner decreasing
speed, theoretical 90 degree dull amount, 90 degree corner decreasing speed.
---Setting range---
-1000 to 99 (%)
Set the compensation coefficient to further reduce or increase the radius reduction amount at the curve (arc,
involute, spline) during the high-accuracy control mode.
Coefficient = 100 - setting value
(Note) This is valid when "#8021 COMP CHANGE" is set to "1".
For theoretical radius reduction error amount, R5mm arc deceleration speed and R1mm arc deceleration
speed, refer to "#8019 R COMP".
---Setting range---
-1000 to 99 (%)
For M system only.
Specify whether to enable the fine spline function.
0: Disable the fine spline function.
1: Enable the fine spline function.
Spline interpolation will be valid during G61.2 modal regardless of this setting.
Set the angle where the spline interpolation is temporarily canceled.
When the angle made by blocks exceeds this parameter setting value, spline interpolation will be canceled
temporarily. In consideration of the pick feed, set a value a little smaller than the pick feed angle.
---Setting range---
0 to 180 ()
0: 180 ()
Set the maximum chord error (tolerance) in a block that includes an inflection point. Set the tolerance appli cable when the applicable block is developed to fine segments by CAM. (normally about 10 m)
When "0.000" is set, the applicable block will be linear.
---Setting range---
0.000 to 100.000 (mm)
Set the maximum chord error (tolerance) in a block that includes no inflection point. Set the tolerance appli cable when the applicable block is developed to fine segments by CAM. (normally about 10 m)
When "0.000" is set, the applicable block will be linear.
---Setting range---
0.000 to 100.000 (mm)
Set the length of the block subject to fairing.
(Enabled when "#8033 Fairing ON" is set to "1".)
---Setting range---
0 to 100.000 (mm)
#8022 CORNER COMP
#8023 CURVE COMP
#8025 SPLINE ON
#8026 CANCEL ANG. (for M system only)
#8027 Toler-1 (for M system only)
#8028 Toler-2 (for M system only)
#8029 FairingL (for M system only)

Set the fine-segment length where the spline interpolation is temporarily canceled.
When the length of one block exceeds this parameter setting value, spline interpolation is canceled tempo rarily and linear interpolation is performed. Set a value a little smaller than one block length of the program.
If "-1" is set, spline interpolation will be performed regardless of block length.
---Setting range---
-1 to 127 (mm)
0: 1 (mm)
Select whether or not to use the fairing or smooth fairing function.
0: Use neither of them
1: Use the fairing function
2: Use the smooth fairing function
Set the length of the block to be excluded when deciding a corner.
(Enabled when "#8036 CordecJudge" is set to "1".)
---Setting range---
0 to 99999.999 (mm)
Set whether to enable the SSS control with G05 P10000.
0: Disable
1: Enable
Set the maximum value of the range for recognizing the shape.
To eliminate the effect of steps or errors, etc., set a large value. To enable sufficient deceleration, set a small value.
If "0.000" is set, the standard value (1.000mm) will be applied.
---Setting range---
0 to 100.000 (mm)
Set the width of the step at which the speed is not to be decelerated. (Approximately the same as the CAM path difference [Tolerance].)
If "0" is set, the standard value (5m) will be applied.
If a minus value is set, the speed will decelerate at all minute steps.
---Setting range---
-1.000 to 0.100 (mm)
Specify the time constant of the filter that smoothes out fluctuations in acceleration under the tolerance con trol.
Basically set to 0.
---Setting range---
0 to 200 (ms)
Time constant for machining condition selection I
Set the time constant for the machining condition selection I function. This is equivalent to the parameter "#1207 G1btL".
---Setting range---
Without high-accuracy control time constant expansion: 0 to 5000 (ms)
With high-accuracy control time constant expansion: 0 to 30000 (ms)
#8030 MINUTE LENGS (for M system only)
#8033 Fairing ON (for M system only)
#8037 CorJudgeL (for M system only)
#8090 SSS ON (for M system only)
#8091 StdLength (for M system only)
#8093 StepLeng (for M system only)
#12070 Sfilt2_tol Tolerance control: Soft acceleration/deceleration filter
2
#42001 P1-G1btL Time constant for machining condition selection I

G01soft acceleration/deceleration filter for machining condition selection I
Set the G01 soft acceleration/deceleration filter's time constant for the machining condition selection I func tion. This is equivalent to the parameter "#1568 SfiltG1".
---Setting range---
0 to 200 (ms)
Soft acceleration/deceleration filter 2 for machining condition selection I
Set the soft acceleration/deceleration filter 2's time constant for the machining condition selection I function.
This is equivalent to the parameter "#1570 Sfilt2".
---Setting range---
0 to 50 (ms)
Accuracy coefficient for machining condition selection I
Set the accuracy coefficient for the machining condition selection I function. This is equivalent to the param eter "#8019 R COMP".
* This setting is enabled when "#8021 COMP_CHANGE" is set to "0".
---Setting range---
0 to 99 (%)
Corner accuracy coefficient for machining condition selection I
Set the corner accuracy coefficient for the machining condition selection I function. This is equivalent to the parameter "#8022 CORNER COMP".
* This setting is enabled when "#8021 COMP_CHANGE" is set to "1".
---Setting range---
-1000 to 99 (%)
Curve accuracy coefficient for machining condition selection I
Set the curve accuracy coefficient for the machining condition selection I function. This is equivalent to the parameter "#8023 CURVE COMP".
* This setting is enabled when "#8021 COMP_CHANGE" is set to "1".
---Setting range---
-1000 to 99 (%)
Feed forward gain for machining condition selection I
Set the feed forward gain for the machining condition selection I function. This is equivalent to the parameter "#2010 fwd_g".
---Setting range---
0 to 200 (%)
Corner deceleration angle for machining condition selection I
Set the corner deceleration angle for the machining condition selection I function. This is equivalent to the parameter "#8020 DCC ANGLE".
---Setting range---

0 to 89 ()
#42002 P1-SfiltG1 G01soft acceleration/deceleration filter for machining
condition selection I
#42003 P1-Sfilt2 Soft acceleration/deceleration filter 2 for machining
condition selection I
#42004 P1-rcomp Accuracy coefficient for machining condition selection
I
#42005 P1-cor_comp Corner accuracy coefficient for machining condition se lection I
#42006 P1-cur_comp Curve accuracy coefficient for machining condition se lection I
#42007 P1-fwd_g Feed forward gain for machining condition selection I
#42008 P1-fcorn Corner deceleration angle for machining condition se lection I

Cancel angle for machining condition selection I
Set the cancel angle for the machining condition selection I function. This is equivalent to the parameter
"#8026 CANCEL ANG".
---Setting range---
0 to 180 ()
Chord error 1 for machining condition selection I
Set the chord error 1 for the machining condition selection I function. This is equivalent to the parameter
"#8027 Toler-1".
---Setting range---
0.000 to 100.000 (mm)
Chord error 2 for machining condition selection I
Set the chord error 2 for the machining condition selection I function. This is equivalent to the parameter
"#8028 Toler-2".
---Setting range---
0.000 to 100.000 (mm)
Fine segment length for machining condition selection I
Set the fine segment length for the machining condition selection I function. This is equivalent to the param eter "#8030 MINUTE LENGS".
---Setting range---
-1 to 127 (mm)
Fairing ON for machining condition selection I
Set whether to enable the fairing function for the machining condition selection I function. This is equivalent
to the parameter "#8033 Fairing ON".
---Setting range---
0/1
Fairing L for machining condition selection I
Set the fairing length for the machining condition selection I function. This is equivalent to the parameter
"#8029 FairingL".
---Setting range---
0 to 100.000 (mm)
Corner judgment length for machining condition selection I
Set the corner judgment length for the machining condition selection I function. This is equivalent to the pa rameter "#8037 CorJudgeL".
---Setting range---
0 to 99999.999 (mm)
SSS/EasySSS control ON for machining condition selection I
Set whether to enable the SSS/EasySSS control for the machining condition selection I function. This is
equivalent to the parameter "#8090 SSS ON".
---Setting range---
0/1
#42009 P1-spcanag Cancel angle for machining condition selection I
#42010 P1-distth1 Chord error 1 for machining condition selection I
#42011 P1-distth2 Chord error 2 for machining condition selection I
#42012 P1-minute Fine segment length for machining condition selection I
#42013 P1-fairing Fairing ON for machining condition selection I
#42014 P1-minleng Fairing L for machining condition selection I
#42015 P1-cordeclen Corner judgment length for machining condition selec tion I
#42016 P1-sss_prcm SSS/EasySSS control ON for machining condition se lection I

Standard length for machining condition selection I
Set the standard length for the machining condition selection I function. This is equivalent to the parameter
"#8091 StdLength".
---Setting range---
0 to 100.000 (mm)
Step width for machining condition selection I
Set the width of the step for the machining condition selection I function. This is equivalent to the parameter
"#8093 StepLeng".
---Setting range---
-1.000 to 0.100 (mm)
Set the tolerance for machining condition selection parameter group for machining condition selection I func tion. This is equivalent to the parameter "#2659 tolerance".
---Setting range---
0 to 100.000 (mm)
Specify the maximum speed for the machining condition parameters of the machining condition selection I
function (equivalent to "#1206 G1bF").
---Setting range---
1 to 1000000 (mm/min)
Specify the tolerance control soft acceleration/deceleration filter 2 for the machining condition parameters of
the machining condition selection I function (equivalent to "#12070 Sfilt2_tol").
---Setting range---
0 to 200 (ms)
Time constant for machining condition selection I
Set the time constant for the machining condition selection I function. This is equivalent to the parameter
"#1207 G1btL".
---Setting range---

Without high-accuracy control time constant expansion: 0 to 5000 (ms)
With high-accuracy control time constant expansion: 0 to 30000 (ms)
G01soft acceleration/deceleration filter for machining condition selection I
Set the G01 soft acceleration/deceleration filter's time constant for the machining condition selection I func tion. This is equivalent to the parameter "#1568 SfiltG1".
---Setting range---
0 to 200 (ms)
Soft acceleration/deceleration filter 2 for machining condition selection I
Set the soft acceleration/deceleration filter 2's time constant for the machining condition selection I function.
This is equivalent to the parameter "#1570 Sfilt2".
---Setting range---
0 to 50 (ms)
#42017 P1-std_length Standard length for machining condition selection I
#42018 P1-step_length Step width for machining condition selection I
#42019 P1-tolerance Tolerance for machining condition selection I
#42020 P1-G1bF Machining condition selection I: maximum speed
#42021 P1-Sfilt2_tol Machining condition selection I: tolerance control soft
accel/decel filter 2
#42301 P2-G1btL Time constant for machining condition selection I
#42302 P2-SfiltG1 G01soft acceleration/deceleration filter for machining
condition selection I
#42303 P2-Sfilt2 Soft acceleration/deceleration filter 2 for machining
condition selection I

Accuracy coefficient for machining condition selection I
Set the accuracy coefficient for the machining condition selection I function. This is equivalent to the param eter "#8019 R COMP".
* This setting is enabled when "#8021 COMP_CHANGE" is set to "0".
---Setting range---
0 to 99 (%)
Corner accuracy coefficient for machining condition selection I
Set the corner accuracy coefficient for the machining condition selection I function. This is equivalent to the
parameter "#8022 CORNER COMP".
* This setting is enabled when "#8021 COMP_CHANGE" is set to "1".
---Setting range---
-1000 to 99 (%)
Curve accuracy coefficient for machining condition selection I
Set the curve accuracy coefficient for the machining condition selection I function. This is equivalent to the
parameter "#8023 CURVE COMP".
* This setting is enabled when "#8021 COMP_CHANGE" is set to "1".
---Setting range---
-1000 to 99 (%)
Feed forward gain for machining condition selection I
Set the feed forward gain for the machining condition selection I function. This is equivalent to the parameter
"#2010 fwd_g".
---Setting range---
0 to 200 (%)
Corner deceleration angle for machining condition selection I
Set the corner deceleration angle for the machining condition selection I function. This is equivalent to the
parameter "#8020 DCC ANGLE".
---Setting range---
0 to 89 ()
Cancel angle for machining condition selection I
Set the cancel angle for the machining condition selection I function. This is equivalent to the parameter
"#8026 CANCEL ANG".
---Setting range---
0 to 180 ()
Chord error 1 for machining condition selection I
Set the chord error 1 for the machining condition selection I function. This is equivalent to the parameter
"#8027 Toler-1".
---Setting range---
0.000 to 100.000 (mm)
#42304 P2-rcomp Accuracy coefficient for machining condition selection
I
#42305 P2-cor_comp Corner accuracy coefficient for machining condition se lection I
#42306 P2-cur_comp Curve accuracy coefficient for machining condition se lection I
#42307 P2-fwd_g Feed forward gain for machining condition selection I
#42308 P2-fcorn Corner deceleration angle for machining condition se lection I
#42309 P2-spcanag Cancel angle for machining condition selection I
#42310 P2-distth1 Chord error 1 for machining condition selection I

Chord error 2 for machining condition selection I
Set the chord error 2 for the machining condition selection I function. This is equivalent to the parameter
"#8028 Toler-2".
---Setting range---
0.000 to 100.000 (mm)
Fine segment length for machining condition selection I
Set the fine segment length for the machining condition selection I function. This is equivalent to the param eter "#8030 MINUTE LENGS".
---Setting range---
-1 to 127 (mm)
Fairing ON for machining condition selection I
Set whether to enable the fairing function for the machining condition selection I function. This is equivalent
to the parameter "#8033 Fairing ON".
---Setting range---
0/1
Fairing L for machining condition selection I

Set the fairing length for the machining condition selection I function. This is equivalent to the parameter
"#8029 FairingL".
---Setting range---
0 to 100.000 (mm)
Corner judgment length for machining condition selection I
Set the corner judgment length for the machining condition selection I function. This is equivalent to the pa rameter "#8037 CorJudgeL".
---Setting range---
0 to 99999.999 (mm)
SSS/EasySSS control ON for machining condition selection I
Set whether to enable the SSS/EasySSS control for the machining condition selection I function. This is
equivalent to the parameter "#8090 SSS ON".
---Setting range---
0/1
Standard length for machining condition selection I
Set the standard length for the machining condition selection I function. This is equivalent to the parameter
"#8091 StdLength".
---Setting range---
0 to 100.000 (mm)
Step width for machining condition selection I
Set the width of the step for the machining condition selection I function. This is equivalent to the parameter
"#8093 StepLeng".
---Setting range---
-1.000 to 0.100 (mm)
#42311 P2-distth2 Chord error 2 for machining condition selection I
#42312 P2-minute Fine segment length for machining condition selection I
#42313 P2-fairing Fairing ON for machining condition selection I
#42314 P2-minleng Fairing L for machining condition selection I
#42315 P2-cordeclen Corner judgment length for machining condition selec tion I
#42316 P2-sss_prcm SSS/EasySSS control ON for machining condition se lection I
#42317 P2-std_length Standard length for machining condition selection I
#42318 P2-step_length Step width for machining condition selection I

Set the tolerance for machining condition selection parameter group for machining condition selection I func tion. This is equivalent to the parameter "#2659 tolerance".
---Setting range---
0 to 100.000 (mm)
Specify the maximum speed for the machining condition parameters of the machining condition selection I
function (equivalent to "#1206 G1bF").
---Setting range---
1 to 1000000 (mm/min)
Specify the tolerance control soft acceleration/deceleration filter 2 for the machining condition parameters of
the machining condition selection I function (equivalent to "#12070 Sfilt2_tol").
---Setting range---
0 to 200 (ms)
Time constant for machining condition selection I
Set the time constant for the machining condition selection I function. This is equivalent to the parameter
"#1207 G1btL".
---Setting range---
Without high-accuracy control time constant expansion: 0 to 5000 (ms)
With high-accuracy control time constant expansion: 0 to 30000 (ms)
G01soft acceleration/deceleration filter for machining condition selection I
Set the G01 soft acceleration/deceleration filter's time constant for the machining condition selection I func tion. This is equivalent to the parameter "#1568 SfiltG1".
---Setting range---
0 to 200 (ms)
Soft acceleration/deceleration filter 2 for machining condition selection I
Set the soft acceleration/deceleration filter 2s time constant for the machining condition selection I function.
This is equivalent to the parameter "#1570 Sfilt2".
---Setting range---
0 to 50 (ms)
Accuracy coefficient for machining condition selection I
Set the accuracy coefficient for the machining condition selection I function. This is equivalent to the param eter "#8019 R COMP".
* This setting is enabled when "#8021 COMP_CHANGE" is set to "0".
---Setting range---
0 to 99 (%)
#42319 P2-tolerance Tolerance for machining condition selection I
#42320 P2-G1bF Machining condition selection I: maximum speed
#42321 P2-Sfilt2_tol Machining condition selection I: tolerance control soft
accel/decel filter 2
#42601 P3-G1btL Time constant for machining condition selection I
#42602 P3-SfiltG1 G01soft acceleration/deceleration filter for machining
condition selection I
#42603 P3-Sfilt2 Soft acceleration/deceleration filter 2 for machining
condition selection I
#42604 P3-rcomp Accuracy coefficient for machining condition selection
I

Corner accuracy coefficient for machining condition selection I
Set the corner accuracy coefficient for the machining condition selection I function. This is equivalent to the
parameter "#8022 CORNER COMP".
* This setting is enabled when "#8021 COMP_CHANGE" is set to "1".
---Setting range---
-1000 to 99 (%)
Curve accuracy coefficient for machining condition selection I
Set the curve accuracy coefficient for the machining condition selection I function. This is equivalent to the
parameter "#8023 CURVE COMP".

* This setting is enabled when "#8021 COMP_CHANGE" is set to "1".
---Setting range---
-1000 to 99 (%)
Feed forward gain for machining condition selection I
Set the feed forward gain for the machining condition selection I function. This is equivalent to the parameter
"#2010 fwd_g".
---Setting range---
0 to 200 (%)
Corner deceleration angle for machining condition selection I
Set the corner deceleration angle for the machining condition selection I function. This is equivalent to the
parameter "#8020 DCC ANGLE".
---Setting range---
0 to 89 ()
Cancel angle for machining condition selection I
Set the cancel angle for the machining condition selection I function. This is equivalent to the parameter
"#8026 CANCEL ANG".
---Setting range---
0 to 180 ()
Chord error 1 for machining condition selection I
Set the chord error 1 for the machining condition selection I function. This is equivalent to the parameter
"#8027 Toler-1".
---Setting range---
0.000 to 100.000 (mm)
Chord error 2 for machining condition selection I
Set the chord error 2 for the machining condition selection I function. This is equivalent to the parameter
"#8028 Toler-2".
---Setting range---
0.000 to 100.000 (mm)
#42605 P3-cor_comp Corner accuracy coefficient for machining condition se lection I
#42606 P3-cur_comp Curve accuracy coefficient for machining condition se lection I
#42607 P3-fwd_g Feed forward gain for machining condition selection I
#42608 P3-fcorn Corner deceleration angle for machining condition se lection I
#42609 P3-spcanag Cancel angle for machining condition selection I
#42610 P3-distth1 Chord error 1 for machining condition selection I
#42611 P3-distth2 Chord error 2 for machining condition selection I

Fine segment length for machining condition selection I
Set the fine segment length for the machining condition selection I function. This is equivalent to the param eter "#8030 MINUTE LENGS".
---Setting range---
-1 to 127 (mm)
Fairing ON for machining condition selection I
Set whether to enable the fairing function for the machining condition selection I function. This is equivalent
to the parameter "#8033 Fairing ON".
---Setting range---
0/1
Fairing L for machining condition selection I
Set the fairing length for the machining condition selection I function. This is equivalent to the parameter
"#8029 FairingL".
---Setting range---
0 to 100.000 (mm)
Corner judgment length for machining condition selection I
Set the corner judgment length for the machining condition selection I function. This is equivalent to the pa rameter "#8037 CorJudgeL".
---Setting range---
0 to 99999.999 (mm)
SSS/EasySSS control ON for machining condition selection I
Set whether to enable the SSS/EasySSS control for the machining condition selection I function. This is
equivalent to the parameter "#8090 SSS ON".
---Setting range---
0/1
Standard length for machining condition selection I
Set the standard length for the machining condition selection I function. This is equivalent to the parameter
"#8091 StdLength".
---Setting range---
0 to 100.000 (mm)
Step width for machining condition selection I
Set the width of the step for the machining condition selection I function. This is equivalent to the parameter
"#8093 StepLeng".
---Setting range---
-1.000 to 0.100 (mm)
Set the tolerance for machining condition selection parameter group for machining condition selection I func tion. This is equivalent to the parameter "#2659 tolerance".
---Setting range---
0 to 100.000 (mm)
#42612 P3-minute Fine segment length for machining condition selection I
#42613 P3-fairing Fairing ON for machining condition selection I
#42614 P3-minleng Fairing L for machining condition selection I
#42615 P3-cordeclen Corner judgment length for machining condition selec tion I
#42616 P3-sss_prcm SSS/EasySSS control ON for machining condition se lection I
#42617 P3-std_length Standard length for machining condition selection I
#42618 P3-step_length Step width for machining condition selection I
#42619 P3-tolerance Tolerance for machining condition selection I

Specify the maximum speed for the machining condition parameters of the machining condition selection I
function (equivalent to "#1206 G1bF").
---Setting range---

1 to 1000000 (mm/min)
Specify the tolerance control soft acceleration/deceleration filter 2 for the machining condition parameters of the machining condition selection I function (equivalent to "#12070 Sfilt2_tol").
---Setting range---
0 to 200 (ms)
#42620 P3-G1bF Machining condition selection I: maximum speed
#42621 P3-Sfilt2_tol Machining condition selection I: tolerance control soft accel/decel filter 2

14.15 Menu Selection Parameters
Select the menu Nos. to be displayed on Monitor screen's main menus.
Set the menu No. (numbered in the initial order) which you wish to set first from the left of Monitor's main menus in #10501, second in the next parameter and likewise afterwards.
(E.g.) When you set the parameter #10501 to 11, the menu initially displayed at the left end of Monitor main menu's 2nd page is displayed at the left end of the 1st page.
(Note) If you set the No. of menu which is not displayed in the initial state (without setting the menu selection parameters), the menu won't be displayed after this parameter setting.
-- Menu No. --
-1: Not display
0: Default
1: Search
2: Restart
3: Edit
4: Trace
5: Check
6: Offset
7: Coord
8: W-shift
10: Dsp.Chg
11: Modal
12: Tree
13: Time
14: Com var
15: Loc var
16: P corr
17: PLC SW
18: G92 set
19: Col stp
20: LdMeter
21: Sp-stby
22: TipDisp
23: All sp
26: S-sel
27: Next Ax
28: Cnt exp
29: Cnt set
30: MST
(PR) #10501-
10530
Monitr main menu 1 to 30

Select the menu Nos. to be displayed on Setup screen's main menus.
Set the menu No. (numbered in the initial order) which you wish to set first from the left of Setup's main menus in #10551, second in the next parameter and likewise afterwards.
(E.g.) When you set the parameter #10551 to 11, the menu initially displayed at the left end of Setup main menu's 2nd page is displayed at the left end of the 1st page.
(Note) If you set the No. of menu which is not displayed in the initial state (without setting the menu selection parameters), the menu won't be displayed after this parameter setting.
-- Menu No. --
-1: Not display
0: Default
1: T-ofs
2: T-meas
3: T-reg
4: T-life
5: Coord
6: W-meas
7: T-Mng.
8: MDI
9: Cnt set
10: MST
11: T-list
12: Pallet
13: User
15: Storage
16: Surf
17: MacCond
22: Barrier
23: WE mea.
26: E-mail
27: Range
Select the menu Nos. to be displayed on Edit screen's main menus.
Set the menu No. (numbered in the initial order) which you wish to set first from the left of Edit's main menus in #10601, second in the next parameter and likewise afterwards.

(E.g.) When you set the parameter #10601 to 11, the menu initially displayed at the left end of Edit main menu's 2nd page is displayed at the left end of the 1st page.
(Note) If you set the No. of menu which is not displayed in the initial state (without setting the menu selection parameters), the menu won't be displayed after this parameter setting.
-- Menu No. --
-1: Not display
0: Default
1: Edit
2: Check
3: NAVI (NAVI MILL)
4: NAVI (NAVI LATHE)
5: I/O
(PR) #10551-
10580
Setup main menu 1 to 30
(PR) #10601-
10630
Edit main menu 1 to 30

14.16 Tolerance Parameters
Specify a tolerance (tolerable error) to be used under tolerance control.
Set a tolerable error for fine segment program created by CAM. (Usually around 0.01(mm))
If 0.000 is set, it is operated with the tolerance of 0.01(mm).
When designating the tolerance amount with the ", K address", this parameter is not used.
---Setting range---
0.000 to 100.000 (mm)
Set a cutting feedrate when applying pre-interpolation acceleration/deceleration.
When high-accuracy control time constant expansion is valid, set the maximum of cutting feed clamp speed of each axis.
---Setting range---
1 to 999999 (mm/min)
Set a cutting feed time constant when applying pre-interpolation acceleration/deceleration.
When set to "0", the time constant will be clamped at 1ms.
---Setting range---
Without high-accuracy control time constant expansion: 1 to 5000 (ms)
With high-accuracy control time constant expansion: 1 to 30000 (ms)
Cutting feed Acc Cutting feed acceleration
Displays cutting feed acceleration.
Set the filter time constant for smoothly changing the acceleration rate for the cutting feed acceleration/de celeration in pre-interpolation acceleration/deceleration.
- Notch frequency Hz
Displays the notch frequency (Hz) for the S-pattern filter set in "#1568 SfiltG1" (G01 soft acceleration/decel eration filter).
---Setting range---
0 to 200 (ms)
Specify the time constant of filter that is used for smoothing the change of jerk when pre-interpolation accel eration/deceleration is performed in cutting feed.
This filter causes no path error, as the filter is applied to the resultant speed calculated before interpolation.
If you specify the jerk filter time constant, the time constants of each filter will be as follows:
- S-shape filter time constant
"#1568 SfiltG1" - "Jerk_filtG1"
- Jerk filter time constant
"Jerk_filtG1"
---Setting range---
0 to 50 (ms)
#2659 tolerance Tolerance
#1206 G1bF Maximum speed
#1207 G1btL Time constant
#1568 SfiltG1 G01 soft acceleration/deceleration filter
#12051 Jerk_filtG1 G01 jerk filter
G1btL
G1bF
Time
Speed

Select whether to enable the tolerance control.
0: Disable
1: Enable
(Note) Tolerance control is available only under SSS control.
To enable this function, set "#8090 SSS ON" to "1".
Specify the time constant of the filter that smoothes out fluctuations in acceleration under the tolerance con trol.
Basically set to 0.
---Setting range---
0 to 200 (ms)
#12066 Tolerance ctrl ON
#12070 Sfilt2_tol Tolerance control: Soft acceleration/deceleration filter
2
15

15Machine Parameters
The parameters with "(PR)" requires the CNC to be turned OFF after the settings. Turn the power OFF and ON to enable the parameter settings.
15.1 Base System Parameters

Select the existence of PLC axes and part systems.
0: Not exist
1: Exist
Set the number of control axes and PLC axes.
A total of 32 axes can be set.
Control axis: 0 to 16
PLC axis: 0 to 8
When set to "0", the number of control axes in the part system will be "0". Do not set the number of control axes of the first part system to "0".
(Note) The setting range differs according to the model.
Select the input setting value for each part system and the PLC axis.
Increments in parameters will follow this selection.
B: 1 m
C: 0.1 m
D: 0.01 m (10 nm)
E: 0.001 m (1 nm)
Set the unit for the NC internal position data, data communicated between the NC and drive unit, and the servo movement data.
Some parameter units, such as the pitch error and backlash, follow this specification.
The standard value is "E"; however, set the optimum value according to the machine model and specifica tions.
B: 1 m
C: 0.1 m
D: 0.01 m (10 nm)
E: 0.001 m (1 nm)
F: 0.0001 m (0.1 nm)
Select the PLC interface setting and display increment.
The PLC interface setting and display increment will follow this specification. Note that the PLC axis will follow "#1003 iunit".
B: 1 m
C: 0.1 m
D: 0.01 m (10 nm)
E: 0.001 m (1 nm)
F: 0.0001 m (0.1 nm)
(PR) #1001 SYS_ON System validation setup
(PR) #1002 axisno Number of axes
(PR) #1003 iunit Input setup unit
(PR) #1004 ctrl_unit Control unit
(PR) #1005 plcunit PLC unit

Select the machine error compensation setting and display increment.
The parameters related to machine error compensation (backlash, pitch error compensation, etc.) and PLC interface (external machine coordinate system compensation) will follow this selection.
B: 1 m
C: 0.1 m
D: 0.01 m (10 nm)
E: 0.001 m (1 nm)
F: 0.0001 m (0.1 nm)
Select the NC system type.
0: Machining center system (M system)
1: Lathe system (L system)
(Note 1) If the setting value is out of range, M system will be selected.
Select the plane to be selected when the power is turned ON or reset.
When 0 is specified, 1 is assumed (X-Y plane).e model and specifications.
1: X-Y plane (G17 command state)
2: Z-X plane (G18 command state)
3: Y-Z plane (G19 command state)
Set the names of the basic axes that compose the plane.
Set the axis name set in "#1013 axname".
If all three items ("base_I", "base_J" and "base_K") do not need to be set, such as for 2-axis specifications, input "0", and the parameter will be blank.
Normally, when X, Y and Z are specified respectively for base_I, _J, _K, the following relation will be estab lished:
G17: X-Y
G18: Z-X
G19: Y-Z
Or specify any other axis name desired.
---Setting range---
Axis names such as X, Y or Z
Set the names of the basic axes that compose the plane.
Set the axis name set in "#1013 axname".
If all three items ("base_I", "base_J" and "base_K") do not need to be set, such as for 2-axis specifications, input "0", and the parameter will be blank.
Normally, when X, Y and Z are specified respectively for base_I, _J, _K, the following relation will be estab lished:
G17: X-Y
G18: Z-X
G19: Y-Z
Or specify any other axis name desired.
---Setting range---
Axis names such as X, Y or Z
(PR) #1006 mcmpunit Machine error compensation unit
(PR) #1007 System type select System type select
#1025 I_plane Initial plane selection
#1026 base_I Base axis I
#1027 base_J Base axis J

Set the names of the basic axes that compose the plane.
Set the axis name set in "#1013 axname".
If all three items ("base_I", "base_J" and "base_K") do not need to be set, such as for 2-axis specifications,
input "0", and the parameter will be blank.
Normally, when X, Y and Z are specified respectively for base_I, _J, _K, the following relation will be estab lished:
G17: X-Y
G18: Z-X
G19: Y-Z
Or specify any other axis name desired.
---Setting range---
Axis names such as X, Y or Z
Set the axis name when there is an axis parallel to "#1026 base_I".
---Setting range---
Axis names such as X, Y or Z
Set the axis name when there is an axis parallel to "#1027 base_J".
---Setting range---
Axis names such as X, Y or Z
Set the axis name when there is an axis parallel to "#1028 base_K".
---Setting range---
Axis names such as X, Y or Z
Set the G code list and compensation type for programs.
1: List1 (for M) Type I (one compensation amount for one compensation No.)
2: List1 (for M) Type II (shape and wear compensation amounts for one comp. No.)
3: List2 (for L) Type III (shape and wear compensation amounts for one comp. No.)
4: List3 (for L) Ditto
5: List4 (for special L) Ditto
6: List5 (for special L) Ditto
7: List6 (for special L) Ditto
8: List7 (for special L) Ditto
9: List8 (for M) M2 form at type Type I
(one compensation amount for one compensation No.)
10: List8 (for M) M2 form at type Type II
(shape and wear compensation amounts for one compensation No.)
There are some items in the specifications that can be used or cannot be used according to the value set in
this parameter.
The file structure may also change depending on the compensation data type.
(Note) When this parameter is changed, the file system will be changed after the power is turned ON.
So always execute format.
The new format will be enabled after turning the power ON again.
Setting order
(1) cmdtyp changeover -> (2) Turn power ON again -> (3) Format -> (4) Turn power ON again
(Note) Compensation type III can be selected for M system by setting #1046.
#1028 base_K Base axis K
#1029 aux_I Flat axis I
#1030 aux_J Flat axis J
#1031 aux_K Flat axis K
(PR) #1037 cmdtyp Command type

Select the mode (absolute or incremental) at turning ON the power or reset.
0: Incremental setting
1: Absolute setting
Select the feedrate mode at turning ON the power or reset.
0: Asynchronous feed (feed per minute)
1: Synchronous feed (feed per revolution)
Select the linear command mode at turning ON the power or reset.
0: Linear interpolation (G01 command state)
1: Positioning (G00 command state)
Select the command method for the absolute and incremental commands.
The absolute command/incremental command can be issued by using the absolute command address and
incremental command address for the same axis.
0: Use G command for the absolute and incremental commands.
1: Use axis name for the absolute and incremental commands.
(The axis name in "#1013 axname" will be the absolute command, "#1014 incax" will be the incremental
command.)
Select whether to apply dry run (feed at manual setting speed instead of command feedrate) to the G00 com mand.
0: Not apply to G00. (move at rapid traverse rate)
1: Apply to G00. (move at manual setting speed)
Select the G00 travel path type.
0: Move linearly toward the end point. (interpolation type)
1: Move to the end point of each axis at the rapid traverse feedrate for each axis. (non-interpolation)
(Note) If this parameter is set to "1", neither of the following functions will be available: rapid traverse con stant-gradient acceleration/deceleration and rapid traverse constant-gradient multi-step acceleration/decel eration.
Select the user macro interrupt with the substitute M code.
0: Disable substitute M code
1: Enable substitute M code
Set an M code to replace M96 when "#1109 subs_M" is set to "1".
---Setting range---
3 to 97 (excluding 30)
Specify an M code to replace M97 when "#1109 subs_M" is set to "1".
---Setting range---
3 to 97 (excluding 30)
#1073 I_Absm Initial absolute setting
#1074 I_Sync Initial synchronous feed
#1075 I_G00 Initial G00
#1076 AbsInc ABS/INC address (for L system only)
#1085 G00Drn G00 dry run
#1086 G0Intp G00 non-interpolation

#1109 subs_M Validate substitute M code
#1110 M96_M M96 substitute M code
#1111 M97_M M97 substitute M code

Select the modal state at power ON from among the following: high-accuracy control mode, high-speed high accuracy control I mode, high-speed high-accuracy control II mode or high-speed high-accuracy control III mode.
0: G08P0/G64 (cutting) mode
1: G08P1/G61.1 (high-accuracy control) mode
2: G05.1Q1 (high-speed high-accuracy control I) mode
3: G05P10000 (high-speed high-accuracy control II) mode
4: G05P20000 (high-speed high-accuracy control III) mode
Select whether to initialize (power ON state) the modals by resetting.
0: Not initialize modal state
1: Initialize modal state
Set the name of each part system.
This must be set only when using multi-part system.
This name will be displayed on the screen only when the part systems must be identified.
Use 4 or less characters consisting of both alphabets and numbers.
---Setting range---
4 or less characters consisting of both alphabets and numbers
Set this address code when using the 2nd miscellaneous command. Set an address with A, B or C that is not used for "#1013 axname" or "#1014 incax".
---Setting range---
A, B, C
Set the tap return override value for the synchronous tapping.
When "0" is set, it will be regarded as 100%.
---Setting range---
0 to 100 (%)
Set the override value applied during a retract operation in synchronous tapping.
When set to "0", 100% is applied.
---Setting range---
0 to 999 (%)
Set the skip signal for ending the G04 (dwell) command.
PLC interface input signal
Skip3 Skip2 Skip1
0: - - -
1: - - *
2: - * -
3: - * *
4: * - -
5: * - *
6: * * -
7: * * *
(*: Enable, -: Disable)
#1148 I_G611 Initial hi-precis
#1151 rstint Reset initial
#1169 system name Part system name
#1170 M2name Second miscellaneous code
#1171 taprov Tap return override
#1172 tapovr Tap return override
#1173 dwlskp G04 skip condition

Set the feedrate when there is no F command in the program at G31 (skip) command.
---Setting range---
1 to 999999 (mm/min)
Designate the skip signal in multi-step skip G31.1.
The setting method is same as "#1173 dwlskp".
Set the skip feedrate in multi-step skip G31.1.
---Setting range---
1 to 999999 (mm/min)
Set the skip signal in multi-step skip G31.2.
The setting method is same as "#1173 dwlskp".
Set the skip feedrate in multi-step skip G31.2.
---Setting range---
1 to 999999 (mm/min)
Set the skip signal in multi-step skip G31.3.
The setting method is same as "#1173 dwlskp".
Set the skip feedrate in multi-step skip G31.3.
---Setting range---
1 to 999999 (mm/min)
Select the axis to be targeted for constant surface speed control.
0: Program setting will be disabled, and the axis will always be fixed to the 1st axis
1: 1st axis
2: 2nd axis
3: 3rd axis
:
16: 16th axis
However, when set to other than "0", the priority will be on the program setting.
Set the retract speed when not using chamfering in the thread cutting cycle.
0: Cutting feed clamp feedrate
1 to 60000 mm/min: Setting feedrate
---Setting range---
0 to 60000 (mm/min)
Set the M code for C axis clamp in hole drilling cycle.

---Setting range---
0 to 99999999
#1174 skip_F G31 skip speed
#1175 skip1 G31.1 skip condition
#1176 skip1f G31.1 skip speed
#1177 skip2 G31.2 skip condition
#1178 skip2f G31.2 skip speed
#1179 skip3 G31.3 skip condition
#1180 skip3f G31.3 skip speed
#1181 G96_ax Constant surface speed axis
#1182 thr_F Thread cutting speed
#1183 clmp_M M code for clamp

Set the dwell time after outputting the M code for C axis unclamp in hole drilling cycle.
---Setting range---
0.000 to 99999.999 (s)
Set the feedrate for the F command in the F 1-digit command ("#1079 F1digit" is set to "1").
Feedrate when F1 is issued (mm/min).
When "#1246 set08/bit6" is set to "1" and F 1-digit feed is commanded, the feedrate can be increased/de creased by operating the manual handle.
---Setting range---
0 to 1000000 (mm/min)
Set the feedrate for the F command in the F 1-digit command ("#1079 F1digit" is set to "1").
Feedrate when F2 is issued (mm/min).
When "#1246 set08/bit6" is set to "1" and F 1-digit feed is commanded, the feedrate can be increased/de creased by operating the manual handle.
---Setting range---
0 to 1000000 (mm/min)
Set the feedrate for the F command in the F 1-digit command ("#1079 F1digit" is set to "1").
Feedrate when F3 is issued (mm/min).
When "#1246 set08/bit6" is set to "1" and F 1-digit feed is commanded, the feedrate can be increased/de creased by operating the manual handle.
---Setting range---
0 to 1000000 (mm/min)
Set the feedrate for the F command in the F 1-digit command ("#1079 F1digit" is set to "1").
Feedrate when F4 is issued (mm/min).
When "#1246 set08/bit6" is set to "1" and F 1-digit feed is commanded, the feedrate can be increased/de creased by operating the manual handle.
---Setting range---
0 to 1000000 (mm/min)
Set the feedrate for the F command in the F 1-digit command ("#1079 F1digit" is set to "1").
Feedrate when F5 is issued (mm/min).
When "#1246 set08/bit6" is set to "1" and F 1-digit feed is commanded, the feedrate can be increased/de creased by operating the manual handle.
---Setting range---
0 to 1000000 (mm/min)
Select whether to enable or disable inclined axis control.
0: Disable inclined axis control
1: Enable inclined axis control
Set the inclination angle ().
(Note) When set to "0", the angle determined by three-side setting will be applied.
---Setting range---
-80.000 to 80.000 ()
#1184 clmp_D Dwelling time after outputting M code for unclamp
#1185 spd_F1 F1 digit feedrate F1
#1186 spd_F2 F1 digit feedrate F2
#1187 spd_F3 F1 digit feedrate F3
#1188 spd_F4 F1 digit feedrate F4
#1189 spd_F5 F1 digit feedrate F5
(PR) #1190 s_xcnt Validate inclined axis control (for L system only)
(PR) #1191 s_angl Inclination angle (for L system only)

Select whether to perform compensation for the basic axis corresponding to the inclined axis at reference
position return.
0: Perform compensation
1: Not perform compensation
The setting is selected with the parameter "#1306 InpsTyp".
0: Deceleration check method 1
Select the deceleration check method for G0.
0: Command deceleration check
1: In-position check
2: Smoothing check
1: Validate in-position check
Specify the deceleration confirmation method for the positioning or cutting command.
0: G0, G1+G9 Command deceleration check
1: G0, G1+G9 In-position check
2: G0, G1+G9 Smoothing check
Select the time constant for manual handle feed.
0: Use time constant for G01
1: Time constant 0 (step)
Select whether to enable or disable M command macro call of user macro.
0: Disable
1: Enable
Select whether to enable or disable S command macro call of user macro.
0: Disable
1: Enable
Select whether to enable a call of user macro using command T.
0: Disable macro call
1: Enable macro call, irrespective of the number of command T digits

2: Enable macro call when a tool No. (excluding 0) is given to the upper digit of command T
3: Enable macro call when a tool No. (including 0) is given to the upper digit of command T.
Select whether to enable or disable 2nd miscellaneous command macro call of user macro.
0: Disable
1: Enable
Select the initial condition of spindle control after power is turned ON.
0: 1st spindle control mode (G43.1)
1: 2nd spindle control mode (G44.1)
2: All spindle simultaneously control mode (G47.1)
(Note) While G43.1 or G44.1 command is given, the spindle No. is selected with "#12090 SnG43.1" or "#1534 SnG44.1".
(PR) #1192 s_zrmv Compensation at reference position return (for L sys tem only)
#1193 inpos Deceleration check method 1
#1194 H_acdc Time constant 0 for handle feed
#1195 Mmac Macro call for M command
#1196 Smac Macro call for S command
#1197 Tmac Macro call by command T
#1198 M2mac Macro call with 2nd miscellaneous code
#1199 Sselect Select initial spindle control

Select the acceleration and deceleration type when a rapid traverse command is issued.
0: Acceleration and deceleration with constant time (conventional type)
1: Acceleration and deceleration with a constant angle of inclination
(Note) When rapid traverse constant-gradient multi-step acceleration/deceleration is valid, this parameter will be invalid.
Select the acceleration and deceleration type when a linear interpolation command is issued.
0: Acceleration and deceleration with constant time (conventional type)
1: Acceleration and deceleration with a constant angle of inclination
Set the distance between tools (edges) (between facing turrets).
---Setting range---
0 to 99999.999 (mm)
Select the turrets, which correspond to the tool Nos. 1 to 32, as facing turrets for T code mirror image.
---Setting range---
0 to FFFFFFFF
Select the turrets, which correspond to the tool Nos. 33 to 64, as facing turrets for T code mirror image.
---Setting range---
0 to FFFFFFFF
0: Post-interpolation acceleration/deceleration is applied to G00.
1: Pre-interpolation acceleration/deceleration is applied to G00 even in the high accuracy control mode.
2: Rapid traverse constant-gradient multi-step acceleration/deceleration is enabled.
When the multi-part system simultaneous high-accuracy control option is enabled, "1" can be set for the 2nd part system and the following.
Set a cutting feedrate when applying pre-interpolation acceleration/deceleration.
When high-accuracy control time constant expansion is valid, set the maximum of cutting feed clamp speed of each axis.
---Setting range---
1 to 999999 (mm/min)
(PR) #1200 G0_acc Validate acceleration and deceleration with inclination constant G0
(PR) #1201 G1_acc Validate acceleration and deceleration with inclination constant G1
#1202 mirofs Distance between facing turrets (for L system only)
#1203 TmirS1 Select turrets as facing turrets with T command (for L system only)
#1204 TmirS2 Select turrets as facing turrets with T command (for L system only)
#1205 G0bdcc Acceleration and deceleration before G0 interpolation
#1206 G1bF Maximum speed

Set a cutting feed time constant when applying pre-interpolation acceleration/deceleration.
When set to "0", the time constant will be clamped at 1ms.
---Setting range---
Without high-accuracy control time constant expansion: 1 to 5000 (ms)
With high-accuracy control time constant expansion: 1 to 30000 (ms)
Cutting feed Acc Cutting feed acceleration
Displays cutting feed acceleration.
Set a coefficient for arc radius error compensation.
An arc radius error compensation amount can be increased or decreased between -60.0 and +20.0%.
---Setting range---
-60.0 to +20.0 (%)
Set the deceleration speed at the arc entrance or exit.
---Setting range---
1 to 999999 (mm/min)
#1207 G1btL Time constant
#1208 RCK Arc radius error compensation factor
#1209 cirdcc Arc deceleration speed
G1btL
G1bF
Time
Speed

Select whether to initialize G code group modals and H and D codes, which corresponds to bits as follows,

when the system is reset.
0: Initialize.
1: Not initialize.
<Description of bits for M system>
bit 1F: (Not used)
bit 1E: (Not used)
bit 1D: (Not used)
bit 1C: (Not used)
bit 1B: (Not used)
bit 1A: (Not used)
bit 19: Spindle clamp rotation speed initialization
bit 18: H, D codes initialization
bit 17: (Not used)
bit 16: Group23
bit 15: (Not used)
bit 14: (Not used)
bit 13: Group 20 2nd spindle control modal initialization
bit 12: Group 19 G command mirror modal initialization
bit 11: Group 18 Polar coordinate command modal initialization
bit 10: Group 17 Constant surface speed control command modal initialization
bit F: Group 16 Retains inclined surface machining modal
bit E: Group 15 Normal line control modal initialization
bit D: (Not used)
bit C: Group 13 Cutting modal initialization
bit B: Group 12 Workpiece coordinate system modal initialization
bit A: (Not used)
bit 9: Group 10 Fixed cycle return command modal initialization
bit 8: (Not used)
bit 7: Group 8 Length compensation modal initialization
bit 6: Group 7 Radius compensation modal initialization
bit 5: Group 6 Inch/metric modal initialization
bit 4: Group 5 Feed G modal initialization
bit 3: (Not used)
bit 2: Group 3 Absolute/incremental command modal initialization
bit 1: Group 2 Plane selection modal initialization
bit 0: Group 1 Move G modal initialization
#1210 RstGmd Modal G code reset
1F 1E 1D 1C 1B 1A 19 18 17 16 15 14 13 12 11 10
0000 00 * * 0 * 0 0 ****
FEDC BA9 8 7 6 5 4 3 2 1 0
* * 0 * * 0 * 0 **** 0 ***
M800/M80/E80 Series Alarm/Parameter Manual
15 Machine Parameters
327 IB-1501279-S
The H code indicates the tool length offset number, and the D code indicates the tool radius compensation number.
When bit 18 is set to ON, the H and D codes and group 8 G modal are retained.
When bit 7 is set to ON, the H code and group 8 G modal are retained.
<Description of bits for L system>
bit 1F: (Not used)
bit 1E: (Not used)
bit 1D: (Not used)
bit 1C: (Not used)
bit 1B: (Not used)
bit 1A: (Not used)
bit 19: Spindle clamp rotation speed initialization
bit 18: (Not used)
bit 17: (Not used)
bit 16: (Not used)
bit 15: (Not used)
bit 14: (Not used)
bit 13: Group 20 2nd spindle control modal initialization
bit 12: (Not used)
bit 11: Group 18 Balance cut initialization
bit 10: Group 17 Constant surface speed control command modal initialization
bit F: Group 16 Retains inclined surface machining modal
bit E: Group 15 Facing turret mirror image initialization
bit D: (Not used)
bit C: Group 13 Cutting modal initialization
bit B: Group 12 Workpiece coordinate system modal initialization
bit A: (Not used)
bit 9: Group 10 Fixed cycle return command modal initialization
bit 8: (Not used)
bit 7: (Not used)
bit 6: Group 7 Nose R compensation modal initialization
bit 5: Group 6 Inch/metric modal initialization
bit 4: Group 5 Feed G modal initialization
bit 3: Group 4 Barrier check modal initialization
bit 2: Group 3 Absolute/incremental command modal initialization
bit 1: Group 2 Plane selection modal initialization
bit 0: Group 1 Move G modal initialization
1F 1E 1D 1C 1B 1A 19 18 17 16 15 14 13 12 11 10
0000 00 * 0 000
*
* 0 * *
FEDC BA9 8 7 6 5 4 3 2 1 0
*
0

Specify the length of the side of the triangle formed by the tilt angle in line with the rectangular coordinate system of the inclined axis.
---Setting range---
-9999.999 to 9999.999
Specify the length of the side of the triangle formed by the tilt angle in line with the actual axis of the inclined axis.
---Setting range---
-9999.999 to 9999.999
Specify the length of the side of the triangle formed by the tilt angle in line with the actual axis of the base axis corresponding to the inclined axis.
---Setting range---
-9999.999 to 9999.999
Set the upper limit value of the feedrate when the external deceleration signals are enabled.
---Setting range---
1 to 999999 (mm/min)
Specify the number of the rotational tool axis (servo axis) used for polygon machining (G51.2).
Set "0" when not using polygon machining (spindle-servo axis), or when using spindle-spindle polygon ma chining.
A value exceeding the base specification parameter "#1002 axisno" cannot be specified.
This parameter is valid when the G code system is 1, 6 or 7 ("1", "2", "7" or "8" is set in the parameter "#1037 cmdtyp").
---Setting range---
0 to controlled axis number
Select whether to perform a deceleration check when the travel direction is changed from G1 to G0.
0: Not perform
1: Perform
Select whether to perform a deceleration check when the travel direction is changed from G1 to G1.
0: Not perform
1: Perform
Select whether the check is carried out at the specified position in manual second reference position return mode upon completion of spindle orientation or at second reference position return interlock signal.
0: Upon completion of spindle orientation
1: At second reference position return interlock signal
Set the maximum value up to which the F 1-digit feedrate can be changed.
---Setting range---
0 to 1000000 (mm/min)
Set the constant that determines the speed change rate per manual handle graduation in F 1-digit feedrate change mode.
---Setting range---
0 to 32767
(PR) #1213 proaxy Side 1 of inclination angle (for L system only)
(PR) #1214 macaxy Side 2 of inclination angle (for L system only)
(PR) #1215 macaxx Side 3 of inclination angle (for L system only)
#1216 extdcc External deceleration speed
#1501 polyax Rotational tool axis number
#1502 G0Ipfg G1 -> G0 deceleration check
#1503 G1Ipfg G1 -> G1 deceleration check
#1505 ckref2 Second reference position return check
#1506 F1_FM Upper limit of F 1-digit feedrate
#1507 F1_K F 1-digit feedrate change constant

Select whether to shorten the time during which the axis is stopped when the door is opened.
0: Use the conventional axis stop time.
1: Shorten the axis stop time.
(Note) When the door interlock II signal is input via a ladder, the conventional axis stop time will be used.
Set the fixed device number for door interlock II signal input for each part system.
A device number from X01 to XFF can be specified. (Except X100.)
Device number "000" is invalid.
Set device number "100" when using no fixed device number for door interlock II signal input.
Related parameter: "#1154 pdoor" (Door interlock II for each part system)
---Setting range---
000 to 2FF (hexadecimal)
Set the fixed device number for door interlock II signal input for each part system.
(Set the same value as that of "#1155 DOOR_m".)
Related parameter: "#1154 pdoor" (Door interlock II for each part system)
---Setting range---
000 to 2FF (hexadecimal)
Set the M code for the synchronous tapping selection.
Select the synchronous tapping mode using the miscellaneous function code of the value set in this param eter. The M function command can be issued immediately before the tap command or in the same block.
This function is valid only when "1" is set in "#1272 ext08/bit1" (M-function synchronous tap cycle).
(Note) Do not use M00, 01 02, 30, 98, and 99.
---Setting range---
0 to 99999999
Set the axis name for the linear axis used in exponential function interpolation.
---Setting range---
A to Z
Set the axis name for the rotary axis used in exponential function interpolation.
---Setting range---
A to Z
Set the name of the rotary axis used in milling interpolation. Only one rotary axis can be set.
When there is no E command in issuing the G12.1 command, this parameter will be followed.
---Setting range---
A to Z

Select the hypothetical axis command name for milling interpolation.
When there is no D command in issuing the milling interpolation command, this parameter will be followed.
(Note) The setting value "2" cannot be used for Milling interpolation.
0: Y axis command (Fixed)
1: Command rotary axis name.
2: Base axis corresponding to hypothetical axis
#1510 DOOR_H Shorten door interlock II axis stop time
#1511 DOORPm Signal input device 1 for door interlock II: for each part
system
#1512 DOORPs Signal input device 2 for door interlock II: for each part
system
#1513 stapM M code for synchronous tap selection
#1514 expLinax Exponential function interpolation linear axis
#1515 expRotax Exponential function interpolation rotary axis
#1516 mill_ax Milling axis name
#1517 mill_C Milling interpolation hypothetical axis name

Set the name or No. of the spindle which controls the workpiece used in spindle-spindle polygon machining.
(Note 1) The 1st spindle will be selected when "0" is set.
(Note 2) There are 2 spindle designation methods: spindle No. method and spindle name method. When names (any of 1 to 9) are set by the parameter "#3077 Sname" (Spindle command name) for all spindles, spindle name method is applied. Otherwise, spindle No. method is applied.
---Setting range---
0 to 9
Set the name or No. of the spindle which controls the rotary tool used in spindle-spindle polygon machining.
(Note 1) The 2nd spindle will be selected when "0" is set.
(Note 2) There are 2 spindle designation methods: spindle No. method and spindle name method. When names (any of 1 to 9) are set by the parameter "#3077 Sname" (Spindle command name) for all spindles, spindle name method is applied. Otherwise, spindle No. method is applied.
---Setting range---
0 to 9
Select axis to carry out the additional axis' tool compensation function.
0: 3rd axis.
1: 4th axis.
Set the minimum turning angle of the normal line control axis at the block joint during normal line control.
---Setting range---
0.000 to 360.000 () (Input setting increment applies)
Set the number of the axis for normal line control.
Set a rotary axis No.
0: Normal line control disabled
1 to 16: Axis No. (number of control axes)
Set the turning speed of the normal line control axis at the block joint during normal line control.
Set a value that does not exceed the normal line control axis' clamp speed ("#2002 clamp").
This is enabled during the normal line control type I.
---Setting range---
0 to 100000 (/min)
Select the normal line control type.
0: Normal line control type I
1: Normal line control type II
Set the linear axis name used for pole coordinate interpolation.
---Setting range---
Axis names such as X, Y or Z
#1518 polm Spindle-spindle polygon Workpiece spindle No.
#1519 pols Spindle-spindle polygon Tool spindle No.
(PR) #1520 Tchg34 Additional axis tool compensation operation (for L sys tem only)
#1521 C_min Minimum turning angle
(PR) #1522 C_axis Normal line control axis
#1523 C_feed Normal line control axis turning speed
#1524 C_type Normal line control type
#1533 millPax Pole coordinate linear axis name

Specify which spindle to be selected when G44.1 is commanded.
<Spindle No. type>
Specify by the spindle No. 1 to 8.
The 2nd spindle is selected if you specify a nonexistent spindle No.
<Spindle name type>
Specify by the spindle name 1 to 9.
The 2nd spindle is selected if you specify a nonexistent spindle name.
(Note) When names (any of 1 to 9) are for all spindles by the parameter "#3077 Sname" (Spindle command name), "Spindle name type" is applied.
---Setting range---
0 to 9
Set the minimum turning movement amount of the normal line control axis at the block joint during normal line control.
---Setting range---
0.000 to 99999.999 (mm) (Input setting increment applies)
Set the axis to be interchanged during the mixed control (cross axis control).
Using two digits, set the name of the axis to be interchanged with the axis in the part system where the mixed control (cross axis control) request signal is input, or the name of the axis to be shifted to that part system.
---Setting range---
Two digits between A to Z and 1 to 9
(Setting is cleared when "0" is set)
Set the axis to be interchanged during the mixed control (cross axis control).
Using two digits, set the name of the axis to be interchanged with the axis in the part system where the mixed

control (cross axis control) request signal is input, or the name of the axis to be shifted to that part system.
---Setting range---
Two digits between A to Z and 1 to 9
(Setting is cleared when "0" is set)
Set the axis to be interchanged during the mixed control (cross axis control).
Using two digits, set the name of the axis to be interchanged with the axis in the part system where the mixed control (cross axis control) request signal is input, or the name of the axis to be shifted to that part system.
---Setting range---
Two digits between A to Z and 1 to 9
(Setting is cleared when "0" is set)
Set the axis to be interchanged during the mixed control (cross axis control).
Using two digits, set the name of the axis to be interchanged with the axis in the part system where the mixed control (cross axis control) request signal is input, or the name of the axis to be shifted to that part system.
---Setting range---
Two digits between A to Z and 1 to 9
(Setting is cleared when "0" is set)
(PR) #1534 SnG44.1 Spindle No. for G44.1 command
#1535 C_leng Minimum turning movement amount
#1537 crsax[1] Mixed control (cross axis control) axis
#1538 crsax[2] Mixed control (cross axis control) axis
#1539 crsax[3] Mixed control (cross axis control) axis
#1540 crsax[4] Mixed control (cross axis control) axis

Set the axis to be interchanged during the mixed control (cross axis control).
Using two digits, set the name of the axis to be interchanged with the axis in the part system where the mixed control (cross axis control) request signal is input, or the name of the axis to be shifted to that part system.
---Setting range---
Two digits between A to Z and 1 to 9
(Setting is cleared when "0" is set)
Set the axis to be interchanged during the mixed control (cross axis control).
Using two digits, set the name of the axis to be interchanged with the axis in the part system where the mixed control (cross axis control) request signal is input, or the name of the axis to be shifted to that part system.
---Setting range---
Two digits between A to Z and 1 to 9
(Setting is cleared when "0" is set)
Set the axis to be interchanged during the mixed control (cross axis control).
Using two digits, set the name of the axis to be interchanged with the axis in the part system where the mixed control (cross axis control) request signal is input, or the name of the axis to be shifted to that part system.
---Setting range---
Two digits between A to Z and 1 to 9
(Setting is cleared when "0" is set)
Set the axis to be interchanged during the mixed control (cross axis control).
Using two digits, set the name of the axis to be interchanged with the axis in the part system where the mixed control (cross axis control) request signal is input, or the name of the axis to be shifted to that part system.
---Setting range---
Two digits between A to Z and 1 to 9
(Setting is cleared when "0" is set)
Set the lower limit of the override for involute interpolation override.
---Setting range---
0 to 100 (%)
Set the maximum acceleration (time constant) for the acceleration clamping during involute interpolation.
---Setting range---
0 to 32767 (ms)
Set the minimum feedrate for the acceleration clamping during involute interpolation.
---Setting range---
0 to 999999 (mm/min)
The workpiece coordinate display during 3D coordinate conversion is switched to the workpiece coordinate system or G68 program coordinate system.
0: Workpiece coordinate system
1: G68 program coordinate system
(Note) The special display unit's absolute coordinates also follow this parameter setting.
#1541 crsax[5] Mixed control (cross axis control) axis
#1542 crsax[6] Mixed control (cross axis control) axis
#1543 crsax[7] Mixed control (cross axis control) axis
#1544 crsax[8] Mixed control (cross axis control) axis
#1558 IvOMin Involute interpolation override lower limit value
#1559 IvAMax Involute interpolation allowable acceleration speed
#1560 IvFMin Involute interpolation minimum feedrate
#1561 3Dcdc Switch workpiece coordinate display during 3D coordi nate conversion

The remaining command display during 3D coordinate conversion is switched to the workpiece coordinate system or G68 program coordinate system.
0: Workpiece coordinate system
1: G68 program coordinate system
The coordinate system of the workpiece/skip coordinate read value in the 3D coordinate conversion modal is switched.
0: G68 program coordinate system
1: Workpiece (local) coordinate system
Set the rapid traverse rate for the hole drilling cycle during 3D coordinate conversion.
0: The cutting feed clamp speed is used.
Other than 0: The set speed is used.
Note that if the rapid traverse rate is exceeded, the speed will be clamped at the rapid traverse rate.
---Setting range---
0 to 1000000mm/min

Set the base axis for helix angle calculation in helical machining. When no setting, Z axis will be used.
---Setting range---
Axis name such as X, Y, Z, U, V, W, A, B, and C
Switch the rapid traverse mode in non-drilling blocks among a drilling cycle to the cutting feed mode during
3-dimensional coordinate conversion.
0: Rapid traverse mode. The speed follows the setting of "#2001 rapid".
1: Cutting feed mode. The speed follows the setting of "#1564 3Dspd".
Set the filter time constant for smoothly changing the acceleration rate for the cutting feed acceleration/de celeration in pre-interpolation acceleration/deceleration.
- Notch frequency Hz
Displays the notch frequency (Hz) for the S-pattern filter set in "#1568 SfiltG1" (G01 soft acceleration/decel eration filter).
---Setting range---
0 to 200 (ms)
Set the filter time constant for smoothly changing the acceleration rate for the rapid traverse acceleration/
deceleration in pre-interpolation acceleration/deceleration.
---Setting range---
0 to 200 (ms)
Set the filter time constant for smoothly changing the acceleration rate in pre-interpolation acceleration/de celeration.
This will be disabled when "0" or "1" is set.
- Notch frequency Hz
Displays the notch frequency (Hz) for the S-shape filter set in "#1570 Sfilt2" (Soft acceleration/deceleration
filter 2).
---Setting range---
0 to 200 (ms)
#1562 3Dremc Switch remaining command display during 3D coordi nate conversion
#1563 3Dcdrc Switch coordinate reading during 3D coordinate con version
#1564 3Dspd Hole drilling speed during 3D coordinate conversion
#1565 helgear Helical machining base axis
#1566 3DSelctDrillaxMode Switch drill axis's mode from rapid traverse during 3D
coordinate conversion
#1568 SfiltG1 G01 soft acceleration/deceleration filter
#1569 SfiltG0 G00 soft acceleration/deceleration filter
#1570 Sfilt2 Soft acceleration/deceleration filter 2

Fix the shape recognition range for SSS control.
---Setting range---
0/1
This eliminates speed fluctuations at the joint of the arc and straight line and arc and arc.
Set as a bit unit.
0: Do not overlap the arc command blocks
1: Overlap the arc command blocks
bit0: Arc command during high-speed high-accuracy control II
bit1: Arc command during high-speed machining mode II
bit2: Arc command during high-accuracy control (G61.1)
bit3: Arc command during cutting mode (G64)
The line command block and arc command block won't be overlapped during G61.2 modal regardless of this
setting.
(Note) This parameter is invalid during SSS control.
---Setting range---
0 to F (HEX)
Select the axis to be moved later after tool return.
This is referred to with the movement path (transit point #1 -> interrupt point).
Up to eight axes can be specified by expressing one axis with one bit.
bit0: Transit point #1 1st axis
bit1: Transit point #1 2nd axis
bit2: Transit point #1 3rd axis
bit3: Transit point #1 4th axis
bit4: Transit point #1 5th axis
bit5: Transit point #1 6th axis
bit6: Transit point #1 7th axis
bit7: Transit point #1 8th axis
---Setting range---
00000000 to 11111111 (Binary)
#1571 SSSdis SSS control adjustment coefficient fixed value selec tion
#1572 Cirorp Arc command overlap
#1573 Ret1 Return type 1

Select the axis to be moved later after tool return.
This is referred to with the movement path (return start point -> transit point #2).
Up to eight axes can be specified by expressing one axis with one bit.
bit0: Transit point #2 1st axis
bit1: Transit point #2 2nd axis
bit2: Transit point #2 3rd axis
bit3: Transit point #2 4th axis
bit4: Transit point #2 5th axis
bit5: Transit point #2 6th axis
bit6: Transit point #2 7th axis
bit7: Transit point #2 8th axis
---Setting range---
00000000 to 11111111 (Binary)
Specify the spindle No. or spindle name of rotary tool in "MITSUBISHI CNC Special Format (G81.4)" of hob bing command.
(Note) There are 2 spindle designation methods: spindle No. method and spindle name method. When
names (any of 1 to 9) are set by the parameter "#3077 Sname" (Spindle command name) for all spindles,
spindle name method is applied. Otherwise, spindle No. method is applied.
---Setting range---

0 to 9
Specify the NC axis No. of workpiece axis (in a part system) in "MITSUBISHI CNC Special Format (G81.4)"
of hobbing command.
This parameter is valid when "#1292 ext28/bit4" (Hobbing workpiece axis selection switch) is "0".
---Setting range---
1 to the number of NC axes (in a part system)
Set wether to enable the axis travel for the compensation change when the compensation amount of rotary
axis workpiece position is changed.
0: Enable
1: Disable
* Regardless of the parameter setting, the axis travel is not enabled at reset.
Specify the tolerable range for an error of the end point of travel command which is deviated from the tool
path direction during the G68.1 ,E1 command.
---Setting range---
0.000 to 100.000 (mm)
Set the part system axis name ("#1013 axname") for the two axes that intersect with the rotary axis direction.
When one of the two axes is blank, a constant speed will be applied without using constant surface speed
control.
---Setting range---
Axis addresses such as X, Y, Z, U, V, W, A, B, and C
#1574 Ret2 Return type 2
#1595 hobm Hobbing rotary tool axis No.
#1596 hobs Hobbing workpiece axis No.
#1597 rpcNoMove No axis travel with compensation amount change for
rotary axis workpiece position
#1599 3DEndPointErr End point error in 3D coordinate conversion
#12001 ManualB RectanA xH Manual feed rate B constant surface control intersect ing part system axis name (horizontal)

Set the part system axis name ("#1013 axname") for the two axes that intersect with the rotary axis direction.
When one of the two axes is blank, a constant speed will be applied without using constant surface speed
control.
---Setting range---
Axis addresses such as X, Y, Z, U, V, W, A, B, and C
Set the machine coordinate position (horizontal axis) at the center of the rotary axis.
---Setting range---
-99999.999 to 99999.999 (mm)
Set the machine coordinate position (vertical axis) at the center of the rotary axis.
---Setting range---
-99999.999 to 99999.999 (mm)
Set the number of M codes that can be specified within the same block.
---Setting range---
1 to 4
Data type 0: BCD
Data type 1: Unsigned binary
Data type -1: Singed binary
<For unsigned binary>
The absolute value "1" is output for "-1".
<For singed binary>
"-1" is output as "0xFFFFFFFF".
---Setting range---
Data type
(-1,0,1)
Set the number of spindles.
(Note 1) The setting range differs according to the model.
(Note 2) "Sfig" is set in the range of 1 to 8. However, the number of outputs by "Sfig" cannot be controlled.
Thus, only one S command is output regardless of the Sfig setting value.
---Setting range---
1 to 8
#12002 ManualB RectanA xV Manual feed rate B constant surface control intersect ing part system axis name (vertical)
#12003 ManualB RotCent erH Manual feed rate B constant surface control rotation
center machine position (horizontal)
#12004 ManualB RotCent erV Manual feed rate B constant surface control rotation
center machine position (vertical)
(PR) #12005 Mfig Number of M
(PR) #12006 Mbin M binary
(PR) #12007 Sfig Number of S

Data type 0: BCD
Data type 1: Unsigned binary
Data type -1: Singed binary
<For unsigned binary>
The absolute value "1" is output for "-1".
<For singed binary>
"-1" is output as "0xFFFFFFFF".
(Note 1) Sbin can be set with "-1", "0" and "1", but the S command cannot be BCD output.
If BCD (0) is selected for Sbin, it will be handled as a singed binary (-1).
---Setting range---
Data type
(-1,0,1)
Set the number of T codes that can be specified within the same block.
---Setting range---
1 to 4
Data type 0: BCD
Data type 1: Unsigned binary

Data type -1: Singed binary
<For unsigned binary>
The absolute value "1" is output for "-1".
<For singed binary>
"-1" is output as "0xFFFFFFFF".
---Setting range---
Data type
(-1,0,1)
Set the number of B codes that can be specified within the same block.
---Setting range---
1 to 4
Data type 0: BCD
Data type 1: Unsigned binary
Data type -1: Singed binary
<For unsigned binary>
The absolute value "1" is output for "-1".
<For singed binary>
"-1" is output as "0xFFFFFFFF".
---Setting range---
Data type
(-1,0,1)
(PR) #12008 Sbin S binary
(PR) #12009 Tfig Number of T
(PR) #12010 Tbin T binary
(PR) #12011 Bfig Number of B
(PR) #12012 Bbin B binary

Select the axis to use as C axis with its axis name.
---Setting range---
A to Z
Not used.
bit0: Skip speed spec: Cutting feed override ON
Select whether to enable cutting feed override for a skip command.
0: Disable cutting feed override
1: Enable cutting feed override
bit1: Skip speed spec: Dry run ON
Select whether to enable dry run for a skip command.
0: Disable dry run
1: Enable dry run
bit2: Skip speed spec: Feed rate selection
Select the feed rate for a skip command.
0: A feed rate given to address F of the G31 block. If the G31 block has no address F, the value specified by "#1174 skip_F" is applied. In either case the F modal status is unchanged.
1: A feed rate programmed as an F modal value. F modal status is updated by the address F given to the G31 block.
Set M codes to which pre-read will not be applied.
---Setting range---
0 to 99999999
Set M codes to which pre-read will not be applied.
---Setting range---
0 to 99999999
Set M codes to which pre-read will not be applied.
---Setting range---
0 to 99999999
Set M codes to which pre-read will not be applied.
---Setting range---
0 to 99999999
Set M codes to which pre-read will not be applied.
---Setting range---
0 to 99999999
Set M codes to which pre-read will not be applied.
---Setting range---
0 to 99999999
#12013 G33.n rot G33.n rotary axis name
#12014 G33.n ovr G33.n override
#12022 skipF_spec
(PR) #12023 Mblkstp1 Pre-read prohibited M code 1
(PR) #12024 Mblkstp2 Pre-read prohibited M code 2
(PR) #12025 Mblkstp3 Pre-read prohibited M code 3
(PR) #12026 Mblkstp4 Pre-read prohibited M code 4
(PR) #12027 Mblkstp5 Pre-read prohibited M code 5
(PR) #12028 Mblkstp6 Pre-read prohibited M code 6

Set M codes to which pre-read will not be applied.
---Setting range---
0 to 99999999
Set M codes to which pre-read will not be applied.
---Setting range---
0 to 99999999
Set M codes to which pre-read will not be applied.
---Setting range---
0 to 99999999
Set M codes to which pre-read will not be applied.
---Setting range---

0 to 99999999
Set the minimum value of the M code to which pre-read will not be applied.
---Setting range---
0 to 99999999
Set the maximum value of the M code to which pre-read will not be applied.
---Setting range---
0 to 99999999
Set the minimum value of the M code to which pre-read will not be applied.
---Setting range---
0 to 99999999
Set the maximum value of the M code to which pre-read will not be applied.
---Setting range---
0 to 99999999
Set the minimum value of the M code to which pre-read will not be applied.
---Setting range---
0 to 99999999
Set the maximum value of the M code to which pre-read will not be applied.
---Setting range---
0 to 99999999
(PR) #12029 Mblkstp7 Pre-read prohibited M code 7
(PR) #12030 Mblkstp8 Pre-read prohibited M code 8
(PR) #12031 Mblkstp9 Pre-read prohibited M code 9
(PR) #12032 Mblkstp10 Pre-read prohibited M code 10
(PR) #12033 MblkstpMin1 Minimum value of the pre-read prohibited M code range
setting 1
(PR) #12034 MblkstpMax1 Maximum value of the pre-read prohibited M code range
setting 1
(PR) #12035 MblkstpMin2 Minimum value of the pre-read prohibited M code range
setting 2
(PR) #12036 MblkstpMax2 Maximum value of the pre-read prohibited M code range
setting 2
(PR) #12037 MblkstpMin3 Minimum value of the pre-read prohibited M code range
setting 3
(PR) #12038 MblkstpMax3 Maximum value of the pre-read prohibited M code range
setting 3

Set the minimum value of the M code to which pre-read will not be applied.
---Setting range---
0 to 99999999
Set the maximum value of the M code to which pre-read will not be applied.
---Setting range---
0 to 99999999
Set the minimum value of the M code to which pre-read will not be applied.
---Setting range---
0 to 99999999
Set the maximum value of the M code to which pre-read will not be applied.
---Setting range---
0 to 99999999
Set the minimum value of the M code to which pre-read will not be applied.
---Setting range---
0 to 99999999
Set the maximum value of the M code to which pre-read will not be applied.
---Setting range---
0 to 99999999
Specify the ID number (address B value) to be used when activating this part system as a sub part system
during G122 command. Set to "0" when this part system is not used as a sub part system.
---Setting range---
0 to 7
Specify the No. of program to be called when activating this part system as a sub part system during G122
command. This parameter setting is used when a program designation (address A value/<file name>) is omit ted.
---Setting range---
0 to 99999999
(PR) #12039 MblkstpMin4 Minimum value of the pre-read prohibited M code range
setting 4
(PR) #12040 MblkstpMax4 Maximum value of the pre-read prohibited M code range
setting 4
(PR) #12041 MblkstpMin5 Minimum value of the pre-read prohibited M code range
setting 5
(PR) #12042 MblkstpMax5 Maximum value of the pre-read prohibited M code range
setting 5
(PR) #12043 MblkstpMin6 Minimum value of the pre-read prohibited M code range
setting 6
(PR) #12044 MblkstpMax6 Maximum value of the pre-read prohibited M code range
setting 6
#12049 SBS_no Sub part system I identification No.
#12050 SBS_pro Sub part system I standard program No.

Specify the time constant of filter that is used for smoothing the change of jerk when pre-interpolation accel eration/deceleration is performed in cutting feed.
This filter causes no path error, as the filter is applied to the resultant speed calculated before interpolation.
If you specify the jerk filter time constant, the time constants of each filter will be as follows:
- S-shape filter time constant
"#1568 SfiltG1" - "Jerk_filtG1"
- Jerk filter time constant
"Jerk_filtG1"

---Setting range---
0 to 50 (ms)
Specify the time constant of filter that is used for smoothing the change of jerk when pre-interpolation accel eration/deceleration is performed in cutting feed.
This filter causes no path error, as the filter is applied to the resultant speed calculated before interpolation.
If you specify the jerk filter time constant, the time constants of each filter will be as follows:
- S-shape filter time constant
"#1569 SfiltG0" - "Jerk_filtG0"
- Jerk filter time constant
"Jerk_filtG0"
---Setting range---
0 to 50 (ms)
Select how to calculate the deceleration speed for a corner between the blocks where the high-accuracy con trol is enabled.
0: Optimal corner deceleration
(calculate the deceleration speed using the acceleration tolerance common for all the axes determined by
G1bF and G1btL)
1: Axis-specific acceleration tolerance control
(calculate the deceleration speed using acceleration tolerances of each axis determined by G1bFx and
G1btLx)
Specify the number of offset sets to be allocated when the arbitrary allocation method is selected for offset
sets.
---Setting range---
0 to 999
Specify the number of life management tools to be allocated when the arbitrary allocation method is selected
for life management tools.
---Setting range---
0 to 1000
Select whether to enable the rapid traverse block overlap function at power ON or at reset.
0: Disabled
1: Enabled
Select the entry inhibition area for stroke check before travel.
0: Perform stroke check before travel for the area specified by G22.
1: Perform stroke check before travel for the area set by the stored stroke limit function, with or without
G22.
#12051 Jerk_filtG1 G01 jerk filter
#12052 Jerk_filtG0 G00 jerk filter
#12053 EachAxAccCntrl Enable axis-specific acceleration tolerance control
(PR) #12054 Tol-Ofsnum Number of tool offset sets for allocation
(PR) #12055 Tol-lifenum Number of life management tools for allocation
#12056 I_G0ol Initial rapid traverse block overlap for G00
#12057 OT_prechkON Enabling stroke check before travel for stored stroke
limit

Select whether to enable or disable the stroke check before travel for skip (G31 or G31.n) and automatic tool
length measurement (G37).
0: Disable
1: Enable
(Note) This parameter is enabled when #12057=1 and the option "Stroke check before travel" is ON.
Specify each sub part system name.
This name is displayed when the part system acts as a sub part system.
---Setting range---
4 or less characters consisting of both alphabets and numbers
Select whether to enable variable-acceleration pre-interpolation acceleration/deceleration control while high accuracy control is ON.
0: Pre-interpolation acceleration/deceleration
(Apply the acceleration rate that is determined by G1bF and G1btL and is common for all the axes)
1: Variable-acceleration pre-interpolation acceleration/deceleration
(Apply the acceleration rate that is determined by G1bFx and G1btLx for each axis)
(Note) Variable-acceleration pre-interpolation acceleration/deceleration is a function available under
SSS control. To enable this function, set "#8090 SSS ON" to "1".
Specify the time constant of the filter that smoothes out fluctuations in acceleration under the tolerance con trol.
Basically set to 0.
---Setting range---
0 to 200 (ms)
Specify the axis address to be given in an arbitrary axis exchange command for the part system.
(Note 1) This parameter is disabled when the arbitrary axis exchange function is unused.
(Note 2) Do not give an identical name to two or more of the parameters adr_abs[1] to adr_abs[8].
(Note 3) Do not leave any unspecified parameter in the middle between adr_abs[1] and [8].
(Note 4) Set the addresses of adr_abs[ ] in the same order as of the axis names (#1013 axname). Note that
you can set a nonexistent axis name in the middle.
(Note 5) If there are 9 or more control axes per part system, specify the axis address that is programmed
based on the basic axis configuration.
---Setting range---
Axis address such as X, Y, Z, U, V, W, A, B and C
Specify the incremental command address for each of the axes to be used in an arbitrary axis exchange com mand.
(Note 1) This parameter is disabled when the arbitrary axis exchange function is unused.
(Note 2) There is no need to set this parameter when command type (absolute or incremental) is not distin guished by the axis address ("#1076 AbsInc" is "0").
(Note 3) Do not give an identical name to two or more of the parameters adr_inc[1] to adr_inc[8]. If there is
any overlap, priority is given in the ascending order (adr_inc[1] to adr_inc[8]).
---Setting range---
Axis address such as X, Y, Z, U, V, W, A, B and C
#12058 OT_prechkTYPE Stroke check before travel for skip and automatic tool
length measurement
#12059 SBS_name Sub part system name
#12060 VblAccPreInt Variable-acceleration pre-interpolation acceleration/de celeration ON
#12070 Sfilt2_tol Tolerance control: Soft acceleration/deceleration filter
2
(PR) #12071-12078 adr_abs[1]-[8] Command address for arbitrary axis exchange

(PR) #12079-12086 adr_inc[1]-[8] Incremental command address for arbitrary axis ex change

Specify a dry run speed for each part system.
When "0" is set, the manual feed rate selected by Manual feedrate method selection (JVS) signal is applied.
---Setting range---
0 to 1000000 (mm/min)
Select the address type of the 2nd miscellaneous function.
0: One-letter command for the 2nd miscellaneous function
1: Two-letter command for the 2nd miscellaneous function
Specify which spindle to be selected when G43.1 is commanded.
<Spindle No. type>
Specify by the spindle No. 1 to 8.
The 1st spindle is selected if you specify a nonexistent spindle No.
<Spindle name type>
Specify by the spindle name 1 to 9.
The 1st spindle is selected if you specify a nonexistent spindle name.
(Note) When names (any of 1 to 9) are for all spindles by the parameter "#3077 Sname" (Spindle command name), "Spindle name type" is applied.
---Setting range---
0 to 9
Select whether to enable tool offset on the 2nd additional axis.
0: Disable
1: Enable
Select on which axis to perform the 2nd additional axis tool offset.
Specify the axis address set in "#1013 axname".
---Setting range---
A to Z
Specify the operation when the turning angle is set the minimum turning angle (#1521 C_min) or less and the turning operation is not inserted, in the seams of the arc blocks during normal line control.
0: Interpolate before reaching arc end point.
1: Do not interpolate.
Specify the axis to be moved later after tool return.
This is referred to with the movement path (transit point #2 to transit point #1).
One bit represents one axis. Up to eight axes can be specified.
---Setting range---
00000000 to 11111111 (Binary)
#12088 Drn_F Dry run speed
#12089 M2adr 2nd miscellaneous function address type
(PR) #12090 SnG43.1 Spindle designation for G43.1
(PR) #12103 2nd add T-ofs ON 2nd additional axis tool offset ON (for L system only)
(PR) #12104 2nd add T-ofs set 2nd additional axis tool offset setting (for L system on ly)
#12105 C_minTyp Operation selection of minimum turning angle or less
#12110 Ret3 Return type

Specify the head of the common variables which are protected from setting operation.
(Note 1) If #12111 or #12112 is 0 or is greater than the bottom No. (#12112), this setting is disabled.
(Note 2) For the common variables shared by part systems, the protection takes effect in a part system set by this parameter.
(Note 3) It is possible to set an unspecified variable, but the protection covers the specified variables only.
---Setting range---
0: Disabled
100 to 199, 400 to 999
Specify the end of the common variables which are protected from setting operation.
(Note 1) If #12111 or #12112 is 0 or is smaller than the top No. (#12111), this setting is disabled.
(Note 2) For the common variables shared by part systems, the protection takes effect in a part system set by this parameter.
(Note 3) It is possible to set an unspecified variable, but the protection covers the specified variables only.
---Setting range---
0: Disabled
100 to 199, 400 to 999
Specify the head of the common variables which are protected from setting operation.
(Note 1) If #12113 or #12114 is 0 or is greater than the bottom No. (#12114), this setting is disabled.
(Note 2) For the common variables shared by part systems, the protection takes effect in a part system set by this parameter.
(Note 3) It is possible to set an unspecified variable, but the protection covers the specified variables only.
---Setting range---
0: Disabled
100 to 199, 400 to 999
Specify the end of the common variables which are protected from setting operation.
(Note 1) If #12113 or #12114 is 0 or is smaller than the top No. (#12113), this setting is disabled.
(Note 2) For the common variables shared by part systems, the protection takes effect in a part system set by this parameter.
(Note 3) It is possible to set an unspecified variable, but the protection covers the specified variables only.
---Setting range---
0: Disabled
100 to 199, 400 to 999
#12111 Var protect Top1 Common variable setting protection - Top variable No. (1st group)
#12112 Var protect Btm1 Common variable setting protection - Bottom variable No. (1st group)
#12113 Var protect Top2 Common variable setting protection - Top variable No. (2nd group)
#12114 Var protect Btm2 Common variable setting protection - Bottom variable No. (2nd group)

Specify whether to show or hide the tool compensation data for each axis.
0: Show
1: Hide
Specify the setting individually for each axis assigned to the hexadecimal bits.
bit0: axis in the 1st column
bit1: axis in the 2nd column
bit2: axis in the 3rd column
bit3: axis in the 4th column
(Note 1) The setting of bit3 is enabled for L system when "#12103 2nd add T-ofs ON" is "1".
(Note 2) This parameter is invalid for the tool compensation type I or II.
---Setting range---
0 to F (hexadecimal)
Specify the name of macro program for the rotation center error measurement.
The macro program name is input at initialization of rotation center error measurement macro.
If 0 is set, the macro program for the measurement is not input to the part system.
The macro program is used for execution of the measurement.
---Setting range---
0, 9000 to 9099, 9300 to 9999,
100010000 to 100018999,
100030000 to 199999998
Rotation direction of primary axis for rotation center error measurement.
Select the direction, allowing for the rotary axis stroke limit, etc.
0: Positive direction
1: Negative direction
This parameter specifies the upper limit of the frequency.
If this parameter is set to "0", the upper limit will be 40 (Hz).
---Setting range---
0, or from 30 to 300 (Hz)
(PR) #12117 T-ofs hide axis Hiding tool compensation data of specific axis
#12121 REM Mcr No Macro No. for rotation center error measurement
#12122 REM PrimAx Rot Dir Primary axis rotation direction for rotation center error
measurement
#12131 FrqClmpSys_VCC Upper limit of frequency (per part system)

15.2 Base Axis Specification Parameters
Specify the unit for data communicated with the servo drive unit.
The data communicated between the NC and servo drive unit, and the servo movement data unit follow this
specification.
The standard value is "E"; however, set the optimum value according to the machine model and specifica tions.
B: 1 m
C: 0.1 m
D: 0.01 m (10 nm)
E: 0.001 m (1 nm)
F: 0.0001 m (0.1 nm)
Set each axis' name with an alphabetic character.
Use the characters X, Y, Z, U, V, W, A, B or C.
(Note 1) Do not set the same name twice in one part system.
The same name which is used in another part system can be set.
(Note 2) The PLC name does not need to be set. (Numbers 1 to 6 are shown as the axis names.)
---Setting range---
X,Y,Z,U,V,W,A,B,C
Set the axis name when commanding an incremental value for the axis travel amount.
(Note 1) Set an alphabet that is different from that of "#1013 axname".
(Note 2) There is no need to set this parameter when command type (absolute or incremental) is not distin guished by the axis address (when "#1076 AbsInc" = "0").
---Setting range---
X, Y, Z, U, V, W, A, B, C, H
Set the minimum increment of program travel command.
<Travel amount for travel command 1>
0: Follow "#1003 iunit"
1: 0.0001 mm (0.1 m)
10: 0.001 mm (1 m)
100: 0.01 mm (10 m)
1000: 0.1 mm (100 m)
10000: 1.0 mm
If there is a decimal point in travel command, the decimal point position will be handled as 1 (mm) regardless
of this setting.
Select whether the axis is a rotary axis or linear axis.
When rotary axis is set, the axis will be controlled with the rotary axis's coordinate system. Set the rotary axis
type with "#8213 Rotation axis type".
0: Linear axis
1: Rotary axis
Select the direction of the motor rotation to the command direction.
0: Clockwise (looking from motor shaft) with the forward rotation command
1: Counterclockwise (looking from motor shaft) with the forward rotation command
(PR) #1010 srvunit Output unit (servo)
(PR) #1013 axname Axis name
(PR) #1014 incax Incremental command axis name
(PR) #1015 cunit Program command unit
(PR) #1017 rot Rotational axis
(PR) #1018 ccw Motor CCW

Select the command method of program travel amount.
When the travel amount is commanded with the diameter dimensions, the travel distance will be 5mm when the command is 10mm of travel distance.
The travel amount per pulse will also be halved during manual pulse feed.
If diameter is selected, tool length, the wear compensation amount, and the workpiece coordinate offset will be displayed in diameter value. Other parameters concerning length will always be displayed in radius value.
0: Command with travel amount
1: Command with diameter dimension
Select "1" when using the spindle for contour control of NC axis (C-axis).
Select "2" to implement the spindle-mode rotary axis control.
0: Servo axis is used for contour control.
1: Spindle is used for contour control.
2: Spindle-mode rotary axis control.
Using a 4-digit number, set the drive unit interface channel No. and which axis in that channel is to be used when connecting a servo drive unit.
Set the name of the axis displayed on the screen with two characters. (X1, Z2, etc.)
Always use an alphabetic character (A to Z) for the first character.
---Setting range---
A to Z and 1 to 9 (Two digits)
(Setting is cleared when "0" is set)
Set the axis name for issuing a command to this axis during mixed control (cross axis control).
---Setting range---
A to Z
(Setting is cleared when "0" is set)
Set the axis name for issuing an incremental command to this axis during mixed control (cross axis control).
---Setting range---
A to Z
(Setting is cleared when "0" is set)
Select whether to update the absolute position data during automatic handle interrupt.
This parameter is enabled only when "#1145 I_abs" is set to "1".
0: Do not update (coordinate system shifted the amount of the interruption)
1: Update (same coordinates as when interrupt did not occur will be applied)
(PR) #1019 dia Diameter specification axis
(PR) #1020 sp_ax Spindle interpolation
(PR) #1021 mcp_no Drive unit I/F channel No. (servo)
(PR) #1022 axname2 2nd axis name
(PR) #1023 crsadr Command address during mixed control (cross axis control)
(PR) #1024 crsinc Incremental command address during mixed control (cross axis control)
(PR) #1061 intabs Manual ABS updating
Axis No.
Not used (Set to "0")
Drive unit interface channel No.

Select whether the tool length compensation and wear compensation are enabled during T command exe cution.
0: Tool length compensation enable Wear compensation enable
1: Tool length compensation enable Wear compensation disable
2: Tool length compensation disable Wear compensation enable
3: Tool length compensation disable Wear compensation disable
Select the manual reference position return method for the second return (after the coordinate system is es tablished) and later.
The initial reference position return after the power ON is performed with dog-type return, and the coordinate system will be established.
(This setting is not required when the absolute position detection is used.)
0: High speed return
1: Dog-type
Select whether to correct the error when the servo is OFF.
0: Not correct the error
The command value will not change during servo OFF, and the movement amount during servo OFF will be handled as droop. When the servo is turned ON the next time, the axis will move to the command position where it used to be when the servo was turned OFF.
1: Correct the error
The command value and the current position will follow the feedback position. When the servo is turned ON the next time, the axis will not move.
During servo READY OFF, the operation will be always the same as of "Correct the error". (The current po sition will follow the position of the axis.)
Set the axis number of the slave axis in synchronous control.
The axis number is an NC number excluding the spindle and PLC axis.
Two or more slave axis cannot be set for one master axis.
This parameter cannot be set for a slave axis.
When using the multi-part system, the relation of the master axis and slave axis cannot extend over part sys tems.
You cannot set the No. of the axis targeted for the multiple axis synchronization control.
You cannot set this parameter for the axis targeted for the multiple axis synchronization control.
0: No slave axis
1 to 32: 1st to 32nd axis
Select whether to display the axis counter or not.
This setting is enabled on the counter display screen (relative position counter, etc.).
0: Display
1: Not display
Select whether to enable or disable axis removal control.
0: Disable
1: Enable
Select the chopping axis.
0: Non-chopping axis
1: Chopping axis
#1062 T_cmp Tool compensation function
#1063 mandog Manual dog-type

(PR) #1064 svof Error correction
(PR) #1068 slavno Slave axis number
#1069 no_dsp Axis with no counter display
#1070 axoff Axis removal
#1072 chop_ax Chopping axis

0: Master axis and slave axis determine their zero points individually.
1: The zero points of both master and slave axes are determined by initializing the master axis' zero point.
The slave axis moves in perfect synchronization with the master axis.
Set this to "1" for speed/current command synchronization control.
Set this in order to change the axis order of counter display.
If this is set, the axes will be displayed in ascending order.
However, axis whose setting is "0" will be displayed after axes whose settings are between "1" and "16" are displayed.
(Note 1) When the same value is set for more than one axis, axis that is displayed on the left side on the parameter screen will be first displayed.
(Note 2) When both of the mixed control (cross axis control) and interchange coordinate position display ("1280 ext16/bit2" OFF) are valid, and when there are two or more valid part systems, this parameter will be ignored.
(Note 3) When the arbitrary axis exchange control (option) is ON, and when there are two or more valid part systems, this parameter will be ignored.
---Setting range---
0: The axis is displayed after the axes whose settings are between "1" and "16" are displayed.
1 to 16: Axes are displayed in ascending order.
If the number other than "1" to "16" is set, it is dealt as "0" setting.
Select the axis travel direction in the 2D graphic drawing (trace, check).
If set to 1, the positive/negative directions are reversed.
---Setting range---
0/1
Specify the sub axis for the simple synchronous control using its NC axis number.
This parameter can be set for the master axis and the slave axis of the synchronous control, because the axes act as main axis of the simple synchronous control.
Before setting this parameter, set the synchronous control parameter (#1068 slavno) first, and then turn OFF and ON the power.
The sub axis number must be greater than that of the main axis of the same part system.
Neither a spindle C-axis nor a PLC indexing axis can be designated as main or sub axis.
---Setting range---
0: No sub axis
1 to 32: 1st axis to 32nd axis
Specify the second letter of command axis name when the axis name extension parameter is valid (#1266 ext02/bit0 = 1).
The command axis name is not extended if this parameter is unspecified, and the only one letter set in "#1013 axname" or "#1014 incax" respectively is the absolute command axis name or incremental command axis name.
Axis configuration should not be as the non-name extension axis (1-letter axis) after the name extension axis (2-letter axis) in the part system.
(Configure the 2-letter axis after the 1-letter axis)
---Setting range---
A to Z (Setting is cleared when "0" is set)
Specify the PLC I/F device assignment No. for the axis.
---Setting range---
0: No designation for assignment
1 to 32: Axis device assignment No.
(PR) #1493 ref_syn Synchronization at zero point initialization
(PR) #1494 dsp_ax_change Axis order of counter display
(PR) #1495 grf_ax_direction Axis travel direction in 2D graphic
(PR) #1497 sync_sub Sub axis number
(PR) #1601 axnameEx Axis name extension letter
(PR) #1603 PLCdev_no Axis device assignment No.

Specify the machine group No. to which each axis belongs.
---Setting range---
0 to 32
(PR) #1605 mgrnum Machine group No.

15.3 Base Common Parameters
Not used. Set to "0".
Select the number of spindles.
0: No spindle
1 to 8: One to eight spindles
(Note) The setting range differs according to the model.
Select the unit system for setting and display regarding machine parameter and PLC interface's position, length and speed.
0: Metric system
1: Inch system
Select the unit system for the program travel amount when the power is turned ON or reset and for position display.
0: Metric system
1: Inch system
(Note) The units of the following data are converted by "#1041 I_inch".
- Command unit at power ON and reset (Inch/metric command mode)
But under the following conditions, the unit will follow G20/G21 command modal even at reset.

When reset modal is retained ("#1151 rstint"="0")
When G code group 06 reset modal is retained ("#1210 RstGmd/bit5" ON)
- Unit system for position display (counter, user parameter, tool, work offset)
- User parameter I/O unit
- Parameter unit of user parameters concerning length and speed
- Arc error parameter (#1084 RadErr)
Select the unit system for the commands to the PLC axis.
0: Metric system
1: Inch system
#1038 plcsel Ladder selection
(PR) #1039 spinno Number of spindles
(PR) #1040 M_inch Constant input (inch)
(PR) #1041 I_inch Initial state (inch)
(PR) #1042 pcinch PLC axis command (inch)

Select the display language.
0: English
1: Japanese
11: German
12: French
13: Italian
14: Spanish
15: Traditional Chinese
16: Korean
17: Portuguese
18: Dutch
19: Swedish
20: Hungarian
21: Polish
22: Simplified Chinese
23: Russian
24: Turkish
25: Czech
31: Indonesian
32: Vietnamese
(Note) NC displays in English, when it doesn't equip language option.
Set the number of MR-J2-CTs connected.
(Note) The number of MR-J2-CTs possible to connect and setting range are different according to the model.
Check the specifications of each series.
Specify the number of NSK megatorque motors connected. When a value other than 0 is specified, 2nd mis cellaneous function data is output as signed binary data.
---Setting range---
0 to 16
Set this parameter to 1 when you use the L system's tool compensation type (e.g. when using a turning tool)
in the M system.
0: Use the compensation type specified by "#1037 cmdtyp"
1: Use the tool compensation type III, irrespective of "#1037 cmdtyp"
(Note that the type is not switched to III on the tool measurement screen.)
Select the part system for which you enable the program format switch.
0: Part system 1 (default)
1: Part system 1
2: Part system 2
If G188 is given to any other part system, a program error (P29) occurs. If PFCHR is turned ON in any other
part system, it is ignored.
0: Tool compensation memory separate for part systems
1: Tool compensation memory common for part systems
#1043 lang Select language displayed
(PR) #1044 auxno MR-J2-CT Connections
(PR) #1045 nskno Megatorgue motor connections
(PR) #1046 T-ofs disp type Tool compensation display type switch (for M system
only)
(PR) #1047 G_Chg_En_Sno Select program format switch-enabled part system
(PR) #1051 MemTol Tool compensation memory common for part systems

0: Common variables common for part systems (number fixed)
#100 -: Per part system
#500 -: Common for part systems
1: Common variables common for part systems (number designation)
#100 -: Designate with V1comN
#500 -: Designate with V0comN
(Note 1) When this parameter is changed, the file system will be changed after the power is turned ON.
So always execute format.
The new format will be enabled after turning the power ON again.
Setting order
(1) MemVal changeover -> (2) Turn power ON again -> (3) Format -> (4) Turn power ON again
(Note 2) When this parameter is set to "1", #900000 to #907399 are not available even if the number of com mon variables is 8000.
Select whether the incremental command of the diameter specification axis ("#1019 dia" is set to "1") uses
the diameter value or radius value.
0: Diameter value
1: Radius value
Select the increment of position commands that do not have a decimal point.
0: Minimum input command unit (follows "#1015 cunit")
1: 1mm (or 1inch) unit (For the dwell time, 1s unit is used.)
Select the F command method.
0: Direct numerical command (command feedrate during feed per minute or rotation)

1: 1-digit code command (feedrate set with "#1185 spd_F1" to "#1189 spd_F5")
Select a fixed cycle hole drilling axis.
0: Use an axis vertical to the selected plane as hole drilling axis.
1: Use the Z axis as the hole drilling axis regardless of the selected plane.
Select the G code priority relationship during the macro call with G command.
0: Priority is on G code used in the system
1: Priority is on registered G code for call
Select the type of geometric to use.
0: Not use
1: Use only geometric I
2: Use geometric I and IB
With geometric, specific address codes are used for exclusive meanings. Thus, if A or C is used for the axis name or 2nd miscellaneous command code, the A used for the axis name may function as the geometric's angle designation. Pay special attention to axis names, etc., when using this function.
Set the tolerable error range when the end point deviates from the center coordinate in the circular command.
---Setting range---
0 to 1.000 (mm)
(PR) #1052 MemVal No. of common variables shared in part system desig nation
#1077 radius Incremental command for diameter specification axis
#1078 Decpt2 Decimal point type 2
#1079 F1digt Validate F1 digit
#1080 Dril_Z Drilling Z fixed
#1081 Gmac_P Give priority to G code parameter
#1082 Geomet Geometric
#1084 RadErr Arc error

Select how to handle the surface speed for the G00 command when using the constant surface speed control function.
0: Calculate the surface speed constantly even during G00 movement
1: Calculate the surface speed at the block end point in the G00 command
Select how to handle the soft limit during G30 (2nd reference position return).
0: Enable
1: Disable
Select how to handle the middle point during G28 and G30 reference position return.
0: Pass the middle point designated in the program and move to the reference position.
1: Ignore the middle point designated in the program and move straight to the reference position.
Select the movement of the additional axis at the tool change position return command.
0: The additional axis will not move
1: After the standard axis returns, the additional axis will also return to the tool change position
Select the timing of synchronization between part systems when using the multi-part system.
When the travel command is found in the synchronization command (!, M) block:
0: Synchronize before executing travel command
1: Synchronize after executing travel command
Select whether to count the data units to be used for single block operation when using the tool life manage ment II function (L system).
0: Not count
1: Count
Select how to handle TF for T00 command.
0: TF will be output
1: TF wont be output
Select the tool life management type.
1: Life management I
The cutting hours or number of cuttings of the tool that is commanded in the program is accumulated to monitor the usage state.
2: Life management II
The same as tool life management I, but with the spare tool selection function.
A spare tool is selected from a group of tool commands commanded in the program.
Tool compensations (tool length and radius compensations) are carried out for the selected tool.
3: Life management III (for M system only)
The cutting hours or number of cuttings of the tool that is commanded in the program is accumulated to monitor the usage state.
The group No. is not used to manage the tool life.
(Note) When "3" is set for the L system, the tool life management I is selected.
#1087 G96_G0 Constant surface speed control by rapid traverse feed command
#1088 G30SL Disable G30 soft limit
#1091 Mpoint Ignore middle point
#1092 Tchg _A Replace tools for additional axis
#1093 Wmvfin Synchronization between part systems method
#1094 TI_SBK Select life count for single block (for L system only)
#1095 T0tfof TF output (for L system only)
(PR) #1096 T_Ltyp Tool life management type

Select the number of digits for an offset No. in command T.
0: Lower two digits of command T serve as an offset No.; the remaining upper digits as a tool No.
1: Lower one digit of command T serves as an offset No.; the remaining upper digits as a tool No.
2: Lower two digits of command T serve as an offset No., the remaining upper digits as a tool No.
3: Lower three digits of command T serve as an offset No.; the remaining upper digits as a tool No.
Select the number of digits of the tool length compensation No. in the T command.
0: Lower 3 digits in T code serve as a tool length and wear offset Nos.; the remaining upper digits as a tool No.
1: Lower 3 digits in T code serve as a tool wear offset No.; the remaining upper digits as a tool No. and tool length offset No.
Select how to handle the tool compensation vector when resetting the system.
0: Clear the tool length and wear compensation vectors when resetting

1: Hold the tool length and wear compensation vectors when resetting
When the values are cleared, the compensation will not be applied. So the axis will be shifted by the com pensation amount in the next compensation operation.
When the values are kept, the compensation will be applied, so the axis will shift the differential amount of
the compensation amount in the next compensation operation.
Select when to perform tool length compensation and wear compensation.
0: Compensate when T command is executed.
1: Superimpose and compensate with the travel command in the block where the T command is located.
If there is no travel command in the same block, compensation will be executed after the travel command
is superimposed in the next travel command block.
2: Compensate the wear amount when the T command is executed. Superimpose and compensate the
tool length compensation amount with the travel command in the same block. If there is no travel com mand in the same block, compensation will be executed after the travel command is superimposed in
the next travel command block.
Select the type of travel command when "#1100 Tmove" is set to "1" or "2".
0: Compensate regardless of the travel command type (absolute or incremental)
1: Compensate only at the travel command in the absolute command
Select whether to use the tool life management.
0: Not use tool life management.
1: Use tool life management.
Select how to handle the tool command in the program when "#1103 T_Life" is set to "1".
0: Handle the command as group No.
1: Handle the command as tool No.
(Note) In the case of the tool life management III, the program tool command will be handled as the tool No.
regardless of the setting.
Select the tool selection method when "#1103 T_Life" is set to "1".
0: Select in order of registered No. from the tools used in the same group.
1: Select the tool with the longest remaining life from the tools used or unused in the same group.
#1097 Tldigt Tool offset No. digits selection
#1098 Tlno. Tool length offset number
#1099 Treset Cancel tool compensation amount
#1100 Tmove Tool compensation
#1101 Tabsmv Tool compensation method
#1103 T_Life Validate life management
#1104 T_Com2 Tool command method 2
#1105 T_sel2 Tool selection method 2

Select the input method when address N is omitted in inputting the data (G10 L3 command) for tool life man agement function II.
0: Time specified input
1: Number of times specified input
Set the number of groups to be displayed on the tool life management II (L system) screen.
0: Displayed group count 1, maximum number of registered tools: 16
1: Displayed group count 2, maximum number of registered tools: 8
2: Displayed group count 4, maximum number of registered tools: 4
Set the M code for tool life management II (L system) re-count.
---Setting range---
0 to 99
Select the enable conditions for the user macro interrupt signal (UIT).
0: Enable when interrupt signal (UIT) turns ON
1: Enable when interrupt signal (UIT) is ON
Select the performance after user macro interrupt signal (UIT) input.
0: Execute interrupt program without waiting for block being executed to end
1: Execute interrupt program after completing block being executed
Select whether to clear statements other than specified arguments by macro call.
Also select whether to clear local variables by power-ON and resetting.
0: Clear the non-specified arguments by macro call.
1: Hold non-specified arguments by macro call
2: Hold non-specified arguments by macro call, and clear local variables by power-ON and resetting
Set the number of waits for retract when chamfering is OFF in thread cutting.
---Setting range---
0 to 99 (Approx. 4 ms)
Standard setting value: 4
Enable this function when disabling the soft limit check function at the second to fourth reference position
return.
0: Enable soft limit function
1: Disable soft limit function
Not used.
Select one of the following two methods:
- Set the current length of tools on each facing turret.
- Set a value, assuming that the tools on each facing turret are in the same direction as that of those on the
base turret.
0: Current length of the tools on each facing turret
1: Value, assuming that the tools on each facing turret are in the same direction as that of those on the
base turret
#1106 Tcount Life management (for L system only)
#1107 Tllfsc Split life management display screen (for L system on ly)
#1108 TlrectM Life management re-count M code (for L system only)
(PR) #1112 S_TRG Validate status trigger method
(PR) #1113 INT_2 Validate interrupt method type 2
#1114 mcrint Macro argument initialization
#1115 thwait Waiting for retract
#1116 G30SLM Invalidate soft limit (manual operation)
(PR) #1117 H_sens
#1118 mirr_A Select how to set up the length of tools on cutter tables
(opposed tables) (for L system only)

Select whether to enable the mirror image of each facing turret with the T command.
0: Disable
1: Enable
Select whether to change the macro variable (tool offset) numbers for shape compensation and wear com pensation.
0: Not change (Conventional specification)
1: Change the shape and wear compensation variable numbers each for X, Z, and R
Specify whether to prohibit editing of program Nos. 9000 to 9999.
0: Editing possible
1: Editing prohibited
(Note) If "#1122 pglk_c" is set to "1" or "2", "1" will be set in "#1121 edlk_c" when the power is turned ON.
The display and search of program Nos. 9000 to 9999 can be prohibited.
Specify whether to prohibit display and search.
0: Display and search is possible.
1: Program details are not displayed.
2: Program details are not displayed, and operation/restart search is prohibited.
The program details will not be displayed, but the program No. and sequence No. will display in the prohibited
state.
(Note) If "#1122 pglk_c" is set to "1" or "2", "1" will be set in "#1121 edlk_c" when the power is turned ON.
Select whether to use the origin set function.
0: Use
1: Not use
Select how to handle the compensation No. when the input key is pressed on the tool compensation screen.
0: Increment the compensation No. by 1 (Same as general parameters)
1: # compensation No. does not change
When setting in sequence, "0" is handier. When changing and setting repeatedly while adjusting one com pensation value, "1" is handier.
Select the feedrate display on the monitor screen.
0: Command speed
1: Actual travel feedrate
Select the method to command the playback travel amount in the playback editing.
0: Incremental value
1: Absolute value
Select the alignment for printing out with the DPRINT function.
0: No alignment, output s printed with left justification
1: Align the minimum digit and output
#1119 Tmiron Select the mirror image of each facing turret with T com mand (for L system only)
(PR) #1120 TofVal Change macro variable
#1121 edlk_c Edit lock C
(PR) #1122 pglk_c Program display lock C
#1123 origin Origin set prohibit
#1124 ofsfix Fix tool compensation No.
#1125 real_f Actual feedrate display
#1126 PB_G90 Playback G90
#1127 DPRINT DPRINT alignment

Select how to handle the common variables when resetting.
0: Common variables won't change after resetting.
1: Common variables will be cleared #100 to #199 by resetting.
Select how to handle the common variables when the power is turned ON.
0: The common variables are in the same state as before turning the power OFF.
1: Common variables will be cleared #100 to #199 when the power is turned ON.
Select the tool command value display on the monitor screen.
0: Display T-modal value of program command
1: Display Tool No. sent from PLC
Select the brightness of display unit.
1: High brightness (in bright state)
0: Medium brightness
-1: Low brightness (in dim state)
Not used. Set to "0".
Not used. Set to "0".
Set the unit name.
Use 4 or less characters consisting of both alphabets and numbers.
If "0" is set, the unit name won't be displayed.
---Setting range---
4 or less characters consisting of both alphabets and numbers
Not used. Set to "0".
Not used. Set to "0".
Not used. Set to "0".
Not used. Set to "0".
Set the first number of M code that corresponds to the setup Nos. from 100 to 199.
---Setting range---
0 to 99999999
Set the first number of M code that corresponds to the setup Nos. from 200 to 299.
---Setting range---
0 to 99999999
Set the first number of M code that corresponds to the setup Nos. from 300 to 399.
---Setting range---
0 to 99999999
#1128 RstVCl Clear variables by resetting
#1129 PwrVCl Clear variables by power-ON
#1130 set_t Display selected tool number
#1132 brightness Brightness control
#1133 ofsmem
#1134 LCDneg
#1135 unt_nm Unit name
#1136 optype
#1137 Cntsel

#1138 Pnosel
#1139 edtype
#1140 Mn100 M code number
#1141 Mn200 M code number
#1142 Mn300 M code number

Set the first number of M code that corresponds to the setup Nos. from 400 to 499.
---Setting range---
0 to 99999999
Select whether to enable MDI setting in non-MDI mode.
0: Disable MDI setting
1: Enable MDI setting
Select how to handle the absolute position data during automatic handle interrupt.
0: Absolute position data will be renewed if manual ABS switch is ON. If it is OFF, data won't be renewed.
1: Follow the "intabs" state when "#1061 intabs" is enabled
Select how to handle the spindle rotation speed clamp function with the G92/G50S command.
0: G92/G50S command is handled as a clamp command only in the G96 state (during constant surface speed control).
G92S will be handled as normal S command in G97 state (constant surface speed OFF).
1: The S command in the same block as G92/G50 is constantly handled as a clamp command
Specify the type of spindle min. rotation speed clamp value.
0: Rotation speed setting
1: Output voltage coefficient setting
Set "#3023 smini" according to this type setting.
Select whether to decelerate at the arc entrance or exit.
0: Not decelerate
1: Decelerate
Select whether to perform a deceleration check or in-position check at the hole bottom in a hole drilling cycle.
This parameter is enabled only for a hole drilling cycle in which no dwell command can be issued at the hole bottom.
0: Perform no deceleration check and in-position check
1: Perform deceleration check
2: Perform in-position check
Not used. Set to "0".
Not used. Set to "100".
Not used. Set to "100".
Not used. Set to "0".
Not used. Set to "0".
#1143 Mn400 M code number
#1144 mdlkof MDI setup lock
#1145 I_abs Manual ABS parameter
#1146 Sclamp Spindle rotation speed clamp function
#1147 smin_V Minimum spindle rotation speed clamp type
#1149 cireft Arc deceleration speed change
#1153 FixbDc Hole bottom deceleration check
(PR) #1154 pdoor
#1155 DOOR_m
#1156 DOOR_s
#1157 F0atrn
#1158 F0atno

Select whether to enable or disable RIO connection detection.
0: Enable
1: Disable
If your I/O consists of only cards such as CC-LINK, setting this parameter to "1" will avoid the RIO commu nication cutoff alarm.
Select whether to enable or disable the automatic tuning function.
0: Disable
1: Enable
(Note 1) Enable this parameter when using MS Configurator.
(Note 2) Disable this parameter during normal operation.
(Note 3) Search & start function is disabled for safety when this parameter is set to "1".
Select the type of programs handle on the Edit/Program list/Data in/out screen from the following: general programs, fixed cycles, or machine tool builder macro programs.
When Machine tool builder macro password management method type 1 is selected ("#1761 cfgPR11/bit6" = 0)
0: General programs can be edited, etc.
1: Fixed cycles can be edited, etc.
Password No.: The machine tool builder macro programs can be edited, etc.
When Machine tool builder macro password management method type 2 is selected ("#1761 cfgPR11/bit6" = 1)
0: General programs can be edited, etc.
1: Fixed cycles can be edited, etc.
2: Machine tool builder macro programs can be edited, etc.
(*) "2" can be set only when a password is authenticated in "#11796 mmacpro".
---Setting range---
0 to 99999999
Not used. Set to "0".
Select the test mode for the control unit.
In the test mode, test is performed with a hypothetical reference position return complete even though the real reference position return hasn't been completed. This is limited to test operation of the control unit itself, and must not be used when the machine is connected.
0: Normal operation mode
1: Test mode
Not used. Set to "0".

(PR) #1163 No rio RIO connection detection invalid
(PR) #1164 ATS Automatic tuning function
#1166 fixpro Fixed cycle editing
#1167 e2rom
#1168 test Simulation test
#1217 aux01

bit3: Parameter input/output format
Select the parameter input/output format.
0: Type I
Displayed on one line per parameter.
(Example)
N1001T1P1
N1001T2P1
N1001T3P0
1: Type II
Data with the same parameter number is displayed on the same line.
(Example)
N1001 T1 P1 T2 P1 T3 P0
bit4: External workpiece coordinate offset tool number selection
Select the R register that contains the tool number used for automatic calculation when measuring the coor dinate offset of an external workpiece.
0: Follow the setting of "#1130 set_t".
1: Use the tool number indicated by user PLC.
bit5: Parameter I/O II spindle specification address
Select the spindle specification address of parameter I/O type II.
0: C
1: T
This parameter is also applied to the spindle specification address for input and verification.
(Note) This parameter is valid only for parameter I/O type II (when "#1218 aux02/bit3" is set to "1").
#1218 aux02

bit1: Stop high-speed PC monitoring function
Set "1" to disable the function that triggers the emergency stop when the PC high-speed processing time is extended.
Disable the monitoring function only as a temporary measure.
bit5: Dog-type intermediate point
Select whether to move to the intermediate point during automatic dog-type reference position return.
0: Not move.
1: Move.
bit7: Time constant setting changeover for soft acceleration/deceleration
0: Accelerating time is G0tL(G1tL).
When the G00 pre-interpolation acceleration/deceleration and the soft acceleration/deceleration are used together, the inclination of soft acceleration/deceleration will be steeper by setting a time to the soft acceleration/deceleration 2nd step time constant (#2005 G0t1). Consequently, the acceleration for G28/G30 will be larger than that for G00.
(1) Total accelerating time is "G0tL".
(2) The time for curve part is "G0t1".
(3) The time for linear part is obtained by "G0tL-(2 x G0t1)".
1: Accelerating time is obtained by G0tL+G0t1 (G1tL+G1t1).
When the G00 pre-interpolation acceleration/deceleration and the soft acceleration/deceleration are used together, you can attain the G28/G30 acceleration that is equal to G00, by setting the same value to G00 soft acceleration/deceleration filter (#1569 SfiltG0) as well as to the soft acceleration/deceleration 2nd step time constant (#2005 G0t1).
(1) Total accelerating time is obtained by "G0tL+G0t1".
(2) The time for curve part is "G0t1".
(3) The time for linear part is obtained by "G0tL-G0t1".
#1219 aux03
t
t
G0tL - G0t1
G0tL
G0t1 G0t1
Speed
Acceleration
G0tL
G0tL + G0t1
G0t1 G0t1
t
t
Acceleration
Speed

bit0: Tool life check timing selection
Select the criterion to judge the end of tool life when the cumulative number of cuttings is incremented in tool life management II.
0: Determine the tool life end when the incremented cumulative number of cuttings has exceeded the esti mated number of cuttings. (Default)
(cumulative number of cuttings > estimated number of cuttings)
1: Determine the tool life end when the incremented cumulative number of cuttings has reached the esti mated number of cuttings.
(cumulative number of cuttings >= estimated number of cuttings)
bit0: Workpiece coordinate/absolute coordinate display switch
Select whether to display the workpiece coordinate or to display the absolute coordinate in the coordinate value screen, command value screen or modal information screen.

0: Workpiece coordinate
1: Absolute coordinate
bit3: Enable setup parameter lock
Select whether to enable the setup parameter lock.
0: Disable
1: Enable
bit4: Minimum cut-in amount selection
Select the minimum cut-in amount command value for the compound thread cutting cycle (G76 command).
0: The minimum cut-in amount (Q) will be "0".
1: The minimum cut-in amount (Q) will be set in the last command value (it is retained even after the NC
power has been turned off).
bit5: Fixed cycle for compound lathe command format check selection
Select the operation when the 1st block of the fixed cycle for compound lathe is omitted while the conven tional format is selected ("#1265 ext01/bit0" is set to "0").
0: Program error (P33) will occur.
1: Parameter setting value will be used.
bit7: Reference position return deceleration check method
Select the deceleration check method to be used during automatic reference position return.
0: In-position check
1: Commanded deceleration check
#1220 aux04 (for L system only)
#1221 aux05
#1222 aux06
M800/M80/E80 Series Alarm/Parameter Manual
15 Machine Parameters
IB-1501279-S 364
bit1: Deceleration check method 2
Select the deceleration check method in G1+G9.
0: Command deceleration check in G1+G9
1: In-position check in G1+G9
The deceleration check is not performed for the commands except G1+G9.
When "#1306 InpsTyp deceleration check specification type" is set to "1" (Deceleration check specification
type 2), this parameter will be invalid.
bit2: Synchronous tap R-point in-position check
Select whether to enable the synchronous tap I-point -> R-point in-position check.
0: Disable
1: Enable
(Note) This parameter is valid only when "1" (Enable in-position check) is set for "#1223 aux07/bit3 Synchro nous tap in-position check improvement".
bit3: Synchronous tap in-position check improvement
Select whether to enable the synchronous tap in-position check improvement.
0: Disable
1: Enable
Related parameters:
#1223/bit2 Synchronous tap R-point in-position check
#1223/bit4 Synchronous tap hole bottom in-position check
#1223/bit5 Synchronous tap R-point in-position check 2
bit4: Synchronous tap hole bottom in-position check
Select whether to enable the synchronous tap hole bottom in-position check.
0: Disable
1: Enable
(Note) This parameter is valid only when "1" (Enable in-position check) is set for "#1223 aux07/bit3 Synchro nous tap in-position check improvement".
bit5: Synchronous tap R-point in-position check 2
Select whether to enable the synchronous tap R-point in-position check.
0: Disable
1: Enable
(Note) This parameter is valid only when "1" (Enable in-position check) is set for "#1223 aux07/bit3 Synchro nous tap in-position check improvement".
bit6: Cancel synchronous tap (, S) return
0: Retain the spindle speed (,S) in synchronous tap return
1: Cancel the spindle speed (,S) in synchronous tap return with G80
bit7: Synchronous tap method
Specify a synchronous tap method.
0: Synchronous tap with multi-step acceleration deceleration
1: Conventional type synchronous tap
#1223 aux07
M800/M80/E80 Series Alarm/Parameter Manual
15 Machine Parameters
365 IB-1501279-S
bit0: Sampling data output
Select whether to enable the sampling data output.
0: Disable
1: Enable
bit7: Enable/disable spindle rotation speed clamp
Select whether to enable the spindle rotation speed clamp by the G92 S or Q command for the spindle com mand rotation speed (R7000) set with the user ladder.
0: Enable
1: Disable
bit0: Tool compensation data for external workpiece coordinate offset measurement
Select the tool compensation data to be used for external workpiece coordinate offset measurement.
0: Tool length data and tool nose wear data
1: Tool length data
bit1: Optional block skip type
Select whether to enable the optional block skip in the middle of a block.
0: Enable only at the beginning of a block.
1: Enable in the middle of a block, as well as at the beginning of the block.
Note that a slash "/" in an equation between [ ] is handled as division operator.
(Note) This parameter is enabled when "#1274 ext10/bit4" is "0".
bit2: Single block stop timing
Select the timing at which the "Single block" signal is activated.
0: When the signal goes ON while automatic operation is starting, the block will stop after finished.
1: When the signal is ON at the end of the block, the block will stop.

bit3: C-axis reference position return type
Select the C-axis reference position return type.
0: Basic position return is performed by the G28 reference position return command or by activating the
manual reference position return. The basic point dog is used.
1: When the first C-axis command is issued after the C-axis mode is entered in automatic mode, reference
position return is performed before the execution of the block. The reference position return is also per formed by the G28 reference position return command or by activating the manual reference position
return. The Z phase of the encoder is used.
bit4: S command during constant surface speed
Select whether to output a strobe signal when the S command is issued in constant surface speed mode.
0: Not output any strobe signal in constant surface speed mode.
1: Output strobe signals in constant surface speed mode.
bit5: Arbitrary allocation of dog signal
Select whether to enable the arbitrary allocation parameter for "Reference position return near-point detec tion" signal and "Stroke end" signal.
0: Disable (Fixed device is used.)
1: Enable (Device is specified by the parameter.)
bit7: Shorten JOG stop time
Specify whether to shorten the JOG stop time.
0: Do not shorten the JOG stop time. (Same as before)
1: Shorten the JOG stop time.
#1224 aux08
#1225 aux09
#1226 aux10
M800/M80/E80 Series Alarm/Parameter Manual
15 Machine Parameters
IB-1501279-S 366
bit0: Select PLC signal or spindle feedrate attained
Set up this option when disabling the cutting start interlock by spindle feedrate attained.
0: Cutting start interlock by PLC signal
1: Cutting start interlock by spindle feedrate attained
bit1: Select H or D code
Set up this option to validate the data that is set up on the tool life management screen when issuing the H99
or D99 command.
0: The H and D codes validate the data that is set up on the management setup screen.
1: Validates the data that is set up on the management setup screen when issuing the H99 or D99 com mand.
bit2: Measures against tool setter chattering
Select a condition where a relieving operation completes after measurement with tools.
0: Sensor signals have stopped for 500 (ms) or longer.
1: 100 (m) or longer has passed after sensor signals stopped.
bit4: Word command check
Select whether to output an error when no numeric value follows a program address during execution of a
machining program.
0: Not check
1: Check
bit5: Spindle rotation speed clamp
Specify whether to clamp the rotation speed in constant surface speed mode when the spindle rotation clamp
command is issued.
0: Clamps the rotation regardless of the constant surface speed mode.
1: Clamps the rotation only in constant surface speed mode.
bit7: Switch the range of tool life data to be input
Set up the range of tool life data to be input or compared.
0: Inputs or compares all of the data output.
1: Inputs or compares part of the data output
(1) Tool life management I data to be input or compared
Tool number (D), lifetime (E), life count (F), and auxiliary data (B).
(2) Tool life management II data to be input or compared
Group number (G), method (M), life (E/F), tool number (D), and compensation number (H)
#1227 aux11
M800/M80/E80 Series Alarm/Parameter Manual
15 Machine Parameters
367 IB-1501279-S
bit0:
When not using, set to "0".
bit1: Switch "offset and parameter" screen
Select to switch the "offset and parameter" screen to the parameter screen.
0: Display the "offset and parameter" screen.
1: Display the "parameter" screen.
bit2: Switch data protection in data transmission mode
Select the range of data protection in data transmission mode.
0: Enable the protection for both send and receive data.
1: Enable the protection for receive data only.
bit3: Nose R specification
Select whether to specify the nose R compensation by shape or wear number.
0: Specifies the nose R compensation by shape number.
1: Specifies the nose R compensation by wear number.
bit4: Select operation error or stop code
Select operation error or stop code to provide for both block start and cutting start interlocks.
0: Operation error
1: Stop code
bit5: Select constant surface speed coordinates
Select the constant surface speed coordinate.
0: Workpiece coordinate
1: Absolute value coordinate
bit6: Switch relative values displayed
Select whether to preset the relative coordinates with workpiece coordinate preset (G92.1) or counter preset
(G92).
0: Preset the relative coordinates.
1: Not preset the relative coordinates.
bit7: Protection with manual value command

Select whether to protect a manual value command.
0: Not protect. (Conventional specification)
1: Protect.
#1228 aux12

bit0: Subprogram interrupt
Select the type of the user macro interrupt.
0: Macro type user macro interrupt
1: Sub-program type user macro interrupt
bit1: Accurate thread cutting E
Select what the address E specifies in inch screw cutting.
0: Number of threads per inch
1: Precision lead
bit2: Radius compensation type B (for M system only)
Select the method of the arithmetic processing for the intersection point when the start-up or cancel com mand is operated during radius compensation.
0: The processing does not handle the start-up or cancel command block: handle the offset vector in the direction vertical to that of the command instead.
1: The processing is executed for the intersection point between the command block and the next block.
bit2: Nose R compensation type B (for L system only)
Select the method of the arithmetic processing for the intersection point when the start-up or cancel com mands are operated during nose R or radius compensation.
0: The processing does not handle the start-up or cancel command block: handle the offset vector in the direction vertical to that of the command instead.
1: The processing is executed for the intersection point between the command block and the next block.
bit3: Initial constant surface speed
Select the initial state after the power-ON.
0: Constant surface speed control cancel mode
1: Constant surface speed control mode
bit4: Synchronous tap
Select the operation when ",R" is omitted in G74/G84 tapping cycle.
0: Asynchronous tap
1: Synchronous tap
bit5: Start point alarm
Select the operation when the operation start point cannot be found while executing the next block of G115, G116 or G117.
0: (G115/G116)Starts after the block has been moved.
(G117)Enables an auxiliary function after the block has been moved.
1: (G115)Waits until reaching start point at the movement after next block when the operation start point is not found.
(G116/G117)Outputs an program error (P33) when the operation start point is not found.
bit6: Grid display selection
Select the grid display type on the servo monitor screen during the dog type reference position return.
0: Distance between dog OFF and basic point (including a grid mask amount)
1: A value given by reducing a grid mask amount from the distance between dog OFF and basic point
bit7: Command switch during fixed cycle with label O
Select the condition to handle the address E or P given during fixed cycle mode as a command of fixed cycle.
0: When a G-code from group 0, 1, 4, 8 or 11 is not given
1: When a G-code from group 0, 1, 4, 8, 11 or 12 is not given
* This parameter is enabled when "#11009 M2 label O" (Program number label for M2-format) is "1" (Label O).
#1229 set01

bit2: Proximity switch spindle orientation: Z phase re-detection request type
Select when to request Z phase re-detection for proximity switch type spindle orientation.
0: After confirming the spindle has reached the Z phase detection speed.
1: Right after Servo ON of the spindle.
bit4: Tolerance control mode selection
Select the tolerance control mode. When you give higher priority to the tolerable acceleration rate in the speed control, set "0". When giving priority to the tolerance, set "1".
0: Give priority to the speed for the tolerable acceleration rate
1: Give priority to the speed for the tolerance
bit7: Macro interface input/output for each part system
Select the specification of the macro interface input/output.
0: Shared by all part systems.
1: Used independently by the part systems.
#1230 set02

bit0: Graphic check compatibility parameter
Select whether to return the data to the pre-starting data after having checked a machining program that re writes the common variables, workpiece offsets and tool offsets.
0: Return the data.
1: Not return the data.
bit1: Switch graphic coordinates
Select whether to use machine coordinate value or tool position coordinate value (position being machined, obtained by subtracting the tool compensation amount from machine coordinate values) for drawing with trace display.
0: Machine coordinates zero point (same as conventional method)
1: Tool position coordinate value
bit2: Switch graphic check trace
Select the coordinates to draw at program check: both machine coordinate value (tool center path) and tool position coordinate value (program path) simultaneously, or only the coordinates selected with "#1231 set03/ bit1" (Switch graphic trace coordinates).
0: Both machine coordinates and tool position coordinates (conventional method)
1: Only coordinates designated with switch graphic coordinates

bit4: Switch zero point mark display position
Select the position for displaying the zero point mark in the graphic display.
0: Machine coordinates zero point (same as conventional method)
1: Workpiece coordinate zero point
bit5: Switch graphic check counter display
Select the type of counter displayed on the Graphic Check screen with the combination of "#1231 set03/bit1".
If the drawing coordinate system is other than "all workpiece coordinates", the counter displayed is workpiece
coordinate position counter or tool position (workpiece coordinate) regardless of this setting.
0: (When "#1231 set03/bit1" is set to "0") Machine position counter
(When "#1231 set03/bit1" is set to "1") Tool position (machine coordinate) counter
1: (When "#1231 set03/bit1" is set to "0") Workpiece coordinate counter
(When "#1231 set03/bit1" is set to "1") Tool position (workpiece coordinate) counter
bit6: Initialization of drawing in graphic check
Select whether to initialize the workpiece drawing automatically when you change any data in the 3D check
workpiece setup screen.
0: Initialize the workpiece drawing (conventional specifications)
1: Not initialize the workpiece drawing
Note that if you change the workpiece shape or dimensions, the workpiece drawing is automatically reset,
irrespective of this parameter.
bit7: Disable switching of graphic check method
Select whether to enable or disable switching of the 3D check method.
0: Enable
1: Disable
If you choose Disable, the last selected check method remains selected.
#1231 set03
M800/M80/E80 Series Alarm/Parameter Manual
15 Machine Parameters
371 IB-1501279-S
bit0: Exclude acceleration/deceleration in load monitor
Select whether or not to exclude acceleration/deceleration when detecting the load in load monitoring.
0: Acceleration/Deceleration is included
1: Acceleration/Deceleration is excluded
(Note) When "Exclude acceleration/deceleration in load monitor" ("#1232 set04/bit0") is enabled, "Spindle
function 8" ("#13228 SP228/bit2") needs to be set to "1" (load display, high-cycle motor output effective val ue).
bit5: Actual load selection
Load fluctuation due to speed change is excluded from the actual load.
0: Disable
1: Enable
(Note) When "Actual load selection" ("#1232 set04/bit5") is enabled, "Spindle function 8" ("#13228 SP228/
bit2") needs to be set to "1" (load display, high-cycle motor output effective value).
bit7: Spindle unit disturbance torque display selection
Select display contents on "estimated disturbance torque" and "MAX disturbance torque" of the drive unit
(spindle unit).
0: Estimated disturbance torque
1: Cutting torque
When not using, set to "0".
bit3: Interlock when tap retract enabled
Select whether to enable automatic/manual interlock for the part system with "Tap retract enable" signal ON.
0: Interlock all the axes
1: Disable the interlock
bit4: Tap retract possible state cancel signal operation selection
Specify the behavior after "TAP RETRACT POSSIBLE" signal (TRVE) is turned OFF with "TAP RETRACT
POSSIBLE STATE CANCEL" signal (TRVEC).
0: After reset, "TAP RETRACT POSSIBLE" signal (TRVE) is turned ON.
1: "TAP RETRACT POSSIBLE" signal (TRVE) remains OFF state after reset.
#1232 set04
#1233 set05
#1234 set06
M800/M80/E80 Series Alarm/Parameter Manual
15 Machine Parameters
IB-1501279-S 372
bit0: Helical interpolation/Helical involute interpolation speed 2
0: Designated with the resultant velocity of all programmed axes
1: Designated with the velocity component in the plane of the circle/involute
bit2: Fixed type chopping compensation valid only at start
When the fixed type compensation value is selected, the method can be changed to the compensation value
sequential update type after the first four cycles.
0: Disable the method changeover
1: Enable the method changeover
bit4: Condition to select multi-step acceleration/deceleration synch tap gear step
Select the parameters that determine the gear step for multi-step acceleration/deceleration synchronous tap ping ("#1223 aux07/bit7" = 0).
0: #3005 to #3008 (smax1 to 4) when "#1245 set17/bit2" = 0
#43046 to #43049 (smax_tap1 to 4) when "#1245 set17/bit2" = 1
1: #3013 to #3016 (stap1 to 4), #3037 to #3040 (taps21 to 24) and #43046 to #43049 (smax_tap1 to 4)
bit5: Tool wear data clear on tool length measurement (For L system only)
Select whether to clear tool wear data to zero when the tool length is set using [Measure] menu on the [T ofs] screen.
0: Not clear tool wear data to zero
1: Clear tool wear data to zero
(Note) This parameter is invalid for the tool compensation type I or II.
bit0: Manual rotary axis feedrate unit
Select the unit of manual rotary axis feedrate.
0: Fixed to [/min]
1: Same speed as before (When inch command, the speed is the command speed divided by 25.4.)
bit1: Spindle speed detection
Select the pulse input source of actual spindle rotation speed (R6506/R6507) when the spindle encoder se rial connection is selected ("#3025 enc-on" is set to "2").
0: Serial input
1: Encoder input connector
bit2: Current limit droop cancel invalid

Select whether to cancel the position droop when the current limit changeover signal is canceled.
0: Cancel the droop.
1: Not cancel the droop.
bit3: Rotary axis command speed scale
Select to multiply the rotary axis command speed by 10 times.
0: Invalid
1: During initial inching, the rotary axis command speed is multiplied by 10.
In other words, if "F100" is commanded, the speed will be the same as when 1000/min is commanded.
The rotary axis speed display unit will be 10/min.
Not used. Set to "0".
#1235 set07
#1236 set08
(PR) #1237 set09

bit0: Switch G36 function
Select the function, the automatic tool length measurement or arc thread cutting (CCW), to be applied to G36 when the G code system 6 or 7 is selected.
0: Automatic tool length measurement
1: Arc thread cutting (CCW)
bit3: Ignoring input from RIO
Select whether to ignore the input from RIO.
0: Output the input from RIO to the device X.
1: Ignore the input from RIO, and not output it to X device.
(X000 to X0FF, X100 to X1FF and X200 to X2BF)
* Normally set this parameter to "0".
* The devices X2C0 to X2FF are used for the handle pulse input and board reset from the operation panel I/O unit card (HN391/HN392), thus are excluded from the target.
bit6: Switch absolute position detection alarm
Select the output destination of the absolute position detection alarm.
0: NC alarm 4 (AL4)
1: NC alarm 5 (AL5)
(Note) The absolute position detection alarm is listed in the alarm history regardless of this parameter setting.
bit7: Switch operation alarm
Select whether to enable the NC alarm 5 (AL5) signal output.
0: Disable NC alarm 5 (AL5)
All operation alarms will be output to NC alarm 4 (AL4).
1: Enable NC alarm 5 (AL5)
The following operation alarms will be output to NC alarm 5 (AL5), not to NC alarm 4 (AL4).
External interlock axis exists (M01 0004)
Cutting override zero (M01 0102)
External feedrate zero (M01 0103)
Block start interlock (M01 0109)
Cutting block start interlock (M01 0110)
Interference check disabled (M01 0200)
Cutting interlock for spindle-spindle polygon (G51.2) (M01 1033)
The above alarms are not recorded in the alarm history regardless of the setting value of this parameter.
(PR) #1238 set10

bit0: Coil switching method
Select the coil switching method.
0: Via PLC. (Y189F)
1: NC internal processing. (Y189F is invalid.)
bit1: Handle I/F selection
Select the handle connection destination.
0: Use the handle connected to the encoder communication connector.
1: Use the remote I/O unit as a priority.
(Note) When the operation panel I/O unit is mounted, the handle connected to the unit will be used regardless of this parameter setting.
bit3: Polygon machining mode at reset
Select whether to cancel the polygon machining mode when reset is applied.
0: Not cancel.
1: Cancel.
bit4: Invalidate G51.1 phase command
Select whether to enable the phase control with the spindle-spindle polygon function.
0: Always enable. (When R is not commanded, it will be handled as R0.)
1: Enable only at the R command.
bit5: Door interlock spindle speed clamp valid
Select whether to enable the spindle clamp speed changeover by the PLC signal.
0: Disabled
1: Enabled
bit6: External deceleration axis compliance valid
Designate the method for setting the external deceleration speed.
0: Set speed common for all axes ("#1216 extdcc" (external deceleration speed))
1: Set speed for each axis ("#2086 exdcax" (external deceleration speed))
bit0: Handle input pulse
Select the handle input pulse.
0: MITSUBISHI CNC standard handle pulse (25 pulse/rev)
1: Handle 400 pulse (100 pulse/rev)
bit2:Zero point shift amount magnification
If "1" is set, the following magnification will be applied on the #2027 G28sft reference point shift amount, #2057 zero point proximity + and #2058 zero point proximity - settings.
For 0.1m: 10-fold
For 0.01m: 100-fold
bit4: Optical communication automatic channel detection invalid

Select whether to enable the optical communication automatic channel detection.
0: Enable
1: Disable
(PR) #1239 set11
(PR) #1240 set12

bit0: Prevention of program error due to incorrect G code combination
When a G code from some modal groups is commanded in the same block as an unmodal G code, a program error due to incorrect G code combination occurs. This parameter is used to avoid this program error.
0: The program error (P45) will occur.
1: The program error is avoided, however, a G code from an uncombinable modal group is ignored.
bit1: Interference check at starting up radius compensation (for M system only)
Interference check at starting up nose R compensation (for L system only)
0: In a start-up block, an interference check is not carried out.
1: An error occurs even at a start-up block if an interference occurs.
The error occurs even when the interference avoidance is set to ON (#8102="1"). However, an interfer ence check is not carried out when it is set to OFF (#8103="1").
bit4: Plane axis check invalid in fixed cycle for turning machining
Select whether to raise a program error when a fixed cycle for turning machining is commanded in either of the following conditions:
* The commanded axis does not coincide with the selected plane
* One or both of the selected plane axes have no movement
0: Raise a program error
1: Not raise a program error
bit5: Macro argument L/P valid
Select whether to enable L and P to be used as argument of G(MSTB) macro command or ASCII code macro command.
0: L and P commands cannot be used.
1: L and P commands can be used as argument.
bit7: Spindle rotation speed during synchronous tap return
Specify how to operate in a sync tap command block if the tap return spindle rotation speed (,S) is lower than the tap spindle rotation speed (S).
0: Operate at the tap return spindle rotation speed (,S)
1: Operate at the tap spindle rotation speed (S)
bit0: Ignoring timing sync in multi-system simultaneous thread cut cycle I (G76.1)
Select whether to execute timing synchronization during multi-part system simultaneous thread cut cycle I (G76.1).
0: Execute timing synchronization at the start and end of thread cutting.
1: Ignore the timing synchronization given during the cycle.
bit1: G92.1 single command error check ON
Select whether to enable the error check when G92.1 (G50.3) is given alone in a block.
0: Disable the error check
1: Enable the error check
bit2: Spindle rotation speed fluctuation alarm selection
Select whether to output an operation error upon detection of spindle speed fluctuation (G162).
0: Output an operation error
1: Not output an operation error
bit6: G113 command type when multiple spindle synchronization set valid
Specify the G113 command type of when multiple spindle synchronization set is valid.
0: Cancels all the spindle synchronization by issuing G113H0 or G113D0.
1: Cancels all the spindle synchronization by issuing G113.
Not used. Set to "0".
#1241 set13
#1242 set14
#1243 set15

bit0: No superimposition of timing synchronization block onto subsequent block
0: Superimpose a block, where timing synchronization command is given as a single command, onto the subsequent block, and treat the blocks as one block
1: Treat a block, where timing synchronization command is given as a single command, as one block.
bit1: Enable automatic re-calculation after timing synchronization
0: Look-ahead a block next to the timing synchronization command block
1: Automatically re-calculate a block next to the timing synchronization command block after the synchro nization has been completed.
bit2: Balance cut in all the blocks
Select in which block(s) to execute synchronization between part systems when a balance cut command is given.
0: Execute synchronization in cutting feed command block(s)
1: Execute synchronization in all the blocks
bit3: Enable tool offset at start/stop of arbitrary axis superimposition
Select whether or not to apply tool offset to a travel at workpiece coordinate system switch or a travel toward the superimposition start/end position when the arbitrary axis superimposition control start/stop command is issued.
0: Not apply
1: Apply
bit4: Speed clamp method under superimposition control
0: Apply a fixed superimposition clamp speed to the superimposition-related axes. This clamp speed takes effect irrespective of the feed status (feed direction and mode) of the superimposition-related axes.
When this method is chosen, the clamp speed is unchanged during block execution.
1: Apply the optimal clamp speed according to the real-time monitored feed status of the superimposition related axes (feed direction and mode). When this method is chosen, the clamp speed is changed even during block execution. This method helps reduce the cycle time.
bit5: Read of position info with superimposing travel distance taken into account
Select whether to take into account the superimposing travel distance (travel distance of the reference axis) when reading position info (machine coordinates/skip coordinates) using a variable under control axis super imposition or arbitrary axis superimposition control.
0: Not take the distance into account
1: Take the distance into account

bit6: Axis address check ON
Select whether to output a program error (P32) when any address other than those specified by "#1013 ax name" and "#1014 incax" is given as an axis address.
If the arbitrary axis exchange function is ON, select whether to output a program error (P32) when any ad dress other than those specified by "#12071-12078 adr_abs[1]-[8]" and "#12079-12086 adr_inc[1]-[8]" is giv en as an axis address.
0: Not output a program error (P32). (Ignore the axis address.)
1: Output a program error (P32)
#1244 set16

bit2: Speed to select multi-step acceleration/deceleration synch tap gear step
Specify the rotation speeds that determine the gear step for multi-step acceleration/deceleration synchro nous tapping ("#1223 aux07/bit7" = 0).
0: #3005 to #3008 (smax1 to 4)
1: #43046 to #43049 (smax_tap1 to 4)
(Note) This parameter is enabled when "#1235 set07/bit4" = 0.
bit7: Synchronous tap spindle rotation direction type
Select whether the spindle's rotation direction is determined by the synchronous tapping axis' travel direction.
0: The spindle's rotation direction is determined by the synchronous tapping axis' travel direction.
When the travel direction is negative, the spindle rotates forward.
When the travel direction is positive, the spindle rotates in reverse.
1: The spindle always rotates forward regardless of the synchronous tapping axis' travel direction.
(Note) When a reverse tap is commanded, the spindle rotates in an opposite direction to that mentioned
above.
#1245 set17

bit0: Thread cut override ON
Select whether to enable spindle override during thread cutting.
0: Disabled
1: Enabled
bit1: Thread cut override feed hold
Select whether to perform feed hold when spindle override is changed during thread cutting.
0: Not perform feed hold
1: Perform feed hold
bit2: Switch coordinate systems for radius compensation
Select the coordinate system for radius compensation.
0: Type 1 (conventional specification)
Perform radius compensation with reference to a position on the workpiece coordinate system.
1: Type 2
Perform radius compensation with reference to a position on the program coordinate system.
bit3: Change repetition final return position at M2L
Select the final return position after repetition, when in G99 modal and in M2 format with the label L.
0: Initial point
1: R point
bit4: T-lifeover signal output
Select the timing at which the "Tool life over" signal is output when using the M system tool life management
I/III.
0: Turn the signal ON when a selected tool has reached the lifetime.
1: Turn the signal ON when any of tools (in the case of the tool life management III, all the registered tools)
in a selected group has reached the lifetime.
bit5: Tool status update type
Select whether to update tool status automatically when estimated tool life data/cumulative usage data is
changed on the screen in the M system tool life management I/II/III.
0: Do not update
1: Update.
(Note) When "1" is selected, tool status will be updated as follows.
When usage data is "0", tool status will be "0".
When usage data is smaller than lifetime data, tool status will be "1".
When usage data is the same as or larger than lifetime data, tool status will be "2".
bit6: Switch F 1-digit feedrate change method
Set whether to enable feedrate change with handle until power OFF, or change the parameters #1185 to
#1189 with change of speed.
0: Enabled until power OFF
1: Change "#1185 spd_F1" to "#1189 spd_F5"
bit7: PLC axis random device assignment
Select whether to enable PLC axis random device assignment for "Reference position return near-point de tection" signal and "Stroke end" signal.
0: Disable (Fixed device is used.)
1: Enable (Device is specified by the parameter.)
#1246 set18

bit0: Movement by tool length compensation command (for M system only)
Select whether or not to move the axis by the compensation amount when tool length compensation/cancel
is independently commanded.
0: Move
1: Not move
bit1: Thread cutting operation when manual speed command enabled
Select the thread cutting operation in manual speed command.
0: The axis travels at the handle feed rate, jog feed rate, or manual rapid traverse rate
1: The axis travels following the program command
bit2: Inclined surface machining mode hold
Select whether to hold or cancel the inclined surface machining mode at an emergency stop or power OFF.
0: Cancel the inclined surface machining mode.
1: Hold the inclined surface machining mode.
Not used. Set to "0".
bit2: Encryption key setting
Select whether to enable the encryption key for System lock to be entered.

0: Disable the encryption key entry
1: Enable the encryption key entry
bit5: Warning on 24Hr continuous ON display
Select whether to show or hide the alarm (V53 0001).
0: Not display
1: Display
bit0: Enable cycle operation after turning OFF manual arbitrary reverse run mode
Select whether to enable automatic cycle operation after turning OFF the manual arbitrary reverse run mode.
0: Disable
1: Enable
bit3: Switch acceleration for rapid traverse
Select how to determine the acceleration for rapid traverse (G0) in high-accuracy control.
This parameter is enabled during tool center point control, workpiece installation error compensation or in clined surface machining command.
0: The acceleration is determined by "#1206 G1bF" (Maximum speed) and "#1207 G1btL" (Time constant)
and is common to all axes.
1: The acceleration is determined by "#2001 rapid" (Rapid traverse rate) and "#2004 G0tL" (G0 time con stant (linear)) and is individual for each axis.
bit7: Movement at command of workpiece position offset for rotary axis
Select whether to move the machine by the workpiece position offset when the workpiece position offset for
rotary axis is started or cancelled.
0: Move
1: Not move
#1247 set19
#1248 set20
#1249 set21
#1250 set22
M800/M80/E80 Series Alarm/Parameter Manual
15 Machine Parameters
IB-1501279-S 380
bit0: Load inertia ratio display
Select whether to show the load inertia ratio of servo and spindle units on the drive monitor screen.
0: Display
1: Not display (Show zero)
bit1: Spindle temperature display
Select whether or not to display the spindle unit temperature on the drive monitor screen.
0: Display according to "#13225 SP225/bit2"
1: Not display (Show zero)
bit2: Warning of "WCS offset not reflected"
This parameter specifies whether to enable the warning that informs that any of the following items being
selected has not been reflected in the workpiece position counter or in the program position counter:
Workpiece coordinate system offset
Extended workpiece coordinate system offset
External workpiece coordinate system offset
Workpiece coordinate system shift
0: Disable
1: Enable
bit4: Speed indication when selection of axis for feedrate command is valid
Select which speed is to be displayed on the screen when the axis (axes) for feedrate command is (are) being
selected with G130.
0: Display the resultant speed of the axis (axes) designated with G130
1: Display the resultant speed of all the axes
bit5: Warning “Continuous write of parameter" invalid
Select whether to indicate the warning when write of parameter is being continuously executed through a
"write window" of the PLC window function.
0: Indicate the warning
1: Not indicate the warning
bit6: Retention of directory path invalid
Select whether to enable/disable the function of retaining the previous directory path.
0: Enable
1: Disable
(Note) The function supports the following screens: Operation search, Collation and stop, T-list search and
Check search.
bit7: 3D machine interference check: pinch gesture
Switch the pinch-to-zoom gesture on the model for 3D machine interference check.
0: Pinch in to zoom in on the model, and pinch out to zoom out on the model.
1: Pinch in to zoom out on the model, and pinch out to zoom in on the model.
bit3: Number of file input/output points for PLC constant (extension)
Specify the number of file I/O points for the PLC constant (extension) at the time of parameter input/output
(ALL.PRM).
0: All the points of file input/output (ALL.PRM) for the PLC constant (extension)
1: The number of points specified by #1326 (PLC Const Ext. Num) for the PLC constant (extension)
#1251 set23
#1252 set24
M800/M80/E80 Series Alarm/Parameter Manual
15 Machine Parameters
381 IB-1501279-S
bit0: Number of machine tool builder macro definition files
Select the number of definition files for machine tool builder macro.
0: One (O199999999)
1: Ten (O199999990 to O199999999)
bit2: Acceleration/Deceleration mode change in hole drilling cycle
Change the acceleration/deceleration mode of hole drilling cycle.
0: The operation follows the parameter setting.
The setting of #1153 is enabled.
1: A constant inclination acceleration/deceleration and an acceleration/deceleration after interpolation are
applied to the hole drilling cycle.
The setting of #19417 is enabled.
bit4: Clearing data at fixed cycle mode switch
Select whether to zero clear the argument data at the time of fixed cycle mode switch.

0: Do not zero clear the argument data
1: Zero clear the argument data
bit5: G53 motion type
Change the motion type for G53 command.
0: Cutting feed or rapid traverse is determined by the active modal status.
1: Fixed to rapid traverse.
bit6: Switch G68/G69 function
Select whether to use G68/G69 as tool post mirror image function or balance cut function when the selected G code system is 6 or 7.
0: Facing turret mirror image
1: Balance cut
bit0: Reducing processing time of zero-travel-distance block (for L system only)
Select whether to reduce the processing time of a zero-travel-distance block.
0: Disable the reduction of non-travel block processing time.
1: Enable the reduction of non-travel block processing time.
bit1: Program format switch
Enable the program format switch function.
0: Disable the function
1: Enable the function
bit3: Select timing for updating axis parameter
Select the timing for when to update axis parameter.
0: Update after All axes smoothing zero turns ON for all the part systems.
1: Update after All axes smoothing zero turns ON for each part system.
bit4: Reference of zero point shift distance for spindle C axis
Select the reference method for zero point shift distance when C axis returns to zero under spindle C axis control.
0: Use "#2027 G28sft" as the zero point shift distance.
1: Use "#3113 cax_sft" as the zero point shift distance.
(PR) #1253 set25
(PR) #1254 set26

bit0: High-accuracy calculation during constant surface speed control
Enable the high-accuracy spindle speed calculation under constant surface speed control.
0: Calculate the speed with the tolerance of plus or minus 10r/min (same as conventional specifications).
1: Calculate the speed with the tolerance of plus or minus 1r/min.
bit1: MTB macro M99 command single block stop
For M99 command during MTB macro, select whether to execute single block stop or not.
0: Not execute single block stop in the M99 command
1: Execute single block stop in M99 command
(Note 1) During Suppression of single block stop (#3003/bit0 = 1) of system variable, single block stop is not applied in the M99 command even if this parameter is valid.
(Note 2) While single block is suppressed by the A1 command of macro definition program (O199999999), single block stop is applied if this parameter is valid.
bit3: Holding diameter/radius designation after NC reset
Select whether to hold the diameter/radius designation of each axis selected in G10.9 after NC reset.
0: Diameter/radius designation is initialized by NC reset.
1: Diameter/radius designation is held after NC reset.
bit4:Tool retraction from hole bottom in boring cycle
0: Move at the rapid traverse rate (G0 interpolation feed).
1: Move with linear interpolation (at the feedrate commanded with F).
bit5: Tool length offset for multiple axis synchronization control
Select whether to enable the tool length offset dedicated to the multiple axis synchronization control.
0: Disable
1: Enable
bit6: Acc/Dec pattern applied until rotation sync when sync SP start signal is OFF
Select the acceleration/deceleration pattern to be applied until the synchronized spindle attains rotation syn chronization, when spindle synchronization command is given with the spindle start signal of the synchro nized spindle OFF (servo OFF).
0: Linear acceleration/deceleration
1: Spindle synchronization multi-step acceleration/deceleration
(PR) #1255 set27

bit0: Switch to C axis mode at cancel of EMG stop/door open under spindle C axis
Select whether to switch the control to C axis mode when you execute and cancel emergency stop, or turn ON and OFF the door open signal under spindle C axis control mode.
(This takes effect when spindle/C axis switch method is PLC signal type.)
0: Not switch to C axis mode.
Control is switched to C axis mode when C axis' Servo OFF signal is turned OFF and ON after cancel of emergency stop or door open.
1: Switch to C axis mode when emergency stop or door open is cancelled.
bit1: Position loop gain in C axis zero return/orientation/synch tap zero return
Select the position loop gain to be applied when the interpolation mode is selected for the spindle C axis, spindle orientation or synchronous tap zero return that is executed when the spindle stops (when "#3106 zrn_typ/bitE"="0").
0: SP003 PGS
1: SP002 PGN
bit2: Change current FB (load) output unit
Select the units in which the current FB (load) is output to a register.
When output in units of 0.01%, the output range is from 0 to 327.67%.
0: Default (Output in units of 1%).
1: Output in units of 0.01%.
bit3: Tool shape compensation in 3D coordinate conversion mode (For L system only)
Select whether to apply tool shape compensation before or after executing 3D coordinate conversion.
0: Apply tool shape compensation before 3D coordinate conversion
1: Apply tool shape compensation after 3D coordinate conversion

Not used. Set to "0".
bit0: Skip I/F switch
Select A or B contact for the skip interface.
0: A contact (Skip operation starts at rising edge of a signal)
1: B contact (Skip operation starts at falling edge of a signal)
(Note) This parameter is not applied to PLC skip.
bit3: System lock warning selection
Set this parameter to "1" if you choose to have the system alarm message (Z64) cleared by NC reset.
0: Not clear the message by NC reset
1: Clear the message by NC reset
bit4: Thread recut command
Specify through which interface to give a thread recut command.
0: Through HMI screen
1: Through PLC I/F
bit5: Addition of command Q to thread recut
Select whether to add the command Q's data to the spindle angle to be compensated during thread recut of
a stored thread section.
0: Not add the command Q's data
1: Add the command Q's data
bit6: Spindle compensation angle in thread recut mode
Select whether to calculate the spindle compensation angle when a thread cut command is given during the
thread recut mode.
0: Calculate the angle for the initial thread cut command in automatic operation. (The initially calculated an gle is used for the 2nd and subsequent thread cut commands.)
1: Calculate the angle every time a thread cut command is given.
(PR) #1256 set28
#1257 set29
(PR) #1258 set30
M800/M80/E80 Series Alarm/Parameter Manual
15 Machine Parameters
IB-1501279-S 384
bit0: Enable normal life tool's data count (for M system only)
Select whether to enable or disable too use data counting when the tool status is 2 (normal life tool).
0: Not count the use data of normal life tool.
1: Count the use data of normal life tool.
bit2: Disabling decimal point for PLC window
Select the input/output specifications of fraction data for PLC window.
0: Enable decimal point
Fraction data is output as the fixed fraction information.
(The numbers of digits in the integer and fraction parts are the same as of the on-screen specifications.)
1: Disable decimal point (cut off all digits after decimal point)
Only the integer part is input/output.
bit7: Macro processing method
Select the macro processing method.
0: High speed
1: Compatible with conventional models
(*) Remarks
Select whether to refresh the display data at regular intervals of a certain number of macro blocks when
processing successive macro blocks.
Selecting "0" enables high-speed macro processing, because it creates no data for refreshing display.
Selecting "1" enables most of the blocks under processing to be viewed, because it creates display re fresh data at regular intervals even for successive macro blocks.
When "1" is selected, the operation is the same as of M700 Series control.
(PR) #1259 set31
M800/M80/E80 Series Alarm/Parameter Manual
15 Machine Parameters
385 IB-1501279-S
bit0: Switching to actual cutting mode during automatic operation
0: Unable to switch to actual cutting mode or no-load operation mode during automatic operation.
Block stop is executed before a speed change-disabled command (thread cut or tap).
1: Able to switch to actual cutting mode or no-load operation mode during automatic operation.
Block stop is not executed before a speed change-disabled command (thread cut or tap).
bit1: Speed selection for other part systems during actual cutting mode
0: Other part systems operate at the programmed speed in the same manner as the part system where a
speed change-disabled command (thread cut or tap) is given.
1: Other part systems operate at the program check speed.
bit2: Prohibit reverse run of fixed cycle
Select whether to prohibit reverse run of a fixed cycle during manual arbitrary reverse run.
0: Permit reverse run
1: Prohibit reverse run
(Note) Even when the parameter is "1", reverse run is enabled during fixed cycle operation.
bit3: Prohibit MSTB reverse run
Select whether to prohibit reverse run of MSTB during the manual arbitrary reverse run.
0: Enable MSTB reverse run
1: Disable MSTB reverse run
(Note) Even when the parameter is "0", MSTB reverse run is disabled while the MSTB reverse run prohibit
signal (MRPSG) is ON.
bit4:Thread cut start shift angle operation
Select the operation to be performed at the start of thread cutting when a thread cut start shift angle com mand is issued.
0: Start thread cut from the thread cut start shift angle after phase Z has been detected once.
1: Start thread cut from the thread cut start shift angle, independently of phase Z detection.
bit7: Storage of spindle C axis coordinate system
Select whether to automatically insert zero return to spindle/C axis control at the initial servo ON or at every
servo ON.
This parameter is enabled when spindle/C axis deceleration stop type (#3106 zrn_typ/bit8=1) and zero point
return automatic insertion (#1226 aux10/bit3=1) are selected.
0: Execute automatic zero return before C axis rotation for the first C axis command given after every servo
ON.
1: Execute automatic zero return before C axis rotation for the first C axis command given after the initial
servo ON.

For the 2nd and subsequent servo ON, the coordinate system is retained after servo OFF, and zero re turn is not automatically inserted.
(PR) #1260 set32

bit1: Operation panel I/O emergency stop function OFF
Select whether to disable the emergency stop function when an operation panel I/O unit is disconnected.
(This setting is enabled for separated-type NC only)
0: Enable the emergency stop function
1: Disable the emergency stop function
(*) While the operation panel I/O unit is connected to the NC unit, the emergency stop function is enabled
irrespective of this parameter.
bit2: Synchronized turning ON/OFF of NC and display
Select whether to synchronize the turning ON/OFF of the M800W Series NC controller and display.
0: NC and display turn ON/OFF independently.
1: NC and display turn ON/OFF in synchronization with each other.
(*) If no operation panel I/O unit is connected, the NC and display turn ON/OFF independently, irrespective
of this parameter.
bit3: PLC high-speed process start timing selection
Select the type of PLC high-speed process start timing.
0: Type 1 (default)
1: Type 2
bit4: High-speed ladder execution cycle
Specify the high-speed ladder execution cycle. (Standard value: 0)
0: Default (equivalent to Mitsubishi M700V Series)
1: Twice the default
(Note 1) When you set "1" for M800/M80 Series with S/W C2 or the previous version, the cycle execution is
equivalent to Mitsubishi M700V Series.
(Note 2) When the parameter "#1261 set33/bit4" is set to its default value, the high-speed ladder execution
cycle differs according to the model and the number of part systems.
bit5: Operation switch at OT and soft limit in synchronous operation method
This parameter switches the axis operation at stoke end and soft limit for slave axis in the synchronous op eration method.
When independent operation method or correction mode is set, the operation will be the same as #1261=0
(disable).
0: When "Stroke end" signal is turned ON for only slave axis by stroke end or soft limit, the slave axis stops
but master axis does not stop.
1: When one of master axis or slave axis is in the stroke end or soft limit, both master and slave axes stop.
bit2: Disable warning for coordinate system selection without 3D manual feed spec.
Select whether to display a warning when hypothetical coordinate system has been selected although 3D
manual feed is not included in the specifications.
0: Display
1: Not display
bit3: Condition of turning OFF Tool life end signal (for L system only)
Select when to turn OFF the tool life end signal in the tool life management 1 for L system.
0: When M function finish signal (FIN) is turned ON
1: When a tool that has not reached the end of life is selected
(PR) #1261 set33
(PR) #1262 set34

bit1: Show/Hide history clear menus
Show/Hide operation menus for data clear of collection setting screen, history clear of alarm history screen,
history start, and history stop.
0: Show history clearing operation menus
1: Hide history clearing operation menus
bit2: Hide the alarm category of PLC message
Select whether to hide the alarm category of PLC message (alarm or operator message).
0: Display the alarm category
1: Hide the alarm category
bit3: Overvoltage alarm switch
Select the alarm for overvoltage.
0: Display the warning upon occurrence of overvoltage alarm.
1: Execute emergency stop upon occurrence of overvoltage alarm.
bit2: Disabling manual numerical value command during automatic operation
Specify whether manual numerical commands should be disabled during automatic operation.
0: Enable manual numerical command during automatic operation
1: Disable manual numerical command during automatic operation
bit0: Command format 1
Select the command format for the fixed cycle for compound lathe.
0: Conventional format
1: MITSUBISHI CNC special format
(1 block command method)
bit1: Command format 2
Select the command format for the lathe fixed cycle.
0: Conventional format
1: MITSUBISHI CNC special format
bit2: Command format 3
Select the command format for the fixed cycle for drilling.
0: Conventional format
1: MITSUBISHI CNC special format
bit3: F-command unit 2 (for L system only)
Specify the unit to be used if a synchronous feed or thread cutting lead command contains no decimal point.
0: Type 1 (conventional specifications) or Type 2
Type 1 or Type 2 is selected by the parameter "#1271 ext07/bit2".
1: Type 3
F command 0.01 mm/rev, 0.0001 inch/rev
E command

Sync feed (corner chamfer/corner R feedrate) 0.01 mm/rev, 0.0001 inch/rev
Thread cut (fine thread cut lead) 0.0001 mm/rev, 0.000001 inch/rev
(Note) Type 3 is independent of the input unit.
bit0: Axis name extension valid
0: "Axis name extension" invalid
1: "Axis name extension" valid
bit0:
Not used.
(PR) #1263 set35
#1264 set36
(PR) #1265 ext01
(PR) #1266 ext02
(PR) #1267 ext03

bit2: Enable synchronous tapping per minute
Select whether to enable feed per minute with the F command of synchronous tapping cycle.
0: Disable (Command in pitch regardless of "G group 5" modal)
1: Enable (Follow "G group 5" modal)
bit4: Enable address K to specify the repetition count in G76/G87
Select whether to enable address K to be used for specifying the repetition count in G76/G87 command.
0: Disable
1: Enable
When "1" is set in this parameter with "#1271 ext07/bit1" (Specifying repetition count with address K) set to "1", the address K given to G76/G87 is treated as the number of repetitions.
bit0: Inverse tangent (ATAN) command format
Select the command format of ATAN operation.
0: Format 1
Either the ratio of two sides or the whole expression is enclosed in square brackets "[ ]".
ATAN[#k] or ATAN[#j/#k]
1: Format 2
Two sides are enclosed in "[ ]" respectively and also divided by a slash "/".
ATAN[#j]/[#k]
bit1: Range of inverse tangent (ATAN) calculation result
Select the range of calculation result for inverse tangent (ATAN) to be applied when Format 2 is selected for inverse tangent (ATAN) command (when #1269/bit0 = 1).
0: -180 to 180
1: 0 to 360
(PR) #1268 ext04
(PR) #1269 ext05

bit2: Select finished shape program search method
Select how to search a finished shape program to be called by G70, G71, G72 or G73 command.
0: Search from the top of the currently executed program or from the top of the program specified with the address A.
1: <G71, G72, G73>
Search from a block following G71, G72 or G73.
<G70>
Search from the same start sequence No., if it exists, as that of the finished shape program where G71, G72 or G73 has been executed.
In the other cases, search from the top of the currently executed program or from the top of the program specified with the address A.
bit4: Switch chamfering operation
Select the operation to be performed when the cycle start point is exceeded as a result of chamfering in a thread cutting cycle.
0: Output a program error (P192).
1: Stop chamfering upon arrival at the cycle start point, and then move to the end point of the thread cutting block at a rapid traverse rate.
bit5: Coordinate rotation angle without command (for L system only)
Select the operation when there is no rotation angle command R for the coordinate rotation.
0: Use the previously commanded value (modal value). If the command is the first issued command, the rotation angle will be 0.
1: Use the set value in "#8081 Gcode Rotat".
bit6: Switch continuous thread cutting Z phase wait operation
Select when to start the 2nd block thread cutting when there is a command with no movement (MST com mand, etc.) between the thread cutting blocks.
0: Wait for the spindle's single rotation synchronization signal before starting the movement.
1: Start movement without waiting for the spindle's single rotation synchronization signal.
bit7: Handle C axis coordinate during cylindrical interpolation
Specify whether to keep the rotary axis coordinate as before the cylindrical interpolation start command is issued during the cylindrical interpolation.
0: Not keep
1: Keep
(PR) #1270 ext06

bit0: Mirror image operation
Select the type of mirror image operation.
0: Type 1
The program mirror image, external mirror image, and parameter mirror image are exclusive to each other.
An incremental command moves the image to the position indicated by the travel amount with the sign inverted.
1: Type 2
Mirror image operation is enabled when the program mirror image (G51.1) command is issued or

when the external signal or parameter is ON.
An incremental command moves the image to the position determined by applying the mirror image
to the absolute program coordinates.
bit1: Address specifying fixed cycle repetition count (for M system only)
Select the address that specifies the fixed cycle repetition count.
0: Address L only (Default)
1: Addresses K and L
If addresses K and L are specified simultaneously, the data at address K will be used for operation.
bit2: F-command unit
(M system)
Specify the unit to be used if a thread cutting lead command contains no decimal point.
* This setting is independent of the input unit.
0: Type 1 (conventional specifications)
F1: 1 mm/rev, 1 inch/rev
1: Type 2
F1: 0.01 mm/rev, 0.0001 inch/rev
(L system)
Specify the unit to be used if a synchronous feed or thread cutting lead command contains no decimal
point.
0: Type 1 (conventional specifications)
[Input unit B] F1: 0.0001 mm/rev, 0.000001 inch/rev
[Input unit C] F1: 0.00001 mm/rev, 0.0000001 inch/rev
1: Type 2
F1: 0.0001 mm/rev, 0.000001 inch/rev
* Type 2 is independent of the input unit.
bit3: G-code group for unidirectional positioning (for M system only)
Select the G-code group for unidirectional positioning.
0: Unmodal G code (group 00)
1: Modal G code (group 01)
Related parameter: "#8209 G60 Shift" (Set the last positioning direction and distance for each axis ap plicable when the unidirectional positioning command is issued.)
bit4: Operation by independent G40 command
Select whether the radius compensation vector is canceled by the independent G40 command.
0: Type 1 (conventional specification) (Default)
The radius compensation vector will be canceled by the independent G40 command.
1: Type 2
The radius compensation vector won't be canceled by the independent G40 command: it will be can celed by the next travel command for the radius compensation plane.
(PR) #1271 ext07

bit5: Cut start position (for L system only)
Select the position from where cutting begins in a fixed cycle for compound lathe.
0: Conventional specification (Default)
The cut start position will be determined by the final shaping program.
1: Extended specifications
Determined from the cycle start point.
bit6: Nose R compensation (for L system only)
Select whether to apply nose R compensation for shapes in a rough cutting cycle.
0: Conventional specification (Default)
The shape after nose R compensation in the final shaping program will be used as rough cutting shape.
(when the nose R compensation for the final shaping program).
1: Extended specifications
The shape without nose R compensation in the final shaping program will be used as rough cutting
shape.
bit7: Cut amount (for L system only)
Select the operation to be performed when the program-specified cut amount exceeds the cut amount of the
final shaping program.
0: Conventional specification (Default)
A program error will occur when the program-specified cut amount exceeds the cut amount of the final
shaping program.
1: Extended specifications
Rough cutting will be performed by one cut when the program-specified cut amount exceeds the cut
amount of the final shaping program.

bit0: Switch pocket machining operation
Select the pocket machining specification.
0: Conventional specification
Pocket machining will be selected with the H designation.
The pull direction when pocket machining is ON will be the Z direction.
1: Extended specifications
Pocket machining will start only when both X and Z axes are specified in the first travel block after the
finished shape start block.
The pull direction when pocket machining is ON will be the X direction.
bit1: M function synchronous tap cycle
Specify whether to enable the M function synchronous tapping cycle.
0: Disable
1: Enable
bit2: Spiral/conical interpolation command format 2
Select the command format for spiral and conical interpolation.
0: Type 1 (conventional specification)
1: Type 2 (with the number of spiral rotation L designation and the increment designation)
bit3: Switch macro call function
Select whether to shift the argument to the subprogram if nests are overlapped when per block call (G66.1)
is commanded.
0: Shift
1: Not shift (Conventional specification)

bit4: Tap cycle selection
Select the tapping cycle.
0: Pecking tapping cycle
1: Deep hole tapping cycle
bit5: Deep hole tap cycle override selection
Select whether to enable override on the pulling operation during synchronized tapping with the deep hole tapping cycle.
0: Disable
1: Enable
bit6: Switch corner chamfering/ corner R command format
Select the command format of the corner chamfering/corner R.
0: Command format I (conventional format)
Issue a command with comma (,C and ,R).
1: Command format II
In addition to command format I, addresses without comma can be used to command. I/K or C can be used for corner chamfering, while R can be used for corner R.
bit7: Return position after macro interrupt in fixed cycle selection
Select the destination to return to after a macro interrupt in the fixed cycle.
0: Return to the block in the fixed cycle.
1: Return to the block next to the fixed cycle.
(PR) #1272 ext08

bit0: Switch ASIN calculation results range
Select the notation system for operation result of ASIN.
0: Do not switch minus figures to positive figures. (-90 to 90)
1: Switch minus figures to positive figures. (270 to 90)
bit1: Switch system variable unit
Select the unit for the system variable #3002 (cycle start operation time).
0: 1 ms unit
1: 1 hour unit
bit2: Switch G71, G72, G73 cutting direction judgment
Select the cutting direction when the longitudinal rough cutting cycle (G71), face rough cutting cycle (G72) or closed loop cutting cycle (G73) is commanded.
0: Conventional specification
Determined according to the finished shape program.
1: Extended specifications
Determined according to the finishing allowance and cutting allowance commanded in the program.
bit3: Facing turret mirror image coordinate value type
Select how to show the workpiece coordinate values of the axis for which the facing turret mirror image is valid.
0: Movements in the workpiece coordinate system are in the same direction as those in the workpiece ma chine coordinate system.
1: Movements in the workpiece coordinate system are in the opposite direction to those in the workpiece machine coordinate system.
bit4: Facing turret mirror image valid axis selection
Select the axis for which the facing turret mirror image is valid.
0: Fixed to 1st axis.
1: Determined according to the plane selected when the facing turret mirror image is commanded.
bit2: M98 sequence No. address selection
Select which address to use for calling a sequence No. in a sub program under sub program control (M98/M198).
0: Address H is used for specifying the sequence No.
1: Address Q is used for specifying the sequence No.
bit4: Optional block skip operation changeover
Select the optional block skip operation.
0: Enable or disable optional block skipping in the middle of a block according to the setting of "#1226 aux10/bit1".
1: Enable optional block skipping at the top and in the middle of a block.
Note that a slash "/" on the right-hand side of equation or that in an equation between [ ] is handled as division operator.
bit5: Use of G54Pn for selecting extended workpiece coordinate system
Select whether to use G54Pn as a command for selecting an extended workpiece coordinate system.
0: Not use G54Pn as a command for selecting an extended workpiece coordinate system
1: Use G54Pn as a command for selecting an extended workpiece coordinate system
When 1 is set in this parameter, G54Pn is treated in the same manner as G54.1Pn.
bit7: Word range check
Select whether to check that the operation expression of the word data in the program is enclosed in brackets [ ] when the machine program is executed.
This check is also applied to the 08000 to 09999 and the machine tool builder macro program.
0: Not check
1: Check
(PR) #1273 ext09
(PR) #1274 ext10

Not used. Set to "0".
Not used. Set to "0".
bit0: Tool life management II count type 2 (default: 0)
Select how and when cumulative number of mountings or cuttings will be incremented in tool life manage ment II. The condition to output "tool group life over (TGLO)" signal will be changed accordingly.
0: Type 1 (default)
Counts up when the spindle tool is used for cutting. TGLO signal will be output when the last tool in se lected group is judged as expired.
1: Type 2
Counts up by one for a tool used or mounted in a program at the time of resetting. TGLO signal will be output when any of tool groups has reached its lifetime limit.
bit1: Tool life management II life prediction
Select whether to enable tool life prediction function in tool life management II.

0: Disabled
1: Enabled
bit2: Tool life management II life end signal timing
Select the timing in which tool life prediction signal is output in tool life management II.
0: Output only when the ["tool life data" - "tool usage data"] matches the remaining tool life prediction setting.
1: Output when the ["tool life data" - "tool usage data"] is less than the remaining tool life prediction setting.
bit3: Tool life management II life end signal tool
Select the tool for which the tool life prediction signal is output in tool life management II.
0: Output the signal tool by tool.
1: Output the signal at the last tool in the group.
bit4: Tool life management II count changeover (For M system only)
Select the tool life count method and its timing.
0: Conforms to "#1227 ext13/bit0" setting.
1: When "#1227 ext13/bit0" is set to "0":
Counts up by one for a tool used or mounted in a program at the time of resetting.
When "#1227 ext13/bit0" is set to "1":
Follow the setting of "Method (Mthd)" on Tool life screen.
The output condition of "tool group life over" signal conforms to "#1227 ext13/bit0".
(PR) #1275 ext11
(PR) #1276 ext12
(PR) #1277 ext13

bit0: Program restart method selection
Select the program restart type.
0: Restart type A
1: Restart type B
bit1: Change miscellaneous command completion method
Select the complete signal and completion condition.
0: Normal method
Complete at the falling edge of M function finish 1 signal (FIN1) or rising edge of M function finish 2
(FIN2).
1: High-speed method
Complete when High-speed M finish signal (MFIN1 to 4, SFIN1 to 6, TFIN1 to 4 or BFIN1 to 4) reaches
the same logical level as the strobe signal.
bit2: Change areas for stored stroke limit I
Enable/Disable change of the areas for stored stroke limit I.
0: Disable
1: Enable
bit3: Select M30 rewinding operation
Select the operation when the miscellaneous function completed signal (FIN) is returned to M30.
0: Not carry out automatic rewinding
1: Carry out automatic rewinding
bit4: Select M02 rewinding operation
Select the operation when the miscellaneous function completed signal (FIN) is returned to M02.
0: Not carry out automatic rewinding
1: Carry out automatic rewinding
bit5: M code output during high-speed simple program check
Select whether to enable M code output during high-speed simple program check.
The M codes to be output are those specified by "#1451 M[M031-000](SMLK)" to "#1466 M[M511-480](SM LK)".
0: Disable
1: Enable
bit7: Operation for circular radius error at perfect circle command
Select the operation to be performed when a perfect circle command is given and there is a difference be tween the start point and end point radii, but no difference between the start point and end point angles.
0: Linear interpolation from the start to the end point
1: Spiral interpolation from the start to the end point
(PR) #1278 ext14

bit0: Part system synchronization method
Select the part system synchronization method.
0: If one part system is not in the automatic operation, the synchronization command will be ignored and
the next block will be executed.
1: Operate according to the "waiting ignore" signal.
If the "waiting ignore" signal is set to "1", the synchronization command will be ignored. When set to "0",
synchronization will be applied.
bit1: Interrupt amount during machine lock
Select when to cancel the interruption amount during machine lock.
0: Canceled when resetting
1: Canceled during manual reference position return (not when resetting)
bit2: Selection of cutting start interlock target block
Select whether to enable the cutting start interlock for successive cutting blocks.
0: Enable
1: Disable
bit4: Dry run OFF during thread cutting
Select whether to enable or disable dry run during thread cutting.
0: Enable dry run
1: Disable dry run
bit5: Cancel G92 shift distance
Select whether to clear the G92 (coordinate system setting) shift distance when the manual reference posi tion is reached.
0: Not clear
1: Clear
bit6: Enable single block stop at middle point
Set whether to enable/disable single block stop at the middle point of G28/G29/G30.
0: Disable single block stop
1: Enable single block stop

bit7: Retain G52 at manual reference position return
Select whether to retain the local coordinate system setting (G52) at the time of manual reference position arrival. This parameter is enabled when #1279 ext15/bit5 is 1.
0: Not retain (Cancel)
1: Retain
(PR) #1279 ext15

bit0: I/F per axis during mixed control (cross axis control)
Select how to handle the following PLC interface for axes interchanged with the mixed control (cross axis control).
- Mirror image
- Manual/automatic interlock
- Manual/automatic machine lock
0: Follows axis configuration before the mixed control (cross axis control).
1: Follows axis configuration after the mixed control (cross axis control).
(Example)
The device No. of automatic interlock (+) for X1 will be as follows when the mixed control (cross axis control) is executed with the 1st axis (X1) in the 1st part system and 1st axis (X2) in the 2nd part system.
When "0" is set: YA60 (interface for 1st axis in 1st part system)
When "1" is set: YA68 (interface for 1st axis in 2nd part system)
(Note) If the number of axes in the part system changes with the mixed control (cross axis control), the inter face of the target axis may change when this parameter is set to "1".
bit1: Mixed control (cross axis control) cancel with reset
Select whether to cancel the mixed control (cross axis control) when reset is applied.
0: Cancel.
1: Not cancel.
bit2: Interchange coordinate position display
Select whether to display interchanged (or moved) coordinate positions in the mixed control (cross axis con trol).
This setting will be followed not only when the axes are interchanged but also when the axes are moved.
0: Display interchanged (or moved) coordinate positions.
1: Display coordinate positions without being interchanged (nor moved).
(Example)
When 1st part system's C axis is moved to 2nd part system with a 1st part system (X, Z, C, Y) and 2nd part system (X, Z) configuration:
1st part system: X, Z and Y coordinate positions are displayed.
2nd part system: X, Z and C coordinate positions are displayed.
bit3: Reset operation for synchronization/superimposition control
Select whether to cancel synchronization/superimposition control when reset is applied.
0: Cancel.
1: Not cancel.
bit4: Mixed control (cross axis control) command method
Select how to command mixed control (cross axis control).
0: Use PLC interface signal for mixed control
1: Use G command for mixed control
bit5: Command method of control axis synchronization between part systems
Select how to command the control axis synchronization between part systems.
0: Use PLC I/F.
1: Use G command.
(PR) #1280 ext16

bit6: Interchange machine position display
Select whether to display interchanged (or moved) machine positions in the mixed control (cross axis con trol).
This setting will be followed not only when the axes are interchanged but also when the axes are moved.
(Note 1) This parameter is enabled when "#1280 ext16/bit2 (Interchange coordinate position display)" is "0".
0: Display interchanged (or moved) machine positions.
1: Display machine positions without being interchanged (nor moved).
bit7: Control axis superimposition command method
Select how to command control axis superimposition.
0: Use PLC interface signal for control axis superimposition
1: Use G command for control axis superimposition
bit0: Switch manual high-speed reference position return in synchronous control
Select the movement of synchronized axes in manual high-speed reference position return.
0: Master and slave axes start the return synchronizing. Even when one axis stops at its reference position, the other axis continues moving until it reaches its reference position.
1: Master and slave axes start the return synchronizing, and when the master axis stops at the reference position, the slave axis also stops. Thus, the relative position of the master and slave is kept.
bit1: Selection of additional tool offset axis (for L system only)
Select axis to carry out the additional axis' tool compensation function.
0: Follow the setting of "#1520 Tchg34".
1: The axis specified by "#1027 base_J" is used as the 3rd compensation axis.
bit3: Synchronous control operation setting
Select whether or not the positioning of slave axis automatically aligns with that of master axis when the axis subject to synchronous control is changed from servo OFF to servo ON.
0: The positioning does not automatically align.
1: The positioning automatically aligns.
bit5: High-speed synchronous tapping valid
Select whether to enable the high-speed synchronous tapping.
0: Disable
1: Enable
bit6: Compensation method for external machine coordinate system/ball screw thermal expansion during synchronization
Select the method of how to compensate the slave axis when compensating external machine coordinate system or ball screw thermal expansion during synchronization control. The setting of this parameter will be validated when you select synchronous operation method by the synchronization control operation method signal.

0: Master axis and slave axis are independently compensated.
1: Master axis' compensation amount is applied to slave axis.
bit7: Switch automatic high-speed reference position return in synchronous control
Select the movement of synchronized axes in automatic high-speed reference position return.
0: Master and slave axes start the return synchronizing, and when the master axis stops at the reference
position, the slave also stops. Thus, the relative position of the master and slave is kept.
1: Master and slave axes start the return synchronizing. Even when one axis stops at its reference position,
the other axis continues moving until it reaches its reference position.
(PR) #1281 ext17

bit1: Condition of the reference position reached signal in synchronous control
This parameter switches only conditions of a master axis's reference position return reached signal in syn chronous operation. A slave axis's signal is output when the slave axis reaches the reference position coor dinate.
0: A master axis's reference position reached signal is output only when both of the master and slave axes
reach the reference position coordinate by a reference position return.
1: A master axis's reference position reached signal is output when the master axis reaches the reference
position coordinate.
bit3: Index table clamp type
Set the clamp type of the index table.
0: Type A
Clamped when an unclamp command turns OFF.
1: Type B
Clamped when a clamp command turns ON.
bit5: Automatic correction of synchronization offset at power ON
The slave axis position is automatically corrected so that the synchronization offset before having turned the
power OFF the last time can be restored at power ON.
(Note) This parameter is enabled when the parameter "#1281 ext17/bit3" (Synchronous control operation
setting) is set to "1".
0: Disable
1: Enable
bit6: Reset type at emergency stop cancel
Select the type of reset to be applied when emergency stop is cancelled.
0: Reset 1
1: Reset 2
bit7: Functional operation inhibition during write of servo parameters
Select whether to inhibit functional operation during write of servo parameters.
0: Inhibit functional operation with an alarm displayed
1: Give priority to functional operation with write of servo parameters suspended
(Note) This parameter can inhibit a start of the following four functions.
Spindle/C axis changeover
Speed observation mode signal ON
High-speed synchronous tapping
Start of PLC indexing axis
Not used. Set to "0".
(PR) #1282 ext18
(PR) #1283 ext19

bit0: Spindle speed clamp check
Select whether to check the spindle speed clamp under the constant surface speed control.
0: Check the spindle speed clamp.
1: Not check the spindle speed clamp.
(Note) This parameter is enabled when the parameter "#1146 Sclamp" is set to "1".
bit1: Spindle control selected in response to Z83 (NC started during SP rotation)
Select whether to force-stop the spindle when the alarm (Z83 0001) occurs.
0: Not force-stop the spindle
1: Force-stop the spindle
bit3: M code output during multi-system simultaneous simulation (Check type II)
Select whether to enable a miscellaneous function code output during execution of multi-part system simul taneous simulation (Check type II).
0: Not output a miscellaneous function
1: Output a miscellaneous function
(Note) When the output is enabled, the miscellaneous codes specified in #1406 S_mode(SMLK), #1407 T_-
mode(SMLK), #1408 M2_mode(SMLK) and #1451 M[M031-000](SMLK) to #1466 M[M511-480](SMLK)
can be output.
M code output specification is determined by #1405 M_mode(SMLK).
bit4: Maximum life time/life count for tool life management I (for L system only)
Select the maximum life time and life count for tool life management I of L system.
0: Life time 0 to 99:59 (h:min)
Life count 0 to 65000 (times)
1: Life time 0 to 5000:00 (h:min)
Life count 0 to 99999999 (times)
bit6: Automatic operation handle interruption during inclined surface machining
Select whether to enable the automatic operation handle interruption function during inclined surface machin ing.
0: Disable
1: Enable
bit0: Multi-part system program management
Select whether to use multi-part system program management.
0: Not use
1: Use
(Note) When this parameter's value is changed, the power must be turned OFF and ON, and the system for matted. Two or more part systems from [1] to [4] need to be set to "1" in "#1001 SYS_ON". Otherwise this
parameter will be disabled even though set to "1".
bit1: Program search type switch
Select how to search a program to operate.
0: Operation search is performed in the selected part system.
1: Operation search is performed for all part systems.
(The program No. will be common to all part systems.)

bit2: Multi-part system program generation and operation
Select whether to perform the following processes for all the part systems or for each part system separately in multi-part system program management: newly create, delete or rename the machining programs in NC memory (including MDI program and machine tool builder macro program) or transfer, compare, merge the programs between NC memory and other device.
0: Perform these processes for the programs in all the part systems.
If no subprogram contents are found by the subprogram call during automatic operation, the program will be searched for and executed from $1.
1: Perform these processes for the programs in the selected part system.
(PR) #1284 ext20
(PR) #1285 ext21

bit5: Selection of multi-part system program input/output method
Select whether to perform the transfer from NC memory to other device for all the part systems or for each part system separately in multi-part system program management.
0: Output the designated programs for all the part systems.
(The programs output from NC memory contain the system delimiter $ marks.)
1: Output the programs of only the selected part system.
bit1: Inclined surface coordinate display
0: Display the position which includes tool length offset.
1: Display the position on the program which excludes tool length offset.
bit2: Inclined surface coordinate display (for M system only)
0: Display the position which includes tool radius compensation.
1: Display the position on the program which excludes tool radius compensation.
bit4: Relative coordinate display
(M system)
0: Display the position which includes tool length offset.
1: Display the position on the program which excludes tool length offset.
(L system)
0: Display the position which includes tool shape compensation.
1: Display the position on the program which excludes tool shape compensation.
bit5: Relative coordinate display
(M system)
0: Display the position which includes tool radius compensation.
1: Display the position on the program which excludes tool radius compensation.
(L system)
0: Display the position which includes nose R compensation.
1: Display the position on the program which excludes nose R compensation.
bit6: Absolute coordinate display
Select how coordinate values are displayed when absolute coordinate display is selected ("#1221 aux05/ bit0"="1").
(L system)
0: Display the position which includes tool shape compensation.
1: Display the position on the program which excludes tool shape compensation.
bit7: Absolute coordinate display
Select how coordinate values are displayed when absolute coordinate display is selected ("#1221 aux05/ bit0"="1").
(L system)
0: Display the position which includes nose R compensation.
1: Display the position on the program which excludes nose R compensation.
(PR) #1286 ext22
(PR) #1287 ext23

bit0: MDI program clear
Select whether to clear the MDI programs when MDI operation ends, the power is turned ON again, reset is input, or emergency stop is canceled.
0: Not clear
1: Clear (save only % programs).
bit2: Restore previous program before external search by NC reset
Select whether to restore the previous program before external search when operation is finished, power is turned OFF and ON, NC reset is input or Emergency stop is cancelled.
0: Not restore the previous program before external search
1: Restore the previous program before external search
bit3: Restore previous program before external search by Program restore signal
Select whether to restore the previous program before external search when Program restore signal is input.
0: Not restore the previous program before external search
1: Restore the previous program before external search
bit7: Behavior of position counter at change in workpiece coordinate system offset
When a change is made to the workpiece coordinate system offset, extended workpiece coordinate system offset, external workpiece coordinate system offset or workpiece coordinate system shift being selected, the position counter will be updated in accordance with the setting of this parameter.
The specified behavior applies to the following counters:
Workpiece coordinate position
Program position
Tip workpiece position (*1)
Table coordinate position (*1)
Workpiece set position (*1)
Inclined surface coordinate position (*1)
(*1) These counters are displayed when an optional function associated with 5-axis control is active.
0: The counter is updated when any of the following actions takes place after the change.
Cycle start
Reset
Emergency stop
1: The counter is updated immediately upon the change.

bit0: Tool radius compensation switch corner judgment method (nose R compen.)
Select the criterion to execute the outer rounding at the small corner in tool radius compensation.
(L system)
0: The corner angle is 0; linear-linear; G02-G03/G03-G02; the radius is the same. (Conventional method)
1: The corner angle is 1 or smaller; linear-linear; G02-G03/G03-G02; the radius is almost the same. (Meth od for rounding minute corner angle)
(M system)
0: The corner angle is 1 or smaller; linear-linear; G02-G03/G03-G02. (Conventional method)
1: The corner angle is 1 or smaller; linear-linear; G02-G03/G03-G02; the radius is almost the same. (Meth od for rounding minute corner angle)
Not used. Set to "0".
bit2: Variable command: Reset operation for tool function T code (#4120/#4320)
Select how reset operation affects the address T's modal information (#4120/#4320).
0: Clear the information
1: Retain the information
(PR) #1288 ext24
(PR) #1289 ext25
(PR) #1290 ext26
(PR) #1291 ext27

bit1: Address F given in sync tap cycle
Select the specification of address F given in synchronous tapping cycle.
0: The value given to address F in synchronous tapping cycle is treated as the feed rate. Feed command
follows the setting of "#1268 ext04/bit2 Enable synchronous tapping per minute". F modal status is un changed.
1: Follow the G code group 5 modal status, irrespective of the setting of "#1268 ext04/bit2 Enable synchro nous tapping per minute". The F modal value given in the program is treated as the feed rate.
bit5: Selection of sub program call operation in fixed cycle mode
Select the operation to be carried out when sub program call (M98/M198) and either an axis address or ad
dress R (for hole drilling cycle) are given in one block during fixed cycle for drilling or turning machining.
0: Not execute fixed cycle operation in the sub program call block.
Sub program call is executed after travelling to the position specified by the axis address in modal status
of G code group 01. Neither the axis address nor address R affects the subsequent fixed cycle operation.
1: Execute fixed cycle operation in the sub program call block before executing the sub program call. The
axis address or address R is treated as the fixed cycle argument.
bit0: Synchronous feed in milling
Select whether to enable synchronous feed in milling interpolation, cylindrical interpolation or polar coordi nate interpolation mode.
0: Disable
1: Enable
bit1: Enabling N0 command
Select how to handle a command of sequence number zero (N0).
0: N0 causes an error.
1: N0 is ignored (causes no error).
Not used. Set to "0".
bit6: Analog spindle synchronous tapping ON
Select whether to enable analog spindle synchronous tapping.
0: Disable
1: Enable
bit7: Synchronous tapping with analog I/F spindle: control switching method
This parameter specifies the control method for the synchronous tapping with analog I/F spindle function.
0: Not use the feedback from the encoder
1: The rotation speed command is compensated in accordance with the difference between the command
position and the actual position of the analog I/F spindle.
bit4: Behavior at the start of tool compensation (for L system only)
Select the behavior to be executed at the start of tool compensation.
The parameter is enabled when "#1100 Tmove" is "0".
0: Move the axis by the offset amount
1: Reflect the offset in the programmed position without axis travel
Not used. Set to "0".
Not used. Set to "0".
Not used. Set to "0".
(PR) #1292 ext28
(PR) #1293 ext29
(PR) #1294 ext30
(PR) #1295 ext31
(PR) #1296 ext32
(PR) #1297 ext33
(PR) #1298 ext34
(PR) #1299 ext35

bit0: Multiple spindle control II
Select multiple spindle control I or II.
0: Multiple spindle control I (L system only)
1: Multiple spindle control II (select from ladder)
bit1: Spindle control for each part system
Select whether to set spindle control command (S code/G96/G92) to be common in the part systems or to
be separated by each part system when multiple spindle control II is enabled (#1300 ext36/bit0 = 1).
0: Common in the part systems
1: Separated by each part system
bit2: Part system-based spindle clamp speed management
Select how to manage the spindle clamp speed data.
0: Manage the data of all part systems collectively
1: Manage the data of each part system individually
bit3: Spindle command rotation speed input timing selection
When multiple-spindle control II is enabled (#1300 ext36/bit0 = 1), switch the timing to update the spindle
command rotation speed input when performing the spindle selection(SWS) or spindle command selec tion(SLSP) with M command given in the same block as S command.
0: S command updates the spindle command rotation speed input for the spindle which is before the selec tion by the spindle selection(SWS) or spindle command selection(SLSP).
1: S command updates the spindle command rotation speed input for the spindle which is after the selection

by the spindle selection(SWS) or spindle command selection(SLSP).
bit7: Spindle synchronization command method
Select the spindle synchronization command method.
0: Spindle synchronization with PLC I/F
1: Spindle synchronization with machining program
Select the high-speed check method of the origin neighboring signal.
0: Do not check positions near the origin at high speeds. (Conventional specifications)
1: Check positions near the origin at high speeds using command machine positions.
2: Check positions near the origin at high speeds using encoder feedback positions.
Select the method to move to the restart position when restarting the program.
0: Move the system to the restart position manually.
1: For program restarting, the first activation automatically moves the system to the restart position.
Set the number of common variables, common for part systems, starting from address #100.
This is valid only when "#1052 MemVal" is set to "1".
---Setting range---
0 to 100
Set the number of common variables, common for part systems, starting from address #500.
This is valid only when "#1052 MemVal" is set to "1".
---Setting range---
0 to 500
(PR) #1300 ext36
#1301 nrfchk Near reference position check method
#1302 AutoRP Automatic return by program restart
(PR) #1303 V1comN No. of #100 address part system common variables
(PR) #1304 V0comN No. of #500 address part system common variables

Select the parameter specification type for the G0 or G1 deceleration check.
0: Deceleration check specification type 1
G0 is specified with "#1193 inpos", and G1+G9 with "#1223 aux07/bit1".
1: Deceleration check specification type 2
G0 or G1+G9 is specified with "#1193 inpos".
Set a type of acceleration/deceleration for the rapid traverse command.
0: Constant-time acceleration/deceleration (conventional method)
1: Constant-gradient acceleration/deceleration
Select the type of acceleration/deceleration for a cutting feed command.
0: Constant-time acceleration/deceleration (conventional method)
1: Constant-gradient acceleration/deceleration
Select which is used to command the reverse tap.
0: G84.1/G88.1
1: D command with the value changed to negative
Set the minimum value for the M code. When "0" is set, the synchronization M code will be invalid.
---Setting range---
0, 100 to 99999999
Set the maximum value for the M code. When "0" is set, the synchronization M code will be invalid.
---Setting range---
0, 100 to 99999999
Set the standard No. for the tool life management.
When the value specified by the T code command exceeds the set value in this parameter, the set value will be subtracted from the command value, which will be used as tool group No. for tool life management.
When the value specified by the T code command is equal to or less than the set value, the T code will be handled as a normal T code and not subjected to tool life management.
When "0" is set in this parameter, the T code command will always specify a group No. (Valid for M-system tool life management II.)
---Setting range---
0 to 9999
Set the hole bottom wait time for synchronous tapping.
When P address is specified, the greater value will be used as the hole bottom wait time. When an in-position check is performed at the hole bottom, the wait time will be provided after the completion of the in-position check.
(Note) This parameter is valid only when "1" is set in "#1223 aux07/bit3" (synchronous tap in-position check improvement) and "#1223 aux07/bit4" (synchronous tap hole bottom in-position check).
---Setting range---
0 to 999 (ms)
#1306 InpsTyp Deceleration check specification type
(PR) #1307 G0acc_plc PLC axis G00 constant-gradient acceleration/decelera tion valid
(PR) #1308 G1acc_plc PLC axis G01 constant-gradient acceleration/decelera tion valid
(PR) #1309 GType Switch command format
#1310 WtMmin Minimum value for synchronization M code
#1311 WtMmax Maximum value for synchronization M code
#1312 T_base Tool life management standard number
#1313 TapDw1 Synchronous tap hole bottom wait time

Set the hole bottom in-position check width for synchronous tapping.
(Note) This parameter is valid only when "1" is set in "#1223 aux07/bit3" (synchronous tap in-position check improvement) and "#1223 aux07/bit4" (synchronous tap hole bottom in-position check).
---Setting range---
0.000 to 99.999
Specify the maximum number of pre-read blocks for Tool radius compensation.
(Note) When "0" or a value out of the setting range is set, the maximum number of pre-read blocks is "4".
---Setting range---
0, 2 to 4
Select whether to use the common variables from #100100 to #800199.
0: Not use
1: Use

This parameter is valid only when the number of variable sets is set to 600 or more.
When this parameter is set to "1", variables from #100100 to #100110 will not be available as the system variables for PLC data read function, and the setting of "#1052 MemVal" will be invalid.
In a multi-part system configuration, select whether to use the machine tool builder macro variables (#450 to #499, #80000 to #80049 and #80500 to #80649) in common to all part systems or individually for each part system.
0: #450 to #499, #80000 to #80049 and #80500 to #80649 are used in common.
1: #450 to #499 are used in common to part systems. #80000 to #80049 and #80500 to #80649 are indi vidual for each part system.
2: #450 to #499 are individual for each part system. #80000 to #80049 and #80500 to #80649 are common to part systems.
3: #450 to #499, #80000 to #80049 and #80500 to #80649 are used individually for each part system.
Select whether or not to retain the G group 24 modal state (G188/G189) after modal retention reset.
0: Not initialize the G group 24 modal state even when you turn OFF the program format change request signal (PFCHR) and press Cycle Start.
1: Determine the G group 24 modal state according to the program format change request signal (PFCHR) when Cycle Start is pressed.
Set the head No. of the R register used as the compensation amount save area during fixed compensation amount method.
When the first number is an odd number, the operation message "Setting error" appears.
When the value overlaps with the chopping control data area, the operation message "Setting error" appears.
---Setting range---
8300 to 9782
(Only the even number)
(Within backup area)
Set the number of PLC constant extension points.
---Setting range---
0 to 750
#1314 TapInp Synchronous tap in-position check width (tap axis)
#1315 RcmpBlk Maximum number of pre-read blocks for Tool radius compensation
(PR) #1316 CrossCom Reference of common variables common for part sys tems
(PR) #1318 MacVcom Machine tool builder macro variables for each part sys tem
#1319 Grp24_mdrst_off G group 24 modal retention reset OFF
(PR) #1324 chop_R Chopping compensation value fixing method
(PR) #1326 PLC Const Ext. Num PLC constant extension number

Select the tool change method for determining the tool to draw solids.
With 3D drawing, the tool will be changed by the method designated with this parameter, and then the image will be drawn.
0: With one standby tool
1: With two standby tools
2: With no standby tool
Select the reference position for tool measurement.
0: The machine position at the time when TLM is turned ON
1: The machine zero point
Set the time taken for the drive section's main power to be shut-off when the confirmation of all the axes' stop failed after the emergency stop state.
The contactor shut-off signal is output as soon as all the axes are confirmed stopped if the confirmation is done prior to the set time.
When there is no safety observation option or "0" is set, the shut-off time will be 30 (s).
---Setting range---
0 to 60 (s)
When safety observation is executed, set the remote I/O device to input the contactor's auxiliary b contact signal used for the contactor weld detection.
If "0" is set, weld detection will not be executed.
Thus, "X0" cannot be used as contactor weld detection device.
---Setting range---
0000 to 02FF (HEX)
When safety observation is executed, set the remote I/O device to input the contactor's auxiliary b contact signal used for the contactor weld detection.
If "0" is set, weld detection will not be executed.
Thus, "X0" cannot be used as contactor weld detection device.
---Setting range---
0000 to 02FF (HEX)
Specify a period of time during which the control does not detect a Fieldbus communication error of the Field bus expansion card mounted in the slot EXT3 (or EXT1 for M80/M800S/E80), after startup of the NC is com pleted.
Set this in 0.1-second increments.
(Note) PROFIBUS-DP communication expansion card refers to this parameter, whichever slot (EXT3 or EXT4 (or EXT1 or EXT2 for M80/M800S/E80)) the card is mounted in. It does not refer to the parameter #1490.
---Setting range---
0 to 60000 (0.1s)
Select whether to restrain the lost motion compensation in handle mode.
0: Not restrain
1: Restrain
#1327 3D ATC type Tool change method specification
#1328 TLM type Reference position for tool measurement
#1329 Emgcnt Emergency stop contactor shut-off time
(PR) #1330 MC_dp1 Contactor weld detection device 1
(PR) #1331 MC_dp2 Contactor weld detection device 2
(PR) #1332 F-bus init delay Fieldbus communication error invalid time
#1333 LMC restrain Lost motion compensation restraint in handle mode

Select the start cycle of PLC main processing program.
When wait time until the next start cycle from 1 scan end is long, the wait time can be shortened by adjusting

the start cycle.
-1: Low-speed mode (2 fold)
0: Standard mode
1: High-speed mode 1 (1/2 fold)
2: High-speed mode 2 (1/4 fold)
(Note 1) When the high-speed mode is selected, the fine segment processing performance may degrade due to the increased processing load of the system.
(Note 2) When the high-speed mode 2 is selected, the scan time should be 1/4 or less of the base interruption cycle as a standard. If the standard is exceeded, the update of all the DI/DOs in refresh cycle may not be able to be performed.
(Note 3) If the number of RIO stations connected is large, the update of all the RIO in refresh cycle may not be able to be performed. Make the setting according to the number of stations per RIO channel.
Select the acceleration/deceleration mode in jog feed, incremental feed and manual reference position return (when rapid traverse signal OFF).
0: Acceleration/Deceleration for rapid traverse
1: Acceleration/Deceleration for cutting feed
Select whether the #400-level variables are used as machine tool builder macro variables or as common vari ables.
0: #400 to #449 are not available;
#450 to #499 are used as machine tool builder macro variables.
1: #400 to #499 are used as common variables
(Note) 700 sets or more of common variables are required for using #400 to #499 as common variables.
If this parameter is set to "1" while the number of common variables is set to less than 700, this parameter setting will be regarded as "0".
Select the condition to start/stop saving reverse run data.
0: Starts when the reverse run control mode signal is turned ON, and stops when turned OFF.
1: Start when the reverse run control mode signal is ON and macro interrupt is valid (M96/ION). Stop when the reverse run control mode signal is OFF or macro interruption is finished (M97/IOF). (compatible with M500M)
When safety observation is executed, set the remote I/O device to input the contactor's auxiliary b contact signal used for the contactor weld detection.
If "0" is set, weld detection will not be executed.
Thus, "X0" cannot be used as contactor weld detection device.
---Setting range---
0000 to 02FF (HEX)
When safety observation is executed, set the remote I/O device to input the contactor's auxiliary b contact signal used for the contactor weld detection.
If "0" is set, weld detection will not be executed.
Thus, "X0" cannot be used as contactor weld detection device.
---Setting range---
0000 to 02FF (HEX)
(PR) #1334 DI/DO refresh cycl DI/DO refresh cycle
#1335 man_smg Manual feed acceleration/deceleration selection
(PR) #1336 #400_Valtype #400 address variable type
(PR) #1338 rev data save trg Trigger switching to save arbitrary reverse run data
(PR) #1339 MC_dp3 Contactor weld detection device 3
(PR) #1340 MC_dp4 Contactor weld detection device 4

Set a period of time by which alarm display is delayed.
Set a time between when an operation alarm occurs and when the alarm display and signal turn ON.
When set to "0", the alarm display and signal will turn ON immediately after the alarm occurrence.
When set to "-1", the alarm display and signal will not turn ON after the alarm occurrence.
Target alarms:
M01 External interlock axis exists 0004
M01 Internal interlock axis exists 0005
M01 Sensor signal illegal ON 0019
M01 No operation mode 0101
This parameter is disabled if "#1343 DlyReg" is set.
---Setting range---
-1 to 30000 (ms)
Set the head No. of the R register to be used for delayed display of an operation alarm.
If any R register outside the user area is specified, delayed alarm display is disabled.
If this parameter is set, the setting of #1342 AlmDly is disabled.
When not using, set to "0".
---Setting range---
0 to 29899
Set a remote I/O device to input the door sensor signal to detect Door 1's status in safety observation.
When "0" is set, the door is always detected to be open.
Thus, "X0" cannot be used as Door 1 switch input device.
---Setting range---
0000 to 02FF (HEX)
Set a remote I/O device to input the door sensor signal to detect Door 2's status in safety observation.
When "0" is set, the door is always detected to be open.
Thus, "X0" cannot be used as Door 2 switch input device.
---Setting range---
0000 to 02FF (HEX)
Set a device of an output remote I/O device to control contactor in safety observation.
When set to "0", contactor shutoff output is disabled.
Thus, "Y0" cannot be used as contactor shutoff output device.
---Setting range---
0000 to 02FF (HEX)
Set a period of time until emergency stop is issued when a contactor does not operate even though contactor shutoff output 1 is output.
If the vertical axis drop prevention function is used, set a value bigger than the vertical axis drop prevention time (SV048 EMGrt).
When "0" is set, the contactor operation check will be disabled.
---Setting range---

0 to 30000 (ms)
Select the acceleration/deceleration type of auxiliary axis in PLC axis indexing.
0: Acceleration/deceleration with constant time
1: Acceleration/deceleration with a constant angle of inclination
#1342 AlmDly Alarm display delay time
(PR) #1343 DlyReg R register for delayed alarm display setting
(PR) #1349 DOOR_1 Door 1 switch input device
(PR) #1350 DOOR_2 Door 2 switch input device
(PR) #1353 MC_ct1 Contactor shutoff output 1 device
(PR) #1357 mchkt1 Contactor operation check allowed time 1
(PR) #1361 aux_acc Auxiliary axis acceleration/deceleration type

Select the manual speed command type.
0: Manual speed command
The axis travels at the handle/jog feed rate.
Reverse run is performed for each part system independently of the other ones.
1: Manual speed command 2
In a multi-part system configuration, the axis travels at the handle/jog feed rate multiplied by the ratio of each part system's program command speeds.
When the block start point is reached in reverse run in any of the part systems, the axes in the other part systems stop simultaneously.
Select the operation when G31 is commanded in more than one part system.
(Note) When set to "1", the skip coordinate position will always be "0" whether G31 is commanded in a single part system or in one part system of a multi-part system.
Set to "0" when using G31 command for measurement etc.
0: Carry out G31 command in one part system, while the G31 is kept in an interlocked state in the other systems.
1: Carry out G31 command simultaneously in more than one part system.
Note that the skip coordinate is not read and so the skip coordinate value will be 0.
Set the maximum override value to be applied to the cutting feed that is in constant inclination acceleration/deceleration.
When the setting of this parameter is between 0 and 99, the override value is handled as 100% even though the specified cutting feed override is over 100%.
---Setting range---
0 to 300 (%)
Set the remote I/O device to input the observation speed change signal 1 during executing the safety obser vation function.
When set to "0", there is no observation speed change signal input.
Therefore "X0" cannot be used as safety observation signal device.
---Setting range---
0000 to 02FF (HEX)
Set the remote I/O device to input the observation speed change signal 2 during executing the safety obser vation function.
When set to "0", there is no observation speed change signal input.
Therefore "X0" cannot be used as safety observation signal device.
---Setting range---
0000 to 02FF (HEX)
Specify the intervals of accumulating power consumption to create the history.
The accumulated power consumption history can be obtained according to this parameter along with "#1392 StartTimeIPC" (Power consumption accumulation start time).
When 0 is set, power consumption is not accumulated.
---Setting range---
0 to 999 (hr)
Specify the fixed power consumption of the drive system.
This value is used for calculating the power consumption.
---Setting range---
0 to 99999999 (W)
#1365 manualFtype Manual speed command type
#1366 skipExTyp Multi-system simultaneous skip command
#1367 G1AccOVRMax Max. override value for cutting feed constant inclination acc./dec.
(PR) #1369 S_Sig1 Safety observation signal device 1
(PR) #1370 S_Sig2 Safety observation signal device 2
(PR) #1371 PwrIntegIntvl Power consumption accumulation interval
#1372 DrvBasePwr Fixed drive system power consumption

Enable the multi-step speed monitor.
0: Disable the multi-step speed monitor
1: Enable the multi-step speed monitor
* When enabling the multi-step speed monitor, setting values for SV238, SV239, SP238 and SP239 will be ignored.
Set the remote I/O device to input the observation speed change signal 3 during executing the safety obser vation function.
When set to "0", there is no observation speed change signal input.
Therefore "X0" cannot be used as safety observation signal device.
---Setting range---
0000 to 02FF (HEX)
Not used. Set to "0".
Select whether to apply smoothing check method to a cutting block for deceleration check, when deceleration check method is selected individually for G0 and G1 (when "#1306 InpsTyp" = 0).
0: Follow the setting of "#1223 aux07/bit1"
1: Apply smoothing check method
Specify the number of the display's rear USB ports occupied by a machine tool builder. Using this setting the control determines the drive to be used for the front SD and USB memory.
(Note) This parameter is enabled for a Windows-based display of M800W/M80W.
---Setting range---
0 to 6

Enable the function of Data protection by user's level.
0: Use a machine user password to switch the protection of each operation (same as the conventional models)
1: Switch the protection according to the protective levels (0 to 7) specified for each operation through the protection setting screen
(Note) You are authorized to change this parameter from 1 to 0 only if your operation level is the same or higher than that of "Available level" on the protection setting screen.
Specify when to start accumulating power consumption to create the history.
The accumulated power consumption history can be obtained according to this parameter along with "#1371 PwrIntegIntvl" (Power consumption accumulation interval).
---Setting range---
0 to 23 (o'clock)
Specify the efficiency for calculating power consumption.
This value is used for calculating the drive system power consumption.
When 0 is set, the efficiency is treated as 70 (%).
If the drive system power consumption computed by the NC is different from that measured by a measuring device, this parameter is used to adjust the drive system power consumption of the NC.
---Setting range---
0 to 100 (%)
(PR) #1373 mstpssc Multi-step speed monitor enabled
(PR) #1379 S_Sig3 Safety observation signal device 3
(PR) #1380 TolOfsVal_M Tool compensation variable change
#1389 G1SmthChk Smoothing check method in cutting block
(PR) #1390 BackUSBUseNum Number of backside USB ports occupied
(PR) #1391 User level protect Enable Data protection by user's level
(PR) #1392 StartTimeIPC Power consumption accumulation start time
#1393 Efficiency (PwrCal) Efficiency for power consumption computation

Specify the connection destination of the 1st handle.
bit0 to bit3: Handle connection channel 1 to 3 ("3" is only valid for operation panel)
bit4 to bit7: Handle connection destination
0: CNC unit
1 to 3: Remote I/O unit
5: Expansion unit
D to F: Operation panel I/O unit
bit8 to bitF: Remote I/O unit station 1 to 40 (HEX)
(Example)
0001: Handle 1 connected to the CNC unit
2421: Handle 1 of 36th station for remote I/O unit connected to RIO2
00D3: Handle 3 of operation panel I/O unit connected to RIO1
(Note 1) When the specified destination is not implemented, handle movement is not performed.
(Note 2) When all the "H1_pno" to "H3_pno"are set to "0000", handles are automatically allocated.
Other than above, "0000" setting is the same connection as "0001" setting.
---Setting range---
0x0000 to 0xFFFF
Specify the connection destination of the 2nd handle.
Refer to "#1395 H1_pno" (1st handle selection) for further details.
Specify the connection destination of the 3rd handle.
Refer to "#1395 H1_pno" (1st handle selection) for further details.
(Note) In case of using C80, refer to "#11746 H4_pno" to "#11751 H9_pno" for the 4th to 9th handle selection.
Specify the average filter scale factor for the spindle's actual rotation speed data.
If the scale factor increases, fluctuations in speed display are mitigated.
0: Standard setting
1: 0.5-fold
2: 1-fold
3: 2-fold
4: 4-fold
5: 8-fold
Select the M command operation.
(Note) Register M codes in the special operation registration M codes (#1411 to #1426).
0: Not wait for the completion of registered M codes,
but wait for the completion of the other M codes
1: Wait for the completion of registered M codes,
but not wait for the completion of the other M code
Select the S command completion method.
0: Wait for the complete signal from PLC
1: Not wait for the complete signal from PLC
Select the T command completion method.
0: Wait for the complete signal from PLC
1: Not wait for the complete signal from PLC
(PR) #1395 H1_pno 1st handle selection
(PR) #1396 H2_pno 2nd handle selection
(PR) #1397 H3_pno 3rd handle selection
#1399 sp_filt Spindle's actual rotation speed filter
#1401 M_mode M command operation selection
#1402 S_mode S command completion method selection
#1403 T_mode T command completion method selection

Select the 2nd miscellaneous command completion method.
0: Wait for the complete signal from PLC
1: Not wait for the complete signal from PLC
M code output (during high-speed simple program check)
Select the M code output method to be applied during high-speed simple program check.
0: Output the M codes registered in #1449 to #1464 M[M511-000](SMLK), but not output unregistered M

codes.
M512 or subsequent M codes are not output.
1: Output the M codes unregistered in #1449 to #1464 M[M511-000](SMLK), but not output those regis tered.
M512 and subsequent M codes are all output.
S code output (during high-speed simple program check)
Select the S code output method to be applied during high-speed simple program check.
0: Not output S code
1: Output S code
T code output (during high-speed simple program check)
Select the T code output method to be applied during high-speed simple program check.
0: Not output T code
1: Output T code
2nd miscellaneous code output (during high-speed simple program check)
Select the 2nd M code output method to be applied during high-speed simple program check.
0: Not output 2nd M code
1: Output 2nd M code
Register an M code that needs special operation.
Each bit of the set value corresponds to the M code number.
(Example) To register M05, set 00000020 in #1411.
(Note) Note that the registered M code operation varies according to M_mode (#1401).
---Setting range---
0 to FFFFFFFF
Set this in hexadecimal format.
Register an M code (32 to 63) that needs special operation.
Each bit of the set value corresponds to the M code number.
(Example) To register M05, set 00000020 in #1411.
(Note) Note that the registered M code operation varies according to M_mode (#1401).
---Setting range---
0 to FFFFFFFF
Set this in hexadecimal format.
#1404 M2_mode 2nd miscellaneous command completion method se lection
#1405 M_mode(SMLK) M code output (during high-speed simple program
check)
#1406 S_mode(SMLK) S code output (during high-speed simple program
check)
#1407 T_mode(SMLK) T code output (during high-speed simple program
check)
#1408 M2_mode(SMLK) 2nd miscellaneous code output (during high-speed
simple program check)
#1411 M_wait[M031-000] Special operation registration M code
#1412 M_wait[M063-032] Special operation registration M code

Register an M code (64 to 95) that needs special operation.
Each bit of the set value corresponds to the M code number.
(Example) To register M05, set 00000020 in #1411.
(Note) Note that the registered M code operation varies according to M_mode (#1401).
---Setting range---
0 to FFFFFFFF
Set this in hexadecimal format.
Register an M code (96 to 127) that needs special operation.
Each bit of the set value corresponds to the M code number.
(Example) To register M05, set 00000020 in #1411.
(Note) Note that the registered M code operation varies according to M_mode (#1401).
---Setting range---
0 to FFFFFFFF
Set this in hexadecimal format.
Register an M code (128 to 159) that needs special operation.
Each bit of the set value corresponds to the M code number.
(Example) To register M05, set 00000020 in #1411.
(Note) Note that the registered M code operation varies according to M_mode (#1401).
---Setting range---
0 to FFFFFFFF
Set this in hexadecimal format.
Register an M code (160 to 191) that needs special operation.
Each bit of the set value corresponds to the M code number.
(Example) To register M05, set 00000020 in #1411.
(Note) Note that the registered M code operation varies according to M_mode (#1401).
---Setting range---
0 to FFFFFFFF
Set this in hexadecimal format.
Register an M code (192 to 223) that needs special operation.
Each bit of the set value corresponds to the M code number.
(Example) To register M05, set 00000020 in #1411.
(Note) Note that the registered M code operation varies according to M_mode (#1401).
---Setting range---
0 to FFFFFFFF
Set this in hexadecimal format.
Register an M code (224 to 255) that needs special operation.
Each bit of the set value corresponds to the M code number.
(Example) To register M05, set 00000020 in #1411.
(Note) Note that the registered M code operation varies according to M_mode (#1401).
---Setting range---
0 to FFFFFFFF
Set this in hexadecimal format.
#1413 M_wait[M095-064] Special operation registration M code
#1414 M_wait[M127-096] Special operation registration M code

#1415 M_wait[M159-128] Special operation registration M code
#1416 M_wait[M191-160] Special operation registration M code
#1417 M_wait[M223-192] Special operation registration M code
#1418 M_wait[M255-224] Special operation registration M code

Not used.
Not used.
Not used.
Not used.
Not used.
Not used.
Not used.
Not used.
Select whether to enable switching of acceleration/deceleration time constant after G1 interpolation.
0: Disable switching of acceleration/deceleration time constant after G1 interpolation.
1: Enable switching of acceleration/deceleration time constant after G1 interpolation.
Select whether to change acceleration/deceleration time constant back to parameter value when NC is reset.
0: Disable changing acceleration/deceleration time constant back when NC is reset.
1: Enable changing acceleration/deceleration time constant back when NC is reset.
Choose which of the following controls to enable; Mixed control (Cross axis control) I, II or arbitrary axis ex change control.
Set this parameter to "1" to enable the arbitrary axis exchange control function with S/W Version E1 or later
for M80typeA (M system) and M80W (M system).
0: Mixed control (Cross axis control) I or II
1: Arbitrary axis exchange control
bit0: Selection of alarm when axis exchange is disabled
Select whether to issue an alarm or wait until the axis becomes exchangeable when axis exchange is dis abled.
0: Wait until the axis becomes exchangeable when the axis declared in an axis exchange command is in capable of being exchanged.
* The parameter #1433 (G140TimeOut) determines the operation to be carried out during the waiting
time.
1: Output the alarm (M01 1101) when the axis declared in an axis exchange command is incapable of be ing exchanged.
bit1: Compensation cancel after arbitrary axis exchange
Select whether to enable canceling of compensation after an arbitrary axis exchange.
0: Not cancel compensation after arbitrary axis exchange
1: Cancel compensation after arbitrary axis exchange
#1419 M_wait[M287-256] Special operation registration M code
#1420 M_wait[M319-288] Special operation registration M code
#1421 M_wait[M351-320] Special operation registration M code
#1422 M_wait[M383-352] Special operation registration M code
#1423 M_wait[M415-384] Special operation registration M code
#1424 M_wait[M447-416] Special operation registration M code
#1425 M_wait[M479-448] Special operation registration M code
#1426 M_wait[M511-480] Special operation registration M code
(PR) #1427 RT2AftG1 RT2: Enable switching of acce/dece time constant after
G1 interpolation
(PR) #1428 RT2rst RT2: Enable changing acce/dece time constant back
when NC is reset
(PR) #1431 Ax_Chg Selection of mixed control (cross axis control) or arbi trary axis exchange control
#1432 Ax_Chg_Spec

Specify a period of time to wait before outputting the alarm (M01 1101) when an axis declared in the axis
exchange command is unexchangeable.
If the specified time elapses with the axis remaining unexchangeable, the alarm (M01 1101) is output. How ever this alarm is cancelled and axis exchange is carried out once the axis becomes capable of being ex changed.
0 to 254: Period of time to wait before timeout (sec)
255: Wait until the axis becomes exchangeable without executing timeout check
(Note) This parameter is enabled when the alarm is not caused by an axis' unexchangeable state (when
#1432 Ax_Chg_Spec(bit0) = 0).
---Setting range---
0 to 254 (s)
255: No timeout
Select which axis address(es) can be commanded under G140 (Arbitrary axis exchange) control.
0: The axis (or axes) specified in the G140 block can be commanded.
1: Not only the axis (or axes) specified in the G140 block but those unspecified in the block can also be
commanded.
Select whether to enable manual interruption for an axis being under cross machining control.
0: Disable
1: Enable
Select whether to enable override for the dwell time and miscellaneous function time.
0: Disable (Override takes no effect.)
1: Enable (Override takes effect.)
bit0: Selection of alarm when sub part system II start is disabled
Select the type of operation to be carried out when the sub part system specified by G144 is incapable of
being activated.
0: Wait until the system becomes capable of being activated
1: Output an alarm
bit1: Sub part system control II: Reset type selection
Select how to reset the sub part system control II.
0: Reset sub part system at the same time as main part system reset.
1: Not reset sub part system at the time of main part system reset.
Select the allocation method of tool offset sets.
0: Automatic equal allocation
1: Arbitrary allocation
The setting of "1" is enabled for a system configured with two or more part systems.
When "1" is selected for a system configured with a single part system, all the offset sets of the system are
allocated to the 1st part system.

Select the allocation method of the life management tools.
0: Automatic equal allocation
1: Arbitrary allocation
The setting of "1" is enabled for a system configured with two or more part systems.
When "1" is selected for a system configured with a single part system, all the life management tools of the
system are allocated to the 1st part system.
#1433 G140TimeOut G140 timeout period
#1434 G140Type2 G140 command type 2
#1435 crsman Manual interruption during cross machining
#1436 mstsyn Enable override for dwell and miscellaneous function
time
#1437 SBS2_Spec Selection of alarm when sub part system II start is dis abled
(PR) #1438 Ofs-SysAssign Enable part system allocation of tool offset sets
(PR) #1439 Tlife-SysAssign Part system allocation of life management tools

Select whether to enable multiple spindle synchronization.
0: Disable multiple spindle synchronization.
1: Enable multiple spindle synchronization.
Select the tool command method.
0: Tool life management II format
1: Tool function
Select whether to enable the G00 rapid traverse block overlap function.
0: Disable
1: Enable
Select whether to enable the G28 rapid traverse block overlap function.
0: Disable
1: Enable
Select whether to stop all the part systems or only the part system where H/W stroke end, soft limit or inter ference check alarm has occurred.
(Note) If H/W stroke end, soft limit or interference check alarm has occurred on an axis related to superim position, synchronization, arbitrary axis superimposition, or synchronization during axis traveling, the part
system to which the superimposition (synchronous) and reference axes belong is treated as the one
where the alarm has occurred.
0: Stop each part system
1: Stop all the part systems
Select whether to display or hide additional information on the tool management screen.
0: Display
1: Not display
Select the operation to be performed when command T has no tool length offset No.
0: Tool length offset No. is deemed as 0.
1: Last commanded tool length offset No.is applied.
(Tool length offset No. is unchanged.)
0: Disable a spindle rotation command given in another part system
1: Enable a spindle rotation command given in another part system
0: Disable cancel of the error
1: Enable cancel of the error
0: Rapid traverse rate (#2001 rapid) serves as the maximum speed in jog, handle, incremental or manual
reference position return (high-speed) mode. However you can use a PLC device to switch the maxi mum speed to the manual feed clamp speed (#2614 m_clamp).
1: Manual feed clamp speed (#2614 m_clamp) serves as the maximum speed in jog, handle, incremental,
or manual reference position return (high-speed) mode.
(PR) #1440 multi_sp_syn Multiple spindle synchronization valid
(PR) #1441 Tcode_Method_Chg T command method selection
#1442 G0ol Enable G00 rapid traverse block overlap
#1443 G28ol Enable G28 rapid traverse block overlap
#1444 otsys Stop all part systems at OT
(PR) #1445 Tol-Custom-nondisp Non-display of additional info on tool management
screen
#1446 Tlno.hold Tool length offset No. retention
#1447 G96_tmp_cancel Temporary cancel of constant surface speed control
#1448 Sclamp_err_cancel Cancel of the error for absence of spindle speed clamp
#1449 m_clamp_on Manual feed rate clamp ON

bit0: Axis name setting method of rotary axis configuration parameter
Select the axis name setting method for rotary axis configuration parameter (#7900, #7901, #7902, #7922,
#7932, #7942, #7952).
0: Set by axis name
1: Set by 2nd axis name
bit1: Using G174 tool axis rotation angle as compensation amount
0: Specify the compensation amount using the address R and R register.
1: Use the tool axis rotation angle of G174 as the compensation amount.
bit2: Application of rotary axis configuration parameters
Select the method of applying the rotary axis configuration parameters.
0: Automatic selection method
1: PLC signal method
(Note) This parameter is enabled when "#1450 5axis_Spec/bit0 (Axis name setting method of rotary axis
configuration parameter)" is "1".
bit3: Select specifications of rotation direction parameter
Select the specifications of rotation direction parameter (#7923, #7933, #7943, #7953).
0: The parameter specifications vary for each function.
1: The parameter specifications are common to the functions.
"#7923 DIR_T1", "#7933 DIR_T2", "#7943 DIR_W1", "#7953 DIR_W2"
0: When the tool motion viewed from the workpiece is in right-hand screw direction, it is taken as the
positive direction.
1: When the tool motion viewed from the workpiece is in left-hand screw direction, it is taken as the
positive direction.
bit5: Rotation center error compensation: restraint of machine movement

Select whether to enable restraint of machine movement when the rotation center error compensation is used in combination with any of the following multi-part system functions:
Arbitrary axis exchange control
Mixed control I or II
Control axis synchronization between part systems I or II
Control axis superimposition
Arbitrary axis superimposition
0: Enable restraint of machine movement
Retain the multi-part system function at reset or emergency stop
Perform error check when multi-part system function is commanded
1: Disable restraint of machine movement
Not retain the multi-part system function at reset or emergency stop
Not perform error check when multi-part system function is commanded
(Note) This parameter is enabled when "#1450 5axis_Spec/bit0" (Axis name setting method of rotary axis configuration parameter) is "1".
Register an M code to be output during high-speed simple program check.
Each bit of the set value corresponds to the M code number.
(Example) To register M05, set 00000020 in #1451.
Note that operation of the registered M code varies according to #1405 M_mode(SMLK).
---Setting range---
0 to FFFFFFFF
Set this in hexadecimal format.
(PR) #1450 5axis_Spec
#1451 M[M031-000](SMLK) Special operation registration M code (High-speed sim ple program check)

Register an M code to be output during high-speed simple program check.
Each bit of the set value corresponds to the M code number.
(Example) To register M05, set 00000020 in #1451.
Note that operation of the registered M code varies according to #1405 M_mode(SMLK).
---Setting range---
0 to FFFFFFFF
Set this in hexadecimal format.
Register an M code to be output during high-speed simple program check.
Each bit of the set value corresponds to the M code number.
(Example) To register M05, set 00000020 in #1451.
Note that operation of the registered M code varies according to #1405 M_mode(SMLK).
---Setting range---
0 to FFFFFFFF
Set this in hexadecimal format.
Register an M code to be output during high-speed simple program check.
Each bit of the set value corresponds to the M code number.
(Example) To register M05, set 00000020 in #1451.
Note that operation of the registered M code varies according to #1405 M_mode(SMLK).
---Setting range---
0 to FFFFFFFF
Set this in hexadecimal format.
Register an M code to be output during high-speed simple program check.
Each bit of the set value corresponds to the M code number.
(Example) To register M05, set 00000020 in #1451.
Note that operation of the registered M code varies according to #1405 M_mode(SMLK).
---Setting range---
0 to FFFFFFFF
Set this in hexadecimal format.
Register an M code to be output during high-speed simple program check.
Each bit of the set value corresponds to the M code number.
(Example) To register M05, set 00000020 in #1451.
Note that operation of the registered M code varies according to #1405 M_mode(SMLK).
---Setting range---
0 to FFFFFFFF
Set this in hexadecimal format.
#1452 M[M063-032](SMLK) Special operation registration M code (High-speed sim ple program check)
#1453 M[M095-064](SMLK) Special operation registration M code (High-speed sim ple program check)
#1454 M[M127-096](SMLK) Special operation registration M code (High-speed sim ple program check)
#1455 M[M159-128](SMLK) Special operation registration M code (High-speed sim ple program check)
#1456 M[M191-160](SMLK) Special operation registration M code (High-speed sim ple program check)

Register an M code to be output during high-speed simple program check.
Each bit of the set value corresponds to the M code number.
(Example) To register M05, set 00000020 in #1451.
Note that operation of the registered M code varies according to #1405 M_mode(SMLK).
---Setting range---
0 to FFFFFFFF
Set this in hexadecimal format.
Register an M code to be output during high-speed simple program check.
Each bit of the set value corresponds to the M code number.
(Example) To register M05, set 00000020 in #1451.
Note that operation of the registered M code varies according to #1405 M_mode(SMLK).
---Setting range---
0 to FFFFFFFF
Set this in hexadecimal format.
Register an M code to be output during high-speed simple program check.
Each bit of the set value corresponds to the M code number.
(Example) To register M05, set 00000020 in #1451.
Note that operation of the registered M code varies according to #1405 M_mode(SMLK).

---Setting range---
0 to FFFFFFFF
Set this in hexadecimal format.
Register an M code to be output during high-speed simple program check.
Each bit of the set value corresponds to the M code number.
(Example) To register M05, set 00000020 in #1451.
Note that operation of the registered M code varies according to #1405 M_mode(SMLK).
---Setting range---
0 to FFFFFFFF
Set this in hexadecimal format.
Register an M code to be output during high-speed simple program check.
Each bit of the set value corresponds to the M code number.
(Example) To register M05, set 00000020 in #1451.
Note that operation of the registered M code varies according to #1405 M_mode(SMLK).
---Setting range---
0 to FFFFFFFF
Set this in hexadecimal format.
#1457 M[M223-192](SMLK) Special operation registration M code (High-speed sim ple program check)
#1458 M[M255-224](SMLK) Special operation registration M code (High-speed sim ple program check)
#1459 M[M287-256](SMLK) Special operation registration M code (High-speed sim ple program check)
#1460 M[M319-288](SMLK) Special operation registration M code (High-speed sim ple program check)
#1461 M[M351-320](SMLK) Special operation registration M code (High-speed sim ple program check)

Register an M code to be output during high-speed simple program check.
Each bit of the set value corresponds to the M code number.
(Example) To register M05, set 00000020 in #1451.
Note that operation of the registered M code varies according to #1405 M_mode(SMLK).
---Setting range---
0 to FFFFFFFF
Set this in hexadecimal format.
Register an M code to be output during high-speed simple program check.
Each bit of the set value corresponds to the M code number.
(Example) To register M05, set 00000020 in #1451.
Note that operation of the registered M code varies according to #1405 M_mode(SMLK).
---Setting range---
0 to FFFFFFFF
Set this in hexadecimal format.
Register an M code to be output during high-speed simple program check.
Each bit of the set value corresponds to the M code number.
(Example) To register M05, set 00000020 in #1451.
Note that operation of the registered M code varies according to #1405 M_mode(SMLK).
---Setting range---
0 to FFFFFFFF
Set this in hexadecimal format.
Register an M code to be output during high-speed simple program check.
Each bit of the set value corresponds to the M code number.
(Example) To register M05, set 00000020 in #1451.
Note that operation of the registered M code varies according to #1405 M_mode(SMLK).
---Setting range---
0 to FFFFFFFF
Set this in hexadecimal format.
Select whether to enable a miscellaneous command macro call through the manual numerical value com mand.
0: Disable
1: Enable
When Disable is selected, the commanded MSTB code and strobe are output.
#1462 M[M383-352](SMLK) Special operation registration M code (High-speed sim ple program check)
#1463 M[M415-384](SMLK) Special operation registration M code (High-speed sim ple program check)
#1464 M[M447-416](SMLK) Special operation registration M code (High-speed sim ple program check)
#1465 M[M479-448](SMLK) Special operation registration M code (High-speed sim ple program check)
#1466 M[M511-480](SMLK) Special operation registration M code (High-speed sim ple program check)
#1467 Manual MSTB macro MSTB macro call via manual numerical value command

Set the standard value "0".
Select how to allocate the PLC devices that are used for PROFIBUS-DP(DPV0): fixed allocation (512 points)
or arbitrary allocation (8192 points).
0: Fixed
1: Arbitrary
Select whether to enable the machine groupwise alarm stop function.
0: Disable
1: Enable
Select whether to allow automatic operation to be activated after machine groupwise alarm stop.
0: Not allow automatic operation to start after machine groupwise alarm stop
1: Allow automatic operation to start after machine groupwise alarm stop
When any alarm causes an axis that is in the midst of program execution to stop, this parameter allows you
to select the behavior of axes that belong to machine groups other than that of the said axis.
0: Feed hold
1: The operation is allowed to continue.

Specify the number of sub part systems to use in sub part system control II.
The specified number of part systems counted from the end of the system's effective part systems are treated
as sub part systems.
---Setting range---
0 to 7
Set whether to enable the MES interface function.
0: Disable
1: Enable
Specify a period of time by which to delay the alarm display and record to the alarm history, when the com munication error (Y02 0051) occurs. Set this time when a communication error is caused at power OFF. If it
does not occur (if unused), set to 0.
---Setting range---
0 to 5000 (ms)
Specify a period of time by which to delay the alarm display and record to the alarm history, when a servo/
spindle alarm occurs. Set this time when a servo/spindle alarm is caused at power OFF. If it does not occur
(if unused), set to 0.
---Setting range---
0 to 5000 (ms)
Select whether to enable or disable the Fieldbus communication expansion card mounted in the slot EXT3
(or EXT1 for M80/M800S/E80).
0: Enable (default)
1: Disable
(Note) This parameter is enabled for all the communication expansion cards, except CC-Link expansion
card.
#1468 ctrl period Control period
(PR) #1469 P-BUS dev assign PROFIBUS device allocation method
(PR) #1471 mgralmstp Enable machine groupwise alarm stop
(PR) #1472 mgralmrestart Allowing automatic operation to start after machine
groupwise alarm stop
(PR) #1473 mgralmcont Allowing operation to continue after machine group wise alarm stop
(PR) #1474 SBS2_sys num Number of sub systems to use in sub part system con trol II
(PR) #1475 MES-IF_on MES-IF ON
#1476 ComErrDly Delayed display of communication alarm
#1477 SrvAlmDly Delayed display of servo alarm
(PR) #1478 F-bus Card 1 OFF Fieldbus communication extension card 1 OFF

Select whether to enable or disable the Fieldbus communication expansion card mounted in the slot EXT4
(or EXT2 for M80/M800S/E80).
0: Enable (default)
1: Disable
(Note) This parameter is enabled for all the communication expansion cards, except CC-Link expansion
card.
Select whether to disable input via touch panel.
0: Enable touch panel operation
1: Disable touch panel operation
Select whether to enable smart safety observation.
0: Disable
1: Enable
Specify the number of sub part systems to be used for Sub part system control I in M80/M80W. The specified
number of part systems counted from the end of the system's effective part systems are treated as sub part
systems.
(Note) For M800, this setting is ignored. (All the effective part systems can be used as main or sub part sys tem.)
---Setting range---
0 to 7
bit0: Speed clamp specifications at entering the interference warning area
In interference check III, select whether to perform speed clamp and torque limit in only the part systems re lating to the interference warning or in all the part systems at entering the interference warning area.
0: Perform in only the part systems relating to the interference warning
1: Perform in all the part systems and axes
Interference check III is validated.
When interference check III is invalid, interference check between part systems is valid.
0: Interference check III invalid
1: Interference check III valid
Select whether to enable or disable the SLMP server function.
0: Disable
1: Enable
Specify a period of time during which the control does not detect a Fieldbus communication error of the Field bus expansion card mounted in the slot EXT4 (or EXT2 for M80/M800S/E80), after startup of the NC is com pleted.
Set this in 0.1-second increments.
(Note 1) This parameter is enabled for all the communication expansion cards except PROFIBUS-DP com munication expansion card.
(Note 2) PROFIBUS-DP communication expansion card does not refer to this parameter, whichever slot
(EXT3 or EXT4 (or EXT1 or EXT2 for M80/M800S/E80)) the card is mounted in. It refers to the param eter #1332.
---Setting range---
0 to 60000 (0.1s)
(PR) #1479 F-bus Card 2 OFF Fieldbus communication extension card 2 OFF
#1480 tp_invalid Disable touch panel operation
(PR) #1481 Enable S-Safety Enable smart safety observation
(PR) #1483 SBS1_sys num Number of sub systems to use in sub part system con trol I
#1487 ITF3_Spec Interference check III specification
(PR) #1488 ITF3 valid Interference check III valid
(PR) #1489 SLMP_on SLMP_on
(PR) #1490 F-bus init delay 2 Field bus communication error invalid time 2

Select whether to perform the in-position check for each block of the Punch Tap cycle.
bit0-5:
0: Not perform in-position check
1: Perform in-position check

bit1: Disabling movement in prohibited area of stored stroke limit IB/IIB
Specify whether axis movement is disabled or not when the tool is in the prohibited area of stored stroke limit IB/IIB.
0: Not disable movement.
1: Disable movement, except for movements towards the nearest permitted area.
bit2: Mode of rapid traverse block overlap for G00/G28
Select the mode of rapid traverse block overlap for G00 and G28.
When pre-interpolation acceleration/deceleration is used, Mode 2 is recommended.
This parameter is valid when rapid traverse block overlap for G00 is enabled (#1442 G0ol = 1) or rapid tra verse block overlap for G28 is enabled (#1443 G28ol = 1).
0: Mode 1 (compatible with post-interpolation acceleration/deceleration)
1: Mode 2 (optimized for post-/pre-interpolation acceleration/deceleration)
bit3: Spindle position control: Program command method Zero point return spec
Specify the zero point return type of the program command method in Spindle position control.
0: Zero point return type
1: Follow the parameter setting in "#3106 zrn_typ/bit8" (Designate zero point return)
bit4: Behavior of Optional block skip in high-speed mode
Select how the program blocks skipped with Optional block skip are handled while any of the following modes is enabled: High-speed machining mode II, High-speed high-accuracy control II or High-speed high-accuracy control III.
0: The blocks are handled as those with no motion.
1: The blocks are skipped.
bit0: Rapid traverse rate: PR display
Specify whether to display PR when Command speed monitoring function is enabled and Rapid traverse rate is changed.
0: Not display
1: Display
bit1: Load monitoring I: torque output switch
Specify how torque is output in Load monitoring I
0: Only during automatic operation (the estimated disturbance torque of the servo axis is always output)
1: Always output
bit0: Confirmation about formatting at edit of SRAM open parameter
Select whether to display a confirmation message at the setting of SRAM open parameter data, notifying that the NC memory needs to be formatted.
0: Not display the confirmation message
1: Display the confirmation message
bit1: Displaying of FIN in status field
Specify whether to display FIN that indicates Waiting for miscellaneous function.
0: Disable FIN display
1: Enable FIN display
#1702 cfg02 In-position check for Punch Tap
#1711 cfg11
#1712 cfg12
#1725 cfg25

bit1: Selection of coordinate system for shift amount of G76/G87
Select in which coordinate system the tool-tip shift amount is interpreted for G76 fine boring cycle or G87 back boring cycle. The shift amount is specified with address Q or I/J/K.
(Note) When "Machine coordinate system" is selected, do not perform figure rotation.
0: Currently active coordinate system
1: Machine coordinate system
bit4: Behavior for G92 (G50) and G53 in the same block
Select the behavior for G92 (G50) and G53 commands in the same block specifying an axis address other than "0".
0: Output a program error (P35)
1: Process the commands by treating the axis address as "0"
bit0: PLC window diameter specification valid
Enable input/output in diameter value for the data of "Diameter specification axis" ("#1019 dia" is set to "1") in PLC window.
0: Input/output is executed in radius value.
1: Input/output is executed in diameter value.
bit2: Constant-gradient acc/dec behavior switch when G0 non-interpolation is enabled
Switch how acceleration/deceleration works while the following modes are active when "#1086 G0Intp" = 1 (G0 non-interpolation) and "#1200 G0_acc" = 1 (G0 constant-gradient acceleration/deceleration).
Inclined surface machining
Tool center point control
Simple inclined surface machining
Simple tool center point control
Workpiece installation error compensation
L system and coordinate rotation by program
0: Constant-time acceleration/deceleration
1: Constant-gradient acceleration/deceleration
bit4: Prioritization of G0 constant-gradient acc/dec time constant
When #1200 G0_acc = 1 (G0 constant-gradient acceleration/deceleration), even if the time constant for G0 constant-gradient acceleration/deceleration is greater than the G0 time constant (axis specification parame ter #2004 G0tL), acceleration/deceleration is performed based on the time constant for G0 constant-gradient acceleration/deceleration.
When this setting is used, the G0 time constant is limited to 2000 ms.
This setting is applied to the following parameters
#2004 G0tL
#2005 G0t1
#2092 plG0tL
#2093 plG0t1
#2598 G0tL_2
#2599 G0t1_2
#2622 pl3G0tL
#2623 pl3G0t1
(Note) When "#1752 cfgPR02/bit4" = 1, even if "#1200 G0_acc" = 0 (G0 constant-gradient acceleration/de celeration invalid), the setting of these parameters is limited.

0: Perform acceleration/deceleration based on the shorter of the G0 constant-gradient acceleration/decel eration time constant and the G0 time constant
1: Perform acceleration/deceleration based on the G0 constant-gradient acceleration/deceleration time
constant
bit5: System variable (feedrate F) value to be read
Select the value to be read from the system variables #4109 and #4309 (Feedrate F).
0: The programmed feed-per-minute F value is read, regardless of the feed mode.
1: Depending on the feed mode, either the programmed feed-per-minute or feed-per-revolution F value is
read.
(PR) #1751 cfgPR01
(PR) #1752 cfgPR02

bit2: Disable extension of encoder input frequency
Specify whether to disable the extension of encoder input frequency range.
0: Enable
1: Disable
bit1: Improvement of Compound type fixed cycle for turning machining I
0: Disable
1: Enable
bit0: Machining condition selection screen - Disable setting of condition names
Select whether to allow setting of names for the machining conditions.
0: Enable the setting
1: Disable the setting
bit2: Enable HD mode on IPC
This parameter specifies whether the NC can run a program stored in the IPC which is connected to the same
network.
0: A program stored in the IPC cannot be run.
1: A program stored in the IPC can be run.
(Note 1) This parameter is valid for M80.
(Note 2) The parameter "#11005 PC IP address" needs to be set to enable program operations.
bit4: Hide motor temperature
Select whether to show/hide the item of the servo unit "Motor temp. (degC)" on the drive monitor screen.
0: Show
1: Hide
bit5: Whether to count a comment block in searching
Select whether to count a comment block as one block when searching is performed within a program, in cluding Operation search and Cursor position search.
0: Count a comment block as one block
1: Not count a comment block
bit6: Wear compensation amount edit in Data protection ON
Specify whether to enable or disable editing of Wear compensation amount.
0: When the data protection key 1 (KEY1) is turned OFF (0), editing is disabled.
1: Editing is enabled regardless of whether the data protection key 1 (KEY1) is turned ON or OFF.
bit7: Interactive cycle insertion feedrate command selection
Specify the command method for the item "Feedrate" of Turning hole cycle and Turning cycle in Interactive
cycle insertion.
0: Feed per revolution (mm/rev)
1: Feed per minute (mm/min)
(PR) #1753 cfgPR03
(PR) #1756 cfgPR06
(PR) #1760 cfgPR10

bit0: Plane selection method for Polar coordinate interpolation
Specify the selection method of Polar coordinate interpolation plane (G17 - G19).
0: The plane whose 1st plane axis is equal to the parameter "#1533 millPax" is specified as a command
plane for Polar coordinate interpolation.
When the X axis is set, G17 (XY plane) is specified as the Polar coordinate interpolation plane.
1: The plane whose 2nd plane axis is equal to the parameter "#1533 millPax" is specified as a command
plane for Polar coordinate interpolation.
When the Y axis is set, G17 (XY plane) is specified as the Polar coordinate interpolation plane.
bit1: Cogging torque compensation ON
Select whether to enable cogging torque compensation.
0: Disable
1: Enable
bit6: Machine tool builder macro password management method
0: MTB macro password management method type 1
Password authentication is set with "#1166 fixpro".
1: MTB macro password management method type 2
Password authentication is set with "#11796 mmacpro".
bit5: BiSS encoder I/F valid
Specify whether to enable/disable BiSS encoder I/F.
0: Disable
1: Enable
(Note) When "1" is set, external encoder I/F and external encoder position output I/F are invalid.
bit6: Z phase detection speed limit
Specify whether to limit the Z phase detection speed with S command speed in Spindle/C axis control for Z
phase detection.
0: Z phase detection speed is not limited with S command speed (conventional operation).
1: Z phase detection speed is limited with S command speed.
(*) This setting is valid when 1 is set to the parameter "#3106 zrn_typ/bit3" (Z phase detection operation ON).
bit2: Suppression of recalculation after FH cancellation
Recalculation after feed-hold cancellation is suppressed during SSS control to improve response speed.
0: Do not suppress
1: Suppress
Start or stop the Ethernet communication function.
0: Stop

1: Start
Set the main CPU's IP address.
Set the NC IP address seen from an external source.
---Setting range---
Set these parameters in accordance with the network rules in the connection environment.
Set the subnet mask for the IP address.
---Setting range---
Set these parameters in accordance with the network rules in the connection environment.
(PR) #1761 cfgPR11
(PR) #1762 cfgPR12
(PR) #1766 cfgPR16
#1925 EtherNet Start of service
(PR) #1926 Global IP address IP address
(PR) #1927 Global Subnet mask Subnet mask

Set the IP address for the gateway.
---Setting range---
Set these parameters in accordance with the network rules in the connection environment.
Not used. Set to "0".
Not used. Set to "0".
Set the host's port No.
---Setting range---
1 to 9999
Set the HMI side CPU's IP address.
---Setting range---
Set these parameters in accordance with the network rules in the connection environment.
Set the HMI side CPU's subnet mask.
---Setting range---
Set these parameters in accordance with the network rules in the connection environment.
Specify the IP address on the non-Windows-based display unit (LAN1) side.
---Setting range---
Set these parameters in accordance with the network rules in the connection environment.
Specify the IP address of subnet mask on the non-Windows-based display unit (LAN1) side.
---Setting range---
Set these parameters in accordance with the network rules in the connection environment.
Specify the gateway IP address on the non-Windows-based display unit (LAN1) side.
---Setting range---
Set these parameters in accordance with the network rules in the connection environment.
Specify the IP address of the field network communication expansion unit installed in the slot EXT3 (or EXT1 for M80/M800S/E80).
---Setting range---
0.0.0.0 to 255.255.255.255
Specify the subnet mask of the field network communication expansion unit installed in the slot EXT3 (or EXT1 for M80/M800S/E80).
---Setting range---
0.0.0.0 to 255.255.255.255
(PR) #1928 Global Gateway Gateway
#1929
#1930
(PR) #1931 Host number Host No.
(PR) #1934 Local IP address
(PR) #1935 Local Subnet mask
(PR) #1953 Intra IP address IP address on non-Windows-based display unit (LAN1) side
(PR) #1954 Intra Subnet mask Subnet mask on non-Windows-based display unit (LAN1) side
(PR) #1955 Intra Gateway Gateway on non-Windows-based display unit (LAN1) side
(PR) #1958 Ext Unit1 IP Addr Field network communication expansion unit: IP ad dress 1
(PR) #1959 Ext Unit1 Sub mask Field network communication expansion unit: subnet mask 1

Specify the gateway of the field network communication expansion unit installed in the slot EXT3 (or EXT1 for M80/M800S/E80).
---Setting range---
0.0.0.0 to 255.255.255.255
Specify the IP address of the field network communication expansion unit installed in the slot EXT4 (or EXT2 for M80/M800S/E80).
---Setting range---
0.0.0.0 to 255.255.255.255
Specify the subnet mask of the field network communication expansion unit installed in the slot EXT4 (or EXT2 for M80/M800S/E80).
---Setting range---
0.0.0.0 to 255.255.255.255
Specify the gateway of the field network communication expansion unit installed in the slot EXT4 (or EXT2 for M80/M800S/E80).
---Setting range---
0.0.0.0 to 255.255.255.255
Set the type of screen displayed with the pallet program registration screen.
0: Standard pallet registration screen
1: Pallet 4-page registration screen
Set the number of pallets validated on the pallet program registration screen.
---Setting range---
2 to 12 (Interpreted as 2 when 0 is set.)

Temporarily disable APLC.
Normally set "1".
0: Disable
1: Enable
Select starting condition of the built-in PLC.
0: Start PLC after NC screen startup
1: Start PLC at NC startup
(Note) When standard NC screen is not used, set "1".
(PR) #1960 Ext Unit1 Gateway Field network communication expansion unit: gateway
1
(PR) #1961 Ext Unit2 IP Addr Field network communication expansion unit: IP ad dress 2
(PR) #1962 Ext Unit2 Sub mask Field network communication expansion unit: subnet
mask 2
(PR) #1963 Ext Unit2 Gateway Field network communication expansion unit: gateway
2
(PR) #11001 APC type APC screen display type selection
(PR) #11002 Valid pallet num Number of pallets setting
(PR) #11003 APLC valid APLC valid
(PR) #11004 PLCauto-run enable PLC automatic startup valid

Set the IP address of the display unit or the PC in which machining programs are stored (or the IP address
of the IPC for M80).
Set the IP address of the display unit which is powered OFF with the Auto power OFF function.
When the 3D machine interference check function is enabled, set the IP address of the display unit to be
used for the 3D machine interference check (for M800W only).
(Note) When "0.0.0.0" is entered, "192.168.100.2" is automatically assigned.
PC Subnet
Set the subnet mask for the display unit or PC in which machining programs are stored.
PC Gateway
Set the gateway for the display unit or PC in which machining programs are stored.
---Setting range---
0.0.0.0 to 255.255.255.255
Set the port No. for the display unit or PC in which machining programs are stored.
(Note 1) When "0" is input, "55555" is automatically set.
(Note 2) When changing the parameter, set the same value in "PD_Control_Port" in the PC side environment
setting file.
---Setting range---
0 to 65535
Set the NC side communication timeout time.
Set the timeout time for the display unit to be shut down upon automatic power OFF request.
(Note 1) When "0" is input, "120" is automatically set.
(Note 2) When the value greater than "300" is set, a setting error occurs.
(Note 3) When changing the parameter, set the same value in "PD_Time_out" in the PC side environment
setting file.
---Setting range---
0 to 300 (s)
Select the program number label when using the M2 format.
0: Label L
1: Label O
Select whether or not to use a software keyboard on a touchscreen.
0: Not use (Note 1)
1: Use (no automatic display)
2: Use (The keyboard appears automatically on a specific screen or upon Y/N confirmation)
3: Use (The keyboard appears automatically upon Y/N confirmation)
(Note 1) If no NC keyboard is connected, the screen shows the software keyboard button.
Set the password used for the handy terminal customized downloading.
Blank (when "0" is set) and "0000" are regarded as no password.
Not the password of a new customizing file but the password of the customizing file downloaded to the last
handy terminal is set.
Set blank or "0000" when initially downloading.
---Setting range---
0000 to 9999
(PR) #11005 PC IP address IP address setting
#11006 PC Port number Port No. setting
(PR) #11007 PC Timeout Communication timeout time setting
(PR) #11009 M2 label O M2 label O
(PR) #11010 Software keyboard Software keyboard
#11011 Handy TERM. PW. Handy terminal password

Select the maximum number of axes (sum of the NC axis, spindle, and PLC axis) connected to the drive unit
interface (channel 1).
0: Up to 8 axes can be connected to channel 1.
1: Up to 16 axes can be connected to channel 1. This parameter is disabled when the extension unit is
connected. It is possible to connect only up to eight axes or less per channel.
Select whether to enable the 3D machine interference check function.
0: Enable
1: Disable
Set the 1st-step check distance when in 3D machine interference check mode.
The standard value is "30.000".
---Setting range---
0.000 to 99999.999 (mm)
Set the 2nd-step check distance when in 3D machine interference check mode.
The standard setting value is "5.000".
---Setting range---

0.000 to 99999.999 (mm)
Set the model shape expansion rate to be used for 3D machine interference check. This parameter is used
for expanding a model shape to be used for 3D machine interference check. The interference check is per formed using a shape expanded by the amount of [Check length (mm) x Shape expansion rate (%)].
---Setting range---
0 to 300 (%)
Select whether to enable the tool compensation amount setting and life value setting during automatic oper ation and operation pause.
0: Disable
1: Enable
When set to "1", the "Machine user" (operation level 6) password will be held even if the NC is restarted.
0: Do not hold
1: Machine user password is held
Select whether to enable simultaneous display of multiple part systems on the monitor screen.
0: Display one part system on the monitor screen.
1, 2: Display two part systems simultaneously on the monitor screen.
3: Display three part systems simultaneously on the monitor screen. Note that this is enabled for a 15- or
19-type display unit only.
4: Display four part systems simultaneously on the monitor screen. Note that this is enabled for a 15- or
19-type display unit only.
(Note 1) If the number of part systems to display is smaller than that of the simultaneous display, a single
part system display is selected.
(Note 2) If you select "3" or "4" for any display unit other than 15- or 19-type, a single part system display is
selected.
(PR) #11012 16 axes for 1ch Connecting 16 axes for 1ch
#11013 3D_MChk Invalidate 3D machine interference check
#11014 Chk_len1 1st-step interference check distance
#11015 Chk_len2 2nd-step interference check distance
#11016 Expand_Rate Shape expansion rate
#11017 T-ofs set at run Tool compensation amount setting during automatic
operation enabled
#11018 M password hold Machine user password is held
(PR) #11019 2-system display 2-part system simultaneous display

Select the format of PLC alarms and operator messages to be displayed on the bottom right of the screen.
0: Display up to the first 40 characters.
1: If text is longer than 40 characters, divide it into two and display separately. (Supplementary information
is displayed together)
Not used. Set to "0".
Not used. Set to "0".
Not used. Set to "0".
Set the tolerable correction value for the calculated coordinate value error of R-specified circular center.
When a difference between "a line between the start and end points" and "commanded radius x 2" is the tol erance or smaller, the error is corrected so that the middle of a line between the start and end points will be
the arc center.
When [Setting value < 0]: 0 (Not correct arc center error)
When [Setting value = 0]: 0.002 mm
When [Setting value > 0]: Setting value
---Setting range---
<Metric system> -1 to 0.100 (mm)
<Inch system> -0.0393 to 0.0039 (inch)
When arc center or radius designation is omitted from arc command, change the arc command into linear
without causing program error.
0: Program error
1: Change into linear command
Select whether handle feed of the tapping axis in manual synchronous tappingsynchronizes with the spindle
or not.
0: Synchronize with the spindle
1: Not synchronize with the spindle
Select the cursor position searching method.
0: Disable
1: Pressing the INPUT key in [Monitr] - [Edit] menu starts the operation search for the block with the cursor.
2: Turning ON/OFF the "Edit/Search" signal in [Monitr] - [Edit] menu starts the operation search for the
block with the cursor.
3: Turning ON/OFF the "Edit/Search" signal in [Monitr] - [Edit] menu starts the operation search for the
block with the cursor.
Pressing the reset key shows the top of the program on the [Edit/Search] window.
Select whether to enable the setting of the "menu selection parameters" (#10501 to #10530, #10551 to
#10580, and #10601 to #10630), with which the order of main menus on Monitor, Setup and Edit screens
can be rearranged. And also select who is allowed to do this setting.
0: Disable
1: Enable (machine tool builder password is required)
2: Enable (users are allowed to set)
#11021 PLC mesg disp type Format of PLC alarm and operator message
#11022 SRAM Output Type
#11023 G33.n Drn
#11024 G33.n fhd
#11028 Tolerance Arc Cent Tolerable correction value of arc center error
#11029 Arc to G1 no Cent Change command from arc to linear when no arc center
designation
#11030 Man tap sync cancl Synchronization cancel in manual synchronous tap ping
(PR) #11031 Cursor pos search Cursor position search
(PR) #11032 Menu sel para lkof Validate menu selection parameter setting

Select the contact of the sensor which you wish to set as unconnected, when the skip signal is set to contact
B.
Set "1" for the contact to be unconnected.

bit0: Skip input 1
bit1: Skip input 2
bit2: Skip input 3
bit3: Skip input 4
bit4: Skip input 5
bit5: Skip input 6
bit6: Skip input 7
bit7: Skip input 8
(Note 1) This parameter is enabled when "#1258 set30/bit0" is set to "1".
(Note 2) This parameter is independent of PLC skip.
---Setting range---
00000000 to 11111111 (Binary)
Select the type of command address to check in circular cutting.
0: Regard command addresses other than D, F, I as illegal.
1: Regard the command address H as illegal.
And commands other than D,F,I and M,S,T,B are disabled.
This restricts switching the part systems displayed on screen.
0: Not restrict
1: Disable the part system switching by pressing [$<->$] key on touch panel.
2: Disable the part system switching by display switch signals(Y730 to Y733).
Set the non-sensitive band to be used for judging the manual measurement direction.
If the feedback position fluctuates widely at the axis stop, set the fluctuation width or larger value in this set
the parameter.
When set to "0", the band will be 1 (m).
---Setting range---
0 to 1000 (m)
0: 1 (m)
Select the machining surface indexing type in the R-Navi function.
0: Indexing type 1 (Only rotary axes move to perform indexing)
1: Indexing type 2 (Indexing is performed with the tool center point fixed to the position seen from the work piece)
Select the T display (tool command value) type on the monitor screen between displaying tool No. only or
displaying tool No. and compensation No. (L system only)
0: Display tool No. only
1: Display the tool command value (the combined value consisting of the tool No. and compensation No.)
last commanded by the program. Even in a manual value command, the program's tool command value
is displayed.
(PR) #11033 skipB_no_sens Unconnected sensor selection when skip is set to con tact B
#11034 G12AddrCheckType Command address type to check in circular cutting
#11035 Sys. change limit Part system switching restriction
#11036 meas dir judge Non-sensitive band for manual measurement direction
judgment (for M system only)
#11037 R-Navi Index Type R-Navi machining surface indexing type
#11038 T disp typ T display (tool command value) type (For L system only)

Set the availability of the cursor position search during single block stop when "#11031 Cursor pos search"
is any of "1" to "3".
0: Disable cursor position search during single block stop.
1: Enable cursor position search during single block stop.
Sub-program is displayed when selecting menus [Monitr]-[Edit] while single block stop is carried out
during sub-program with this parameter set to 1.
Select ON/OFF of the Direct Socket communication I/F.
0: OFF (Default)
1: ON
(Note) When the Direct Socket communication I/F is ON, applications that uses "#1926 Global IP address"
such as MS Configurator and GX Developer cannot be used.
Select in which order to sort the operation log files (all logs) to be output.
0: Sort the data in chronologically ascending order separately for each log type.
1: Sort the data in chronologically ascending order for all the log types.
If the times and dates logged are identical, the log files are output in the order of key, touchscreen, alarm,
PLC signal, tool offset change, workpiece offset change and AC power.
Specify which magazine to display when Sp-stby is selected on the Spindle standby or Tool registration
screen.
0: Fixed to the magazine #1
1: The magazine selected by the menu (Magazine 1 to Magazine 5).
Specify how many part systems to display on a screen.
0: The same number as that of the enabled part systems
1 or greater: The number specified by this parameter serves as that of the part systems to display.
(Note) The setting range differs according to the NC model. For the number of part systems displaying in the
operating state, follow this parameter setting.
---Setting range---
0 to 8
Set this parameter to 1 if you wish to disable the workpiece coordinate system shift function.
0: Enable the workpiece coordinate shift function
1: Disable the workpiece coordinate shift function
Set the No. of F device to specify the displayed operator message.
Device specified with this parameter is treated as No.1, and displays up to 4 operator messages correspond ing to F device that is ON.
This parameter is valid when #6455/bit3 is 0.
(Note 1) Use from F1024 when "0" is set.
(Note 2) Set the device No. to be a multiple of 32. When other value is input, a setting error occurs.
---Setting range---
0 to 2016
Select whether to enable the remote communication.
0: Disabled
1: Enabled
#11039 Cusr pos srch type Cursor position search type
#11051 Direct Socket ON Direct Socket communication I/F ON

#11052 LOG Sort Order Log data sorting order
#11054 Sp-stby disp type Spindle-standby display type
#11055 Disp. sysno Number of part systems to display
(PR) #11056 Workshift invalid Workpiece coordinate system shift OFF (For L system only)
(PR) #11058 plc_opemsg0 Operator messages display device
(PR) #11059 Remote comm enable Remote connect enabled

Select the screen theme colors.
This selection affects the colors of the entire screen.
0: Standard colors (gray tone)
1: Blue tone
Specify how many EcoMonitorLight units (an energy meter made by Mitsubishi Electric for measuring the consumption and regeneration) are connected to the CNC.
---Setting range---
0: None
1 to 16: Number of connected modules
Default 0
Specify the PLC input signal (X) that is excluded from the PLC signal log.
Efficiency of the history analysis is improved by excluding the machine contact input/output signals or other frequently switched signals from the signal log.
When "0" is set, the history exclusion PLC input signal is disabled.
Thus X0 cannot be excluded from the signal log.
---Setting range---
0000 to 1FFF (hexadecimal)
Specify the PLC input signal (X) that is excluded from the PLC signal log.
Efficiency of the history analysis is improved by excluding the machine contact input/output signals or other frequently switched signals from the signal log.
When "0" is set, the history exclusion PLC input signal is disabled.
Thus X0 cannot be excluded from the signal log.
---Setting range---
0000 to 1FFF (hexadecimal)
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When "0" is set, the history exclusion PLC input signal is disabled.
Thus X0 cannot be excluded from the signal log.
---Setting range---
0000 to 1FFF (hexadecimal)
Specify the PLC input signal (X) that is excluded from the PLC signal log.
Efficiency of the history analysis is improved by excluding the machine contact input/output signals or other frequently switched signals from the signal log.
When "0" is set, the history exclusion PLC input signal is disabled.
Thus X0 cannot be excluded from the signal log.
---Setting range---
0000 to 1FFF (hexadecimal)
Specify the PLC input signal (X) that is excluded from the PLC signal log.
Efficiency of the history analysis is improved by excluding the machine contact input/output signals or other frequently switched signals from the signal log.
When "0" is set, the history exclusion PLC input signal is disabled.
Thus X0 cannot be excluded from the signal log.
---Setting range---
0000 to 1FFF (hexadecimal)
(PR) #11060 Screen theme color Select screen theme colors
(PR) #11061 Num of EcoMonitors The Number of EcoMonitorLight connected to CNC
(PR) #11062 NoHistDevIn.1 History exclusion PLC input signal 1
(PR) #11063 NoHistDevIn.2 History exclusion PLC input signal 2
(PR) #11064 NoHistDevIn.3 History exclusion PLC input signal 3
(PR) #11065 NoHistDevIn.4 History exclusion PLC input signal 4
(PR) #11066 NoHistDevIn.5 History exclusion PLC input signal 5

Specify the PLC output signal (Y) that is excluded from the PLC signal log.
Efficiency of the history analysis is improved by excluding the machine contact input/output signals or other frequently switched signals from the signal log.
When "0" is set, the history exclusion PLC output signal is disabled.
Thus Y0 cannot be excluded from the signal log.
---Setting range---
0000 to 1FFF (hexadecimal)
Specify the PLC output signal (Y) that is excluded from the PLC signal log.
Efficiency of the history analysis is improved by excluding the machine contact input/output signals or other frequently switched signals from the signal log.
When "0" is set, the history exclusion PLC output signal is disabled.
Thus Y0 cannot be excluded from the signal log.
---Setting range---
0000 to 1FFF (hexadecimal)
Specify the PLC output signal (Y) that is excluded from the PLC signal log.
Efficiency of the history analysis is improved by excluding the machine contact input/output signals or other frequently switched signals from the signal log.
When "0" is set, the history exclusion PLC output signal is disabled.
Thus Y0 cannot be excluded from the signal log.
---Setting range---
0000 to 1FFF (hexadecimal)
Specify the PLC output signal (Y) that is excluded from the PLC signal log.
Efficiency of the history analysis is improved by excluding the machine contact input/output signals or other

frequently switched signals from the signal log.
When "0" is set, the history exclusion PLC output signal is disabled.
Thus Y0 cannot be excluded from the signal log.
---Setting range---
0000 to 1FFF (hexadecimal)
Specify the PLC output signal (Y) that is excluded from the PLC signal log.
Efficiency of the history analysis is improved by excluding the machine contact input/output signals or other
frequently switched signals from the signal log.
When "0" is set, the history exclusion PLC output signal is disabled.
Thus Y0 cannot be excluded from the signal log.
---Setting range---
0000 to 1FFF (hexadecimal)
Select whether to display the home screen.
0: Not display
1: Display (display at power ON)
2: Display (not display at power ON)
(PR) #11067 NoHistDevOut.1 History exclusion PLC output signal 1
(PR) #11068 NoHistDevOut.2 History exclusion PLC output signal 2
(PR) #11069 NoHistDevOut.3 History exclusion PLC output signal 3
(PR) #11070 NoHistDevOut.4 History exclusion PLC output signal 4
(PR) #11071 NoHistDevOut.5 History exclusion PLC output signal 5
(PR) #11080 HomeScreen display HomeScreen display

When switching the program format from M system to L system with program format switch command (G188)
or when switching G code guidance from M system to L system by the menu [Edit]-[Guide M/L], the G code
systems after switching follow the setting of this parameter.
0: L system G code system 2
1: L system G code system 3
2: L system G code system 4
3: L system G code system 5
4: L system G code system 6
5: L system G code system 7
Select the type of counter display (workpiece coordinate position, relative position and absolute position)
while #8116 is 0 (coordinate rotation by parameter is enabled).
0: Display the position relative to the orthogonal coordinate system.
1: Display the position relative to the coordinate system rotated through the coordinate rotation by param eter.
(with EXT [external workpiece coordinate offset] added during automatic operation)
2: Display the position relative to the coordinate system rotated through the coordinate rotation by param eter.
(with EXT [external workpiece coordinate offset] constantly added)
Select how to specify the measurement reference point coordinates for manual tool length measurement I (L
system).
0: Use the machine zero point as the reference point
1: Use the coordinates of "#2015 tlml-" as the reference point (the same operation as when #1282 bit2 =
0 for M7)
2: Use the workpiece coordinate system offset (modal) as the reference point (the same operation as when
#1282 bit2 = 1 for M7)
Select whether to have the monitor screen show a PLC axis position counter.
0: Monitor screen does not show a PLC axis position counter.
1: Depending on the selected counter type, monitor screen is able to show.
Select whether to block the connection from GX Developer/GX Works2.
0: Allow the connection
1: Block the connection
Select whether the 3D machine interference check outputs an alarm or not when the tool is not mounted.
0: Not output an alarm when the tool check is disabled or the tool is not mounted.
1: Output an alarm when the tool check is disabled or the tool is not mounted.
Designate the destination menu Nos. to move monitor screen's main menus.
-1: Menu not displayed
0: No change
1 to 30: Destination menu No.
(PR) #11082 Lsys_change_Gtype L system G code system after program format switch
(for M system only)
#11086 rot_angle_dsp Counter display during coordinate rotation
(PR) #11087 Meas basic point Tool length measurement I reference point (for L sys tem only)
#11091 PLC counter valid Enable PLC axis counter
(PR) #11094 GX Restriction Inhibiting GX Developer/GX Works2 connection
#11100 3D_MChk_ToolAlm Alarm when tool interference check is disabled
(PR) #11101-
11130
Monitr menu(MTB)1-30 Monitor main menu (MTB) 1 to 30

Designate the destination menu Nos. to move setup screen's main menus.
-1: Menu not displayed
0: No change
1 to 30: Destination menu No.
Designate the destination menu Nos. to move edit screen's main menus.
-1: Menu not displayed
0: No change
1 to 30: Destination menu No.
Designate the destination menu Nos. to move diagn screen's main menus.
-1 : Not display the menu
0: No change
1 to 30: Destination menu No.
Designate the destination menu Nos. to move mainte screen's main menus.
-1 : Not display the menu

0: No change
1 to 30: Destination menu No.
Select the type of data to be input to the multi-analog input unit.
0: Analog voltage
1: Analog current
2: Temperature (resistance thermometer bulb, normal, Pt100, 3-wire)
3: Temperature (resistance thermometer bulb, normal, Pt100, 4-wire)
4: Temperature (resistance thermometer bulb, normal, Pt1000, 3-wire)
5: Temperature (resistance thermometer bulb, normal, Pt1000, 4-wire)
6: Temperature (resistance thermometer bulb, high-accuracy, Pt100, 3-wire)
7: Temperature (resistance thermometer bulb, high-accuracy, Pt100, 4-wire)
8: Temperature (resistance thermometer bulb, high-accuracy, Pt1000, 3-wire)
9: Temperature (resistance thermometer bulb, high-accuracy, Pt1000, 4-wire)
10: Temperature (thermocouple (K))
11: Temperature (thermocouple (J))
(PR) #11151-
11180
Setup menu (MTB) 1-30 Setup main menu (MTB) 1 to 30
(PR) #11201-
11230
Edit menu(MTB) 1-30 Edit main menu (MTB) 1 to 30
(PR) #11251-
11280
Diagn menu(MTB)1-30 Diagn main menu (MTB) 1 to 30
(PR) #11301-
11330
Mainte menu(MTB)1-30 Mainte main menu (MTB) 1 to 30
(PR) #11351-
11366
manasel_00-manasel_15 Multi-analog input data type ch0 to ch15

Set the speed of communication with BiSS encoder.
0: 5MHz
1: 3.33MHz
2: 2.5MHz
3: 2MHz
4: 1.67MHz
5: 1.43MHz
6: 1.25MHz
7: 1.11MHz
8: 1MHz
9: 0.91MHz
10: 0.83MHz
11: 0.77MHz
12: 0.71MHz
13: 667kHz
14: 625kHz
Set the data length (number of bits) for BiSS encoder.
(Note) When "0" is set, the data length defaults to 1 bit.
---Setting range---
0 to 64
Select the CRC generating polynomial used for communication with BiSS encoder.
0: CRC generating polynomial = 0x43
1: CRC invalid
2: CRC generating polynomial = 0xB
3: CRC generating polynomial = 0x13
4: CRC generating polynomial = 0x25
5: CRC generating polynomial = 0x89
6: CRC generating polynomial = 0x12F
7: CRC generating polynomial = 0x190D9
8: Custom
(Note) When "8" is set, enter a CRC generating polynomial into parameter "#11379 BiSS_enc1_CRC_cstm".
Set a CRC generating polynomial in this parameter when parameter "#11378 BiSS_enc1_CRC_slct" is set
to "8: Custom".
(Note) When "0" is set, the CRC generating polynomial defaults to "1".
---Setting range---
0 to FF (HEX)
Set the default value of CRC used in communication with BiSS encoder.
---Setting range---
0 to FFFF (HEX)
Specify the period of time that the NC operates after the brake wear diagnosis is completed before the brake
wear diagnostics incomplete signal (BWDNFm) is next turned on.
If set to "0", the interval is 8 hours.
---Setting range---
0 to 255 hours
(PR) #11376 BiSS_enc_rate BiSS encoder communication speed
(PR) #11377 BiSS_enc1_dat_leng BiSS encoder 1 data length
(PR) #11378 BiSS_enc1_CRC_slct BiSS encoder 1 CRC selection
(PR) #11379 BiSS_enc1_CRC_cstm BiSS encoder 1 CRC (custom)
(PR) #11380 BiSS_enc1_CRC_init BiSS encoder 1 CRC default value
(PR) #11386 BWD_INT Brake wear diagnostics interval

Select whether to activate the brake wear diagnostics incomplete state at power-on.
0: Activate the brake wear diagnostics incomplete state.

1: Not activate the brake wear diagnostics incomplete state.
Specify the behavior when the system variable #3006 (message display and stop) is commanded during
Suppression of single block stop (#3003/bit0 = 1) of system variable.
0: Block stop is not executed with #3006 command.
1: Block stop is executed with #3006 command.
Adjust the axis travel detection cycle for displaying actual feedrate (F) during emergency stop.
Increasing the magnification leads to smaller fluctuations in the actual feedrate readout (F).
0: Standard setting (1-fold)
1: 0.25-fold
2: 0.5-fold
3: 1-fold
4: 2-fold
5: 4-fold
6: 8-fold
(Note) This parameter is enabled when "#1125 real_f (Actual feedrate display)" is "1" .
This parameter specifies the ratio of vibration amplitude to feed per spindle revolution.
(Vibration cutting control is conducted with the amplitude of feed per spindle revolution multiplied by the am plitude-feed ratio.)
If this parameter is set to "0", the ratio will be 2.00.
---Setting range---
0 to 9.99
This parameter specifies the maximum value of the vibration amplitude-to-feed ratio.
If this parameter is set to "0", the maximum value will be 9.99.
---Setting range---
0 to 9.99
This parameter specifies the type of the vibration waveform.
0: Triangular wave
1: Sine wave
2: Rectangular wave
This parameter specifies the maximum number of vibrations per spindle revolution.
If this parameter is set to "0", the maximum number will be 31.50.
The frequency range selected for the VCC mode is switched as follows according to this parameter:
When in the range of 0.10 to 6.50: 5.63 to 281.25 (Hz)
When "0" or in the range of 6.51 to 31.50: 28.13 to 281.25 (Hz)
---Setting range---
0, 0.10 to 31.50 (oscillations)
(PR) #11387 BWD_INIT_NF Brake wear diagnostics incomplete state at power-on
#11482 ValBlkStopSelect System variable #3006 block stop switch
#11669 EMG F_disp Filt Actual feedrate detection cycle for displaying F during
emergency stop
#11670 AmpFeedRate_VCC Vibration amplitude-to-feed ratio
#11671 AmpFeedRateMax_VCC Maximum value of amplitude-to-feed ratio
#11673 VibType_VCC Vibration waveform type
#11678 VibPerRevMax_VCC Maximum number of vibrations per spindle revolution

Specify the starting number of common variables that store the measurement result.
Eight common variables starting from the specified number are used.
Specify the No. of common variable that is common to part systems.
* Select the number so that eight common variables beginning with the selected number are all common to
part systems.
---Setting range---
0, 100 to 142, 400 to 992, 100100 to 800192, 900000 to 907392
Specify the name of macro program for the workpiece installation error measurement.
The macro program name is output at initialization of workpiece installation error measurement macro.
The macro program is used for execution of the measurement.
---Setting range---
0, 9000 to 9099, 9300 to 9999, 100010000 to 100018999, 100030000 to 199999998
Specify the diameter of reference sphere that is used for rotation center error measurement.
If the set value is significantly different from the actual diameter, the sensor may be damaged.
---Setting range---
0.000, 1.000 to 100.000 (mm)
Select whether to activate emergency stop or display a warning if an error occurs on the Fieldbus expansion
card mounted in the slot EXT3 (or EXT1 for M80/M800S/E80).
(Note) The parameter does not apply to a CC-Link expansion card.
0: Emergency stop
1: Warning display
Select whether to activate emergency stop or display a warning if an error occurs on the Fieldbus expansion
card mounted in the slot EXT4 (or EXT2 for M80/M800S/E80).
(Note) The parameter does not apply to a CC-Link expansion card.
0: Emergency stop
1: Warning display
Select the method of specifying the cutting-edge angle that is used for turning-tool shape compensation in
Compound type fixed cycle for turning machining I.
0: Tool shape method
1: Tool compensation method
Select the part system to which the analog spindle synchronous tapping cycle is applied.
When 0 is set, the part system 1 is considered to be selected.
---Setting range---
0 to 8
#11700 EM Cmn No Starting common variable No. for storage of error mea surement result
#11701 WEM Mcr No Macro No. for workpiece installation error measurement
#11702 Ref Sphere Dia Reference sphere diameter
(PR) #11708 F-bus 1 Err Switch Fieldbus communication error switch 1
(PR) #11709 F-bus 2 Err Switch Fieldbus communication error switch 2
#11716 CutEdgeAngleType Turning tool shape compensation: setting method of
cutting-edge angle
(PR) #11717 astap_sysno Analog spindle synch tap: Part system selection

This parameter enables you to adjust the motion start timing of the tap axis and the spindle in analog spindle synchronous tapping.
(1) When the setting = 0
Not adjust the timing.
(2) When the setting > 0
Delay the start of tap axis command by the specified length of time.
This is effective when the analog spindle lags behind the tap axis.
(3) When the setting < 0
Delay the start of analog spindle command by the specified length of time.
This is effective when the analog spindle runs ahead of the tap axis.
---Setting range---
-50 to 50 (ms)
When the synchronous tapping with analog I/F spindle is active, the compensation amount for the spindle rotation speed is calculated using the feedback. The compensation amount can be adjusted by the factor specified in this parameter.
---Setting range---
0 to 300 (%)
When the synchronous tapping with analog I/F spindle is active, the first-order lag filter is applied to compen sate the spindle rotation speed. The time constant of the filter is specified by this parameter.
---Setting range---
0 to 500 (ms)
When the synchronous tapping with analog I/F spindle function is active, there may be a time lag between the command issued to the spindle and the feedback sent from the encoder. The time lag can be corrected by entering the length of time in this parameter.
---Setting range---
0 to 50 (ms)
Select the type of the enhanced PLC security mode.
0: No mode (invalid)
1: Write-protection mode
2: Read/Write-protection mode
Select the number of the project which can be used as "E/U project" by end users.
When "0" is set, the end-user mode is disabled.
When any number from 1 to 6 is selected, the end-user mode is enabled.
While the parameter "#11761 PLC Security Mode" is "0", the end-user mode is invalid irrespective of this pa rameter.
---Setting range---
1 to 6
0: No setting (End-user mode is invalid)
Specify the initial number of the Y devices that are free to use for end users.
The sum of this setting and "#11764 E/U Y Dev Size" cannot exceed 0600 (HEX).
---Setting range---
0000 to 05FF (HEX)
#11718 astap_timeadj Analog spindle synch tap: Timing adjustment
#11719 astap_Fbadj Synchronous tapping with analog I/F spindle: compen sation factor
#11720 astap_filt Synchronous tapping with analog I/F spindle: filter time constant
#11721 astap_Fbtime Synchronous tapping with analog I/F spindle: feedback time lag
(PR) #11761 PLC Security Mode Enhanced PLC security mode
(PR) #11762 E/U Project No. End-user project number
(PR) #11763 E/U Y Dev No. Initial number of Y device for end user

Specify the quantity of the Y devices that are free to use for end users.
The sum of this setting and "#11763 E/U Y Dev No." cannot exceed 0600 (HEX).
---Setting range---
0000 to 0600 (HEX)
Specify the initial number of the M devices that are common to projects, and are free to use for end users.
The sum of this setting and "#11766 E/U M Dev Size" cannot exceed 61440.
---Setting range---
0 to 61439
Specify the quantity of the M devices that are common to projects, and are free to use for end users.
The sum of this setting and "#11765 E/U M Dev No." cannot exceed 61440.
---Setting range---
0 to 61440
Specify the initial number of the D devices that are common to projects, and are free to use for end users.
The sum of this setting and "#11768 E/U D Dev Size" cannot exceed 8192.
---Setting range---
0 to 8191
Specify the quantity of the D devices that are common to projects, and are free to use for end users.
The sum of this setting and "#11767 E/U D Dev No." cannot exceed 8192.
---Setting range---
0 to 8192
Select whether to clear the values of RIO output devices at PLC STOP.
0: Retain the outputs of RIO
1: Clear the outputs of RIO
Specify the in-position range to be applied to the in-position check at the bottom of Punch Tap hole.
---Setting range---
0.000 to 99.999 (mm)
Specify the end point of the deburring process for the pattern PT1.5 or PT2.0, using the distance from the bottom of the hole.
---Setting range---
0.000 to 32.767 (mm)
Specify the angle of the rotation of the Punch Tap tool to be applied in tapping.
An angle of 180 degrees is used commonly for a double-helix Punch Tap tool.
When "0" is set, the angle will be interpreted as 180 degrees.

---Setting range---
0 to 360 (deg)
(PR) #11764 E/U Y Dev Size Quantity of Y devices for end user
(PR) #11765 E/U M Dev No. Initial number of M device for end user
(PR) #11766 E/U M Dev Size Quantity of M devices for end user
(PR) #11767 E/U D Dev No. Initial number of D device for end user
(PR) #11768 E/U D Dev Size Quantity of D devices for end user
(PR) #11769 Remote I/O Clear Initialization of remote I/O
#11771 PTapInp In-position range for Punch Tap (tap axis)
#11772 ptapd End point of deburring
#11773 ptapag Rotation angle of Punch Tap

Set this parameter when the workpiece has scratches during the machining that is switched from linear to circular when Variable torsion compensation function is used.
If the machined workpiece has scratches, set the larger value in the parameter setting.
When "0" is set, it is operated as "1".
---Setting range---
1 to 255
This parameter determines the upper limit of output adjustment in synchronous tapping with analog I/F spin dle.
Specify a limit on the adjustment of output rotation speed in terms of the percentage of commanded spindle speed.
If a value between 0 and 99 is specified, the system behaves as if "120" was specified.
---Setting range---
0 to 300 (%)
Specify the part system to display on the [Monitr] screen after power on.
This parameter is valid only when "#11019 2-system display" is enabled (other than "0").
(*) When "0" is specified, the unassigned part system with the smallest part system number is set.
---Setting range---
0 to 8
Specify the part system to display on the [Monitr] screen after power on.
This parameter is valid only when "#11019 2-system display" is enabled (other than "0").
(*) When "0" is specified, the unassigned part system with the smallest part system number is set.
---Setting range---
0 to 8
Specify the part system to display on the [Monitr] screen after power on.
This parameter is valid only when "#11019 2-system display" is enabled (other than "0").
(*) When "0" is specified, the unassigned part system with the smallest part system number is set.
---Setting range---
0 to 8
(PR) #11776 VDC_cntmax Acceleration rate retaining time
#11790 astap_cmpmax Factor for max speed after adjustment in sync tap w/ an alog I/F spindle
(PR) #11791 Disp area1 sysno Monitr-Area1 part system to display
(PR) #11792 Disp area2 sysno Monitr-Area2 part system to display
(PR) #11793 Disp area3 sysno Monitr-Area3 part system to display
(PR) #11794 Disp area4 sysno Monitr-Area4 part system to display

Register and authenticate a password to enable editing etc. of machine tool builder macro programs.
If a password is unregistered, (blank display), a password consisting of one to eight alphanumeric characters can be set. (lower case letters and a password only consisting of one zero (0) cannot be set.)
If a password has been registered (displays ****), when the registered password is entered, "---OK---" will be displayed and the protection will be canceled.
If a wrong password is entered, "setting error" will occur.
This parameter can be set only when Machine tool builder macro password management method type 2 is selected. (#1761 cfgPR11/bit6 = 1)
---Setting range---
One to eight alphanumeric characters (except for lower case letters and a password consisting of only one zero (0))
Select the part system to be assigned for loader operation.
1 to 8: $1 to $8
When not using this parameter, set "0".
---Setting range---
0 to 8
#11796 mmacpro Machine tool builder macro password
(PR) #11811 LDR Dedicated Sys Loader-dedicated part system (For M system only)

15.4 Axis Specifications Parameters
Set the rapid traverse feedrate for each axis.
(Note) The maximum value to be set depends on the machine specifications.
---Setting range---
1 to 1000000 (mm/min)
Set the maximum cutting feedrate for each axis.
Even if the feedrate in G01 exceeds this value, the clamp will be applied at this feedrate.
---Setting range---
1 to 1000000 (mm/min)
#2001 rapid Rapid traverse rate
#2002 clamp Cutting feedrate for clamp function

Set acceleration and deceleration control modes.
Set value is in hexadecimal.
HEX-1 Rapid traverse acceleration/deceleration type
0(bit3,2,1,0 = 0000): Step
1(bit3,2,1,0 = 0001): Linear acceleration/deceleration
2(bit3,2,1,0 = 0010): Primary delay
8(bit3,2,1,0 = 1000): Exponential acceleration and linear deceleration
F(bit3,2,1,0 = 1111): Soft acceleration/deceleration
(Note) Primary delay is applied because R1 setting has priority over R3 setting when R1 and R3 are both set to "1".
HEX-2 Cutting feed acceleration/deceleration type
0 (bit7,6,5,4 = 0000): Step
1 (bit7,6,5,4 = 0001): Linear acceleration/deceleration
2 (bit7,6,5,4 = 0010): Primary delay
8 (bit7,6,5,4 = 1000): Exponential acceleration and linear deceleration
F (bit7,6,5,4 = 1111): Soft acceleration/deceleration
HEX-3 Stroke end stop types
0 (bit9,8 = 00): Linear deceleration (Decelerates at G0t1)
1 (bit9,8 = 01): Linear deceleration (Decelerates at 2G0t1)
2 (bit9,8 = 10): Position loop step stop
3 (bit9,8 = 11): Position loop step stop
(Note) OT1(bit8) is valid under the following conditions (valid for dog type zero point return):
- Stop type: Linear deceleration
- Acceleration/deceleration mode: Exponential Acceleration and Linear deceleration
HEX-4
Not used. Set to "0".
(PR) #2003 smgst Acceleration and deceleration modes
bit F E D C B A 9 8 7 6 5 4 3 2 1 0
OT2 OT1 C3 C1 L R3 R1 LR
HEX 4 3 2 1
C2 R2
Stroke end stop types Cutting feed
acceleration
/deceleration type
Rapid traverse
acceleration
/deceleration type
G0t1 2 x G0t1 (OT1=1,OT2=0)
G0t1 (OT1=OT2=0)
Stroke end signal
Speed

Set a linear control time constant for rapid traverse acceleration and deceleration.
This time constant is enabled when LR (rapid traverse feed with linear acceleration/deceleration) or F (soft acceleration/deceleration) is selected in "#2003 smgst" (Acceleration and deceleration modes).
---Setting range---
1 to 4000 (ms)
#2004 G0tL G0 time constant (linear)
G0tL G0tL
Speed
Time

Set a primary-delay time constant for rapid traverse acceleration and deceleration.
This time constant is enabled when R1 (rapid traverse feed with primary delay) or R3 (exponential acceler ation and linear deceleration) is selected in "#2003 smgst" (Acceleration and deceleration modes).
When the soft acceleration/deceleration is selected, the second-step time constant will be used.
<Rapid traverse feed with primary delay>
<Rapid traverse feed with exponential acceleration and linear deceleration>
<Soft acceleration/deceleration>
When "#1219 aux03/bit7" is set to "0"
(Note) The time constant setting for the soft acceleration/deceleration can be changed by the setting of "#1219 aux03/bit7"
---Setting range---
1 to 5000 (ms)
Not used. Set to "0".
#2005 G0t1 G0 time constant(primary delay) / Second-step time constant for soft acceleration/deceleration
#2006 G0t2
G0t1 G0t1
Speed
Time
G0t1 2 x G0t1
Speed
Time
G0tL G0tL
G0t1
G0t1
G0t1
G0t1 Time
Speed

IB-1501279-S 450
Set a linear control time constant for cutting acceleration and deceleration.
The time constant will be enabled when LC (cutting feed with linear acceleration/deceleration) or F (soft ac celeration/deceleration) is selected in "#2003 smgst" (Acceleration or deceleration modes).
---Setting range---
1 to 4000 (ms)
Set the primary delay time constant for cutting acceleration and deceleration.
The time constant will be enabled when C1 (cutting feed with the primary delay) or C3 (cutting feed with ex ponential acceleration and linear deceleration) is selected in "#2003 smgst" (Acceleration/deceleration modes).
When the soft acceleration/deceleration is selected, the second-step time constant will be used.
<Cutting feed with primary delay>
<Cutting feed with exponential acceleration and linear deceleration>
<Soft acceleration/deceleration>
---Setting range---
1 to 5000 (ms)
#2007 G1tL G1 time constant (linear)
#2008 G1t1 G1 time constant (primary delay)/Second-step time con stant for soft acceleration/deceleration
G1tL G1tL
Speed
Time
G1t1 G1t1
Speed
Time
G1t1 2 x G1t1
Speed
Time
G1tL G1tL
G1t1 G1t1 G1t1 G1t1
Speed
Time
M800/M80/E80 Series Alarm/Parameter Manual
15 Machine Parameters
451 IB-1501279-S
Not used. Set to "0".
Set a feed forward gain for pre-interpolation acceleration/deceleration.
The larger the set value, the smaller the theoretical control error will be. However, if a machine vibration oc curs, set the smaller value.
---Setting range---
0 to 200 (%)
Set up the backlash compensation amount when the direction is reversed with the movement command in rapid traverse feed mode or in manual mode (except for handle feed mode) .
---Setting range---
-9999999 to 9999999
Set up the backlash compensation amount when the direction is reversed with the movement command in cutting mode.
G1 backlash is enabled in handle feed mode.
---Setting range---
-9999999 to 9999999
Set a soft limit area with reference to the zero point of the basic machine coordinate. Set the coordinate in the negative direction for the movable area of stored stroke limit 1. The coordinate in the positive direction is set in "#2014 OT+".
To narrow the available range in actual use, use the parameters "#8204 OT-" and "#8205 OT+".
When the same value (other than "0") is set in this parameter and "#2014 OT+", this function will be disabled.
---Setting range---
-99999.999 to 99999.999 (mm)
#2009 G1t2
#2010 fwd_g Feed forward gain
#2011 G0back G0 backlash
#2012 G1back G1 backlash
#2013 OT - Soft limit I -
OT- (Z)
OT- (X)
OT+ (Z)
OT+ (X)
M
Basic machine coordinate
Movable area
M800/M80/E80 Series Alarm/Parameter Manual
15 Machine Parameters
IB-1501279-S 452
Set a soft limit area with reference to the zero point of the basic machine coordinate. Set the coordinate in the positive direction for the movable area of stored stroke limit 1. The coordinate in the negative direction is set in "#2013 OT-".
To narrow the available range in actual use, use the parameters "#8204 OT-" and "#8205 OT+".
When the same value (other than "0") is set in this parameter and "#2013 OT-", this function will be disabled.
---Setting range---
-99999.999 to 99999.999 (mm)
Set a sensor position in the negative direction when using the tool setter.
When the TLM is used, set up the distance of a tool replacement point (reference point) for measuring the tool length from the zero point to the measurement reference point (surface).
(Note) In the case of the basic axis and inclined axis of the inclined axis specifications, set the position on the orthogonal coordinate.
---Setting range---
-99999.999 to 99999.999 (mm)
Set the sensor position in the positive direction when using the tool setter.
When the TLM is used, set the distance from a tool change point (reference position) to the measurement basic point (surface) in order to measure the tool length.
(Note) In the case of the basic axis and inclined axis of the inclined axis specifications, set the position on the orthogonal coordinate.
---Setting range---

-99999.999 to 99999.999 (mm)
Set the position loop gain for special operations (synchronized tapping, interpolation with spindle C axis, etc.).
Set the value in 0.25 increments.
The standard setting value is "10".
---Setting range---
0.25 to 200.00 (rad/s)
Select when performing test operation without connecting the drive unit and motor.
0: Normal operation
1: Test operation
When "1" is set, the operation will be possible even if drive units and motor are not connected, because the drive system alarm will be ignored.
This parameter is used for test operation during start up: Do not use during normal operation. If "1" is set during normal operation, errors will not be detected even if they occur.
Set the steps required for reference position return for each axis.
0: Not execute reference position return.
1 to max. number of NC axes: Steps required for reference position return
#2014 OT + Soft limit I +
#2015 tlml- Negative direction sensor of tool setter
#2016 tlml+ Positive direction sensor of tool setter or TLM standard length
#2017 tap_g Axis servo gain
(PR) #2018 no_srv Operation with no servo control
#2019 revnum Return steps
OT- (Z)
OT- (X)
OT+ (Z)
OT+ (X)
M
Basic machine coordinate
Movable area

Set the distance from the second reference position to the position for checking that the spindle orientation has completed during second reference position return.
When the set value is "0", the above check will be omitted.
---Setting range---
0 to 99999.999 (mm)
Set the maximum speed outside the soft limit range.
---Setting range---
0 to 1000000 (mm/min)
Select whether to disable a soft limit check during the second to the fourth reference position return in both automatic and manual operation modes.
0: Enable
1: Disable
Set the minimum speed outside the soft limit range during the second to the fourth reference position return.
---Setting range---
0 to 1000000 (mm/min)
Set the maximum synchronization error, allowable at the synchronization error check, for the master axis.
When "0" is set, the error check will not be carried out.
---Setting range---
0 to 99999.999 (mm)
During simple C-axis synchronous control: 0 to 99999.999()
Set the coordinate of the lower limit of the area where the stored stroke limit IB is inhibited.
Set a value from zero point in the basic machine coordinate system.
If the same value (non-zero) with the same sign as that of "#2062 OT_IB+" is set, the stored stroke limit IB function will be disabled.
---Setting range---
-99999.999 to 99999.999 (mm)
Set the coordinate of the upper limit of the area where the stored stroke limit IB is inhibited.
Set a value from zero point in the basic machine coordinate system.
---Setting range---
-99999.999 to 99999.999 (mm)
Select the type that applies the settings of "#2062 OT_IB+" and "#2061 OT_IB-" in stored stroke limit I.
0: Soft limit IB
1: Disable
2: Soft limit IC
3: Soft limit is checked for the inclined axis control axis with the program coordinate system.
(Note) This is valid only for inclined axis' basic axis and inclined axis.
#2020 o_chkp Spindle orientation completion check during second reference position return
#2021 out_f Maximum speed outside soft limit range (For L system only)
#2022 G30SLX Validate soft limit (automatic and manual)
#2023 ozfmin Set up ATC speed lower limit
#2024 synerr Allowable error
#2061 OT_1B- Soft limit IB-
#2062 OT_1B+ Soft limit IB+
#2063 OT_1B type Soft limit IB type

Set a feed forward gain for G00 pre-interpolation acceleration/deceleration.
The larger the setting value, the shorter the positioning time during in-position checking.
If a machine vibration occurs, set the smaller value.
---Setting range---
0 to 200 (%)

Set the percentage to increase or decrease the arc radius error correction amount for each axis.
---Setting range---
-100.0 to +100.0 (%)
Set the number of divisions of one turn of the rotary axis under control.
(Example)
When "36" is set, one turn is supposed to be 36.000.
(Note 1) When "0" is set, the normal rotary axis (360.000 degrees for one turn) is assumed.
(Note 2) If this parameter is changed when the absolute position detection specification is used, absolute po sition data will be lost. Initialization must be performed again.
---Setting range---
0 to 999
Select whether the axis is to be under the inclined-axis control or to be the basic axis corresponding to the
inclined axis.
0: Not to be under the inclined-axis control
1: Inclined axis
2: Basic axis corresponding to inclined axis
(Note) Each of "1" and "2" values must be set for only one axis. If either value is set for two or more axes,
inclined-axis control does not work.
Set the most minus (-) side position where restart search is possible.
If the machine is positioned on the more minus (-) side than the set value in T-command restart mode, restart
search in type 3 will be disabled.
---Setting range---
-99999.999 to 99999.999 (mm)
Under the standard specifications, the "Reference position return near-point detection" signal is assigned to
a fixed device. Set the device in this parameter to assign this signal to a position other than the fixed device.
(Note1) This parameter is enabled in the following conditions.
NC axis: When "#1226 aux10/bit5" is set to "1".
PLC axis: When "#1246 set18/bit7" is set to "1".
(Note 2) When this parameter is valid, do not set the existing device number. If the existing device number
is set, an emergency stop will occur. However, no device number check will be performed for an axis to
which the "Near-point dog ignored" signal or the "PLC axis near-point dog ignored" signal is input.
(Note 3) The "Reference position return near-point detection" signal is required to be directly input to the op eration panel I/O unit or the remote I/O unit. The device assigned to an expansion unit such as CC-Link,
Profibus, etc, cannot be used. Signals which set in a sequence program cannot be used.
---Setting range---
0000 to 02FF (HEX)
#2068 G0fwdg G00 feed forward gain
#2069 Rcoeff Axis arc radius error correction coefficient
(PR) #2070 div_RT Rotational axis division count
(PR) #2071 s_axis Inclined axis selection (for L system only)
#2072 rslimt Restart limit
#2073 zrn_dog Origin dog Random assignment device

Under the standard specifications, the "Stroke end (+)" signal is assigned to a fixed device. Set the device in
this parameter to assign this signal to a position other than the fixed device.
(Note1) This parameter is enabled in the following conditions.
NC axis: When "#1226 aux10/bit5" is set to "1".
PLC axis: When "#1246 set18/bit7" is set to "1".
(Note 2) When this parameter is valid, do not set the existing device number. If the existing device number
is set, an emergency stop will occur. However, no device number check will be performed for an axis to
which the "OT ignored" signal or the "PLC axis OT ignored" signal is input.
(Note 3) The "Stroke end" signal is required to be directly input to the operation panel I/O unit or the remote
I/O unit. The device assigned to an expansion unit such as CC-Link, Profibus, etc, cannot be used. Signals
which set in a sequence program cannot be used.
---Setting range---
0000 to 02FF (HEX)
Under the standard specifications, the "Stroke end (-)" signal is assigned to a fixed device. Set the device in
this parameter to assign this signal to a position other than the fixed device.
(Note1) This parameter is enabled in the following conditions.
NC axis: When "#1226 aux10/bit5" is set to "1".
PLC axis: When "#1246 set18/bit7" is set to "1".
(Note 2) When this parameter is valid, do not set the existing device number. If the existing device number
is set, an emergency stop will occur. However, no device number check will be performed for an axis to
which the "OT ignored" signal or the "PLC axis OT ignored" signal is input.
(Note 3) The "Stroke end" signal is required to be directly input to the operation panel I/O unit or the remote
I/O unit. The device assigned to an expansion unit such as CC-Link, Profibus, etc, cannot be used. Signals
which set in a sequence program cannot be used.
---Setting range---
0000 to 02FF (HEX)
Select whether the axis is a normal axis or an index table indexing axis.
0: Normal axis
1: Index table indexing axis
(Note) This parameter is valid only for the NC axis. The parameter is invalid if set for the PLC axis.
Set the in-position width for G0.
Between SV024 and this parameter, the parameter with a larger value will be applied.
When "0" is set, this parameter will be invalid. Only SV024 will be available.
When "#1205 G0dbcc" is "1", SV024 is used as the G0 in-position width.
---Setting range---
0.000 to 99.999 (mm)
Set the in-position width for G1.
Between SV024 and this parameter, the parameter with a larger value will be applied.
When "0" is set, this parameter will be invalid. Only SV024 will be available.
---Setting range---
0.000 to 99.999 (mm)
Set the coefficient to be applied to the compensation amount for the insufficient amount caused by servo de lay during chopping.
---Setting range---
0 to 10 (standard value: 8)
#2074 H/W_OT+ H/W OT+ Random assignment device

#2075 H/W_OT- H/W OT- Random assignment device
#2076 index_x Index table indexing axis
#2077 G0inps G0 in-position width
#2078 G1inps G1 in-position width
(PR) #2079 chcomp Chopping compensation coefficient

Set the tolerance between the commanded stroke and actual stroke.
Compensation will be applied during chopping so that the result of [command width - maximum stroke of top or bottom dead point/ 2] will be within this tolerance.
---Setting range---
0 to 10.000 (mm)
Set the clamp speed in chopping operation.
When "0" is set, the clamp speed will be determined by "#2002 clamp".
---Setting range---
0 to 60000 (mm/min)
Set the No. for each axis in order from the 1st automatically returning axis to the restart position.
When "0" is set, the axis will not return.
Note that when "0" is set for all axes, all of the axes will return simultaneously.
(Note) On the absolute position system, when performing the restart search just after power ON, and when the axis that is the order 0 is moved by the follow-up, an operation error(M01 0128) may occur.
---Setting range---
0 to 16
Select how to operate the unidirectional positioning when the positioning command (G00) is issued.
0: Carry out unidirectional positioning according to the command and modal.
1: Carry out unidirectional positioning regardless of the command and modal.
Set "1" for the axis to carry out the unidirectional positioning at every positioning command, regardless of whether the unidirectional positioning command and modal are issued.
<Related parameters>
"#8209 G60 SHIFT" and "#2076 index_x"
Set the maximum feed rate for each axis when the external deceleration signal is ON.
This parameter is valid when "#1239 set11/bit6" is set to "1".
---Setting range---
0 to 1000000 (mm/min)
Set the polarity of synchronized axis with respect to reference axis to the bit corresponding to each axis.
0: Relative to reference axis, polarity is positive
1: Relative to reference axis, polarity is negative
---Setting range---
0 to FF (hexadecimal)
Set the reference axis for synchronous control with the 2nd axis name (axname2). A numerical character cannot be set as the 1st character.
---Setting range---
1st character: A to Z
2nd character: A to Z, 1 to 9
#2080 chwid Bottom dead center position width
#2081 chclsp Maximum chopping speed
#2082 a_rstax Restart position return order
#2084 G60_ax Unidirectional positioning operation selection
#2086 exdcax External deceleration speed
#2087 syncnt Synchronization/superimposition control setting for each axis
#2088 bsax_sy Reference axis for synchronous control

Set the reference axis of superimposition control using the 2nd axis name (axname2).
Always use an alphabetic character (A to Z) for the first character.
(Note) This parameter is enabled only when "#1280 ext16/bit7" (Control axis superimposition command method) is set to "0".
---Setting range---
Two digits between A to Z and 1 to 9
(Setting is cleared when "0" is set)
Set the rapid traverse rate for superimposition control.
(Equivalent to "#2001 rapid" (Rapid traverse rate).)
---Setting range---
0 to 1000000 (mm/min)
Set the cutting feed clamp speed for superimposition control.
(Equivalent to "#2002 clamp" (Cutting feed clamp speed).)
---Setting range---
0 to 1000000 (mm/min)
Set the G0 time constant (linear) for superimposition control.
(Equivalent to "#2004 G0tL G0 time constant (linear)".)
---Setting range---
0 to 4000 (ms)
Set the G0 time constant (primary delay) for superimposition control.
(Equivalent to "#2005 G0t1 G0 time constant (primary delay".)
---Setting range---
0 to 5000 (ms)
Set the G1 time constant (linear) for superimposition control.
(Equivalent to "#2007 G1tL G1 time constant (linear)".)
---Setting range---
0 to 4000 (ms)
Set the G1 time constant (primary delay) for superimposition control.
(Equivalent to "#2008 G1t1 G1 time constant (primary delay)".)
---Setting range---
0 to 5000 (ms)
Set the minimum clamp speed for corner deceleration in the high-accuracy control mode. Normally set "0".

(Note) This parameter is invalid during SSS control.
---Setting range---
0 to 1000000 (mm/min)
#2089 bsax_pl Superimposition control reference axis
#2090 plrapid Rapid traverse rate for superimposition control
#2091 plclamp Cutting feed clamp speed for superimposition control
#2092 plG0tL G0 time constant for superimposition control (linear)
#2093 plG0t1 G0 time constant for superimposition control (primary
delay)
#2094 plG1tL G1 time constant for superimposition control (linear)
#2095 plG1t1 G1 time constant for superimposition control (primary
delay)
#2096 crncsp Minimum corner deceleration speed

Set the sensor position (on sub side) in the (-) direction when using the tool setter on the sub spindle side.
(Note) In the case of the basic axis and inclined axis of the inclined axis specifications, set the position on
the orthogonal coordinate.
---Setting range---
-99999.999 to 99999.999 (mm)
Set the sensor position (on sub side) in (+) direction when using the tool setter on the sub spindle side.
(Note) In the case of the basic axis and inclined axis of the inclined axis specifications, set the position on
the orthogonal coordinate.
---Setting range---
-99999.999 to 99999.999 (mm)
Set the state of the compensation of the rotary axis workpiece position.
0: Disabled
1: Enabled
Set a linear control time constant for variable speed skip acceleration and deceleration, or for an occasion
where a skip command issues acceleration/deceleration time constant enabled (R1).
The time constant will be enabled when LC (cutting feed with linear acceleration/deceleration) or F (soft ac celeration/deceleration) is selected in "#2003 smgst" (Acceleration or deceleration modes).
When set to "0", the time constant set by "#2007 G1tL" is used.
---Setting range---
0 to 4000 (ms)
Set a primary-delay time constant for variable speed skip acceleration and deceleration, or for an occasion
where a skip command issues acceleration/deceleration time constant enabled (R1).
The time constant will be enabled when C1 (cutting feed with the primary delay) or C3 (cutting feed with ex ponential acceleration and linear deceleration) is selected in "#2003 smgst" (Acceleration/deceleration
modes). When the soft acceleration/deceleration is selected, the second-step time constant will be used.
When set to "0", the time constant set by "#2008 G1t1" is used.
---Setting range---
0 to 5000 (ms)
Set the indexing unit to which the rotary axis can be positioned.
---Setting range---
0 to 360 ()
Set the rapid traverse rate for each axis in the high-accuracy control mode. When 0 is set, "#2001 rapid" is
used.
---Setting range---
0 to 1000000 (mm/min)
Set the cutting feed maximum speed for each axis in the high-accuracy control mode. When 0 is set, "#2002
clamp" is used.
---Setting range---
0 to 1000000 (mm/min)
#2097 tlml2- Sub side tool setter - direction sensor
#2098 tlml2+ Sub side tool setter + direction sensor
#2100 rpcax Rotary axis workpiece position compensation valid
#2102 skip_tL Skip time constant linear
#2103 skip_t1 Skip time constant primary delay / Second-step time
constant for soft acceleration/deceleration
#2106 Index unit Indexing unit
#2109 Rapid (H-precision) Rapid traverse rate for high-accuracy control mode
#2110 Clamp (H-precision) Cutting feed clamp speed for high-accuracy control
mode

Set whether to enable the quadrant protrusion compensation.
0: Disable
1: Enable
If either of "#2112 Blf motor inertia", "#2115 Blf motor stl trq" or "#2113 Blf visc friction" is set to "0", quadrant
protrusion compensation will not work even if this parameter is set to "1".
Set the motor inertia for quadrant protrusion compensation.
Refer to the servo manual and input the value appropriate for the motor.
---Setting range---
1 to 32000 (10-6kgm2)
Set the viscous friction for quadrant protrusion compensation.
After setting the other parameters to the appropriate values, monitor the machine end and gradually adjust
the value.
If this parameter setting is small, a recess will form on the inner side of the circle, and if large, a protrusion
will form on the outer side of the circle. When the value is appropriate, a spike-shaped quadrant protrusion
will form based on normal step-shaped backlash.
---Setting range---
1 to 32767 (1/16 Nm/(rad/s))
Set the feed forward gain for quadrant protrusion compensation.
After setting the other parameters to the appropriate values, monitor the machine end and gradually adjust
the value.
If this parameter setting is small, a large quadrant protrusion will form, and if large, a recess will form on the
inner side of the circle.

---Setting range---
0 to 1000 (%)
Set the motor rated current for quadrant protrusion compensation.
Refer to the servo manual and input the value appropriate for the motor.
---Setting range---
1 to 16000 (1/256 Nm)
Select which door group of the speed monitoring the spindle belongs to.
0000: Door 1 group.
0001: Door 1 group.
0002: Door 2 group.
0003: Door 1 and 2 group.
The speed monitoring will not be executed when "#2313 SV113 SSF8/bitF" is OFF regardless of this param eter.
The selected door group must be set when setting the synchronous control.
The spindle/C axis control enables the door selection in "#3071 SscDrSelSp" for the corresponding spindle.
Select whether the variable backlash is to be disabled/enabled/continuous, or variable backlash II enabled.
0: Disabled
1: Enable
2: Continuous
3: Enable variable backlash II
("#2011 G0back" and "#2012 G1back" will not work unless "0: Disable" is selected.)
#2111 Blf valid Quadrant protrusion compensation valid
#2112 Blf motor inertia Motor inertia
#2113 Blf visc friction Viscous friction
#2114 Blf fwdg Compensation FF gain
#2115 Blf motor stl trq Motor stall torque
(PR) #2118 SscDrSel Speed monitor Door selection
#2121 vbacklash valid Variable backlash valid/continuous or Variable back lash II valid

Set the compensation amount for the range of each position during rapid traverse.
(+: B1, =: B2, -: B3 on the compensation amount table)
---Setting range---
-99999999 to 99999999 (Interpolation unit)
Set the compensation amount for the range of each position during rapid traverse.
(+: B1, =: B2, -: B3 on the compensation amount table)
---Setting range---
-99999999 to 99999999 (Interpolation unit)
Set the compensation amount for the range of each position during rapid traverse.
(+: B1, =: B2, -: B3 on the compensation amount table)
---Setting range---
-99999999 to 99999999 (Interpolation unit)
Set the compensation amount for the range of each position during cutting feed.
(+: A1, =: A2, -: A3 on the compensation amount table)
---Setting range---
-99999999 to 99999999 (Interpolation unit)
Set the compensation amount for the range of each position during cutting feed.
(+: A1, =: A2, -: A3 on the compensation amount table)
---Setting range---
-99999999 to 99999999 (Interpolation unit)
Set the compensation amount for the range of each position during cutting feed.
(+: A1, =: A2, -: A3 on the compensation amount table)
---Setting range---
-99999999 to 99999999 (Interpolation unit)
Set the speed range during cutting feed.
(The speed less than 1 is the low speed, and the speed exceeding 2 is the high speed.)
Note that the speed range is identified in the order of low, high and medium speed. Consider whether the set value should be larger or smaller than other values.
---Setting range---
0 to 480000 (mm/min)
Set the speed range during cutting feed.
(The speed less than 1 is the low speed, and the speed exceeding 2 is the high speed.)
Note that the speed range is identified in the order of low, high and medium speed. Consider whether the set value should be larger or smaller than other values.
---Setting range---
0 to 480000 (mm/min)
#2122 G0vback+ Variable G0 backlash +
#2123 G0vback= Variable G0 backlash =
#2124 G0vback- Variable G0 backlash -
#2125 G1vback+ Variable G1 backlash +
#2126 G1vback= Variable G1 backlash =
#2127 G1vback- Variable G1 backlash -
#2128 G1vback feed1 G1 variable backlash compensation amount change over speed 1
#2129 G1vback feed2 G1 variable backlash compensation amount change over speed 2

Set the range of the distance during cutting feed.
(The distance less than 1 is the small distance, and the distance exceeding 2 is the large distance.)
Note that the distance range is identified in the order of small, large and medium. Consider whether the set value should be larger or smaller than other values.
---Setting range---
0 to 999999.999999 (mm)
Set the range of the distance during cutting feed.
(The distance less than 1 is the small distance, and the distance exceeding 2 is the large distance.)
Note that the distance range is identified in the order of small, large and medium. Consider whether the set value should be larger or smaller than other values.
---Setting range---

0 to 999999.999999 (mm)
Set the range of the center of the end point position.
(The range less than position 1 is the - range, and the range exceeding position 2 is the + range.)
The end point position range is determined in the order of -, + , and center. Consider whether the set value
should be larger or smaller than other values.
(Note 1) If continuous variable backlash is set with "#2121 vbacklash valid", position 1 will be set as the po sition - point and position 2 will be set as the position + point.
(Note 2) When the size relation of the compensation amount changeover speed and distance 1 and 2 is not
appropriate while the variable backlash compensation is valid, the followings will be applied:If the backlash
speed and distance are smaller than the compensation amount changeover speed and distance 1, both the
speed and distance will be small; if larger than the compensation amount changeover speed and distance
2, both the speed and distance will be large.
---Setting range---
-999999.999999 to 999999.999999 (mm)
Set the range of the center of the end point position.
(The range less than position 1 is the - range, and the range exceeding position 2 is the + range.)
The end point position range is determined in the order of -, + , and center. Consider whether the set value
should be larger or smaller than other values.
(Note 1) If continuous variable backlash is set with "#2121 vbacklash valid", position 1 will be set as the po sition - point and position 2 will be set as the position + point.
(Note 2) When the size relation of the compensation amount changeover speed and distance 1 and 2 is not
appropriate while the variable backlash compensation is valid, the followings will be applied:If the backlash
speed and distance are smaller than the compensation amount changeover speed and distance 1, both the
speed and distance will be small; if larger than the compensation amount changeover speed and distance
2, both the speed and distance will be large.
---Setting range---
-999999.999999 to 999999.999999 (mm)
Set the arc compensation coefficient.
---Setting range---
0 to 300(%)
#2130 G1vback dist1 G1 variable backlash compensation amount change over distance 1
#2131 G1vback dist2 G1 variable backlash compensation amount change over distance 2
#2132 vback pos1 Variable backlash compensation amount changeover
end point position 1
#2133 vback pos2 Variable backlash compensation amount changeover
end point position 2
#2134 vback arc K Variable backlash arc compensation coefficient

Select the speed range to be used as the reference position.
0: Low speed
1: Medium speed
2: High speed
Select the end point range to be used as the reference position.
0: Position + range
1: Position center range
2: Position - range
Select the entry direction to be used as the reference position.
0: Entry direction +
1: Entry direction -
Set the position center point. (This is used only when continuous variable backlash is set with "#2121 vback lash valid".) Set a value between "#2132 vback pos1" and "#2133 vbackpos2" for the position center point.
(Note) When the size relation of the compensation amount changeover speed and distance 1 and 2 is not
appropriate while the variable backlash compensation is valid, the followings will be applied: If the backlash
speed and distance are smaller than the compensation amount changeover speed and distance 1, both the
speed and distance will be small; if larger than the compensation amount changeover speed and distance
2, both the speed and distance will be large.
---Setting range---
-999999.999999 to 999999.999999 (mm)
Select whether to enable or temporarily disable the OMR-FF control when OMR-FF is valid.
0: Enable
1: Temporarily disable
When "1" is selected while OMR-FF is valid, OMR-FF can be temporarily disabled and conventional feed for ward control can be applied instead.
Set the error detection time for when an error of command speed monitoring or feedback speed monitoring
is detected during servo OFF.
An alarm will occur if the time, for which the speed has been exceeding the safe speed or safe rotation speed,
exceeds the error detection time set in this parameter.
If "0" is set, it will be handled as 200 (ms).
---Setting range---
0 to 9999(ms)
#2135 vback feed refpt Variable backlash reference position selection (speed)
#2136 vback pos refpt Variable backlash reference position selection (end
point position)
#2137 vback dir refpt Variable backlash reference position selection (entry di rection)
#2138 vback pos center Continuous variable backlash position center point
#2139 omrff_off OMR-FF invalid
(PR) #2140 Ssc Svof Filter Speed monitor Error detection time during servo OFF

Set the first-step time constant for the chopping axis when soft acceleration/deceleration is applied.
Note that, however, there may be cases where actual time constant is shorter than the set time constant,
because the time constant is automatically calculated according to the feedrate so that the acceleration rate
during acceleration/deceleration (clamp speed/chopping time constant) will be constant.
When "0" is set, "#2007 G1tL" will be valid.
---Setting range---
0 to 4000 (ms)
Set the second-step time constant for the chopping axis when soft acceleration/deceleration is applied.
Note that, however, there may be cases where actual time constant is shorter than the set time constant,
because the time constant is automatically calculated so that the ratio between first-step and second-step

time constant will be constant.
When "0" is set, "#2008 G1t1" will be valid.
---Setting range---
0 to 4000 (ms)
Set "0" for the reference axis, and set the polarity of the superimposed axis relative to the reference axis.
0: Relative to reference axis, polarity is positive
1: Relative to reference axis, polarity is negative
#2141 chtL Chopping first-step time constant for soft acceleration/
deceleration
#2142 cht1 Chopping second-step time constant for soft accelera tion/deceleration
#2143 polar Control axis relative polarity
chclsp
cht1
chtL
Speed[mm/min]
Time[ms]

X2
X1
Z2(Superimposed axis)
polar=1
Z1(Reference axis)
polar=0

Set each axis's position of the base machine coordinate zero point when an arbitrary point M on the machine
is regarded as a base point.
Unify the directions of all part systems' machine zero point positions with the direction of the machine coor dinate system of the 1st part system.
If the 1st part system doesn't have a parallel axis, determine the direction arbitrarily.
---Setting range---
-99999.999 to 99999.999 (mm)
Set the distance for specifying the compensation change rate in position-dependent increasing-type back lash compensation.
When "#2148 Blf_E1" is set to "0", the position-dependent increasing-type backlash compensation function
will be disabled.
---Setting range---
0.000 to 99999.999 (mm)
#2144 baseps Base machine coordinate zero point relative distance
#2146 Blf_L1 Reference distance for position-dependent increasing type backlash compensation 1
Z1 baseps
Z2 baseps
X2
baseps
X1
baseps
M
Example: System1(X1, Z1), System2(X2, Z2)
System2
base machine coordinate zero point
System1
base machine coordinate zero point
Blf_E1
Blf_E2
Blf_L2 Blf_L1

Set the distance for specifying the compensation change rate in position-dependent increasing-type back lash compensation.
When "#2148 Blf_E1" is set to "0", the position-dependent increasing-type backlash compensation function
will be disabled.
---Setting range---
0.000 to 99999.999 (mm)
Set the compensation amount for specifying the compensation change rate in position-dependent increas ing-type backlash compensation.
When "#2148 Blf_E1" is set to "0", the position-dependent increasing-type backlash compensation function
will be disabled.
---Setting range---
0 to 9999999 (Machine error compensation unit)
Set the compensation amount for specifying the compensation change rate in position-dependent increas ing-type backlash compensation.
When "#2148 Blf_E1" is set to "0", the position-dependent increasing-type backlash compensation function
will be disabled.
---Setting range---
0 to 9999999 (Machine error compensation unit)
#2147 Blf_L2 Reference distance for position-dependent increasing type backlash compensation 2
#2148 Blf_E1 Reference amount of position-dependent increasing type backlash compensation 1
#2149 Blf_E2 Reference amount of position-dependent increasing type backlash compensation 2
Blf_E1
Blf_E2
Blf_L2 Blf_L1
Blf_E1
Blf_E2
Blf_L2 Blf_L1
Blf_E1
Blf_E2
Blf_L2 Blf_L1

Set the farthest distance of the rotating part from the rotation center for executing the 3D machine interfer ence check. When "0" is set, this distance will conform to the rotary axis' specification speed.
---Setting range---
0.000 to 99999.999 (mm)
Set the maximum speed which can be driven with the motor's maximum torque.
(Note 1) This parameter's setting value must be smaller than "#2001 rapid Rapid traverse". If bigger, constant
inclination acceleration/deceleration will be applied.
(Note 2) If rapid traverse constant-gradient multi-step acceleration/deceleration is valid, and also if this pa rameter is set to "0", constant inclination acceleration/deceleration will be applied.
---Setting range---
0 to 1000000 (mm/min)
Set the rate in proportion to the maximum acceleration rate in rapid traverse.
(Note) If this parameter is set to "0" or "100", constant inclination acceleration/deceleration will be applied.
---Setting range---
0 to 100 (%)
Set the acceleration rate up to the rated speed of rapid traverse constant-gradient multi-step acceleration/
deceleration.
(Note) If this parameter is set to "0", constant inclination acceleration/deceleration will be applied.
---Setting range---
0 to 4000 (ms)
Set the feed forward gain when controlling as workpiece axis of tool spindle synchronization II (hobbing).
---Setting range---
0 to 200 (%)
#2150 Rot_len Farthest distance from rotary axis center
#2151 rated_spd Rated speed
#2152 acc_rate Acceleration rate in proportion to the maximum acceler ation rate
#2153 G0t_rated G0 time constant up to rated speed (multi-step acceler ation/deceleration)
#2155 hob_fwd_g Feed forward gain for hobbing machining
rated_spd rapid
rapid
rated_spd
G0t_rated
Torque Speed
Speed Time
amax
amin
amax
amin acc_rate = x 100
rated_spd rapid
Acceleration
Speed

When axis-specific acceleration tolerance control is ON:
Specify the maximum speed to be used for calculating each axis' acceleration tolerance. When "0" is set,
"#2001 rapid" is used.
When variable-acceleration pre-interpolation acceleration/deceleration is ON:
Specify the maximum speed to be used for calculating each axis' acceleration. When "0" is set, "#1206
G1bF" is used.
When both axis-specific acceleration tolerance control and variable-acceleration pre-interpolation accelera tion/deceleration are ON:
Specify the maximum speed to be used for calculating each axis' acceleration. When "0" is set, "#1206
G1bF" is used.
When neither axis-specific acceleration tolerance control nor variable-acceleration pre-interpolation acceler ation/deceleration is ON:
This parameter is disabled.
---Setting range---
0 to 999999 (mm/min)
When axis-specific acceleration tolerance control is ON:
Specify the time constant (a time to be taken until reaching the maximum speed) to be used for calculating
each axis' acceleration tolerance. When "0" is set, "#2004 G0tL" is used.
When variable-acceleration pre-interpolation acceleration/deceleration is ON:
Specify the time constant (a time to be taken until reaching the maximum speed) to be used for calculating
each axis' acceleration. When "0" is set, "#1207 G1btL" is used.
When both axis-specific acceleration tolerance control and variable-acceleration pre-interpolation accelera tion/deceleration are ON:
Specify the time constant (a time to be taken until reaching the maximum speed) to be used for calculating
each axis' acceleration. When "0" is set, "#1207 G1btL" is used.
When neither axis-specific acceleration tolerance control nor variable-acceleration pre-interpolation acceler ation/deceleration is ON:
This parameter is disabled.
---Setting range---
0 to 5000 (ms)
Specify the compensation coefficient to be used for adjusting a path error and clamp speed at a corner for
each axis during the high-accuracy control mode. If the setting value is larger, the edge accuracy will im prove, but the cycle time may be longer because the corner speed will slow down.
This parameter is disabled when the axis-specific acceleration tolerance control is OFF.
---Setting range---
-1000 to 99 (%)
Set the upper limit value of feedrate for each axis when the external deceleration signal is enabled and ex ternal deceleration speed 1 is selected.
This parameter is valid when "#1239 set11/bit6" is set to "1".
---Setting range---
0 to 1000000 (mm/min)
Set the upper limit value of feedrate for each axis when the external deceleration signal is enabled and ex ternal deceleration speed 2 is selected.
This parameter is valid when "#1239 set11/bit6" is set to "1".
---Setting range---
0 to 1000000 (mm/min)
#2157 G1bFx Maximum axis-specific pre-interpolation cutting feed
rate
#2158 G1btLx Axis-specific pre-interpolation cutting feed time con stant
#2159 compx Accuracy coefficient for each axis
#2161 exdcax1 External deceleration speed 1
#2162 exdcax2 External deceleration speed 2

Set the upper limit value of feedrate for each axis when the external deceleration signal is enabled and ex ternal deceleration speed 3 is selected.
This parameter is valid when "#1239 set11/bit6" is set to "1".
---Setting range---
0 to 1000000 (mm/min)
Set the upper limit value of feedrate for each axis when the external deceleration signal is enabled and ex ternal deceleration speed 4 is selected.
This parameter is valid when "#1239 set11/bit6" is set to "1".
---Setting range---
0 to 1000000 (mm/min)
Set the upper limit value of feedrate for each axis when the external deceleration signal is enabled and ex ternal deceleration speed 5 is selected.
This parameter is valid when "#1239 set11/bit6" is set to "1".
---Setting range---
0 to 1000000 (mm/min)
Select the direction of return operation in manual measurement.
0: Opposite to the contact direction
1: Fixed to the + direction
Attempting return in the - direction will cause the operation alarm "0033 Rtn dir err in manual measure".
2: Fixed to the - direction
Attempting return in the + direction will cause the operation alarm "0033 Rtn dir err in manual measure".
Set the lost motion compensation gain in drilling cycle at high-speed retract (CW: - to + direction, CCW: + to
- direction).
Set "-1" when drilling cycle at high-speed retract is not performed.
When set to 0, the performance will follow the setting of "#2171 Lmc2QR (Lost motion compensation gain 2
for high-speed retract)".
---Setting range---
-1, 0 to 200(%)
Set the lost motion compensation gain in drilling cycle at high-speed retract (CW: - to + direction, CCW: + to
- direction).
Set "-1" when drilling cycle at high-speed retract is not performed.
When set to 0, the performance will follow the setting of "#2170 Lmc1QR (Lost motion compensation gain 1
for high-speed retract)".
---Setting range---
-1, 0 to 200(%)
Set the timing of the lost motion compensation in drilling cycle at high-speed retract.
When set to 0, the performance will follow the setting of "#2239 SV039 LMCD (Lost motion compensation
timing)".
---Setting range---
0 to 2000 (ms)
#2163 exdcax3 External deceleration speed 3
#2164 exdcax4 External deceleration speed 4
#2165 exdcax5 External deceleration speed 5
#2169 Man meas rtrn dir Return direction in manual measurement
#2170 Lmc1QR Lost motion compensation gain 1 for high-speed retract
#2171 Lmc2QR Lost motion compensation gain 2 for high-speed retract
#2172 LmcdQR Lost motion compensation timing for high-speed re tract

Set the machine system's spring constant when using lost motion compensation type 3 in drilling cycle with
high-speed retract.
When set to "0", the performance will follow the setting of "#2285 SV085 LMCk (Lost motion compensation
3 spring constant)".
---Setting range---
0 to 32767 (0.01%/m)
Set the machine system's viscous coefficient when using lost motion compensation type 3 in drilling cycle at
high-speed retract.
When set to "0", the performance will follow the setting of "#2286 SV086 LMCc (Lost motion compensation
3 viscous coefficient)".
---Setting range---
0 to 32767(0.01%/m)
Set the radius of the special diametral axis.
---Setting range---
0 to 99999.999 (mm)
Set a clamp speed for the special diametral axis control.
Set the limit speed of the drive system in this parameter.
---Setting range---
0 to 1000000 (/min)
(Note) For "#2001 rapid" and "#2002 clamp", set speeds on a machining line.
When the value in "#2176 Special Ax Clamp" is smaller than that in "#2001 rapid", "Special Ax Clamp" value
will be applied to the clamp speed.
Set the acceleration/deceleration time constant for manual feed rate B.
(Note) When set to "0", this parameter will not be used: conventional acceleration/deceleration will be per formed.
---Setting range---
0 to 20000 (ms)
Set the door signal input in the drive unit.
Use this parameter only when the axis with a door signal belongs to several door groups.
The correspondence between the door signals and bits are as follows.
bit0: Door1 signal
bit1: Door2 signal
If the axis does not receive any door signal, set to "0".
If 0 is set to the axis to which a door signal is input, the setting of #2118 is applied.
Do not turn ON more than one bit.
Only the door signals set in #2118 can be set.
---Setting range---
0000 to 0002 (HEX)
#2173 LmckQR Lost motion compensation 3 spring constant for high speed retract
#2174 LmccQR Lost motion compensation 3 viscous coefficient for

high-speed retract
#2175 Special Ax Radius Special diametral axis radius
#2176 Special Ax Clamp Special diametral axis clamp speed
#2177 ManualFeedBtL Time constant for manual feed rate B
(PR) #2180 S_DIN Speed observation input door No.

Set the observation speed, which is at the machine end, in the multi-step speed monitor.
(Note 1) When the setting value is larger than 18000, the last 2 digits will be ignored.
E.g.: 1234567 -> 1234500 (mm/min, /min)
(Note 2) Observation speeds (#2181 to #2186 and #2191 to #2192) need to satisfy the following condition.
If not satisfied, the alarm (Y20 0007) will result.
---Setting range---
0 to 6553500 (mm/min or /min)
Set the observation speed, which is at the machine end, in the multi-step speed monitor.
(Note 1) When the setting value is larger than 18000, the last 2 digits will be ignored.
E.g.: 1234567 -> 1234500 (mm/min, /min)
(Note 2) Observation speeds (#2181 to #2186 and #2191 to #2192) need to satisfy the following condition.
If not satisfied, the alarm (Y20 0007) will result.
---Setting range---
0 to 6553500 (mm/min or /min)
Set the observation speed, which is at the machine end, in the multi-step speed monitor.
(Note 1) When the setting value is larger than 18000, the last 2 digits will be ignored.
E.g.: 1234567 -> 1234500 (mm/min, /min)
(Note 2) Observation speeds (#2181 to #2186 and #2191 to #2192) need to satisfy the following condition.
If not satisfied, the alarm (Y20 0007) will result.
---Setting range---
0 to 6553500 (mm/min or /min)
Set the observation speed, which is at the machine end, in the multi-step speed monitor.
(Note 1) When the setting value is larger than 18000, the last 2 digits will be ignored.
E.g.: 1234567 -> 1234500 (mm/min, /min)
(Note 2) Observation speeds (#2181 to #2186 and #2191 to #2192) need to satisfy the following condition.
If not satisfied, the alarm (Y20 0007) will result.
---Setting range---
0 to 6553500 (mm/min or /min)
(PR) #2181 sscfeed1 Observation speed 1
(PR) #2182 sscfeed2 Observation speed 2
(PR) #2183 sscfeed3 Observation speed 3
(PR) #2184 sscfeed4 Observation speed 4

sscfeed18 SV002:PC2 32767 SV018:PIT SV001:PC1

sscfeed18 SV002:PC2 32767 SV018:PIT SV001:PC1

sscfeed18 SV002:PC2 32767 SV018:PIT SV001:PC1

sscfeed18 SV002:PC2 32767 SV018:PIT SV001:PC1

Set the observation speed, which is at the machine end, in the multi-step speed monitor.
(Note 1) When the setting value is larger than 18000, the last 2 digits will be ignored.
E.g.: 1234567 -> 1234500 (mm/min, /min)
(Note 2) Observation speeds (#2181 to #2186 and #2191 to #2192) need to satisfy the following condition.
If not satisfied, the alarm (Y20 0007) will result.
---Setting range---
0 to 6553500 (mm/min or /min)
Set the observation speed, which is at the machine end, in the multi-step speed monitor.
(Note 1) When the setting value is larger than 18000, the last 2 digits will be ignored.
E.g.: 1234567 -> 1234500 (mm/min, /min)
(Note 2) Observation speeds (#2181 to #2186 and #2191 to #2192) need to satisfy the following condition.
If not satisfied, the alarm (Y20 0007) will result.
---Setting range---
0 to 6553500 (mm/min or /min)
Specify the I/F No. of the PLC axis to use when switching between NC axis and PLC axis. Set the I/F No. of a vacant PLC axis.
When not using, set to "0".
---Setting range---
0 to 8
This parameter specifies which observation speed change signal is input in the drive unit.
The observation speed change signal corresponds to the following bits of the parameter.
bit0: Observation speed change signal 1 is connected.
bit1: Observation speed change signal 2 is connected.
bit2: Observation speed change signal 3 is connected.
If the axis receives no observation speed change signal, set to "0000".
(Note) When a same setting value is set to more than one axis, or when more than one bit is set to turn ON for one axis, the alarm (Y20 0027) will occur.
---Setting range---
0000 to 0004 (HEX)
Specify the stall torque of the servo motor.
This value is used for calculating the servo motor's power consumption.
---Setting range---
0.000 to 1000.000 (Nm)
(PR) #2185 sscfeed5 Observation speed 5
(PR) #2186 sscfeed6 Observation speed 6
(PR) #2187 chgPLCax PLC axis switchover axis No.
(PR) #2188 S_SigIn Safety observation signal input

#2189 StlTrq (PwrCal) Stall torque for power computation

sscfeed18 SV002:PC2 32767 SV018:PIT SV001:PC1

sscfeed18 SV002:PC2 32767 SV018:PIT SV001:PC1

Set the head R register No. to be used for setting/checking stored stroke limit I.
Eight consecutive R registers from the R register No. set here will be the area for stored stroke limit I.
Changing the areas for stored stroke limit I will be disabled if an R register that is not in the user area is set.
In addition, make sure to set an even number for the head R register No. Changing the areas for stored stroke limit I will be disabled if an odd number is set.
---Setting range---
0 to 29892
Set the observation speed, which is at the machine end, in the multi-step speed monitor.
(Note 1) When the setting value is larger than 18000, the last 2 digits will be ignored.
E.g.: 1234567 -> 1234500 (mm/min, /min)
(Note 2) Observation speeds (#2181 to #2186 and #2191 to #2192) need to satisfy the following condition.
If not satisfied, the alarm (Y20 0007) will result.
---Setting range---
0 to 6553500 (mm/min or /min)
Set the observation speed, which is at the machine end, in the multi-step speed monitor.
(Note 1) When the setting value is larger than 18000, the last 2 digits will be ignored.
E.g.: 1234567 -> 1234500 (mm/min, /min)
(Note 2) Observation speeds (#2181 to #2186 and #2191 to #2192) need to satisfy the following condition.
If not satisfied, the alarm (Y20 0007) will result.
---Setting range---
0 to 6553500 (mm/min or /min)
Set the constant inclination acceleration/deceleration time constant of the hobbing workpiece axis when is suing a hobbing command while the hobbing spindle is rotating. Hobbing workpiece axis time constant is the constant inclination acceleration/deceleration time constant with respect to #2002 Cutting feed rate for clamp function.
If the setting value of hobbing workpiece axis time constant is out of setting range, set the maximum value in the setting range.
---Setting range---
1 to 4000 (ms)
(PR) #2190 OT_Rreg Designate R register for stored stroke limit I
(PR) #2191 sscfeed7 Observation speed 7
(PR) #2192 sscfeed8 Observation speed 8
#2195 hob_tL Hobbing workpiece axis time constant

sscfeed18 SV002:PC2 32767 SV018:PIT SV001:PC1

sscfeed18 SV002:PC2 32767 SV018:PIT SV001:PC1
#2002 clamp
hob_tL hob_tL
t
Wk axis Wk axis command speed
Hob axis
Hob axis command speed
Rotation speed

Acceleration/Deceleration is carried out so that the acceleration/deceleration time will not become longer than this parameter's setting when the acceleration/deceleration type of rapid traverse command is constant inclination.
Set a value smaller than "#2004 G0tL".
This parameter is enabled when "#1200 G0_acc" is constant inclination type.
This parameter is enabled only during fixed cycle if "#1253 set25/bit2" (Acceleration/Deceleration mode change in hole drilling cycle) is enabled even if "#1200 G0_acc" is constant inclination type.
This parameter is disabled if "0" or a value larger than "#2004 G0tL" is set.
---Setting range---
0 to 4000 (ms)
Acceleration/Deceleration is carried out so that the acceleration/deceleration time will not become longer than this parameter's setting when the acceleration/deceleration type of linear interpolation command is con stant inclination.
Set a value smaller than "#2007 G1tL".
This parameter is enabled when "#1201 G1_acc" is constant inclination type.
This parameter is enabled only during fixed cycle if "#1253 set25/bit2" (Acceleration/Deceleration mode change in hole drilling cycle) is enabled even if "#1201 G1_acc" is constant inclination type.
This parameter is disabled if "0" or a value larger than "#2007 G1tL" is set.
---Setting range---
0 to 4000 (ms)
Set the changeover speed at speed normalization.
Set a value smaller than that in "#2562 VBL2 VG0".
Normally, the "#2561 VBL2 VG1" value corresponds to the cutting feedrate, the "#2562 VBL2 VG0" value to the rapid traverse rate.
---Setting range---
1 to 1000000 (mm/min)
Set the changeover speed at speed normalization.
Set a value greater than that in "#2561 VBL2 VG1".
Normally, the "#2561 VBL2 VG1" value corresponds to the cutting feedrate, the "#2562 VBL2 VG0" value to the rapid traverse rate.
---Setting range---
1 to 1000000 (mm/min)
Set the most plus (+) side stroke position among the three.
Set the parameters VBL2 P1 to P3 to be "VBL2 P1 > VBL2 P2 > VBL2 P3".
Normally, divide the axis's stroke by four, and set a dividing position (except for the both ends) to be a stroke

position.
---Setting range---
-99999.999 to 99999.999 (mm)
Set the middle stroke position among the three.
Set the parameters VBL2 P1 to P3 to be "VBL2 P1 > VBL2 P2 > VBL2 P3".
Normally, divide the axis's stroke by four, and set a dividing position (except for the both ends) to be a stroke position.
---Setting range---
-99999.999 to 99999.999 (mm)
#2198 G0tMin Minimum time constant for rapid traverse constant-gra dient acc./dec.
#2199 G1tMin Minimum time constant for cutting feed constant incli nation acc./dec.
#2561 VBL2 VG1 Variable backlash comp II Changeover speed 1
#2562 VBL2 VG0 Variable backlash comp II Changeover speed 2
#2563 VBL2 P1 Variable backlash comp II Stroke position 1
#2564 VBL2 P2 Variable backlash comp II Stroke position 2

Set the most minus (-) side stroke position among the three.
Set the parameters VBL2 P1 to P3 to be "VBL2 P1 > VBL2 P2 > VBL2 P3".
Normally, divide the axis's stroke by four, and set a dividing position (except for the both ends) to be a stroke position.
---Setting range---
-99999.999 to 99999.999 (mm)
Set the compensation data (backlash amount) at changeover speed 1 and stroke position 1.
Calculate the current compensation data according to the current speed and position.
---Setting range---
-99999999 to 99999999 (Machine error compensation unit)
Set the compensation data (backlash amount) at changeover speed 1 and stroke position 2.
Calculate the current compensation data according to the current speed and position.
---Setting range---
-99999999 to 99999999 (Machine error compensation unit)
Set the compensation data (backlash amount) at changeover speed 1 and stroke position 3.
Calculate the current compensation data according to the current speed and position.
---Setting range---
-99999999 to 99999999 (Machine error compensation unit)
Set the compensation data (backlash amount) at changeover speed 2 and stroke position 1.
Calculate the current compensation data according to the current speed and position.
---Setting range---
-99999999 to 99999999 (Machine error compensation unit)
Set the compensation data (backlash amount) at changeover speed 2 and stroke position 2.
Calculate the current compensation data according to the current speed and position.
---Setting range---
-99999999 to 99999999 (Machine error compensation unit)
Set the compensation data (backlash amount) at changeover speed 2 and stroke position 3.
Calculate the current compensation data according to the current speed and position.
---Setting range---
-99999999 to 99999999 (Machine error compensation unit)
Set the time constant in calculating the float amount. Set a value greater than the calculation cycle.
---Setting range---
0 to 10000 (ms)
Set the multiplier in calculating the lost motion amount. When "1000" is set, the multiplier is "1".
---Setting range---
0 to 1000 (1/1000)
#2565 VBL2 P3 Variable backlash comp II Stroke position 3
#2566 VBL2 BL11 Variable backlash comp II Comp data at changeover spd 1 and stroke pos 1
#2567 VBL2 BL12 Variable backlash comp II Comp data at changeover spd 1 and stroke pos 2
#2568 VBL2 BL13 Variable backlash comp II Comp data at changeover spd 1 and stroke pos 3
#2569 VBL2 BL01 Variable backlash comp II Comp data at changeover spd 2 and stroke pos 1
#2570 VBL2 BL02 Variable backlash comp II Comp data at changeover spd 2 and stroke pos 2
#2571 VBL2 BL03 Variable backlash comp II Comp data at changeover spd 2 and stroke pos 3
#2572 VBL2 FloatTC Variable backlash comp II Time constant in calculating float amt
#2573 VBL2 LMMul Variable backlash comp II Multiplier in calculating lost motion amt

Set the boundary value of the speed in calculating the compensation amount.
---Setting range---
1 to 1000000 (mm/min)
Set the compensation magnification in calculating the compensation amount. When "0" is set, the magnifi cation is 100%.
---Setting range---
0 to 300(%)
Set the multiplier in calculating the compensation amount. When "1000" is set, the multiplier is "1".
---Setting range---
0 to 1000 (1/1000)
Set the value to subtract from the compensation amount (CMP) at reversing the axis travel direction.
---Setting range---
-99999999 to 99999999 (Machine error compensation unit)
Set the travel distance to return to the compensation amount (CMP) from the reverse point of the axis travel direction.

---Setting range---
0 to 99999.999 (mm)
Set the feed rate in adjusting the backlash amount.
It is possible to set this parameter also by carrying out a measurement condition adjustment on the backlash
adjustment screen.
---Setting range---
0 to 1000000(mm/min)
The commanded G code of the index table indexing axis is checked.
0: Check is not performed.
1: Cutting feed G command is prohibited.
Set the measurement position in measurement condition adjustment and backlash adjustment on the ma chine coordinate system.
(Note 1) Set the position so that a collision will not occur during adjustment.
(Note 2) Set this parameter for all the axes.
---Setting range---
-99999.999 to 99999.999 (mm)
0: Separate backlash adjustment for master axis and slave axis each.
1: Backlash adjustment is applied only to the master axis. The master axis's backlash amount is applied to
the slave axis.
(Note 1) Set this parameter for the master axis.
(Note 2) In the case of synchronous control of speed/current command, set to "1".
#2574 VBL2 VBound Variable backlash comp II Speed boundary value
#2575 VBL2 CompMag Variable backlash comp II Compensation magnification
#2576 VBL2 CompMul Variable backlash comp II Multiplier in calculating com pensation amount
#2577 VBL2 BLE Variable backlash comp II Gradually increase amount
#2578 VBL2 BLL Variable backlash comp II Gradually increase travel dis tance
#2579 BLAT_feed Feed rate for automatic backlash adjustment
(PR) #2580 index_Gcmd Indexing axis G command check
#2581 BLAT_pos Measurement position for automatic backlash adjust ment
#2582 BLAT_syn Synchronization setting for automatic backlash adjust ment

Specify the speed at which compensation scale is reset to 100%.
When "0" is set, this parameter is disabled.
If a set speed is greater than "#2574 VBL2 VBound", the speed is clamped at "#2574 VBL2 VBound".
---Setting range---
0 to 1000000 (mm/min)
Specify whether to enable the cyclic error compensation.
0: Disable
1: Enable
Specify the initial number of the compensation amounts.
The compensation amounts to be applied will start from this number, and the number of compensation
amounts to be applied is specified by "#2587 Cycdv" (Cyclic error compensation: number of divisions).
---Setting range---
4101 to 5999
Specify the number of divisions per cycle of the cyclic error compensation.
---Setting range---
1 to 128
Specify the number of compensation cycles per revolution of the rotary axis.
---Setting range---
0 to 32767
Set a linear control time constant for rapid traverse acceleration/deceleration to be applied when the G0 time
constant switchover request signal is ON.
This time constant is enabled when LR (rapid traverse feed with linear acceleration/deceleration) or F (soft
acceleration/deceleration) is selected in "#2003 smgst" (Acceleration and deceleration modes).
If #2598 is 0, the time constant set in "#2004 G0tL (G0 time constant)" will be used.
---Setting range---
0 to 4000(ms)
Set a primary-delay time constant for rapid traverse acceleration/deceleration to be applied when the G0 time
constant switchover request signal is ON.
This time constant is enabled when R1 (rapid traverse feed with primary delay) or R3 (exponential acceler ation and linear deceleration) is selected in "#2003 smgst" (Acceleration and deceleration modes).
When the soft acceleration/deceleration is selected, the second-step time constant will be used.
If #2599 is set to 0, the time constant set in "#2005 G0t1 (G0 time constant (primary delay)/2nd-step time
constant for soft acceleration/deceleration)" will be used.
---Setting range---
0 to 5000 (ms)
Switch jog/handle time constants. Set per axis.
0: Not use
1: (Not used)
2: Enable for handle feed
#2584 VBL2 Vlimit Variable backlash compensation 2: Speed to reset com pensation scale to 100%
#2585 Cyccmp Enable cyclic error compensation
#2586 Cycstnum Cyclic error compensation: initial number of compensa tion
#2587 Cycdv Cyclic error compensation: number of divisions
#2588 Cycct Cyclic error compensation: cycle constant
#2598 G0tL_2 G0 time constant 2 (linear)
#2599 G0t1_2 G0 time constant 2 (primary delay)/2nd-step time con stant for soft acceleration/deceleration
(PR) #2614 JH_smgSel Jog/handle acceleration/deceleration selection

Set a linear control time constant for jog/handle feed acceleration/deceleration.
When set to "0", the time constant will be clamped at 1 [ms].
---Setting range---
0 to 4000 (ms)
Specify the maximum cutting feed rate to be applied to thread cutting for each axis.
---Setting range---
1 to 1000000

Specify the primary delay time constant to be used in acceleration/deceleration of a thread cut axis.
* This parameter is enabled when either C1 (Primary delay cutting feed) or LC (Linear acceleration/deceler ation cutting feed) is selected for the acceleration/deceleration mode (#2003 smgst).
---Setting range---
0 to 4000
Specify the rapid traverse rate to be applied under 2-axis superimposition control when the axis traverses in the same direction as the other axis that is travelling at a cutting feed rate.
---Setting range---
0 to 1000000 (mm/min)
Specify the G0 time constant (linear) to be applied under 3-axis serial superimposition control.
---Setting range---
0 to 4000 (ms)
Specify the G0 time constant (primary delay) to be applied under 3-axis serial superimposition control.
---Setting range---
0 to 5000 (ms)
Specify the G1 time constant (linear) to be applied under 3-axis serial superimposition control.
---Setting range---
0 to 4000 (ms)
Specify the G1 time constant (primary delay) to be applied under 3-axis serial superimposition control.
---Setting range---
0 to 5000 (ms)
#2616 JHtL Jog/handle time constant (linear)
#2619 thr_clamp Thread cut clamp speed
#2620 thr_t Thread cut time constant
#2621 plrapid2 Rapid traverse rate for superimposition control 2
#2622 pl3G0tL G0 time constant (linear) for 3-axis serial superimposi tion control
#2623 pl3G0t1 G0 time constant (primary delay) for 3-axis serial super imposition control
#2624 pl3G1tL G1 time constant (linear) for 3-axis serial superimposi tion control
#2625 pl3G1t1 G1 time constant (primary delay) for 3-axis serial super imposition control
JHtL JHtL
Speed
Time

Specify the rapid traverse rate to be applied when all the three superimposed axes are rapid-traversing in a single direction under 3-axis serial superimposition control.
---Setting range---
0 to 1000000 (mm/min)
Specify the rapid traverse rate to be applied under 3-axis serial superimposition control when two of the three superimposed axes are rapid-traversing while the remaining one axis is fed at a cutting feed rate in a single direction.
---Setting range---
0 to 1000000 (mm/min)
Specify the rapid traverse rate to be applied under 3-axis serial superimposition control when one of the three superimposed axes is rapid-traversing while the remaining two axes are fed at a cutting feed rate in a single direction.
---Setting range---
0 to 1000000 (mm/min)
Specify the cutting feed clamp speed to be applied under 3-axis serial superimposition control when all the three superimposed axes are fed at a cutting feed rate in a single direction.
---Setting range---
0 to 1000000 (mm/min)
Specify the cutting feed clamp speed to be applied under 3-axis serial superimposition control when one of the three superimposed axes is rapid-traversing while the other two are fed at a cutting feed rate in a single direction.
---Setting range---
0 to 1000000 (mm/min)
Specify the in-position width for the rapid traverse block overlap at the joint of consecutively given G00 blocks.
---Setting range---
0.000 to 1000.000 (mm)
Specify the in-position width for the rapid traverse block overlap at the joint of two blocks where G01 is in cluded.
---Setting range---
0.000 to 1000.000 (mm)
Specify the in-position width for the rapid traverse block overlap at the joint of two blocks where G28/G30 is included.
---Setting range---
0.000 to 1000.000 (mm)
#2626 pl3rapid Rapid traverse rate for 3-axis serial superimposition control
#2627 pl3rapid2 Rapid traverse rate for 3-axis serial superimposition control 2
#2628 pl3rapid3 Rapid traverse rate for 3-axis serial superimposition control 3
#2629 pl3clamp Cutting feed clamp speed for 3-axis serial superimposi tion control
#2630 pl3clamp2 Cutting feed clamp speed for 3-axis serial superimposi tion control 2
#2631 G0olinps Rapid traverse block overlap G00 in-position width
#2632 G1olinps Rapid traverse block overlap G01 in-position width
#2633 G28olinps Rapid traverse block overlap G28 in-position width

bit0: Change output units of servo axis cutting torue
Change the output units of the servo axis cutting torque.
0: Output unit 1%
1: Output unit 0.01%
bit1: Select stop method at collision detection
Set the operation when a collision is detected.

0: Emergency stop.
1: Servo alarm occurs to an axis that the collision was detected.
The axes in the part system that the collision was detected will be in an automatic interlocked state.
Related parameters: SV035/bitE-C, SV035/bitB, SV060, CrshStpSel
Specify a period of time in which torque skip condition is disabled. This is effective when an improper skip is generated due to current flown during acceleration (when G160 is commanded).
---Setting range---
0 to 32767(ms)
Specify the maximum speed to be applied to each axis when manual speed clamp is enabled.
When 0 is set, the rapid traverse rate (#2001 rapid) is applied.
---Setting range---
0 to 1000000 (mm/min)
Specify a feed rate to be applied to each axis during jog mode.
When 0 is set, the manual feed rate selected by Manual feedrate method selection (JVS) signal is applied.
---Setting range---
0 to 1000000 (mm/min)
Specify the servo load current (%) at which the loadmeter displays a caution sign (yellow).
If servo load current exceeds the specified value, the loadmeter displays a caution (yellow).
If you wish to avoid showing the caution (yellow), set this parameter to be the same as "#2644 LdMeter thresholdR".
When "0" is set, the value becomes 100% (default).
---Setting range---
0 to 300(%)
Specify the servo load current (%) at which the loadmeter displays a warning sign (red).
If servo load current exceeds the specified value, the loadmeter displays a warning (red).
If you wish to avoid showing the warning (red), set this parameter to be the same as "#2645 LdMeter load max".
When "0" is set, the value becomes 150% (default).
---Setting range---
0 to 300(%)
Specify the maximum servo load current (%) for loadmeter display.
When "0" is set, the value becomes 200% (default).
---Setting range---
0 to 300(%)
(PR) #2634 SrvFunc01
#2639 tskip_T Non-sensitive band for torque skip
#2641 m_clamp Manual feed clamp speed
#2642 jogfeed Jog feed rate
(PR) #2643 LdMeter thresholdY Loadmeter: Caution (Yellow) threshold
(PR) #2644 LdMeter thresholdR Loadmeter: Warning (Red) threshold
(PR) #2645 LdMeter load max Loadmeter: Maximum servo load current

Set the responsiveness in detecting the disturbance torque.
---Setting range---
0 to 1000 (ms) (Default value: 0)
Select whether to enable switching of G0 acceleration/deceleration time constant.
0: Disable switching of G0 acceleration/deceleration time constant.
1: Enable switching of G0 acceleration/deceleration time constant.
Select whether to enable switching of G1 acceleration/deceleration time constant.
0: Disable switching of G1 acceleration/deceleration time constant.
1: Enable switching of G1 acceleration/deceleration time constant.
Set the minimum value of time constant when changing time constant during acceleration and deceleration of G0 command.
Set the time constant which is adjusted when workpiece is not attached.
Note that when 0 is set, the value will be 10 (default).
---Setting range---
0 to 4000 (ms)
Set the minimum value when changing time constant during acceleration and deceleration of G1 command after interpolation.
Set the time constant which is adjusted when workpiece is not attached.
Note that when 0 is set, the value will be 10 (default).
---Setting range---
0 to 4000 (ms)
Set the minimum value when changing time constant during acceleration and deceleration of G1 command before interpolation.
Set the time constant which is adjusted when workpiece is not attached.
Note that when 0 is set, the value will be 10 (default).
---Setting range---
0 to 4000 (ms)
Set the changing amount of time constant when changing time constant during acceleration and deceleration of G0 command based on the estimated inertia ratio.
Note that when 0 is set, the value will be 10 (default).
---Setting range---
0 to 4000 (ms)
Set the changing amount of time constant when changing time constant during acceleration and deceleration of G1 command after interpolation based on the estimated inertia ratio.
Note that when 0 is set, the value will be 10 (default).
---Setting range---
0 to 4000 (ms)
#2646 distt Load observation disturbance torque filter time con stant
(PR) #2651 RT2G0 RT2: Minimum value of G0 acce/dece time constant
(PR) #2652 RT2G1 RT2: Enable switching of G1 acce/dece time constant
#2653 RT2G0tL RT2: Minimum value of G0 acce/dece time constant
#2654 RT2G1tLA RT2: Minimum value of acce/dece time constant after G1 interpolation
#2655 RT2G1tLB RT2: Minimum value of acce/dece time constant before

G1 interpolation
#2656 RT2 G0rng RT2: Changing amount of G0 acce/dece time constant
#2657 RT2G1rngA RT2: Changing amount of acce/dece time constant after
G1 interpolation

Set the changing amount of time constant when changing time constant during acceleration and deceleration
of G1 command before interpolation based on the estimated inertia ratio.
Note that when 0 is set, the value will be 10 (default).
---Setting range---
0 to 4000 (ms)
Specify a tolerance (tolerable error) to be used under tolerance control.
Set a tolerable error for fine segment program created by CAM. (Usually around 0.01(mm))
If 0.000 is set, it is operated with the tolerance of 0.01(mm).
When designating the tolerance amount with the ", K address", this parameter is not used.
---Setting range---
0.000 to 100.000 (mm)
Specify the in-position width at which the standard model gain is switched under OMR-FF control.
When set to "0", command deceleration check is performed.
---Setting range---
0.000 to 99.999 (mm)
In interference check III, select whether to limit the torque at entering the interference warning area.
0: No torque limit
(Use "#2213 SV013 (Current limit value)")
1: Limit the torque
(Use "#2214 SV014 (Current limit value in special control)")
(Note) This setting is invalid if spindle/C axis is the target axis. (Torque cannot be limited.)
In interference check III, if clamping the speed, the clamp speed is set at entering the interference warning
area.
(Note) When "0" is set, the speed will not be clamped.
---Setting range---
0 to 1000000 (mm/min)
This parameter is used for the multiple axis synchronization control.
Specify the master axis No. that corresponds to the axis.
Enter the sequential NC axis No., with the 1st axis of the 1st part system set as "1".
You cannot set the No. of the axis targeted for the multiple axis synchronization control in "#1068 slav no".
You cannot set "#1068 slavno" for the axis targeted for the multiple axis synchronization control.
The master axis for multiple axis synchronization control cannot be set in "#2674 primno".
For a multi-part system configuration, you cannot set the axes across different part systems.
---Setting range---
0: No master axis
1 to 32: 1st axis to 32nd axis
This parameter is used for the multiple axis synchronization control.
Specify the starting tool offset No. for the axis.
---Setting range---
0 to 999
#2658 RT2G1rngB RT2: Changing amount of acce/dece time constant before
G1 interpolation
#2659 tolerance Tolerance
#2660 omrff_inps OMR-FF in-position width
#2661 ITF3_ILMT Interference check III torque limit at entering interfer ence warning area
#2662 ITF3_Clamp Interference check III clamp speed at entering interfer ence warning area
(PR) #2674 primno Multiple axis synchronization control: Master axis No.
(PR) #2675 tcmp_top Multiple axis synchronization control: starting tool off set No.

Specify the amplitude of compensation signal (fundamental wave component) in the unit of 0.01% of stall
current.
When "0" is set, the compensation is disabled.
---Setting range---
0 to 10000 (0.01%)
Set the timing of compensation signal (fundamental wave component). The signal timing is adjusted with one
cycle of fundamental wave component taken as 100%.
When "50" is set, the compensation signal is inverted.
Setting it to "100" results in the same signal timing as when "0" is set.
---Setting range---
0 to 100 (%)
Specify the amplitude of compensation signal (second-order component) in the unit of 0.01% of stall current.
When "0" is set, the compensation is disabled.
---Setting range---
0 to 10000 (0.01%)
Set the timing of compensation signal (second-order component). The signal timing is adjusted with one cy cle of fundamental wave component * 2 taken as 100%.
When "50" is set, the compensation signal is inverted.
Setting it to "100" results in the same signal timing as when "0" is set.
---Setting range---
0 to 100 (%)
Specify the amplitude of compensation signal (third-order component) in the unit of 0.01% of stall current.
When "0" is set, the compensation is disabled.
---Setting range---
0 to 10000 (0.01%)
Set the timing of compensation signal (third-order component). The signal timing is adjusted with one cycle
of fundamental wave component * 3 taken as 100%.
When "50" is set, the compensation signal is inverted.
Setting it to "100" results in the same signal timing as when "0" is set.
---Setting range---
0 to 100 (%)

Specify the amplitude of compensation signal (fourth-order component) in the unit of 0.01% of stall current.
When "0" is set, the compensation is disabled.
---Setting range---
0 to 10000 (0.01%)
#2680 TCMPG1 Cogging torque compensation gain 1 (fundamental
wave component)
#2681 TCMPT1 Cogging torque compensation timing 1 (fundamental
wave component)
#2682 TCMPG2 Cogging torque compensation gain 2 (second-order
component)
#2683 TCMPT2 Cogging torque compensation timing 2 (second-order
component)
#2684 TCMPG3 Cogging torque compensation gain 3 (third-order com ponent)
#2685 TCMPT3 Cogging torque compensation timing 3 (third-order
component)
#2686 TCMPG4 Cogging torque compensation gain 4 (fourth-order
component)

Specify the timing of compensation signal (fourth-order component). The signal timing is adjusted with one
cycle of fundamental wave component * 4 taken as 100%.
When "50" is set, the compensation signal is inverted.
Setting it to "100" results in the same signal timing as when "0" is set.
---Setting range---
0 to 100 (%)
Set the fundamental wave frequency to be used for cogging torque compensation, using the electrical angle:
360[deg] * 1/N.
Setting it to "0" leads to the same fundamental wave frequency magnification as when "2" is set.
For a linear motor, set "0".
For a rotary motor, set the fundamental wave frequency magnification per electrical angle according to the
motor to use.
---Setting range---
0 to 32
Select the acceleration and deceleration type for jog feed and manual rapid traverse.
0: Acceleration and deceleration with constant time
1: Acceleration and deceleration with constant gradient
Specify the minimum travel distance when approaching the sensor in Manual tool length measurement 2.
(radius value)
Axis movement more or longer than the distance set in this parameter determines the direction of movement
to the sensor and the contact surface.
(Note) When "0" is set, contact surface identification is not performed after reversing the axis feed direction.
---Setting range---
0 to 99999.999 (mm)
This parameter specifies whether to enable the vibration cutting control.
0: Disable
1: Enable
(*) For a rotary axis or PLC axis, the vibration cutting control is disabled irrespective of this parameter.
This parameter specifies the maximum cutting feedrate to be applied to each axis during the vibration cutting
mode.
If this parameter is set to "0" or a value greater than "#2002 clamp", the value of "#2002 clamp" will be ap plied.
---Setting range---
0 to 1000000 (mm/min)
This parameter specifies the reference model gain (the position response during OMR-FF) to be applied to
each axis during the vibration cutting mode.
If this parameter is set to "0", the value of SV197 (PGMsp) or SV106 (PGM) will be applied in this order.
---Setting range---
0 to 300 (rad/s)
Select whether to enable brake wear diagnostics.
0: Disable
1: Enable
#2687 TCMPT4 Cogging torque compensation timing 4 (fourth-order
component)
#2695 TCMPP Fundamental wave cycle of cogging torque
(PR) #2703 manual_acc Enable constant-gradient acceleration/deceleration in
manual feed
#2709 TLM_approach Tool setter approach distance
#12570 VibCutting_VCC Vibration cutting control ON
#12571 VibClamp_VCC Cutting feedrate clamp in vibration cutting mode
#12583 VibPGMsp_VCC VCC reference model gain
(PR) #12590 BWD_Enable Brake wear diagnostics ON

Specify the current limit value during brake wear diagnostics as a percent of the stall current.
If "0" is set, an alarm is generated when an attempt is made to start brake wear diagnostics, which will not
start.
---Setting range---
0 to 100 (%)
Specify the wait time between the receipt of the brake wear diagnostics start signal (BWDSTm) by the NC
and the issuance of the movement command for brake wear diagnostics.
If set to "0", the command wait time is 400 [ms].
---Setting range---
0 to 30000 (ms)
Specify the amount of travel for the command given to the axis to be diagnosed during brake wear diagnos tics.
If "0" is set, an alarm is generated when an attempt is made to start brake wear diagnostics, which will not
start.
---Setting range---

-99999.999 to 99999.999 (mm or deg)
Specify the feedrate for the command given to the axis to be diagnosed during brake wear diagnostics.
If "0" is set, an alarm is generated when an attempt is made to start brake wear diagnostics, which will not
start.
---Setting range---
0 to 1000000 (mm/min or deg/min)
Specify the duration of the axis travel amount monitoring after the output of the movement command for di agnostics is completed during brake wear diagnostics.
If set to "0", the monitoring time is 1000 [ms].
---Setting range---
0 to 30000 (ms)
Specify the allowable travel amount for the axis to be diagnosed during brake wear diagnostics. (If the travel
amount during brake wear diagnostics exceeds the value of this parameter, "BrakeWearDiagnostics (Warn ing)" is generated.)
If set to "0", the allowable travel amount is 100 [mm].
---Setting range---
0 to 99999.999 (mm or deg)
Specify the allowable travel amount for the axis to be diagnosed during brake wear diagnostics. (If the travel
amount during brake wear diagnostics exceeds the value of this parameter, "BrakeWearDiagnostics (Cau tion)" is generated.)
If a value greater than or equal to "#12596 BWD_TOL(Warning)" or "0" is set, this parameter becomes inval id, and "BrakeWearDiagnostics (Caution)" is not generated.
Specify a value that satisfies "#12596 BWD_TOL(Warning)" > "#12597 BWD_TOL(Caution)".
---Setting range---
0 to 99999.999 (mm or deg)
#12591 BWD_ILIM Brake wear diagnostics current limit value
(PR) #12592 BWD_CMDWT Brake wear diagnostics command wait time
(PR) #12593 BWD_FD Brake wear diagnostics command travel amount
(PR) #12594 BWD_FDRATE Brake wear diagnostics feedrate
(PR) #12595 BWD_OBTIM Brake wear diagnostics monitoring time
(PR) #12596 BWD_TOL(Warning) Brake wear diagnostics allowable travel amount (Warn ing)
(PR) #12597 BWD_TOL(Caution) Brake wear diagnostics allowable travel amount (Cau tion)

Select whether to enable or disable the variable full-closed torsion compensation.
0: Disable
1: Enable
Specify the magnification of time constant for variable full-closed torsion compensation (VDCtex1 to 8).
When not using, set to "0".
---Setting range---
0 to 9999 (%)
Specify the magnification of variable full-closed torsion compensation value (+) (VDCpex1 to 8).
When not using, set to "0".
---Setting range---
0 to 32767 (%)
Specify the magnification of variable full-closed torsion compensation value (-) (VDCnex1 to 8). When not
using, set to "0".
---Setting range---
0 to 32767 (%)
Specify the shift amount for variable full-closed torsion compensation time constant (VDCtex1 to 8).
When not using, set to "0".
---Setting range---
-9999 to 9999(ms)
Specify the shift amount for variable full-closed torsion compensation value (+) (VDCpex1 to 8).
When not using, set to "0".
---Setting range---
-32768 to 32767 (0.01 m)
Specify the shift amount for variable full-closed torsion compensation value (-) (VDCnex1 to 8).
When not using, set to "0".
---Setting range---
-32768 to 32767 (0.01 m)
Specify the acceleration at which variable full-closed torsion compensation is applied. (n=1 to 8)
Set the acceleration at reversal of machine travel direction.
When not using, set to "0".
---Setting range---
0 to 2147483647 (m/s2)
#14301 valVDC Variable full-closed torsion compensation ON
#14302 VDCtex_sc Variable full-closed torsion compensation: time con stant magnification
#14303 VDCpex_sc Variable full-closed torsion compensation: compensa tion (+) magnification
#14304 VDCnex_sc Variable full-closed torsion compensation: compensa tion (-) magnification
#14305 VDCtex_sft Variable full-closed torsion compensation: compensa tion time constant shift
#14306 VDCpex_sft Variable full-closed torsion compensation: compensa tion value (+) shift
#14307 VDCnex_sft Variable full-closed torsion compensation: compensa tion value (-) shift
#14311+5(n-1) VDCan Variable full-closed torsion compensation acceleration
n

Specify the time constant for variable full-closed torsion compensation. (n=1 to 8)
This sets the timing of applying the variable full-closed torsion compensation.
When 0 is set, the compensation is applied at the timing when the speed reaches the acceleration set in Vari able full-closed torsion compensation acceleration n.
---Setting range---
0 to 9999(ms)
Specify the compensation value of variable full-closed torsion compensation in the positive (+) direction.
(n=1 to 8)
Set the length of torsion (+) at reversal of machine travel direction.
When not using, set to "0".
---Setting range---
0 to 32767 (0.01 m)
Specify the compensation value of variable full-closed torsion compensation in the negative (-) direction. (n=1
to 8)

Set the length of torsion (-) at reversal of machine travel direction.
When not using, set to "0".
---Setting range---
0 to 32767 (0.01 m)
Select whether to enable the backlash compensation II function.
0: Disable
1: Enabled
Specify the acceleration rate at which the backlash compensation II function should be applied.
Set the acceleration rate at reversal of machine's travel direction.
When not using, set to "0".
---Setting range---
0 to 2147483647 (m/s2)
Specify the compensation amount to be used for backlash compensation II.
---Setting range---
-9999999 to 9999999 (Machine error compensation unit)
Specify the acceleration rate at which the backlash compensation II function should be applied.
Set the acceleration rate at reversal of machine's travel direction.
When not using, set to "0".
---Setting range---
0 to 2147483647 (m/s2)
Specify the compensation amount to be used for backlash compensation II.
---Setting range---
-9999999 to 9999999 (Machine error compensation unit)
#14312+5(n-1) VDCtexn Variable full-closed torsion compensation: compensa tion time constant n
#14313+5(n-1) VDCpexn Variable full-closed torsion compensation: compensa tion value n (+)
#14314+5(n-1) VDCnexn Variable full-closed torsion compensation: compensa tion value n (-)
#14360 valBL2 Backlash compensation II valid
#14361 BL2_a1 Backlash compensation II acceleration rate 1
#14362 BL2_c1 Backlash compensation II compensation amount 1
#14363 BL2_a2 Backlash compensation II acceleration rate 2
#14364 BL2_c2 Backlash compensation II compensation amount 2

Specify the acceleration rate at which the backlash compensation II function should be applied.
Set the acceleration rate at reversal of machine's travel direction.
When not using, set to "0".
---Setting range---
0 to 2147483647 (m/s2)
Specify the compensation amount to be used for backlash compensation II.
---Setting range---
-9999999 to 9999999 (Machine error compensation unit)
Specify the acceleration rate at which the backlash compensation II function should be applied.
Set the acceleration rate at reversal of machine's travel direction.
When not using, set to "0".
---Setting range---
0 to 2147483647 (m/s2)
Specify the compensation amount to be used for backlash compensation II.
---Setting range---
-9999999 to 9999999 (Machine error compensation unit)
#14365 BL2_a3 Backlash compensation II acceleration rate 3
#14366 BL2_c3 Backlash compensation II compensation amount 3
#14367 BL2_a4 Backlash compensation II acceleration rate 4
#14368 BL2_c4 Backlash compensation II compensation amount 4

15.5 Zero Point Return Parameters
Set a rapid traverse rate for the dog type reference position return command.
This is not used for the distance-coded reference position detection.
---Setting range---
1 to 1000000 (mm/min)
Set up the speed of approach to the reference point in the reference point return command. This speed is attained after the system stops with deceleration by dog detection.
In the distance-coded reference position detection, the set value will be applied from the start of reference position establishment.
(Note) The G28 approach speed unit is (10/min) only when using the Z-phase type encoder (#1226 aux10/bit3=1) for the spindle/C-axis reference position return type. The same unit is used for both the micrometric and sub-micrometric specifications.
---Setting range---
1 to 60000 (mm/min)
Set the distance from the electrical zero-point detection position to the reference position.
This is not used for the distance-coded reference position detection.
(Note 1) When "#1240 set12/bit2" is ON, a magnification (C: 10-fold, D: 100-fold and E: 1000-fold) corre sponding to the input setting unit ("#1003 iunit") will be applied to the setting value.
(Note 2) The sign of setting value is will be following: the direction of "#2030 dir (-)" Reference position di rection (-) is plus, and the opposite direction is minus.
(Note 3) When set value is set to minus, the axis moves to electrical zero-point detection position at first and then moves in opposite direction.
---Setting range---
-99.999 to +99.999 (mm)
Set the distance where the grid point will be ignored when near-point dog OFF signals are close to that grid point during reference position return.
The grid mask is valid for one grid.
This is not used for the distance-coded reference position detection.
---Setting range---
0.000 to 99.999 (mm)
#2025 G28rap G28 rapid traverse rate
#2026 G28crp G28 approach speed
#2027 G28sft Reference position shift distance

#2028 grmask Grid mask amount
Grid
Near-point dog
Grid mask setup distance
Axis speed
Position
(Encoder F/B)
Electrical zero point

Set the distance between grids.
Generally, set up the value equal to the ball screw pitch. However, if the encoder grid interval is not equal to the screw pitch when measured with a linear scale, set up the encoder grid interval.
To make the grid space smaller, set a divisor of the grid space.
This is not used for the distance-coded reference position detection.
(Note) Set the grid interval "#2029 grspc" according to the reference encoder for grid interval "#2041 grsp cref".
(1) Semi-closed loop control
If "#2041 grspcref" is set to "0" (grid interval by the motor-side), set "#2029 grspc" to the same value as the ball screw pitch.
If "#2041 grspcref" is set to "1" (grid interval by the machine-side), set "#2029 grspc" to the moving amount calculation value per a motor rotation ("#2201 SV001 PC1" / "#2202 SV002 PC2" x "#2218 SV018 PIT").
(2) Full-closed loop control
If "#2041 grspcref" is set to "1" (grid interval by the machine-side), set "#2029 grspc" to the same value as the Z phase pitch.
If "#2041 grspcref" is set to "0" (grid interval by the motor-side), set "#2029 grspc" to the moving amount calculation value per Z phase pitch ("#2202 SV002 PC2" / "#2201 SV001 PC1" x the Z phase pitch of the machine-side).
(*) If "#2029 grspc" is set to "0", the ball screw pitch "#2218 SV018 PIT" is used instead of the grid interval.
---Setting range---
0.000 to 999.999 (mm)
Select which side of the near-point dog the reference position is established.
For a rotary axis, select a direction that heads to the zero point from the intermediate point during automatic zero point return.
0: Positive direction
1: Negative direction
Directions in which reference position is established as viewed from the near-point dog
Select whether the reference position is provided for the axis.
0: Reference position is provided. (Normal controlled axis)
1: No reference position is provided.
When "1" is set, reference position return is not required before automatic operation starts.
#2029 grspc Grid interval
(PR) #2030 dir (-) Reference position direction (-)
#2031 noref Axis without reference position
Grid
- direction + direction
Near-point dog
Reference position
Reference position
- direction + direction
Grid
Near-point dog

Select whether to check the reference position return completion.
0: Check the reference position return completion.
1: Not check the reference position return completion.
When "1" is set, the absolute and incremental commands can be executed even if dog type (or Z phase pulse system) reference position return is not completed.
Note that this setting is available for a rotary axis only.
Not used. Set to "0".
Set the offset value from the position for the initial reference position setting to the machine's actual zero point in reference position return in the distance-coded reference position detection.
Input the value of the machine value counter that is displayed immediately after the reference position is es tablished.
When the power is turned ON and this parameter is set to "0", the manual reference position return is regard ed as initial reference position setting.
If this parameter is set to "0", automatic operation won't be available.
---Setting range---
-99999.999 to 99999.999 (mm)
Set the maximum distance for scanning the reference marks when the reference position is not established in the distance-coded reference position detection.
For the scan distance, set the distance that fully covers the number of reference marks as you wish to detect.
(Example) When adding about 10% of additional coverage:
Scan distance = Base reference mark interval [mm] * 2 * 1.1
---Setting range---
0.000 to 99999.999 (mm)
#2032 nochk Whether reference position return is completed not checked
(PR) #2033 zp_no Z phase pulse system reference position return spindle encoder No.
(PR) #2034 rfpofs Distance-coded reference position detection offset
#2035 srchmax Distance-coded reference position detection scan dis tance

Set the distance from the first grid point after leaving the near point dog on the slave axis to the position where the reference position is actually established in dog-type reference position return in synchronous control.

(Reference position shift amount is not included.)
The adjustment value will be automatically set in the slave axis's parameter according to the reference posi tion adjustment complete signal from PLC.
Fine adjustment is also available from the parameter screen.
In the distance-coded reference position detection, the reference position adjustment value will be invalid.
(Note 1) This parameter is enabled when the synchronization at zero point initialization ("#1493 ref_syn" =
"1" of the master axis) is applied.
(Note 2) This parameter can be set when one of the following settings is applied.
- Relative position detection ("#2049 type" = "0")
- Dog-type absolute position detection ("#2049 type" = "3")
- Simple absolute position ("#2049 type" = "9")
(Note 3) Set "0" when using the speed/current command synchronization control.
(Note 4) A setting unit of this parameter is [mm]. It is not influenced by the content of the following parameters
setting.
- "#1003 iunit"
- "#1004 ctrl_unit"
- "#1005 plcunit"
- "#1040 M_inch"
- "#1041 I_inch"
- "#1240 set12/bit2" (Zero point shift amount magnification)
(Note 5) The number of the significant digits after decimal point follows "#1004 ctrl_unit".
(Note 6) A change of this parameter requires reference position return. When the automatic operation starts
without reference position return, an alarm will occur.
---Setting range---
0 to 99999.999999 (mm)
#2036 slv_adjust Reference position adjustment value
Master axis start position
Master axis
Near-point dog
Slave axis
Slave axis start position
Grid
Reference position adjustment
amount
Reference position
adjustment completion
signal ON
Basic machine coordinate system
zero point
G28sft
G28sft
(6) (2)(1) (3) (4) (5)
(6) (7)

Set the position of the first reference position from the zero point of the basic machine coordinate.
---Setting range---
-99999.999 to 99999.999 (mm)
Set the position of the second reference position from the zero point of the basic machine coordinate.
---Setting range---
-99999.999 to 99999.999 (mm)
Set the position of the third reference position from the zero point of the basic machine coordinate.
---Setting range---
-99999.999 to 99999.999 (mm)
#2037 G53ofs Reference position #1
#2038 #2_rfp Reference position #2
#2039 #3_rfp Reference position #3
Reference position #3
(#2039 #3_rfp)
Basic machine coordinate
Reference position #4
(#2040 #4_rfp)
Reference position #2
(#2038 #2_rfp)
Reference position #1
(#2037 G53ofs)
Reference position #3
(#2039 #3_rfp)
Basic machine coordinate
Reference position #4
(#2040 #4_rfp)
Reference position #2
(#2038 #2_rfp)
Reference position #1
(#2037 G53ofs)
Reference position #3
(#2039 #3_rfp)
Basic machine coordinate
Reference position #4
(#2040 #4_rfp)
Reference position #2
(#2038 #2_rfp)
Reference position #1
(#2037 G53ofs)

Set the position of the fourth reference position from the zero point of the basic machine coordinate.

---Setting range---
-99999.999 to 99999.999 (mm)
Select the reference encoder (motor-side or machine-side) based on which the grid interval "#2029 grspc" is set.
0: Motor-side
1: Machine-side
(Note) When an MPI scale made by Mitsubishi Heavy Industries Machine Tool Co., Ltd.is used, set the zero point return parameters so that Z phase of the MPI scale becomes the grid point (electric basic position), and then perform zero point initialization setting.
#2040 #4_rfp Reference position #4
#2041 grspcref Reference encoder for grid interval
Reference position #3
(#2039 #3_rfp)
Basic machine coordinate
Reference position #4
(#2040 #4_rfp)
Reference position #2
(#2038 #2_rfp)
Reference position #1
(#2037 G53ofs)

15.6 Absolute Position Detection Parameters
Select the absolute position zero point alignment method.
0: Not absolute position detection
1: Stopper method (push against mechanical stopper)
2: Marked point alignment method I (The grid point is the reference position.)
3: Dog-type (align with dog and near point detection switch)
4: Marked point alignment method II (The position with which the mark was aligned is the reference posi tion.)
9: Simple absolute position (Not absolute position detection, but the position when the power is turned off is registered.)
Select the direction of the grid point immediately before the machine basic position (basic point of encoder) in the marked point alignment.
0: Positive direction
1: Negative direction
Set the tolerable range of travel distance (deviation distance) while the power is turned OFF.
If the distance between the position when the power is turned OFF and when the power is turned ON again is larger than the set value, the information is notified to the PLC. (signal name: Absolute position warning)
Set "0" to omit the check.
---Setting range---
0 to 99999.999 (mm)
Set the current limit value during the stopper operation in the dogless-type absolute position detection.
The setting value is the ratio of the current limit value to the rated current value.
---Setting range---
0 to 100 (%)
Set the feedrate for the automatic initial setting during stopper method.
---Setting range---
1 to 999 (mm/min)
Set the approach distance of the stopper when deciding the absolute position basic point with the stopper method.
After using stopper once, the tool returns with this distance, and then use stopper again.
---Setting range---
0 to 999.999 (mm)
Set the positive direction width where the near reference position signal is output.
When set to "0", the value is the same as #2218 SV018(PIT).
(Note) When "#1240 set12/bit2" is ON, a magnification (C: 10-fold, D: 100-fold, E: 1000-fold) corresponding to the input setting increment ("#1003 iunit") will be applied to the setting value.
---Setting range---
0 to 999.999 (mm)
(Input setting increment applied)
(PR) #2049 type Absolute position detection method
#2050 absdir Basic point of Z direction
#2051 check Check
#2054 clpush Current limit (%)
#2055 pushf Push speed
#2056 aproch Approach
#2057 nrefp Near zero point +

Set the negative direction width where the near reference position signal is output.
When set to "0", the value is the same as #2218 SV018(PIT).
(Note) When "#1240 set12/bit2" is ON, a magnification (C: 10-fold, D: 100-fold, E: 1000-fold) corresponding to the input setting increment ("#1003 iunit") will be applied to the setting value.
---Setting range---
0 to 999.999 (mm)
(Input setting increment applied)
Select which is to be the zero point coordinate position during absolute position initial setting.
0: Position where the axis was stopped.
1: Grid point just before stopper.
#2058 nrefn Near zero point -
#2059 zerbas Select zero point parameter and basic point

15.7 Servo Parameters
Set the gear ratio in the motor side when there is the gear between the servo motor's shaft and machine (ball

screw, etc.).
For the rotary axis, set the total deceleration (acceleration) ratio.
Even if the gear ratio is within the setting range, the electronic gears may overflow and an initial parameter
error (servo alarm 37) may occur.
For linear servo system
Set to "1".
---Setting range---
1 to 32767
Set the gear ratio in the machine side when there is the gear between the servo motor's shaft and machine
(ball screw, etc.).
For the rotary axis, set the total deceleration (acceleration) ratio.
Even if the gear ratio is within the setting range, the electronic gears may overflow and an initial parameter
error (servo alarm 37) may occur.
For linear servo system
Set to "1".
---Setting range---
1 to 32767
Set the position loop gain. The standard setting is "33".
The higher the setting value is, the more accurately the command can be followed, and the shorter the set tling time in positioning gets, however, note that a bigger shock will be applied to the machine during accel eration/deceleration.
When using the SHG control, also set SV004 (PGN2) and SV057 (SHGC).
When using the OMR-FF control, set the servo rigidity against quadrant projection or cutting load, etc. For
the tracking ability to the command, set by SV106(PGM).
---Setting range---
1 to 200 (rad/s)
When performing the SHG control, set the value of "SV003 x 8/3" to "SV004".
When not using the SHG control, set to "0".
When using the OMR-FF control, set to "0".
Related parameters: SV003, SV057
---Setting range---
0 to 999 (rad/s)
Set the speed loop gain.
The higher the setting value is, the more accurate the control will be, however, vibration tends to occur.
If vibration occurs, adjust by lowering by 20 to 30%.
The value should be determined to the 70 to 80% of the value at which the vibration stops.
The value differs depending on servo motors.
Aim at the standard value determined by the servo motor type and load inertia ratio to adjust.
---Setting range---
1 to 30000
(PR) #2201 SV001 PC1 Motor side gear ratio
(PR) #2202 SV002 PC2 Machine side gear ratio
#2203 SV003 PGN1 Position loop gain 1
#2204 SV004 PGN2 Position loop gain 2
#2205 SV005 VGN1 Speed loop gain 1

Set the speed loop gain at the motor limitation speed VLMT with "VCS(SV029: Speed at the change of speed
loop gain)".
Use this to suppress noise at high speed rotation during rapid traverse, etc. Then, the speed loop gain de creases at faster speed than the setting value of VCS. When not using, set to "0".
---Setting range---
-1000 to 30000
Set this when the limit cycle occurs in the full-closed loop, or overshooting occurs in positioning. The speed
loop delay compensation method can be selected with SV027/bit1,0.
Normally, use "Changeover type 2". Changeover type 2 controls the occurrence of overshooting by lowering
the speed loop lead compensation after the position droop gets 0.
When setting this parameter, make sure to set the torque offset (SV032).
---Setting range---
0 to 32767
Set the gain of the speed loop integral control.
Standard setting: 1364
Standard setting in the SHG control: 1900
Adjust the value by increasing/decreasing this by about 100 at a time.
Raise this value to improve contour tracking accuracy in high-speed cutting.
Lower this value when the position droop does not stabilize (when the vibration of 10 to 20Hz occurs).
---Setting range---
1 to 9999
Set the fixed value of each motor.
Set the standard value for each motor described in the standard parameter list.
---Setting range---
1 to 20480
Set the fixed value of each motor.
Set the standard value for each motor described in the standard parameter list.
---Setting range---
1 to 20480
Set the fixed value of each motor.
Set the standard value for each motor described in the standard parameter list.
---Setting range---
1 to 8192
Set the fixed value of each motor.
Set the standard value for each motor described in the standard parameter list.
---Setting range---
1 to 8192
#2206 SV006 VGN2 Speed loop gain 2
#2207 SV007 VIL Speed loop delay compensation
#2208 SV008 VIA Speed loop lead compensation
#2209 SV009 IQA Current loop q axis lead compensation
#2210 SV010 IDA Current loop d axis lead compensation
#2211 SV011 IQG Current loop q axis gain

#2212 SV012 IDG Current loop d axis gain
VGN1
VGN2
0 VCS VLMT
Gain
Speed

Set the current (torque) limit value in a normal operation.
This is a limit value in forward run and reverse run (for linear motors: forward and reverse direction).
When the standard setting value is "800", the maximum torque is determined by the specification of the mo tor.
Set this parameter as a proportion (%) to the stall current.
---Setting range---
0 - 999 (Stall current %)
Set the current (torque) limit value in a special operation (absolute position initial setting, stopper control and
etc.).
This is a limit value in forward and reverse directions.
Set to "800" when not using.
Set this parameter as a proportion (%) to the stall current.
---Setting range---
0 - 999 (Stall current %)
However, when SV084/bitB=1, the setting range is from 0 to 32767 (Stall current 0.01%).
When a relative error in synchronous control is too large, set this parameter to the axis that is delaying.
The standard setting is "0". The standard setting in the SHG control is "100".
To adjust a relative error in acceleration/deceleration, increase the value by 50 at a time.
---Setting range---
0 to 999 (%)
Set this parameter when the protrusion (that occurs due to the non-sensitive band by friction, torsion, back lash, etc.) at quadrant change is too large. This sets the compensation torque at quadrant change (when an axis feed direction is reversed) by the proportion (%) to the stall torque. Whether to enable the lost motion
compensation and the method can be set with other parameters.
Type 2: When SV027/bit9, 8=10 (Compatible with obsolete type)
Set the type 2 method compensation torque. The standard setting is double the friction torque.
Related parameters: SV027/bit9,8, SV033/bitF, SV039, SV040, SV041, SV082/bit2
Type 3: When SV082/bit1=1
Set the compensation torque equivalent of dynamic friction amount of the type 3 method compensation
amount. The standard setting is double the dynamic friction torque.
Related parameters: SV041, SV082/bit2,1, SV085, SV086
To vary compensation amount according to the direction.
When SV041 (LMC2) is "0", compensate with the value of SV016 (LMC1) in both +/-directions.
If you wish to change the compensation amount depending on the command direction, set this and
SV041 (LMC2).
(SV016: + direction, SV041: - direction. However, the directions may be opposite depending on other set tings.)
When "-1" is set, the compensation will not be performed in the direction of the command.
---Setting range---
-1 to 200 (Stall current %)
Note that when SV082/bit2 is "1", the setting range is between -1 and 20000 (Stall current 0.01%).
#2213 SV013 ILMT Current limit value
#2214 SV014 ILMTsp Current limit value in special control
#2215 SV015 FFC Acceleration rate feed forward gain
#2216 SV016 LMC1 Lost motion compensation 1

Select the servo specifications.
A function is allocated to each bit.
Set this in hexadecimal format.
bit F-C : spm Motor series selection
0: 200V HK motor (Standard)
1: 200V HG motor (Standard)
2: 400V HK-H motor (Standard)
3: 400V HG-H, HQ-H motor (Standard)
6: 200V LM-F linear motor
7: 200V direct-drive motor
8: 400V LM-F linear motor
9: 400V direct-drive motor
bit B :
Not used. Set to "0".
bit A : drvup Combined drive unit:
0: Normal setting (Combined drive unit: normal)
1: Combined drive unit: one upgrade
(Note) It is not available for MDS-EJ/EJH Series.
bit 9 :
Not used. Set to "0".
bit 8 : mp MPI scale pole number setting
0: 360 poles 1: 720 poles
bit 7 : abs Position control
These parameters are set automatically by the NC system.
0: Incremental 1: Absolute position control
bit 6-5 :
Not used. Set to "0".
bit 4 : sdir Sub side encoder feedback
Set the machine side encoder's installation polarity.
0: Forward polarity 1: Reverse polarity
bit 3 : vfb Speed feedback filter
0: Stop 1: Start (4500Hz)
bit 2 : seqh Ready on sequence
0: Normal 1: High-speed

bit 1 : dfbx Dual feedback control
Control the position FB signal in full closed control by the combination of a motor side encoder and machine side encoder.
0: Stop 1: Start
Related parameters: SV051, SV052
bit 0 : mdir Machine side encoder feedback (for Linear/direct-drive motor)
Set the encoder installation polarity in the linear servo and direct-drive motor control.
0: Forward polarity 1: Reverse polarity
(PR) #2217 SV017 SPEC1 Servo specification 1
abs
spm
mdir
dfbx
seqh
vfb
sdir
mp
drvup

For servo motor:
Set the ball screw pitch. For the rotary axis, set to "360".
For direct-drive motor
Set to "360".
For linear motor
Set the ball screw pitch. (For LM-F series, set to "48")
---Setting range---
For general motor: 1 to 32767 (mm/rev)
- For linear motor 1 to 32767 (mm)
For semi-closed loop control
Set the same value as SV020.
For full-closed loop control
Set the number of pulses per ball screw pitch.
For direct-drive motor
Set the same value as SV020.
For 1000 pulse unit resolution encoder, set the number of pulses in SV019 in increments of 1000 pulse (kp).
The value must be input in increments of 10K pulses (the 1st digit of the setting value is "0").
In this case, make sure to set "0" to SV117.
For high-accuracy binary resolution encoder, set the number of pulses to four bite data of SV117 (high-order) and SV019 (low-order) in pulse (p) unit.
SV117 = number of pulses / 65536 (when =0, set "-1" to SV117)
SV019 = the remainder of number of "pulses / 65536"
---Setting range---
When SV117 = 0, the setting range is from 0 to 32767 (kp)
When SV1170, the setting range is from 0 to 65535 (p)
Normally, set to "0".
For linear motor
Set the number of pulses of the encoder per magnetic pole pitch with SV118.
For direct-drive motor
Set the number of pulses per revolution of the motor side encoder.
For 1000 pulse unit resolution encoder, set the number of pulses to SV020 in increments of 1000 pulse(kp).
The value must be input in increments of 10K pulses (the 1st digit of the setting value is "0").
In this case, make sure to set SV118 to "0". For high-accuracy binary resolution encoder, set the number of pulses to four bite data of SV118 (high-order) and SV020 (low-order) in pulse(p) unit.
SV118 = number of pulses / 65536 (when =0, set "-1" to SV118)
SV020 = the remainder of "number of pulses / 65536"
---Setting range---
When SV118 = 0, the setting range is from 0 to 32767 (kp)
When SV1180, the setting range is from 0 to 65535 (p)
Normally, set to "60". (For Mitsubishi Electric adjustment.)
Related parameters: SV022
---Setting range---
1 to 999 (s)
(PR) #2218 SV018 PIT Ball screw pitch/Magnetic pole pitch
(PR) #2219 SV019 RNG1 Sub side encoder resolution
(PR) #2220 SV020 RNG2 Main side encoder resolution
#2221 SV021 OLT Overload detection time constant

Set the "Overload 1" (Alarm 50) current detection level as percentage to the stall current.
Normally set this parameter to "150". (For Mitsubishi Electric adjustment.)
Related parameters: SV021
---Setting range---
110 to 500 (Stall current %)
Set the excessive error detection width in servo ON.
When set to "0", the excessive error alarm detection will be ignored, so do not set to "0".
<Standard setting value>
OD1=OD2= (Rapid traverse rate [mm/min]) / (60PGN1) / 2 [mm]

Related parameters: SV026
---Setting range---
0 to 32767 (mm)
However, when SV084/bitC=1, the setting range is from 0 to 32767 (m).
Set the in-position detection width.
Set the positioning accuracy required for the machine.
The lower the setting is, the higher the positioning accuracy will be. However the cycle time (settling time)

becomes longer.
The standard setting value is "50".
---Setting range---
1 to 32767 (m)
#2222 SV022 OLL Overload detection level
#2223 SV023 OD1 Excessive error detection width during servo ON
#2224 SV024 INP In-position detection width

Set the position encoder type, speed encoder type and motor type.
The setting value is a four-digit hex (HEX).
bit F-C: pen(HEX-4) Position encoder
Semi-closed loop control by general motor
 pen=2
Full-closed loop control by general motor
 - Ball screw end encoder (OSA405ET2AS, OSA676ET2AS)
 pen=6
 - For serial signal output rotary scale (including MDS-EX-HR)
 pen=6
 - For rectangular wave signal output linear scale
 pen=8
 - For serial signal output linear scale (including MDS-EX-HR and MPI scale)
 pen=A
 - For speed command synchronization control
 Primary axis pen=A
 Secondary axis pen=D
 - For common encoder current command synchronous control
 Primary axis pen=2 (Rotary motor)
 pen=A (Linear motor)
 Secondary axis pen=D
For a linear motor
 pen=A
For a direct-drive motor
 pen=2
bit B-8: ent(HEX-3) Speed encoder
For a general motor: ent=2
For common encoder current command synchronous control
 Primary axis pen=2 (Rotary motor)
 pen=A (Linear motor)
 Secondary axis pen=D
For a linear motor: ent=A
For a direct-drive motor: ent=2
(PR) #2225 SV025 MTYP Motor/Encoder type
mtyp
ent
pen
HEX- 1234

bit 7-0: mtyp(HEX-2,1) Motor type
Set the motor type. Set this with SV017/bitF-C.
For SV017/bitF-C = 0 (200V HK motor series)
 HK76 : 51h HK154 (E-V3-80) : 91h HK303 : 68h
 HK105 : 52h HK154 (E-V3-40) : 98h HK354 : 58h
 HK55 : 53h HK223 : 66h HK453 : 59h
 HK104 : 54h HK224 : 56h HK603 : 69h
 HK123 : 64h HK224 (E-V1/V2-160) : 81h HK702 : 6Ah
 HK142 : 65h HK204 : 57h HK703 : 5Ah
 HK154 : 55h HK302 : 67h
For SV017/bitF-C = 1 (200V HG motor series)
HG46 : BAh HG154 (E-V3-40) : 4Fh HG603 : 69h
HG56 : BBh HG224 : 46h HG702 : 6Ah
HG96 : BCh HG204 : 47h HG703 : 4Ah
HG75 : 41h HG354 : 48h HG903 : 4Bh
HG105 : 42h HG123 : 64h HG1103 : 4Ch
HG54 : 43h HG223 : 66h HG142 : 65h
HG104 : 44h HG303 : 68h HG302 : 67h
HG154 : 45h HG453 : 49h
 For SV017/bitF-C = 2 (400V HK-H motor series)
HK-H76 : 51h HK-H223 : 66h HK-H453 : 59h
HK-H105 : 52h HK-H224 : 56h HK-H603 : 69h
HK-H55 : 53h HK-H224 (EH-V1/V2-80) : 81h HK-H702 : 6Ah
HK-H104 : 54h HK-H204 : 57h HK-H703 : 5Ah
HK-H123 : 64h HK-H302 : 67h
HK-H154 : 55h HK-H303 : 68h
HK-H154 (EH-V3-40) : 91h HK-H354 : 58h

For SV017/bitF-C = 3 (400V HG-H, HQ-H motor series)
HG-H75 : 41h HG-H224 : 46h HG-H903 : 4Bh
HG-H105 : 42h HG-H204 : 47h HG-H1502 : 4Dh
HG-H54 : 43h HG-H354 : 48h HQ-H903 : 58h
HG-H104 : 44h HG-H453 : 49h HQ-H1103 : 59h
HG-H154 : 45h HG-H703 : 4Ah
For linear motor and direct-drive motor, follow the settings stated in respective materials.
Set the excessive error detection width during servo OFF.
When set to "0", the excessive error alarm detection will be ignored, so do not set to "0".

<Standard setting value>
OD1=OD2= (Rapid traverse rate [mm/min]) / (60PGN1) / 2 [mm]
Related parameters: SV023
---Setting range---
0 to 32767 (mm)
However, when SV084/bitC=1, the setting range is from 0 to 32767 (m).
#2226 SV026 OD2 Excessive error detection width during servo OFF
M800/M80/E80 Series Alarm/Parameter Manual
15 Machine Parameters
IB-1501279-S 504
Select the servo functions.
A function is assigned to each bit.
Set this in hexadecimal format.
bit F : hfrf Higher harmonic suppression filter
0: Stop
1: Start
bit E : zrn2
Set to "1". (Fixed)
bit D :
Not used. Set to "0".
bit C :
Not used. Set to "0".
bit B-A : ovs Overshooting compensation
Set this if overshooting occurs during positioning.
bitB,A=
00: Compensation stop
01: Setting prohibited
10: Setting prohibited
11: Type 3
Set the compensation amount in SV031(OVS1) and SV042(OVS2).
Related parameters: SV031, SV042, SV034/bitF-C
bit 9-8 : lmc Lost motion compensation type
Set this parameter when the protrusion at quadrant change is too large.
Type 2 has an obsolete type compatible control.
bit9,8=
00: Compensation stop
01: Setting prohibited
10: Type 2
11: Setting prohibited
Set the compensation amount in SV016(LMC1) and SV041(LMC2).
(Note) When "SV082/bit1=1", the lost motion compensation type 3 will be selected regardless of this setting.
bit 7 :
Not used. Set to "0".
bit 6 :
Not used. Set to "0".
bit 5-4 : vfct Jitter compensation pulse number
Suppress vibration by machine backlash when axis stops.
bit5,4=
00: Disable
01: 1 pulse
10: 2 pulse
11: 3 pulses
bit 3 :
Not used. Set to "0".
bit 2 :
Not used. Set to "0".
#2227 SV027 SSF1 Servo function 1
M800/M80/E80 Series Alarm/Parameter Manual
15 Machine Parameters
505 IB-1501279-S
bit 1-0 : vcnt Speed loop delay compensation changeover type selection
Normally, use "Changeover type 2".
bit1,0=
00: Disable
01: Changeover type 1
10: Changeover type 2
11: Setting prohibited
Related parameters: SV007
Set this parameter to adjust the motor magnetic pole position and encoder's installation phase when using
linear motors or direct-drive motors.
During the DC excitation of the initial setup (SV034/bit4=1), set the same value displayed in "AFLT gain" on
the NC monitor screen.
Related parameters: SV034/bit4, SV061, SV062, SV063
For general motor:
Not used. Set to "0".
---Setting range---
-18000 to 18000 (electrical angle 0.01)
Noise at high speed rotation including rapid traverse can be reduced by lowering the speed loop gain at high
speeds.
Set the speed at which the speed loop gain changes. Use this with SV006 (VGN2).
When not using, set to "0".
---Setting range---
0 to 9999 (r/min)
When 100% is set, the voltage reduction amount equivalent to the logical non-energization in the PWM con trol will be compensated.
When "0" is set, 100% compensation will be performed.
Adjust in increments of 10% from the default value of 100%.
If increased too much, vibration or vibration noise may be generated.
---Setting range---

0 to 255 (%)
This compensates the motor torque when overshooting occurs during positioning. This is valid only when the overshooting compensation (SV027/bitB,A) is selected.
Type 3 SV027/bitB,A=11
Set the compensation amount based on the motor stall current. Observing positioning droop waveform, increase in increments of 1% and find the value where overshooting does not occur.
To vary compensation amount depending on the direction.
When SV042 (OVS2) is "0", change the SV031 (OVS1) value in both of the +/- directions to compensate.
To vary the compensation amount depending on the command direction, set this and SV042 (OVS2).
(SV031: + direction, SV042: - direction. However, the directions may be opposite depending on other set tings.)
When "-1" is set, the compensation will not be performed in the direction of the command.
Related parameters: SV027/bitB,A, SV034/bitF-C, SV042, SV082/bit2
---Setting range---
-1 to 100 (Stall current %)
Note that the range will be "-1 - 10000" (Stall current 0.01%) when SV082/bit2 is "1".
(PR) #2228 SV028 MSFT Magnetic pole shift amount (for linear/direct-drive mo tor)
#2229 SV029 VCS Speed at the change of speed loop gain
#2230 SV030 IVC Voltage non-sensitive band compensation
#2231 SV031 OVS1 Overshooting compensation 1

Set the unbalance torque on vertical axis and inclined axis.
When the vertical axis pull up function is enabled, the pull up compensation direction is determined by this parameter's sign. When set to "0", and the pull up function is enabled (SV033/bitE=1), the alarm "S02 2233 Initial parameter error" occurs.
This can be used for speed loop delay compensation and collision detection function.
To use load inertia estimation function (drive monitor display), set this parameter, friction torque (SV045) and load inertia display enabling flag(SV035/bitF).
Related parameters: SV007, SV033/bitE, SV059
---Setting range---
-100 to 100 (Stall current %)
#2232 SV032 TOF Torque offset

Select the servo functions.
A function is assigned to each bit.
Set this in hexadecimal format.
bit F : lmc2a Lost motion compensation 2 timing
0: Normal 1: Change
bit E : zup Vertical axis pull up function
0: Stop 1: Enable
Related parameters: SV032, SV095
bit D : rps Safely limited speed setting increment
Change the setting units of the specified speed signal output speed (SV073).
0: mm/min 1: 100mm/min
Related parameters: SV073
bit C-8 :
Not used. Set to "0".
bit 7-5 : nfd2 Depth of Notch filter 2
Set the depth of Notch filter 2 (SV046).
bit7,6,5=
000: -
001: -18.1[dB]
010: -12.0[dB]
011: -8.5[dB]
100: -6.0[dB]
101: -4.1[dB]
110: -2.5[dB]
111: -1.2[dB]
bit 4 : fhz3 Notch filter 3
0: Stop 1: Start (1125Hz)
bit 3-1 : nfd1 Depth of Notch filter 1
Set the depth of Notch filter 1 (SV038).
bit3,2,1=
000: -
001: -18.1[dB]
010: -12.0[dB]
011: -8.5[dB]
100: -6.0[dB]
101: -4.1[dB]
110: -2.5[dB]
111: -1.2[dB]
bit 0 :
Not used. Set to "0".
#2233 SV033 SSF2 Servo function 2
zup
nfd1
fhz3
nfd2
rps
lmc2a

Select the servo functions.
A function is assigned to each bit.

Set this in hexadecimal format.
bit F-C: ovsn Overshooting compensation type 3 Non-sensitive band
Set the non-sensitive band of the model position droop overshooting amount in increments of 2m.
In the feed forward control, set the non-sensitive band of the model position droop and ignore the overshoot ing of the model.
0 : 0 m, 1: 2 m, 2: 4m,---, E : 28 m, F: 30m
bit B-8 : linN The number of parallel connections when using linear motors (for linear)
Set to"2" to perform 1 amplifier 2 motor control by linear servo.
bit 7-5 :
Not used. Set to "0".
bit 4 : dcd (linear/direct-drive motor)
0: Normal setting 1: DC excitation mode
Related parameters: SV061, SV062, SV063
bit 3 :
Not used. Set to "0".
bit 2 : mohn Thermistor temperature detection (linear/direct-drive motor)
0: Normal setting 1: Disable
bit 1 : has HAS control
This stabilizes the speed overshooting by torque saturation phenomenon.
0: Normal setting 1: Enable
Related parameters: SV084/bitF
bit 0 :
Not used. Set to "0".
#2234 SV034 SSF3 Servo function 3
has2
ovsn
mohn
dcd
linN

Select the servo functions.
A function is assigned to each bit.
Set this in hexadecimal format.
bit F: clt Inertia ratio display
0: Setting for normal use
1: Display the total inertia ratio estimated at acceleration/deceleration at the inertia ratio on the servo monitor screen
To display it on the screen, set an imbalance torque and friction torque to both SV032 and SV045 and repeat acceleration/deceleration operations for several times.
bit E-C: clG1 G1 Collision detection level
Set the collision detection level in the collision detection method 1 during cutting feed (G1) in multiples of that of rapid traverse (G0). When set to "0", detection of collision detection method 1 during cutting feed will be ignored.
G1 Collision detection level = G0 collision detection level (SV060) clG1
bit B: cl2n Collision detection method 2
0: Enable 1: Disable
bit A: clstp Collision detection method 1 disabled during stop
0: Collision detection method 1 enabled during stop
1: Collision detection method 1 disabled during stop
bit 9-8: cltq Retract torque in collision detection
Set the retract torque in collision detection using the ratio of motor's maximum torque.
bit9,8=
00: 100%
01: 90%
10: 80% (Standard)
11: 70%
bit 7: ckab No signal detection 2
Set this to use rectangular wave output linear scale.
This enables the detection of No signal 2 (alarm 21).
0: Disable 1: Enable
bit 6: stod Alarm 4D-2 detection disabled during deceleration and stop
0: Normal 1: Alarm 4D-2 detection disabled during deceleration and stop
bit 5-4:
Not used. Set to "0".
bit 3: clof Collision detection estimated disturbance torque offset
0: Disable 1: Enable
bit 2-0:
Not used. Set to "0".
#2235 SV035 SSF4 Servo function 4
cltq
clstp
ckab
clof
stod
cl2n
clG1
clt

MDS-E/EH Series: Power supply type
When connecting a power supply unit, set a code for each power supply unit.
bit F-C : amp
Set the power backup function to be used.
No function used : 0
Deceleration and stop function at power failure : 8
Retraction function at power failure : C

bit B-8 : rtyp
Not used. Set to "0".
bit 7-0 : ptyp External emergency stop setting
When the emergency stop input signal of the power supply unit is "disabled"
Power supply unit is not connected : 00
MDS-E-CV-37 / MDS-EH-CV-37 : 04
MDS-E-CV-75 / MDS-EH-CV-75 : 08
MDS-E-CV-110 / MDS-EH-CV-110 : 11
MDS-E-CV-185 / MDS-EH-CV-185 : 19
MDS-E-CV-300 / MDS-EH-CV-300 : 30
MDS-E-CV-370 / MDS-EH-CV-370 : 37
MDS-E-CV-450 / MDS-EH-CV-450 : 45
MDS-E-CV-550 / MDS-EH-CV-550 : 55
MDS-EH-CV-750 : 75
When the emergency stop input signal of the power supply unit is "enabled"
(Note) Set the power supply rotary switch to "4".
Power supply unit is not connected : 00
MDS-E-CV-37 / MDS-EH-CV-37 : 44
MDS-E-CV-75 / MDS-EH-CV-75 : 48
MDS-E-CV-110 / MDS-EH-CV-110 : 51
MDS-E-CV-185 / MDS-EH-CV-185 : 59
MDS-E-CV-300 / MDS-EH-CV-300 : 70
MDS-E-CV-370 / MDS-EH-CV-370 : 77
MDS-E-CV-450 / MDS-EH-CV-450 : 85
MDS-E-CV-550 / MDS-EH-CV-550 : 95
MDS-EH-CV-750 : B5
MDS-EM/EMH Series
Not used. Set to "0000".
External emergency stop power supply type is set by spindle parameter (SP032).
(PR) #2236 SV036 PTYP Power supply type/ Regenerative resistor type
ptyp
rtyp
amp
M800/M80/E80 Series Alarm/Parameter Manual
15 Machine Parameters
511 IB-1501279-S
MDS-EJ/EJH Series: Regenerative resistor type
Set the regenerative resistor type.
bit F-8 : amp(bit F-C) / rtyp(bit B-8)
Resistor built-in drive unit : 10
Setting prohibited : 11
MR-RB032 : 12
MR-RB12 or GZG200W39OHMK : 13
MR-RB32 or GZG200W120OHMK 3 units connected in parallel : 14
MR-RB30 or GZG200W39OHMK 3 units connected in parallel : 15
MR-RB50 or GZG300W39OHMK 3 units connected in parallel : 16
MR-RB31 or GZG200W20OHMK 3 units connected in parallel : 17
MR-RB51 or GZG300W20OHMK 3 units connected in parallel : 18
Setting prohibited : 19-1F
Setting prohibited : 20-23
FCUA-RB22 : 24
FCUA-RB37 : 25
FCUA-RB55 : 26
FCUA-RB75/2 : 27
Setting prohibited : 28
R-UNIT2 : 29
Setting prohibited : 2A-2C
FCUA-RB75/2 2 units connected in parallel : 2D
FCUA-RB55 2 units connected in parallel : 2E
Setting prohibited : 2F
MR-RB1H-4 : 33
MR-RB3M-4 : 34
MR-RB3G-4 : 35
MR-RB5G-4 : 36
bit 7-4 : emgx External emergency stop function
Set the external emergency stop function.
0: Disable 4: Enable
bit 3-0 :
Not used. Set to "0".
Set the motor axis conversion total load inertia including motor itself in proportion to the motor inertia.
SV037(JL)=(Jm+Jl)/Jm100
Jm: Motor inertia
Jl: Motor axis conversion load inertia
For linear motor, set the gross mass of the moving sections in kg unit.
<<Drive monitor load inertia ratio display>>
Set SV035/bitF=1 and imbalance torque and friction torque to both SV032 and SV045, and then repeat ac celeration/deceleration for several times.
---Setting range---
For general motor: 0 to 5000 (%)
For linear motor 0 to 5000 (kg)
#2237 SV037 JL Load inertia scale
emgx
rtyp
amp
0 00 0
M800/M80/E80 Series Alarm/Parameter Manual
15 Machine Parameters
IB-1501279-S 512
Set the vibration frequency to suppress when machine vibration occurs.

(Normally, do not set 80 or less.)
Set to "0" when not using.
Related parameters: SV033/bit3-1, SV115
---Setting range---
0 to 5000 (Hz)
Set this when the timing of lost motion compensation type 2 does not match.
Adjust increments of 10 at a time.
---Setting range---
0 to 2000 (ms)
Set the non-sensitive band of the lost motion compensation in the feed forward control.
When "0" is set, 2m is the actual value to be set. Adjust increments of 1m.
---Setting range---
0 to 255 (m)
Set this with SV016 (LMC1) only when you wish to vary the lost motion compensation amount depending on
the command directions.
Normally, set to "0".
---Setting range---
-1 to 200 (Stall current %)
Note that when SV082/bit2 is "1", the setting range is between -1 and 20000 (Stall current 0.01%).
Set this with SV031 (OVS1) only when you wish to vary the overshooting compensation amount depending
on the command directions.
Normally, set to "0".
---Setting range---
-1 to 100 (Stall current %)
Note that when SV082/bit2 is "1", the setting range is between -1 and 10000 (Stall current 0.01%).
Set the disturbance observer filter band.
Normally, set to "100". Setting values of 49 or less is equal to "0" setting.
To use the disturbance observer, also set SV037 (JL) and SV044 (OBS2).
When disturbance observer related parameters are changed, lost motion compensation needs to be read justed.
Set to "0" when not using.
---Setting range---
0 to 1000 (rad/s)
Set the disturbance observer gain. The standard setting is "100 to 300".
To use the disturbance observer, also set SV037 (JL) and SV043 (OBS1).
When disturbance observer related parameters are changed, lost motion compensation needs to be read justed.
Set to "0" when not using.
---Setting range---
0 to 500 (%)
Set the frictional torque when using the collision detection function.
To use load inertia estimation function (drive monitor display), set this parameter, imbalance torque (SV032)
and load inertia display enabling flag (SV035/bitF).
---Setting range---
0 to 255 (Stall current %)
#2238 SV038 FHz1 Notch filter frequency 1
#2239 SV039 LMCD Lost motion compensation timing
#2240 SV040 LMCT Lost motion compensation non-sensitive band
#2241 SV041 LMC2 Lost motion compensation 2
#2242 SV042 OVS2 Overshooting compensation 2
#2243 SV043 OBS1 Disturbance observer filter frequency
#2244 SV044 OBS2 Disturbance observer gain
#2245 SV045 TRUB Friction torque

Set the vibration frequency to suppress when machine vibration occurs.
(Normally, do not set 80 or less.)
Set to "0" when not using.
Related parameters: SV033/bit7-5, SV115
---Setting range---
0 to 5000 (Hz)
Set the inductive voltage compensation gain. Standard setting value is "100".
If the current FB peak exceeds the current command peak, lower the gain.
---Setting range---
0 to 200 (%)
Input the time required to prevent the vertical axis from dropping by delaying READY OFF until the brake
works at an emergency stop.
Increase in increments of 100ms at a time, find and set the value where the axis does not drop.
When using a motor with a break of HG(-H) Series, HQ-H Series, and HK(-H) Series set to "200ms" as a
standard.
When the pull up function is enabled (SV033/bitE=1), the pull up is established during the drop prevention
time.
(Note) When not using the spindle drive unit, use the servo axis that controls vertical axis drop prevention
control to control the power supply (connect with CN4).
Related parameters: SV033/bitE, SV055, SV056
---Setting range---
0 to 20000 (ms)
When set to "0", and the pull up function is enabled (SV033/bitE=1), the alarm "S02 2233 Initial param eter error" occurs.
Set the position loop gain during spindle synchronization control (synchronous tapping and synchronization
control with spindle C-axis).
Set the same value as that of the position loop gain for spindle synchronous tapping control.
When performing the SHG control, set this parameter with SV050 (PGN2sp) and SV058 (SHGCsp).
When changing the value, change the value of "#2017 tap_g Axis servo gain".
---Setting range---
1 to 200 (rad/s)
When using SHG control during spindle synchronous control (synchronous tapping and synchronization con trol with spindle C-axis), set this parameter with SV049 (PGN1sp) and SV058 (SHGCsp).
Make sure to set the value 8/3 times that of SV049.
When not using the SHG control, set to "0".
---Setting range---

0 to 999 (rad/s)
Set the control time constant in dual feed back.
When "0" is set, it operates at 1ms.
The higher the time constant is, the closer it gets to the semi-closed control, so the limit of the position loop
gain will be raised.
For linear servo/direct-drive motor system
Not used. Set to "0".
Related parameters: SV017/bit1, SV052
---Setting range---
0 to 9999 (ms)
#2246 SV046 FHz2 Notch filter frequency 2
#2247 SV047 EC Inductive voltage compensation gain
#2248 SV048 EMGrt Vertical axis drop prevention time
#2249 SV049 PGN1sp Position loop gain 1 in spindle synchronous control
#2250 SV050 PGN2sp Position loop gain 2 in spindle synchronous control
#2251 SV051 DFBT Dual feedback control time constant

Set the non-sensitive band in the dual feedback control.
Normally, set to "0".
For linear servo/direct-drive motor system
Not used. Set to "0".
Related parameters: SV017/bit1, SV052
---Setting range---
0 to 9999 (m)
Set the excessive error detection width when servo ON in a special control (initial absolute position setting,
stopper control and etc.).
When "0" is set, excessive error detection will not be performed when servo ON during a special control.
---Setting range---
0 to 32767 (mm)
However, when SV084/bitC=1, the setting range is from 0 to 32767 (m).
Set the overrun detection width in the full-closed loop control.
When the gap between the motor side encoder and the linear scale (machine side encoder) exceeds the val ue set by this parameter, it will be judged as overrun and "Alarm 43" will be detected.
When "-1" is set, if the differential velocity between the motor side encoder and the machine side encoder
exceeds the 30% of the maximum motor speed, it will be judged as overrun and "Alarm 43" will be detected.
When "0" is set, overrun will be detected with a 2mm width.
For linear servo/direct-drive motor system
Not used. Set to "0".
---Setting range---
-1 to 32767 (mm)
However, when SV084/bitD=1, the setting range is from -1 to 32767 (m).
Set the time required between an emergency stop and forced READY OFF.
Set the maximum value "+ 100ms" of the SV056 setting value of the servo drive unit electrified by the same
power supply unit.
When executing the vertical axis drop prevention, the gate off will be delayed for the length of time set at
SV048 even when SV055's is smaller than that of SV048.
Related parameters: SV048, SV056
---Setting range---
0 to 20000 (ms)
Set the time constant used for the deceleration control at emergency stop.
Set the time required to stop from rapid traverse rate (rapid).
The standard setting value is EMGtG0tL0.9.
However, note that the standard setting value differs from the above-mentioned value when the setting value
of "#2003:smgst Acceleration and deceleration modes bit 3-0:Rapid traverse acceleration/deceleration type"
is 8 or F. Refer to Instruction Manual of the drive unit (section "5.5.1 Deceleration Control") for details.
Related parameters: SV048, SV055
---Setting range---
0 to 20000 (ms)
When performing the SHG control, set to SV003(PGN1)6.
When not using the SHG control, set to "0".
When using the OMR-FF control, set to "0".
Related parameters: SV003, SV004
---Setting range---
0 to 1200 (rad/s)
#2252 SV052 DFBN Dual feedback control non-sensitive band
#2253 SV053 OD3 Excessive error detection width in special control
#2254 SV054 ORE Overrun detection width in closed loop control
#2255 SV055 EMGx Max. gate off delay time after emergency stop
#2256 SV056 EMGt Deceleration time constant at emergency stop
#2257 SV057 SHGC SHG control gain

When using SHG control during spindle synchronization control (synchronous tapping and synchronous con trol with spindle C-axis), set this parameter with SV049 (PGN1sp) and SV050 (PGN2sp).
Make sure to set the value 6 times that of SV049.
When not using the SHG control, set to "0".
---Setting range---
0 to 1200 (rad/s)
Set the torque estimated gain when using the collision detection function.
The standard setting value is the same as the load inertia ratio (SV037 setting value) including motor inertia.
Set to "0" when not using the collision detection function.
Related parameters: SV032, SV035/bitF-8, SV037, SV045, SV060
<<Drive monitor load inertia ratio display>>
Set SV035/bitF=1 and imbalance torque and friction torque to both SV032 and SV045, and then repeat ac celeration/deceleration for several times.
---Setting range---
For general motor: 0 to 5000 (%)
For linear motor: 0 to 5000 (kg)

When using the collision detection function, set the collision detection level at the G0 feeding.
When "0" is set, none of the collision detection function will work.
Related parameters: SV032, SV035/bitF-8, SV037, SV045, SV059
---Setting range---
0 to 999 (Stall current %)
Input the data number you wish to output to the D/A output channel 1.
When using the 2-axis drive unit, set "-1" to the axis that the data will not be output.
When the DC excitation is running (SV034/bit4=1):
Use this when the DC excitation is running (SV034/bit4=1) to adjust the initial magnetic pole position
(when measuring the magnetic pole shift amount) for linear motor and direct-drive motor.
Set the initial excitation level in DC excitation control.
Set 10% as standard.
Related parameters: SV062, SV063
---Setting range---
-32768 to 32767
When the DC excitation is running (SV034/bit4=1): 0 to 100 (Stall current %)
Input the data number you wish to output to the D/A output channel 2.
When using the 2-axis drive unit, set "-1" to the axis that the data will not be output.
When the DC excitation is running (SV034/bit4=1):
Use this when the DC excitation is running (SV034/bit4=1) to adjust the initial magnetic pole position
(when measuring the magnetic pole shift amount) for linear motor and direct-drive motor.
Set the final excitation level in DC excitation control.
Set 10% as standard.
When the magnetic pole shift amount measurement value is unsteady, adjust the value in increments of
5%.
Related parameters: SV061, SV063
---Setting range---
-32768 to 32767
When the DC excitation is running (SV034/bit4=1): 0 to 100 (Stall current %)
#2258 SV058 SHGCsp SHG control gain in spindle synchronous control
#2259 SV059 TCNV Collision detection torque estimated gain
#2260 SV060 TLMT Collision detection level
#2261 SV061 DA1NO D/A output ch1 data No. / Initial DC excitation level
#2262 SV062 DA2NO D/A output ch2 data No. / Final DC excitation level

Set output scale of the D/A output channel 1 in increment of 1/100.
When "0" is set, the magnification is the same as when "100" is set.
When the DC excitation is running (SV034/bit4=1):
Use this when the DC excitation is running (SV034/bit4=1) to adjust the initial magnetic pole position
(when measuring the magnetic pole shift amount) for linear motor and direct-drive motor.
Set the initial excitation time in DC excitation control.
Set 1000ms as standard.
When the magnetic pole shift amount measurement value is unsteady, adjust the value in increments of
500ms.
Related parameters: SV061, SV062
---Setting range---
-32768 to 32767 (1/100-fold)
When the DC excitation is running (SV034/bit4=1): 0 to 10000 (ms)
Set output scale of the D/A output channel 2 in increment of 1/100.
When "0" is set, the magnification is the same as when "100" is set.
---Setting range---
-32768 to 32767 (1/100-fold)
The shape of the machine end is compensated by compensating the spring effect from the machine end to
the motor end.
Set the machine end compensation gain. Measure the error amount by roundness measurement and esti mate the setting value by the following formula.
Compensation amount (m) = Command speed F(mm/min)2 * SV065 / (Radius R(mm) * SV003 *
16,200,000)
Set to "0" when not using.
---Setting range---
-30000 to 30000 (Acceleration ratio 0.1%)
This parameter is set automatically by the NC system.
Set the specified speed.
Also set SV082/bit9,8 to output digital signal.
---Setting range---
0 to 32767 (mm/min)
However, when SV033/bitD=1, the setting range is from 0 to 32767 (100mm/min).
(Only for MDS-E/EH and MDS-EM/EMH)
This parameter is set automatically by the NC system.
#2263 SV063 DA1MPY D/A output ch1 output scale / Initial DC excitation time
#2264 SV064 DA2MPY D/A output ch2 output scale
#2265 SV065 TLC Machine end compensation gain
#2266-2272 SV066 - SV072
(PR) #2273 SV073 FEEDout Specified speed output speed
#2274-2280 SV074 - SV080

Select the servo functions.
A function is assigned to each bit.
Set this in hexadecimal format.
bit F-A:
Not used. Set to "0".
bit 9: npg Earth fault detection
0: Disable 1: Enable (standard)
Set "0" and it is constantly "Enable" for MDS-EJ/EJH Series.
bit 8: cbc motor brake axis selection control

0: Standard 1: Motor brake axis selection control enabled
(Only for MDS-EJ-V2)
bit 7: szchk Distance-coded reference scale reference mark
0: Check at 4 points (standard) 1: Check at 3 points
bit 6-4:
Not used. Set to "0".
bit 3: absc Distance-coded reference scale
0: Disable 1: Enable
bit 2-0:
Not used. Set to "0".
(PR) #2281 SV081 SPEC2 Servo specification 2
absc
szchk
npg
cbc

Select the servo functions.
A function is assigned to each bit.
Set this in hexadecimal format.
bit F-C:
Not used. Set to "0".
bit B-A: dos3 Digital signal output 3 selection
bitB,A=
00: Disable
01: Setting prohibited
10: Contactor control signal output (For MDS-EJ/EJH)
11: Setting prohibited
bit 9-8: dos2 Digital signal output 2 selection
bit9,8=
00: Disable
01: Specified speed output
10: Setting prohibited
11: Setting prohibited
bit 7-3:
Not used. Set to "0".
bit 2: ccu Lost motion overshoot compensation compensation amount setting increment
0: Stall current % 1: Stall current 0.01%
bit 1: lmc3 Lost motion compensation type 3
Set this when protrusion at a quadrant change is too big.
0: Stop 1: Start
Related parameters: SV016, SV041, SV085, SV086
bit 0:
Not used. Set to "0".
#2282 SV082 SSF5 Servo function 5
lmc3
ccu
dos2
dos3

Select the servo functions.
A function is assigned to each bit.
Set this in hexadecimal format.
bit F-8 :
Not used. Set to "0".
bit 7-5 : nfd5 Depth of Notch filter 5
Set the depth of Notch filter 5 (SV088).
bit7,6,5=
000: -
001: -18.1[dB]
010: -12.0[dB]
011: -8.5[dB]
100: -6.0[dB]
101: -4.1[dB]
110: -2.5[dB]
111: -1.2[dB]
bit 4 :
Not used. Set to "0".
bit 3-1 : nfd4 Depth of Notch filter 4
Set the depth of Notch filter 4 (SV087).
bit3,2,1=
000: -
001: -18.1[dB]
010: -12.0[dB]
011: -8.5[dB]
100: -6.0[dB]
101: -4.1[dB]
110: -2.5[dB]
111: -1.2[dB]
bit 0 :
Not used. Set to "0".
#2283 SV083 SSF6 Servo function 6
nfd4
nfd5

Select the servo functions.
A function is assigned to each bit.
Set this in hexadecimal format.
bit F : h2c HAS control cancel amount
0: 1/4 (standard) 1: 1/2
Related parameters: SV034/bit1
bit E :
Not used. Set to "0".
bit D : oru Overrun detection width unit
0: mm (normal setting) 1: m
bit C : odu Excessive error detection width unit
0: mm (normal setting) 1: m
bit B : ilm2u Current limit value (SV014) in special control setting unit
0: Stall current % (normal setting) 1: Stall current 0.01%
bit A-1 :
Not used. Set to "0".
bit 0 : irms Motor current display
0: Motor q axis current display (normal) 1: Motor effective current display
Set the machine system's spring constant when selecting lost motion compensation type 3.
When not using, set to "0".
Related parameters: SV016, SV041, SV082/bit2,1, SV086
---Setting range---
0 to 32767 (0.01%/m)
Set the machine system's viscous coefficient when selecting lost motion compensation type 3.
When not using, set to "0".
Related parameters: SV016, SV041, SV082/bit2,1, SV086
---Setting range---
0 to 32767 (0.01%s/mm)
Set the vibration frequency to suppress when machine vibration occurs.
(Normally, do not set 80 or less.)
Set to "0" when not using.
Related parameters: SV083/bit3-1, SV115
---Setting range---
0 to 5000 (Hz)
#2284 SV084 SSF7 Servo function 7
#2285 SV085 LMCk Lost motion compensation 3 spring constant
#2286 SV086 LMCc Lost motion compensation 3 viscous coefficient
#2287 SV087 FHz4 Notch filter frequency 4
irms
h2c
ilm2u
odu
oru

Set the vibration frequency to suppress when machine vibration occurs.
(Normally, do not set 80 or less.)
Set to "0" when not using.
Related parameters: SV083/bit7-5, SV115
---Setting range---
0 to 5000 (Hz)
Not used. Set to "0".
Not used. Set to "0".
Use this with LMC compensation type 3. As the delay in path tracking is monitored and compensated, the
delay in path tracking will be minimized even if machine friction amount changes by aging. Use the lost mo tion compensation amount (SV016) * 5 (10% of the dynamic friction torque) as the target. The higher the set ting value is, the more accurate the quadrant change be; however, the more likely vibrations occur.
---Setting range---
0 to 20000 (Stall current 0.01%)
Not used. Set to "0".
Not used. Set to "0".
The magnetic pole position detection function monitors the command speed and motor speed at the position
command stop and detects the magnetic pole position error alarm (3E) if any. Set the error detection level
for the command speed and motor speed at the position command stop.
Be aware when setting the parameter as the setting units for general motors and linear motors are different.
<<For general motor>>
When the command speed error detection level is set to "0", the magnetic pole position error (3E) is
detected at 10r/min.
Set "10" as standard.
This detects the magnetic pole position error (3E) when the motor rotation speed is 100r/min and more.
<<For linear motor>>
When the command motor speed level is set to "0", the magnetic pole position error (3E) is detected at
1mm/s.
Set "10" as standard.
This detects the magnetic pole position error (3E) when the motor speed is 10mm/s and more.
---Setting range---
0 to 31999
<<For general motor>>
Ten-thousands digit, Thousands digit ---------- Command speed error detection level (10r/min)
Hundreds digit, Tens digit, Ones digit ---------- Motor speed error detection level (10r/min)
<<For linear motor>>
Ten-thousands digit, Thousands digit ---------- Command speed error detection speed level (1mm/s)
Hundreds digit, Tens digit, Ones digit ---------- Motor speed error detection level (1mm/s)
#2288 SV088 FHz5 Notch filter frequency 5
#2289 SV089
#2290 SV090

#2291 SV091 LMC4G Lost motion compensation 4 gain
#2292 SV092
#2293 SV093
#2294 SV094 MPV Magnetic pole position error detection speed

Set this parameter to adjust the pull up distance when the vertical axis pull up function is enabled. When the pull up function is enabled and this parameter is set to "0", for a rotary motor, 8/1000 of a rotation at the motor end is internally set as the pull up distance, and for a linear motor, 80[m] is set.
Related parameters:
SV032 : The pull up direction is determined. When "0" is set, the alarm occurs.
SV033/bitE : Start-up of the pull up function
SV048 : Set the drop prevention time. When "0" is set, the alarm occurs.
---Setting range---
0 to 2000 (m)
Not used. Set to "0".
Set the scale model gain (position response) in OMR-FF control.
Set the same value as SV003(PGN1).
Increase the setting value to perform a high-speed machining such as a fine arc or to improve the path er ror.Lower the value when vibration occurs during acceleration/deceleration.
Set to "0" when not using OMR-FF control.
---Setting range---
0 to 300 (rad/s)
Not used. Set to "0".
Set the current feed forward rate in OMR-FF control.
The standard setting is "10000".
Setting value of "0" is equal to "10000(100%)" setting.
Set to "0" when not using OMR-FF control.
---Setting range---
0 to 32767 (0.01%)
Select the servo functions.
A function is assigned to each bit.
Set this in hexadecimal format.
bit F-9 :
Not used. Set to "0".
bit 8 : sto Dedicated wiring STO function
Set this parameter to use dedicated wiring STO function.
0: Dedicated wiring STO function unused 1: Dedicated wiring STO function used
(Only for MDS-E/EH and MDS-EJ/EJH)
bit 7 : nmerc Machine error compensation amount
(Note) Do not turn ON the NC power supply with the setting as disable (set to "1"). The initial parameter error alarm is detected.
0: Enable (Normal setting) 1: Disable
bit 0 : omrffon OMR-FF control enabled
0: Disable 1: Enable
#2295 SV095 ZUPD Vertical axis pull up distance
#2296-2305 SV096 - SV105
#2306 SV106 PGM OMR-FF scale model gain
#2307-2311 SV107 - SV111
#2312 SV112 IFF OMR-FF current feed forward gain
#2313 SV113 SSF8 Servo function 8
omrffon
sto
nmerc

Select the servo functions.
A function is assigned to each bit.
Set this in hexadecimal format.
bit F-9 :
Set to "8" when HG46, 56, 96 motors are driven by MDS-E-V3.
Set to "0" for other cases.
bit 8 : nohis History of communication error alarm between NC and DRV (34, 36, 38, 39)
0: Enable 1: Disable
bit 7 : cse Command speed monitoring function
0: Disable 1: Enable (Normal setting)
bit 6-0 :
Not used. Set to "0".
#2314 SV114 SSF9 Servo function 9
cse
nohis

Select the servo functions.
A function is assigned to each bit.
Set this in hexadecimal format.
bit F : are Notch filter5 all frequencies adapted
When enabled, Notch filter5 all frequencies adaptive range is not limited regardless of SV115/bit4,5 setting.
0: Disable 1: Enable
bit E-C: dsl Notch filter frequency display
Switch the "AFLT frequency" display on drive monitor screen to check every notch filter frequency.
When the selected notch filter is not used, "0" is displayed.
bitE,D,C=
000 : Estimated resonance frequency (Normal display)
001 : Notch filter 1 frequency
010 : Notch filter 2 frequency

011 : Notch filter 3 frequency (always displays 1125Hz)
100 : Notch filter 4 frequency
101 : Notch filter 5 frequency
Other settings: setting prohibited
bit B : ade5 Notch filter 5 / Adaptive follow-up function
0: Disable 1: Enable
bit A : ade4 Notch filter 4 / Adaptive follow-up function
0: Disable 1: Enable
bit 9 : ade2 Notch filter 2 / Adaptive follow-up function
0: Disable 1: Enable
bit 8 : ade1 Notch filter 1 / Adaptive follow-up function
0: Disable 1: Enable
bit 7-6 : dsn Estimated resonance frequency display holding time
Set the estimated resonance frequency display holding time to the "AFLT frequency" display on drive monitor screen.
bit7,6=
00: 4 [s]
01: 8 [s]
10: 12 [s]
11: 16 [s]
bit 5-4 : dfhz Notch filter frequency range
Set the adaptive range of the notch filter frequency. When the adaptive follow-up function is enabled and if the estimated resonance frequency exists in the set range, the notch filter will be adapted. Normally set this parameter to "00".
bit5,4=
00: -10 to 10 [%]
01: -20 to 20 [%]
10: -30 to 30 [%]
11: -40 to 40 [%]
#2315 SV115 SSF10 Servo function 10
esn
dfhz
dsn
ade1
ade2
ade4
ade5
dsl
are

bit 3-0 : esn Sensitivity of estimated resonance frequency
Set the sensitivity of the estimated resonance frequency. When the notch filter adaptive follow-up function is enabled, smaller setting value enables to detect smaller vibration component, however, adaptive movement will be repeated frequently. Normally set this parameter to "0".
0 : Normal setting (same sensitivity as A) 1 : Sensitivity high to F : Sensitivity low
bit1: fctcfw Full-closed torsion compensation function forward direction compensation enabled
Compensate the torsion amount in the forward direction with the full-closed torsion compensation function.
When compensating the torsion amount in the reverse direction only, set to "0".
0: Stop 1: Start
For high-accuracy binary resolution encoder, set the number of pulses to four bite data of SV117 (high-order) and SV019 (low-order) by pulse (p).
When SV117=0, the setting unit of SV019 is (kp).
Refer to SV019 for details.
Related parameters: SV019, SV020, SV118
---Setting range---
-1 to 32767
When using high-accuracy binary resolution encoder, set the number of pulses to four bite data of SV118 (high-order) and SV020 (low-order) by pulse (p).
When SV118=0, the setting unit of SV020 is (kp).
Refer to SV020 for details.
Related parameters: SV019, SV020, SV117
---Setting range---
-1 to 32767
Not used. Set to "0".
Set the acceleration rate feed forward filter frequency in high-speed synchronous tapping control. The stan dard setting is "600".
Related parameters: SV244
---Setting range---
0 to 32767 (rad/s)
Set the base reference mark intervals of distance-coded reference scale. When the distance-coded refer ence scale is not used, set to "0".
The interval of basic reference mark (SV130) and auxiliary interval (SV131) must be in the specified relation ship. Other settings cause the initial parameter error (alarm 37).
Following is the specified relationship.
The quotient of (SV1301000) / SV131 must be 4 or more and leaves no remainder.
Related parameters: SV081/bit7,3, SV131, SV134 to SV137
---Setting range---
0 to 32767 (mm)
#2316 SV116 SSF11 Servo function 11
(PR) #2317 SV117 RNG1ex Expansion sub side encoder resolution
(PR) #2318 SV118 RNG2ex Expansion main side encoder resolution
#2319-2328 SV119 - SV128
#2329 SV129 Kwf Synchronous control feed forward filter frequency
(PR) #2330 SV130 RPITS Base reference mark interval

Set the auxiliary interval of reference mark in the distance-coded reference scale. When the distance-coded reference scale is not used, set to "0".

The interval of basic reference mark (SV130) and auxiliary interval (SV131) must be in the specified relation ship. Other settings cause the initial parameter error (alarm 37).
Following is the specified relationship.
The quotient of (SV1301000) / SV131 must be 4 or more and leaves no remainder.
Related parameters: SV081/bit7,3, SV130, SV134 to SV137
---Setting range---
0 to 32767 (m)
Not used. Set to "0".
Not used. Set to "0".
Set this parameter to operate distance-coded reference check when using distance-coded reference scale.
During the distance-coded reference check initial setup (SV137:RAER=-1), set the following items on the NC
drive monitor screen after the distance-coded reference check initial setup warning A3 turns OFF.
SV134=Rn, SV135=Pn, SV136=MPOS
When reference point is set, the warning A3 turns OFF.
To enable the distance-coded reference check function, SV081/bit3=1setting and a battery option are need ed.
Related parameters: SV081/bit3,7, SV130, SV131, SV134 to SV137
---Setting range---
-32768 to 32767
Set this parameter to operate distance-coded reference check when using distance-coded reference scale.
During the distance-coded reference check initial setup (SV137:RAER=-1), set the following items on the NC
drive monitor screen after the distance-coded reference check initial setup warning A3 turns OFF.
SV134=Rn, SV135=Pn, SV136=MPOS
When reference point is set, the warning A3 turns OFF.
To enable the distance-coded reference check function, SV081/bit3=1setting and a battery option are need ed.
Related parameters: SV081/bit3,7, SV130, SV131, SV134 to SV137
---Setting range---
-32768 to 32767
Set this parameter to operate distance-coded reference check when using distance-coded reference scale.
During the distance-coded reference check initial setup (SV137:RAER=-1), set the following items on the NC
drive monitor screen after the distance-coded reference check initial setup warning A3 turns OFF.
SV134=Rn, SV135=Pn, SV136=MPOS
When reference point is set, the warning A3 turns OFF.
To enable the distance-coded reference check function, SV081/bit3=1setting and a battery option are need ed.
Related parameters: SV081/bit3,7, SV130, SV131, SV134 to SV137
---Setting range---
-32768 to 32767
(PR) #2331 SV131 DPITS Auxiliary reference mark interval
#2332 SV132
#2333 SV133
#2334 SV134 RRn0 Distance-coded reference check / revolution counter
#2335 SV135 RPn0H Distance-coded reference check /position within one
rotation High
#2336 SV136 RPn0L Distance-coded reference check / position within one
rotation Low

For the distance-coded reference check function when using distance-coded reference scale, set the allow able gap from the reference point position data calculated by the main side encoder. When the gap exceeds
the allowable range, reference point created by distance-code is judged as wrong and detects alarm 42.
The standard setting value is "basic reference mark interval (SV130) / 4".
SV137=0 setting carries out the same operation as the standard setting value.
SV137=-1 setting enables the distance-coded reference initial set up mode and displays setting values of
SV134 to SV136 on NC drive monitor.
To enable the distance-coded reference check function, SV081/bit3=1setting and a battery option are need ed.
When SV137=32767, the distance-coded reference check function is disabled.
Related parameters: SV081/bit3,7, SV130, SV131, SV134 to SV136
---Setting range---
-1 to 32767 (mm)
Not used. Set to "0".
Set the special detection width for the no signal 2 (alarm 21).
This detects no signal 2 (alarm 21) when machine side feedback is not invoked even if the motor side encod er feedback exceeds this setting in the rectangular wave signal output linear scale.
When "0" is set, the detection will be performed with a 15m width.
---Setting range---
0 to 32767 (m)
In case that machine resonance is induced when mounting a workpiece, the speed loop gain is switched au tomatically in response to inertia by setting the speed loop gain and workpiece inertia multiplier in advance.
The speed loop gain SV199(RTGM) changes in response to the estimated inertia ratio SV200(RTJX) based
on the speed loop gain SV005(VGN1) and the inertia multiplier SV037(JL) which were adjusted when no
workpiece was mounted.
When SV199 is set to "0", the adaptation of the speed loop gain will be disabled.
Related parameters: SV005, SV037, SV200
---Setting range---
0 to 5000 (%)
#2337 SV137 RAER Distance-coded reference check allowable width
#2338-2397 SV138 - SV197
#2398 SV198 NSE No signal 2 special detection width
#2399 SV199 RTGM Real-time tuning: maximum adaptive gain multiplier

RTGM
(SV199)
JL
(SV037)
RTJX
(SV200)
VGN1
(SV005)
Estimated inertia ratio [%]
Speed control gain multiplier [%]

In case that machine resonance is induced when mounting a workpiece, the speed loop gain is switched au tomatically in response to inertia by setting the speed loop gain and workpiece inertia multiplier in advance.
The speed loop gain SV199(RTGM) changes in response to the estimated inertia ratio SV200(RTJX) based
on the speed loop gain SV005(VGN1) and the inertia multiplier SV037(JL) which were adjusted when no
workpiece was mounted.
When SV199 is set to "0", the adaptation of the speed loop gain will be disabled.
Related parameters: SV005, SV037, SV199
---Setting range---
0 to 32767 (%)
Not used. Set to "0".
Set the compensation amount of full-closed torsion compensation function.
Set the torsion amount between the motor-end position and the machine-end position right after the stop as
a standard setting value.
When not using, set to "0".
---Setting range---
0 to 32767 (0.01m)
Not used. Set to "0".
Set the filter for the torque command.
The standard value is "3000" when using HG46, HG56, or HG96.
---Setting range---
0 to 5000 (rad/s)
Set the machine's safely limited speed for the SLS (Safely Limited Speed) function.
Set this parameter within the following setting ranges.
For linear axis: 2000mm/min or less
For rotary axis: 18000/min (50r/min) or less
When not using, set to "0".
---Setting range---
0 to 18000 (mm/min) or (/min)
However, when SV033/bitD = 1, the setting range is from -32768 to 32767 (100mm/min) or (100/min).
#2400 SV200 RTJX Real-time tuning: maximum adaptive inertia ratio
#2401-2405 SV201 - SV205
#2406 SV206 FCTC Full-closed torsion compensation control torsion
amount
#2407-2436 SV207 - SV236
(PR) #2437 SV237 TCF Torque command filter
#2438 SV238 SSCFEED Safely limited speed

RTGM
(SV199)
JL
(SV037)
RTJX
(SV200)
VGN1
(SV005)
Estimated inertia ratio [%]
Speed control gain multiplier [%]

Set the motor's safely limited speed for the SLS (Safely Limited Speed) function.
Set a value to hold the following relationship.
Be aware when setting the parameter as the setting units for general motors and linear motors are different.
<<For general motor>>
SV239 = (SV238/SV018) (SV002/SV001)
Only when the product is 0, set to "1".
<<For linear motor>>
SV239 = SV238/60
Only when the product is 0, set to "1".
When not using, set to "0".
---Setting range---
For general motor: 0 to 32767 (r/min)
For linear motor: 0 to 32767 (mm/s)
(Note) The value of the safely limited speed and safely limited motor speed must satisfy the above relation.
If this relation is not satisfied, the parameter error (37 or E4) will occur. (Error parameter No. is 239.)
Checking this relation is executed when the drive unit is turned ON and parameter is changed and speed
observation mode (states when a speed observation command is turned ON) is entered.
Note that "1 (r/min)" is applied when the calculation result is "0 (r/min)"
Not used. Set to "0".
Set the communication interpolation unit among drive units in high-speed synchronous tapping control.
When set to "0", it will be regarded as 20 (0.05m) is set.
Related parameters: SV129
---Setting range---
0 to 2000 (1/m)
Not used. Set to "0".
#2439 SV239 SSCRPM Safely limited motor speed
#2440-2443 SV240 - SV243
(PR) #2444 SV244 DUNIT Communication interpolation unit for communication
among drive units
#2445-2456 SV245 - SV256
SV238 :SSCFEED SV002 :PC2
SV018 :PIT
X
SV001 :PC1
= SV239 :SSCRPM

15.8 Spindle Specification Parameters
Set the spindle rotation speed for maximum motor speed when gear 00 is selected.
Set the spindle rotation speed for the S analog output=10V during analog spindle control.
---Setting range---
0 to 999999 (r/min)
Set the spindle rotation speed for maximum motor speed when gear 01 is selected.
Set the spindle rotation speed for the S analog output=10V during analog spindle control.
---Setting range---
0 to 999999 (r/min)
Set the spindle rotation speed for maximum motor speed when gear 10 is selected.
Set the spindle rotation speed for the S analog output=10V during analog spindle control.
---Setting range---
0 to 999999 (r/min)
Set the spindle rotation speed for maximum motor speed when gear 11 is selected.
Set the spindle rotation speed for the S analog output=10V during analog spindle control.
---Setting range---
0 to 999999 (r/min)
Set the maximum spindle rotation speed which is actually commanded when gear 00 is selected.
Set this as smax1(#3005)<= slimt1(#3001).
By comparing the S command value and the values of gear 1 - 4, a spindle gear shift command will be output automatically.
---Setting range---
0 to 999999 (r/min)
Set the maximum spindle rotation speed which is actually commanded when gear 01 is selected.
Set this as smax2(#3006)<= slimt2 (#3002).
By comparing the S command value and the values of gear 1 - 4, a spindle gear shift command will be output automatically.
---Setting range---
0 to 999999 (r/min)
Set the maximum spindle rotation speed which is actually commanded when gear 10 is selected.
Set this as smax3(#3007)<= slimt3 (#3003).
By comparing the S command value and the values of gear 1 - 4, a spindle gear shift command will be output automatically.
---Setting range---
0 to 999999 (r/min)
Set the maximum spindle rotation speed which is actually commanded when gear 11 is selected.
Set this as smax4(#3008)<= slimt4 (#3004).
By comparing the S command value and the values of gear 1 - 4, a spindle gear shift command will be output automatically.
---Setting range---
0 to 999999 (r/min)
#3001 slimt1 Limit rotation speed (Gear: 00)
#3002 slimt2 Limit rotation speed (Gear: 01)
#3003 slimt3 Limit rotation speed (Gear: 10)
#3004 slimt4 Limit rotation speed (Gear: 11)
#3005 smax 1 Maximum rotation speed (Gear: 00)
#3006 smax 2 Maximum rotation speed (Gear: 01)
#3007 smax 3 Maximum rotation speed (Gear: 10)
#3008 smax 4 Maximum rotation speed (Gear: 11)

Set the spindle speed for gear shifting with gear 00.
(Note) Setting too large value may cause a gear nick when changing gears.
---Setting range---
0 to 32767 (r/min)
Set the spindle speed for gear shifting with gear 01.
(Note) Setting too large value may cause a gear nick when changing gears.
---Setting range---
0 to 32767 (r/min)
Set the spindle speed for gear shifting with gear 10.
(Note) Setting too large value may cause a gear nick when changing gears.
---Setting range---
0 to 32767 (r/min)
Set the spindle speed for gear shifting with gear 11.
(Note) Setting too large value may cause a gear nick when changing gears.
---Setting range---
0 to 32767 (r/min)
Set the speed which switches from 1st step to 2nd step in synchronous tapping multi-step acceleration/de celeration control when gear 00 is selected.
The inclination of linear acceleration/deceleration control for 1st step is determined by the ratio of "stap1"(#3013) to "stapt1"(#3017).
When the inclination is not set after 2nd step or it is higher than that of 1st step, the acceleration/deceleration control is executed with the same inclination as the 1st step for the rotation speed of "stap1" or higher.
---Setting range---
0 to 99999 (r/min)
Set the speed which switches from 1st step to 2nd step in synchronous tapping multi-step acceleration/de celeration control when gear 01 is selected.
The inclination of linear acceleration/deceleration control for 1st step is determined by the ratio of "stap2" (#3014) to "stapt2" (#3018).
When the inclination is not set after 2nd step or it is higher than that of 1st step, the acceleration/deceleration control is executed with the same inclination as the 1st step for the rotation speed of "stap2" or higher.
---Setting range---
0 to 99999 (r/min)
Set the speed which switches from 1st step to 2nd step in synchronous tapping multi-step acceleration/de celeration control when gear 10 is selected.
The inclination of linear acceleration/deceleration control for 1st step is determined by the ratio of "stap3" (#3015) to "stapt3" (#3019).
When the inclination is not set after 2nd step or it is higher than that of 1st step, the acceleration/deceleration control is executed with the same inclination as the 1st step for the rotation speed of "stap3" or higher.
---Setting range---

0 to 99999 (r/min)
#3009 ssift 1 Shift rotation speed (Gear: 00)
#3010 ssift 2 Shift rotation speed (Gear: 01)
#3011 ssift 3 Shift rotation speed (Gear: 10)
#3012 ssift 4 Shift rotation speed (Gear: 11)
#3013 stap 1 Synchronous tapping 1st step rotation speed (Gear: 00)
#3014 stap 2 Synchronous tapping 1st step rotation speed (Gear: 01)
#3015 stap 3 Synchronous tapping 1st step rotation speed (Gear: 10)

Set the speed which switches from 1st step to 2nd step in synchronous tapping multi-step acceleration/de celeration control when gear 11 is selected.
The inclination of linear acceleration/deceleration control for 1st step is determined by the ratio of "stap4"
(#3016) to "stapt4" (#3020).
When the inclination is not set after 2nd step or it is higher than that of 1st step, the acceleration/deceleration
control is executed with the same inclination as the 1st step for the rotation speed of "stap4" or higher.
---Setting range---
0 to 99999 (r/min)
Set the time constant for synchronous tapping 1st step linear acceleration/deceleration control when gear 00
is selected. (linear acceleration/deceleration pattern)
---Setting range---
1 to 5000 (ms)
Set the time constant for synchronous tapping 1st step linear acceleration/deceleration control when gear 01
is selected. (linear acceleration/deceleration pattern)
---Setting range---
1 to 5000 (ms)
Set the time constant for synchronous tapping 1st step linear acceleration/deceleration control when gear 10
is selected. (linear acceleration/deceleration pattern)
---Setting range---
1 to 5000 (ms)
Set the time constant for synchronous tapping 1st step linear acceleration/deceleration control when gear 11
is selected. (linear acceleration/deceleration pattern)
---Setting range---
1 to 5000 (ms)
#3016 stap 4 Synchronous tapping 1st step rotation speed (Gear: 11)
#3017 stapt 1 Synchronous tapping 1st step acceleration/decelera tion time constant (Gear: 00)
#3018 stapt 2 Synchronous tapping 1st step acceleration/decelera tion time constant (Gear: 01)
#3019 stapt 3 Synchronous tapping 1st step acceleration/decelera tion time constant (Gear: 10)
#3020 stapt 4 Synchronous tapping 1st step acceleration/decelera tion time constant (Gear: 11)

<Relation of spindle limit rotation speed and spindle maximum rotation speed>
The spindle rotation speed which can be attained at the spindle motor's maximum rotation speed is set for the limit rotation
speed (slimt). This value is obtained by multiplying the gear ratio on the spindle motor maximum rotation speed (SP026).
Set the maximum rotation speed (smax) when the rotation speed is to be limited according to the machine specifications,
such as the spindle gear specifications. Up to four value can be set for gear changeover.
<Synchronous tapping multi-step acceleration/deceleration control parameter>
The acceleration/deceleration control can be set up to three steps in synchronous tapping control to carry out an optimal
acceleration/deceleration control in accordance with the spindle motor characteristics whose output torque steps down
when exceeding the base rotation speed.
Set the inclination for 2nd step or subsequent steps when the maximum rotation speed exceeds the base rotation speed
during synchronous tapping control.
When the inclination is not set after 2nd step or it is higher than that of 1st step, the acceleration/deceleration control is
executed with the same inclination as the 1st step for all the rotation speed.
SP026
0
smax1 slimt1 smax2 smax slimt2 slimt (n) (n)
Spindle motor rotation speed
(r/min)
Spindle rotation speed (r/min)
2000
4000
6000
8000
taps21=3000
stap1=1500
0
0 1000 2000 3000 4000
stapt1=300
tapt21=900
tapt31=5000
slimt1=10000 10000
Spindle rotation speed [r/min]
Time [ms]

<Spindle synchronization multi-step acceleration/deceleration control parameter>
The acceleration/deceleration control can be set up to eight steps in spindle synchronization control to carry out an optimal
acceleration/deceleration control in accordance with the spindle motor characteristics whose output torque steps down
when exceeding the base rotation speed and further attenuate in output stepdown zone.
For 2nd step or subsequent steps, the specification allows to set the time constant magnification and changeover rotation
speed based on the acceleration/deceleration setting of the 1st step.
Set the value of limit rotation speed or higher as the changeover rotation speed for the step not to be shifted when not car rying out a step shift.
4000
6000
8000

sptc7=9200
sptc6=8200
sptc5=7200
sptc4=6000
sptc3=4800
sptc2=3000
sptc1=1000
0
spt=400
slimt1=10000
1200(=spt * spdiv1 = 400 * 3)
2000(=spt * spdiv2 = 400 * 5)
2800(=spt * spdiv3 = 400 * 7)
4000(=spt * spdiv4 = 400 * 10)
5600(=spt * spdiv5 = 400 * 14)
8000(=spt * spdiv6 = 400 * 20)
11200(=spt * spdiv7 = 400 * 28)
0 1000 2000 3000 4000
10000
2000
Time [ms]
Spindle rotation speed [r/min]

Not used. Set to "0".
Set the deceleration rate of the encoder to the spindle when inputting ABZ pulse output encoder feedback to NC during analog spindle control.
0: 1/1
1: 1/2
2: 1/4
3: 1/8
---Setting range---
0 to 3
Set the minimum spindle speed.
If an S command below this setting is issued, the spindle will rotate at the minimum speed set by this param eter.
---Setting range---
0 to 32767 (r/min)
Select the connection interface with the spindle drive unit.
0: No unit to connect
1: Digital optical (Mitsubishi spindle drive unit)
2-5: S-analog (Analog I/F spindle drive unit)
10: Pulse train (Analog I/F spindle drive unit)
Set the connection specifications of a spindle's encoder.
0: Without encoder feedback when using analog spindle and connecting to NC
1: With encoder feedback when using analog spindle and connecting to NC
2: Mitsubishi spindle drive unit
Select the coil control in orientation mode for the spindle motor which performs coil changeover.
0: Perform coil changeover based on the command from NC. (depending on the setting of parameter #1239/bit0)
1: Use the coil L
Select the coil control in spindle synchronization control mode for the spindle motor which performs coil changeover.
0: Perform coil changeover based on the command from NC. (depending on the setting of parameter #1239/bit0)
1: Use the coil H
Set the M codes for the spindle forward run/reverse run commands during tapping cycle.
High-order 3 digits: Set the M code for spindle forward run command.
Low-order 3 digits: Set the M code for spindle reverse run command.
When "0" is set, it is handled assuming that "3004" is set (the M code for spindle forward run command is "3" and the M code for spindle reverse run command is "4").
---Setting range---
0 to 999999
#3021
#3022 sgear Encoder gear ratio
#3023 smini Minimum rotation speed
(PR) #3024 sout Spindle connection interface
(PR) #3025 enc-on Spindle encoder
#3026 cs_ori Selection of winding in orientation mode
#3027 cs_syn Selection of winding in spindle synchronization control mode
#3028 sprcmm Tap cycle M command selection

Select the speed which is compared with S command at gear selection when using asynchronous tapping control with the spindle which performs gear changeover.
0: Synchronous tapping 1st step rotation speed (stap)--- Multi-step acceleration/deceleration is not used.
1: Maximum speed (smax)--- Multi-step acceleration/deceleration is used.
This parameter is enabled only when "#1272 ext08/bit1 is 1".
Not used. Set to "0".
Set the interface channel No. of CNC control unit to which the spindle is connected and the axis No. within each channel.
Set this parameter in 4-digit hexadecimal format.
HEX-4: Drive unit interface channel No.
HEX-3: Not used. Set to "0".
HEX-2, 1: Axis No.
For an analog spindle, set to "0000".

---Setting range---
0000, 1001 to 1010, 2001 to 2010
Not used. Set to "0".
Select the data unit for communication with the spindle drive unit.
This selection is applied to the data communicated between the NC and spindle drive unit as well as the spin dle movement data. Although the standard setting is B (0.001deg), set the same value as "#1004 ctrl_unit" when using Spindle/C axis control.
B: 0.001deg (1m)
C: 0.0001deg (0.1m)
D: 0.00001deg (10nm)
E: 0.000001deg (1nm)
Set the speed which switches from 2nd step to 3rd step in synchronous tapping multi-step acceleration/de celeration control when gear 00 is selected.
The inclination of linear acceleration/deceleration control for 2nd step is determined by the ratio of "taps21" (#3037) to "tapt21" (#3041).
When the inclination is not set for 3rd step or it is higher than that of 2nd step, the acceleration/deceleration control is executed with the same inclination as the 2nd step for the rotation speed of "taps21" or higher.
---Setting range---
0 to 99999 (r/min)
#3029 tapsel Asynchronous tap gear selection
#3030
(PR) #3031 smcp_no Drive unit I/F channel No. (spindle)
#3032
(PR) #3035 spunit Output unit
#3037 taps21 Synchronous tapping 2nd step rotation speed (Gear:
00)
1 2 3
HEX- 1234
0
Axis No.
Interface channel
No.
Channel No.=2
Axis No.= 2 n
Axis No.=
Rotary switch settings
CNC
control
unit
Channel No.=1
Spindle drive
unit
Channel No.=m
1
M800/M80/E80 Series Alarm/Parameter Manual
15 Machine Parameters
537 IB-1501279-S
Set the speed which switches from 2nd step to 3rd step in synchronous tapping multi-step acceleration/de celeration control when gear 01 is selected.
The inclination of linear acceleration/deceleration control for 2nd step is determined by the ratio of "taps22" (#3038) to "tapt22" (#3042).
When the inclination is not set for 3rd step or it is higher than that of 2nd step, the acceleration/deceleration control is executed with the same inclination as the 2nd step for the rotation speed of "taps22" or higher.
---Setting range---
0 to 99999 (r/min)
Set the speed which switches from 2nd step to 3rd step in synchronous tapping multi-step acceleration/de celeration control when gear 10 is selected.
The inclination of linear acceleration/deceleration control for 2nd step is determined by the ratio of "taps23" (#3039) to "tapt23" (#3043).
When the inclination is not set for 3rd step or it is higher than that of 2nd step, the acceleration/deceleration control is executed with the same inclination as the 2nd step for the rotation speed of "taps23" or higher.
---Setting range---
0 to 99999 (r/min)
Set the speed which switches from 2nd step to 3rd step in synchronous tapping multi-step acceleration/de celeration control when gear 11 is selected.
The inclination of linear acceleration/deceleration control for 2nd step is determined by the ratio of "taps24" (#3040) to "tapt24" (#3044).
When the inclination is not set for 3rd step or it is higher than that of 2nd step, the acceleration/deceleration control is executed with the same inclination as the 2nd step for the rotation speed of "taps24" or higher.
---Setting range---
0 to 99999 (r/min)
Set the time constant for synchronous tapping 2nd step linear acceleration/deceleration control when gear 00 is selected.
---Setting range---
1 to 5000 (ms)
Set the time constant for synchronous tapping 2nd step linear acceleration/deceleration control when gear 01 is selected.
---Setting range---
1 to 5000 (ms)
Set the time constant for synchronous tapping 2nd step linear acceleration/deceleration control when gear 10 is selected.
---Setting range---
1 to 5000 (ms)
Set the time constant for synchronous tapping 2nd step linear acceleration/deceleration control when gear 11 is selected.
---Setting range---
1 to 5000 (ms)
#3038 taps22 Synchronous tapping 2nd step rotation speed (Gear:
01)
#3039 taps23 Synchronous tapping 2nd step rotation speed (Gear:
10)
#3040 taps24 Synchronous tapping 2nd step rotation speed (Gear:
11)

#3041 tapt21 Synchronous tapping 2nd step acceleration/decelera tion time constant (Gear: 00)
#3042 tapt22 Synchronous tapping 2nd step acceleration/decelera tion time constant (Gear: 01)
#3043 tapt23 Synchronous tapping 2nd step acceleration/decelera tion time constant (Gear: 10)
#3044 tapt24 Synchronous tapping 2nd step acceleration/decelera tion time constant (Gear: 11)

Set the time constant for synchronous tapping 3rd step linear acceleration/deceleration control when gear 00 is selected.
The inclination of linear acceleration/deceleration control for 3rd step is determined by the ratio of slimt1(#3001) to tapt31(#3045).
---Setting range---
1 to 5000 (ms)
Set the time constant for synchronous tapping 3rd step linear acceleration/deceleration control when gear 01 is selected.
The inclination of linear acceleration/deceleration control for 3rd step is determined by the ratio of slimt2(#3002) to tapt32 (#3046).
---Setting range---
1 to 5000 (ms)
Set the time constant for synchronous tapping 3rd step linear acceleration/deceleration control when gear 10 is selected.
The inclination of linear acceleration/deceleration control for 3rd step is determined by the ratio of slimt3(#3003) to tapt33(#3047).
---Setting range---
1 to 5000 (ms)
Set the time constant for synchronous tapping 3rd step linear acceleration/deceleration control when gear 11 is selected.
The inclination of linear acceleration/deceleration control for 3rd step is determined by the ratio of slimt4(#3004) to tapt34(#3048).
---Setting range---
1 to 5000(ms)
Set the acceleration/deceleration time constant under spindle synchronization control.
The inclination of acceleration/deceleration control is determined by the ratio to limit rotation speed (slimt).
Set the same value for the reference axis and synchronized axis.
The time constant for 2nd step or subsequent steps is the magnification setting on the basis of this setting value.
---Setting range---
0 to 9999 (ms)
Set the level of speed difference between the reference and synchronized spindles during spindle synchro nization control. Setting of the synchronized spindle side is enabled. When the difference becomes below the setting level, the spindle speed synchronization complete signal will turn ON.
---Setting range---
0 to 4095 (pulse) (1 pulse = 0.088)
Set the level of phase difference between the reference and synchronized spindles during spindle synchro nization. Setting of the synchronized spindle side is enabled. When the difference becomes below the setting level, the spindle phase synchronization complete signal will go ON.
---Setting range---
0 to 4095 (pulse) (1 pulse = 0.088)
#3045 tapt31 Synchronous tapping 3rd step acceleration/decelera tion time constant (Gear: 00)
#3046 tapt32 Synchronous tapping 3rd step acceleration/decelera tion time constant (Gear: 01)
#3047 tapt33 Synchronous tapping 3rd step acceleration/decelera tion time constant (Gear: 10)
#3048 tapt34 Synchronous tapping 3rd step acceleration/decelera tion time constant (Gear: 11)
#3049 spt Spindle synchronization acceleration/deceleration time constant
#3050 sprlv Spindle synchronization rotation speed attainment lev el
#3051 spplv Spindle phase synchronization attainment level

Set the polarity to match the rotation direction between the spindles which perform synchronization control under spindle synchronization control.
0: Positive polarity (Spindle CW rotation at motor CW rotation)
1: Negative polarity (Spindle CCW rotation at motor CW rotation)
---Setting range---
0000/0001 (HEX)
Set the deviation amount from the spindle's basic point to the spindle encoder's Z phase.
Obtain the deviation amount, considering a clockwise direction as positive when viewed from the spindle's front side.
---Setting range---
0 to 359999 (1/1000)
Set the speed which switches from 1st step to 2nd step in spindle synchronization multi-step acceleration/deceleration control.
Set the same value for the reference axis and synchronized axis.
Set the value of limit rotation speed (slimt) or higher not to carry out a step shift.
---Setting range---
0 to 99999 (r/min)
Set the speed which switches from 2nd step to 3rd step in spindle synchronization multi-step acceleration/deceleration control.
Set the same value for the reference axis and synchronized axis.
Set the value of limit rotation speed (slimt) or higher not to carry out a step shift.
---Setting range---
0 to 99999 (r/min)
Set the speed which switches from 3rd step to 4th step in spindle synchronization multi-step acceleration/deceleration control.
Set the same value for the reference axis and synchronized axis.
Set the value of limit rotation speed (slimt) or higher not to carry out a step shift.
---Setting range---
0 to 99999 (r/min)
Set the speed which switches from 4th step to 5th step in spindle synchronization multi-step acceleration/deceleration control.

Set the same value for the reference axis and synchronized axis.
Set the value of limit rotation speed (slimt) or higher not to carry out a step shift.
---Setting range---
0 to 99999 (r/min)
#3052 spplr Spindle synchronization relative polarity
#3053 sppst Spindle encoder Z -phase position
#3054 sptc1 Spindle synchronization multi-step acceleration/decel eration changeover speed 1
#3055 sptc2 Spindle synchronization multi-step acceleration/decel eration changeover speed 2
#3056 sptc3 Spindle synchronization multi-step acceleration/decel eration changeover speed 3
#3057 sptc4 Spindle synchronization multi-step acceleration/decel eration changeover speed 4

Set the speed which switches from 5th step to 6th step in spindle synchronization multi-step acceleration/ deceleration control.
Set the same value for the reference axis and synchronized axis.
Set the value of limit rotation speed (slimt) or higher not to carry out a step shift.
---Setting range---
0 to 99999 (r/min)
Set the speed which switches from 6th step to 7th step in spindle synchronization multi-step acceleration/ deceleration control.
Set the same value for the reference axis and synchronized axis.
Set the value of limit rotation speed (slimt) or higher not to carry out a step shift.
---Setting range---
0 to 99999 (r/min)
Set the speed which switches from 7th step to 8th step in spindle synchronization multi-step acceleration/ deceleration control.
Set the same value for the reference axis and synchronized axis.
Set the value of limit rotation speed (slimt) or higher not to carry out a step shift.
---Setting range---
0 to 99999 (r/min)
Set the acceleration/deceleration time constant to be used at the speed of changeover speed 1 (sptc1) and higher in spindle synchronization multi-step acceleration/deceleration control. Set this as a magnification in relation to the spindle synchronization acceleration/deceleration time constant (spt).
---Setting range---
0 to 127
Set the acceleration/deceleration time constant to be used at the speed of changeover speed 2 (sptc2) and higher in spindle synchronization multi-step acceleration/deceleration control. Set this as a magnification in relation to the spindle synchronization acceleration/deceleration time constant (spt).
---Setting range---
0 to 127
Set the acceleration/deceleration time constant to be used at the speed of changeover speed 3 (sptc3) and higher in spindle synchronization multi-step acceleration/deceleration control. Set this as a magnification in relation to the spindle synchronization acceleration/deceleration time constant (spt).
---Setting range---
0 to 127
Set the acceleration/deceleration time constant to be used at the speed of changeover speed 4 (sptc4) and higher in spindle synchronization multi-step acceleration/deceleration control. Set this as a magnification in relation to the spindle synchronization acceleration/deceleration time constant (spt).
---Setting range---
0 to 127
#3058 sptc5 Spindle synchronization multi-step acceleration/decel eration changeover speed 5
#3059 sptc6 Spindle synchronization multi-step acceleration/decel eration changeover speed 6
#3060 sptc7 Spindle synchronization multi-step acceleration/decel eration changeover speed 7
#3061 spdiv1 Time constant magnification for changeover speed 1
#3062 spdiv2 Time constant magnification for changeover speed 2
#3063 spdiv3 Time constant magnification for changeover speed 3
#3064 spdiv4 Time constant magnification for changeover speed 4

Set the acceleration/deceleration time constant to be used at the speed of changeover speed 5 (sptc5) and higher in spindle synchronization multi-step acceleration/deceleration control. Set this as a magnification in relation to the spindle synchronization acceleration/deceleration time constant (spt).
---Setting range---
0 to 127
Set the acceleration/deceleration time constant to be used at the speed of changeover speed 6 (sptc6) and higher in spindle synchronization multi-step acceleration/deceleration control. Set this as a magnification in relation to the spindle synchronization acceleration/deceleration time constant (spt).
---Setting range---
0 to 127
Set the acceleration/deceleration time constant to be used at the speed of changeover speed 7 (sptc7) and higher in spindle synchronization multi-step acceleration/deceleration control. Set this as a magnification in relation to the spindle synchronization acceleration/deceleration time constant (spt).
---Setting range---
0 to 127
Set the time to confirm that synchronization is attained before spindle phase synchronization control is start ed.
When "0" is set, the time will be 2000ms. When "100" or less is set, the time will be 100ms.
---Setting range---
0 to 9999 (ms)
Set a period of waiting time for spindle phase synchronization control's completion as a time in which the speed stays within the attainment range.
When "0" is set, the time will be 500ms. When "100" or less is set, the time will be 100ms.
---Setting range---
0 to 9999(ms)
Set the amount of speed fluctuation of synchronized spindle during spindle phase synchronization control.
Set this as a proportion to commanded speed.
When "0" is set, the amount will be 5%.

---Setting range---
0 to 100 (%)
Select which door group of the speed monitoring a spindle belongs to.
0000: Belong to the door 1 group.
0001: Belong to the door 1 group.
0002: Belong to the door 2 group.
0003: Belong to the door 1 and 2 groups.
(Note) Speed monitoring function is validated when "SP229/bitF=1".
---Setting range---
0000 to 0003 (HEX)
#3065 spdiv5 Time constant magnification for changeover speed 5
#3066 spdiv6 Time constant magnification for changeover speed 6
#3067 spdiv7 Time constant magnification for changeover speed 7
#3068 symtm1 Phase synchronization start confirmation time
#3069 symtm2 Phase synchronization end confirmation time
#3070 syprt Phase synchronization alignment speed
(PR) #3071 SscDrSelSp Speed monitor Door selection

Set the error detection time for when an error of command speed monitoring or feedback speed monitoring is detected during servo OFF.
The alarm will occur if actual speed exceeds safe speed or safe rotation speed for a period of time longer than this setting.
When "0" is set, the detection time will be 200 (ms).
(Note) Speed monitoring function is validated when "SP229/bitF=1".
---Setting range---
0 to 9999(ms)
Set the reference spindle and G/B spindle.
1: Reference spindle
2: Guide bushing spindle
0: Other
Specify a spindle name to be used for giving a spindle command.
When spindle command name has been set for all the spindles, the spindle name type is used. If "0" is set to any spindle, the spindle No. type is selected.
(Note) Do not set an identical name to two or more of all the spindles.
---Setting range---
0 to 9
Set the acceleration/deceleration time constant with S command (speed operation mode) when gear 00 is selected. Set the linear acceleration/deceleration time up to limit rotation speed (slimt1). Set the short time constant that the motor torque at acceleration is always saturated, however, when an abnormal noise or V belt slip occurs, increase the time constant.
---Setting range---
0 to 30000(ms)
Set the acceleration/deceleration time constant with S command (speed operation mode) when gear 01 is selected. Set the linear acceleration/deceleration time up to limit rotation speed (slimt2). Set the short time constant that the motor torque at acceleration is always saturated, however, when an abnormal noise or V belt slip occurs, increase the time constant.
---Setting range---
0 to 30000 (ms)
Set the acceleration/deceleration time constant with S command (speed operation mode) when gear 10 is selected. Set the linear acceleration/deceleration time up to limit rotation speed (slimt3). Set the short time constant that the motor torque at acceleration is always saturated, however, when an abnormal noise or V belt slip occurs, increase the time constant.
---Setting range---
0 to 30000 (ms)
Set the acceleration/deceleration time constant with S command (speed operation mode) when gear 11 is selected. Set the linear acceleration/deceleration time up to limit rotation speed (slimt4). Set the short time constant that the motor torque at acceleration is always saturated, however, when an abnormal noise or V belt slip occurs, increase the time constant.
---Setting range---
0 to 30000 (ms)
(PR) #3072 Ssc Svof Filter Sp Speed monitor Error detection time during servo OFF
#3074 GBsp Guide bushing spindle synchronization control
(PR) #3077 Sname Spindle command name
#3101 sp_t 1 Acceleration/deceleration time constant with S com mand (Gear: 00)
#3102 sp_t 2 Acceleration/deceleration time constant with S com mand (Gear: 01)
#3103 sp_t 3 Acceleration/deceleration time constant with S com mand (Gear: 10)
#3104 sp_t 4 Acceleration/deceleration time constant with S com mand (Gear: 11)

Set the speed deviation rate with respect to the commanded speed, at which the speed reach signal will be output.
It will be 15% when set to "0".
If the speed deviation is smaller than 45r/min, it will be set as 45r/min.
---Setting range---
0 to 100 (%)
#3105 sut Speed reach range

Select the zero point return specification.
Functions are allocated to each bit.
Set this in hexadecimal format.
bitF: Spindle zero point detection with proximity switch
0: Normal
1: Enable spindle zero point detection using proximity switch
bitE: Interpolation mode selection 2 (Return to zero when stopping)
0: Interpolation mode (Follow the setting of "#1256 set28/bit1")
1: Non-interpolation mode (Use "#13001 SP001 PGV")
bitD: Interpolation mode selection 1 (Return to zero when rotating)

0: Non-interpolation mode
1: Interpolation mode
bitC: Z phase detection method
0: Follows Z phase detection direction (bit0).
1: Rotates in the commanded direction at Z phase detection speed to detect Z phase.
(*) To enable Z phase detection operation, set the parameter "#3106 zrn_typ/bit3" (Z phase detection oper ation ON) to "1".
bitB: Direction of zero point return initiated during spindle rotation
0: Follow the setting of zero point return direction
Follow the direction setting of orientation (bit2-1)
Follow the setting of synch tap zero return (bit6-5)
Follow the setting of spindle C axis zero return (bitA-9)
1: Follow the spindle rotation direction
bitA-9: Spindle/C axis zero point return direction
bitA,9=
00: Short-cut
01: Forward run
10: Reverse run
#3106 zrn_typ Zero point return specifications
Orientation direction
Designate zero point return
Synchronous tapping zero point return direction
Synchronous tapping command polarity
Spindle/C axis zero point return
Spindle/C axis zero point return direction
Spindle zero point detection with proximity switch
Interpolation mode selection 2 (Return to zero when stopping)
Z phase detection direction
Z phase detection operation ON
Z phase detection method
Direction of zero point return initiated during spindle rotation
Interpolation mode selection 1 (Return to zero when rotating)

bit8: Spindle/C axis zero point return
0: Zero point return type
1: Deceleration stop type (standard setting)
(*) For Program command method, when "#1711 cfg11/bit3" is set to "0" (Zero point return type), Zero point
return type is forcibly set.
bit7: Synchronous tapping command polarity
0: Forward direction
1: Reverse direction (The standard setting when spindle and motor are directly coupled)
bit6-5: Synchronous tapping zero point return direction
bit6,5=
00: Short-cut
01: Forward run
10: Reverse run
bit4: Designate zero point return
0: Automatically return to zero point before synchronous tapping is started (tapping phase alignment)
1: Not return to zero point and immediately synchronous tapping is started
bit3: Z phase detection operation ON
0: When Z phase is not detected, detect Z phase during the rotation executed by a rotation command with out performing the detection operation.
1: When Z phase is not detected, perform the detection operation according to the settings of bitC and bit0,
and then rotate the motor according to a rotation command.
bit2-1: Orientation direction
bit2,1=
00: Short-cut
01: Forward run
10: Reverse run
bit0: Z phase detection direction
0: Forward direction
1: Reverse direction
Set the spindle speed during orientation command.
When the spindle is not running or running to the different direction with the orientation, the orientation is car ried out with this speed after a stop. When the spindle is running to the same direction with the orientation,
this parameter does not have a meaning because it decelerates directly and the orientation is carried out.
---Setting range---
1 to 99999 (r/min)
The orientation stop position can be moved by this parameter setting although normally the position is Z phase position.
During multi-point orientation control, the stop position is determined by the total value of this parameter and
the position data for multi-point orientation of PLC input.
---Setting range---
-35999 to 35999 (0.01)
#3107 ori_spd Orientation command speed
#3108 ori_sft Position shift amount for orientation

For the first S command after power is turned ON, the spindle rotates at the speed of setting value for this
parameter until Z phase is detected twice.
When "#3106/bitF = 1" (Spindle zero point proximity switch detection enabled), also proximity switch is de tected.
(Note) When spindle zero point proximity switch detection is enabled, the rotation direction of the orientation/
zero point return (synchronous tapping, spindle/C axis) will follow Z phase detection direction. And the
speed will follow Z phase detection speed.
---Setting range---
1 to 99999 (r/min)
Set the zero point return speed during synchronous tapping control.
---Setting range---
1 to 99999 (r/min)

Set the zero point return shift amount during synchronous tapping control. Zero point angle shifts from Z phase according to the setting angle.
---Setting range---
0 to 35999 (0.01)
Set the zero point return speed during spindle C axis control.
---Setting range---
1 to 99999 (r/min)
Set the spindle C axis zero point return shift amount. Zero point angle shifts from Z phase according to the setting angle.
---Setting range---
0 to 359999 (0.001)
Parameter switches when switching the encoder system between normal spindle control and C axis control, such as using spindle side encoder only for C axis control in spindle drive system. It is validated with replacing a certain servo parameter of the corresponding servo axis to a spindle parameter.
0: Not switch
1: Switch
---Setting range---
0/1 (Standard: 0)
Set the linear acceleration/deceleration time constant for zero point return control (#3106/bit4,8) which is au tomatically started at the time of switching orientation control, C axis control and synchronous tapping control when gear 00 is selected. The inclination is determined by the ratio to limit rotation speed (slimt1). Set the sufficiently large value compared to the acceleration/deceleration time constant with S command (sp_t1) so that the output torque is not saturated. When executing C axis zero point return manually, it depends on the axis specification parameter.
---Setting range---
0 to 30000 (ms)
#3109 zdetspd Z phase detection speed
#3110 tap_spd Synchronous tapping zero point return speed
#3111 tap_sft Synchronous tapping zero point return shift amount
#3112 cax_spd Spindle C axis zero point return speed
#3113 cax_sft Spindle C axis zero point return shift amount
#3114 cax_para_chg Spindle/C axis parameter switch
#3115 sp2_t1 Time constant in orientation/interpolation mode auto matic reference position return (Gear: 00)

Set the linear acceleration/deceleration time constant for zero point return control (#3106/bit4,8) which is au tomatically started at the time of switching orientation control, C axis control and synchronous tapping control when gear 01 is selected. The inclination is determined by the ratio to limit rotation speed (slimt2). Set the sufficiently large value compared to the acceleration/deceleration time constant with S command (sp_t2) so that the output torque is not saturated. When executing C axis zero point return manually, it depends on the axis specification parameter.
---Setting range---
0 to 30000 (ms)
Set the linear acceleration/deceleration time constant for zero point return control (#3106/bit4,8) which is au tomatically started at the time of switching orientation control, C axis control and synchronous tapping control when gear 10 is selected. The inclination is determined by the ratio to limit rotation speed (slimt3). Set the sufficiently large value compared to the acceleration/deceleration time constant with S command (sp_t3) so that the output torque is not saturated. When executing C axis zero point return manually, it depends on the axis specification parameter.
---Setting range---
0 to 30000 (ms)
Set the linear acceleration/deceleration time constant for zero point return control (#3106/bit4,8) which is au tomatically started at the time of switching orientation control, C axis control and synchronous tapping control when gear 11 is selected. The inclination is determined by the ratio to limit rotation speed (slimt4). Set the sufficiently large value compared to the acceleration/deceleration time constant with S command (sp_t4) so that the output torque is not saturated. When executing C axis zero point return manually, it depends on the axis specification parameter.
---Setting range---
0 to 30000 (ms)
When performing high-speed synchronous tapping control(#1281/bit5), set the reduction rate of the time con stant compared to the time constant in normal synchronous tapping.
(Setting "0" or "100" will be regarded as reduction rate zero, so the time constant won't be reduced.)
E.g.) When set to "10", time constant in high-speed synchronous tapping will be 90% of that in normal syn chronous tapping.
---Setting range---
0 to 100 (%)
Select the validity of turret indexing.
0: Disabled
1: Enable
Set the number of teeth on the turret side when the gear selection command (control input 4/bit6, 5) is set to 00. Set a value of GRC so that the ratio of GRC to the spindle side gear ratio (#13057 SP057) will be 1: N (an integer). If GRC is set to "0", it will be regarded as "1".
---Setting range---
0 to 32767
Set the turret end indexing speed when in turret indexing.
When this parameter is set to 0, it follows the value set for Orientation command speed (#3107).
---Setting range---
0 to 32767(r/min)
#3116 sp2_t2 Time constant in orientation/interpolation mode auto matic reference position return (Gear: 01)
#3117 sp2_t3 Time constant in orientation/interpolation mode auto matic reference position return (Gear: 10)
#3118 sp2_t4 Time constant in orientation/interpolation mode auto matic reference position return (Gear: 11)
#3120 staptr Time constant reduction rate in high-speed synchro nous tapping
#3121 tret Turret indexing
#3122 GRC Turret side gear ratio
#3123 tret_spd Turret indexing speed

Set the acceleration/deceleration time constant to reach Limit rotation speed (slimt1) at gear 00 when in turret indexing. Set this parameter to a larger value than time constant in orientation (#3115).
---Setting range---
0 to 30000 (ms)
Set the position error range in which the index positioning complete signal is output when in turret indexing.

When this parameter is set to 0, the value of In-position width (#13024 SP024) will be used for this width.
---Setting range---
0 to 32767(1/1000)
Set the time to forcedly turn OFF the index positioning complete signal since the indexing start signal turns
ON. If this period of time has not passed yet, the index positioning complete signal will not turn ON even at
the completion of index positioning.
---Setting range---
0 to 10000 (ms)
bit4: Change the timing of thread cutting start
0: Start thread cutting after receiving the Z-phase signal from the encoder.
1: Start thread cutting after receiving an external signal.
bit3: Spindle rotation direction
Define the relationship between the motor's actual direction of rotation and the spindle rotation signals (Spin dle forward run start/Spindle reverse run start).
0: Forward direction
1: Reverse direction
bit1: Spindle cycle counter direction
Specify whether the cycle counter counts up or down during the spindle forward run.
0: Count up during forward run
1: Count down during forward run
bit0: Output conditions of spindle changeover mode and spindle speed reach signals
0: Conventional operation
Spindle changeover mode signal
When the spindle stop signal is ON and when a gear recommended by NC and the one selected in
ladder program are different, the spindle changeover mode signal is output to the spindle drive unit.
Spindle speed reach signal
Spindle speed reach signal is turn ON/OFF according to the FB signal.
1: Operation when the gear responds to the neutral state under full-closed control
Spindle changeover mode signal
When both the spindle stop signal and the spindle gear shift signal are ON, the spindle changeover
mode signal is output to the spindle drive unit.
Spindle speed reach signal
During gear changeover (while gear changeover is being commanded), the spindle speed reach sig nal is turned ON/OFF according to the virtual spindle-end speed that is calculated by multiplying the
motor-end speed by the gear ratio (motor-end gear teeth/spindle-end gear teeth).
---Setting range---
0x0000 to 0xffff (hexadecimal)
#3124 tret_t Turret indexing time constant
#3125 tret_inpos Turret indexing in-position width
#3126 tret_fin_off Index positioning complete signal OFF time
#3127 SPECSP Spindle specification
M800/M80/E80 Series Alarm/Parameter Manual
15 Machine Parameters
549 IB-1501279-S
bit1: High-speed proximity-switch orientation
Select whether to enable high-speed proximity-switch orientation.
This orientation can be used when Proximity-switch spindle zero point detection (#3106 zrn_typ/bitF) is en abled.
0: Disable high-speed
1: Enable high-speed
bit0: Orientation in-position advance output
Reduce the orientation time by detecting an in-position faster.
The in-position detection width is changed from SP024(#13024) to ori_inp2.
0: Disable
1: Enable
---Setting range---
0x0000 to 0xffff (hexadecimal)
bit5: Retention of coordinate system setting offset at switchover to C axis mode
Select whether to retain the offset for the coordinate system setting(G92/G50) or local coordinate system set ting (G52) when the control is switched to C axis mode.
0: Not retain the offset for coordinate system setting
1: Retain the offset for coordinate system setting
bit4: Gain switchover for all the axes within the part system when C axis is selected
0: The gains of servo axes except C axis are not switched when C axis is selected.
1: The gains of servo axes except C axis are switched when C axis is selected.
#2203 (PGN1) SV003 --> #2249 (PGN1sp) SV049
#2204 (PGN2) SV004 --> #2250 (PGN2sp) SV050
#2257 (SHGC) SV057 --> #2258 (SHGCsp) SV058
bit3: Mode selection at reset when the program command method is selected
0: Spindle mode
1: The mode at reset is retained.
This parameter is enabled when the program command method is selected (#3129 cax_spec/bit0 = 1).
bit2: Mode selection at Power ON when the program command method is selected
0: Spindle mode
1: C axis mode
This parameter is enabled when the program command method is selected (#3129 cax_spec/bit0 = 1).
bit1: Coordinate system setting when the deceleration stop type (no zero point return) is selected
Select the C axis coordinate system setting method when the deceleration stop type (no zero point return) is
selected.
0: Establish the coordinates of the deceleration stop position by using the Z-phase position as the coordi nate zero point.
1: The deceleration stop position is used as the coordinate zero point.
bit0: Spindle position control changeover method
Select the method of changing the mode between C axis and spindle.
0: PLC signal method
1: Program command method
---Setting range---
0x0000 to 0xffff (hexadecimal)
#3128 ori_spec Orientation control specification
#3129 cax_spec Spindle/C axis control specification
M800/M80/E80 Series Alarm/Parameter Manual
15 Machine Parameters
IB-1501279-S 550

bit2: Error compensation between reference and synchronized spindles
0: Error compensation is performed.
1: Error compensation is not performed.
(*) Set this parameter for the synchronized spindle.
bit1: Phase alignment method selection
0: Phase alignment method type 1 (step alignment method)
1: Phase alignment method type 2 (multi-step acceleration/deceleration method)
(*) Set this parameter for the synchronized spindle.
bit0: Tool spindle synchronization II (hobbing) automatic compensation selection
0: No compensation.
1: Compensate hobbing axis delay (advance) with workpiece axis.
---Setting range---
0x0000 to 0xffff (hexadecimal)
bitF: Analog spindle encoder polarity
This parameter specifies the polarity of the encoder with respect to the spindle rotation.
0: Forward
1: Reverse
---Setting range---
0x0000 to 0xffff (hexadecimal)
Set the in-position width when in-position advance output control (#3128/bit0) is valid. Reduce the orientation
time by setting a bigger value than the value of conventional SP024 and detecting an in-position faster.
Conventional SP024 is used for 2nd in-position signal detection width.
---Setting range---
0 to 32767 (1deg/1000)
Set the allowable angle between the commanded position and actual position of hobbing axis when it is in
tool spindle synchronization II (hobbing) mode (X18AE ON), and also when hobbing axis and workpiece axis
are synchronizing (X18A9 ON).
---Setting range---
0 to 32767 (1deg/1000)
Set the primary delay time constant of hobbing axis automatic compensation primary delay filter control in
tool spindle synchronization II (hobbing).
When set to "0", primary delay filter control is invalid.
---Setting range---
0 to 32767 (ms)
Set the feed forward gain for the hobbing axis in tool spindle synchronization II (hobbing) mode.
---Setting range---
0 to 200 (%)
#3130 syn_spec Spindle synchronization control specification
#3131 tap_spec Synchronous tapping control specification
#3132 ori_inp2 2nd in-position width for orientation
#3133 spherr Hobbing axis delay (advance) allowable angle
#3134 sphtc Primary delay time constant for hobbing axis automatic
compensation
#3135 sfwd_g Feed forward gain for hobbing axis

Specify the rate of reduction for the time constant of Punch Tap cycle to be applied when Punch Tap cycle
is executed with the high-speed synchronized tap being enabled (#1281 ext17/bit5 = 1).
When "0" or "100" is set, the reduction rate will be interpreted as "0" and the time constant will not be reduced.
(Example) When "10" is set, the time constant for normal Punch Tap cycle will be reduced to 90%.
---Setting range---
0 to 100 (%)
Not used. Set to "0".
Set the spindle motor type. The set type will be displayed on the drive monitor screen, and it will be also out put to the system configuration data.
---Setting range---
Character string within 26 characters including A-Z, a-z, 0-9, "." (decimal point), "-" (hyphen), "/" (slash)
(Setting is cleared when "0" is set)
Select whether to enable spindle control using a servo drive unit and servo motor (spindle-mode servo con trol).
0: Disable spindle-mode servo control
1: Enable spindle-mode servo control
Set the door signal input in the drive unit.
Use this parameter only when the axis with a door signal belongs to several door groups.
The correspondence between the door signals and bits are as follows.
bit0: Door1 signal
bit1: Door2 signal
If the axis does not receive any door signal, set to "0".
An error (Y20 0027) will occur in the following cases.
- Several bits are enabled.
- Any bit other than those set in "#3071 S_DSlSp" is enabled.
---Setting range---
0000 to 0002 (HEX)
Set the observation speed, which is at the machine end, in the multi-step speed monitor.
(Note) When the setting value is larger than 18000, the last 2 digits will be ignored.
E.g.: 1234567 -> 1234500 (deg/min)
---Setting range---
0 to 6553500 (deg/min)
Set the observation speed, which is at the machine end, in the multi-step speed monitor.
(Note) When the setting value is larger than 18000, the last 2 digits will be ignored.
E.g.: 1234567 -> 1234500 (deg/min)
---Setting range---
0 to 6553500 (deg/min)
#3136 ptaptr Reduction rate of time constant for high-speed Punch
Tap cycle
#3137 stap_ax_off High-speed synchronous tapping disabled axis
#3138 motor_type Spindle motor type
(PR) #3139 sp_srvdrv Spindle-mode servo control
(PR) #3140 S_DINSp Speed observation input door No.

(PR) #3141 spsscfeed1 Observation speed 1
(PR) #3142 spsscfeed2 Observation speed 2

Set the observation speed, which is at the machine end, in the multi-step speed monitor.
(Note) When the setting value is larger than 18000, the last 2 digits will be ignored.
E.g.: 1234567 -> 1234500 (deg/min)
---Setting range---
0 to 6553500 (deg/min)
Set the observation speed, which is at the machine end, in the multi-step speed monitor.
(Note) When the setting value is larger than 18000, the last 2 digits will be ignored.
E.g.: 1234567 -> 1234500 (deg/min)
---Setting range---
0 to 6553500 (deg/min)
This parameter specifies which observation speed change signal is input in the drive unit. The observation speed change signal corresponds to the following bits of the parameter.
bit0: Observation speed change signal 1 is connected.
bit1: Observation speed change signal 2 is connected.
bit2: Observation speed change signal 3 is connected.
If the axis receives no observation speed change signal, set to "0000".
(Note) When a same setting value is set to more than one axis, or when more than one bit is set to turn ON for one axis, the alarm (Y20 0027) will occur.
---Setting range---
0000 to 0004 (HEX)
Specify the short-time rated output of the spindle motor (for L-coil).
This value is used for calculating the power consumption of the spindle motor.
---Setting range---
0 to 99999999 (W)
Specify the short-time rated output of the spindle motor (for H-coil).
This value is used for calculating the power consumption of the spindle motor.
This parameter is used also when the coil switch function is OFF.
---Setting range---
0 to 99999999 (W)
When a period of time set in this parameter has elapsed after turning-ON of the spindle chuck close (SPC MPC) signal, you can temporarily cancel spindle sync error by turning ON the spindle sync error temporary cancel (SPDRPO) signal.
If the specified time has not elapsed when the spindle sync error temporary cancel (SPDRPO) signal is turned ON, temporary cancel of spindle sync error is enabled first when the time of this parameter has elapsed.
When "0" is set in this parameter, the delay time will be 284 (ms).
---Setting range---
0 to 30000 (ms)
(PR) #3143 spsscfeed3 Observation speed 3
(PR) #3144 spsscfeed4 Observation speed 4
(PR) #3145 S_SigInSP Safety observation signal input
#3146 RatedOutL(PwrCal) Short-time rated output for power computation (L-coil)
#3147 RatedOutH(PwrCal) Short-time rated output for power computation (H-coil)
#3148 sycmpctm Temporary error cancel calculation delay time

Set the observation speed, which is at the machine end, in the multi-step speed monitor.
(Note) When the setting value is larger than 18000, the last 2 digits will be ignored.
E.g.: 1234567 -> 1234500 (deg/min)
---Setting range---
0 to 6553500 (deg/min)
Set the observation speed, which is at the machine end, in the multi-step speed monitor.
(Note) When the setting value is larger than 18000, the last 2 digits will be ignored.
E.g.: 1234567 -> 1234500 (deg/min)
---Setting range---
0 to 6553500 (deg/min)
Set the observation speed, which is at the machine end, in the multi-step speed monitor.
(Note) When the setting value is larger than 18000, the last 2 digits will be ignored.
E.g.: 1234567 -> 1234500 (deg/min)
---Setting range---
0 to 6553500 (deg/min)
Set the observation speed, which is at the machine end, in the multi-step speed monitor.
(Note) When the setting value is larger than 18000, the last 2 digits will be ignored.
E.g.: 1234567 -> 1234500 (deg/min)
---Setting range---
0 to 6553500 (deg/min)
Set the spindle viscosity friction coefficient.
These parameters are used to estimate the estimated disturbance torque of spindle.
#13018 SP018/bit5 = 0 (Mechanical gear)
#3153 cms1: Coefficient for the mechanical gear 1
#3154 cms2: Coefficient for the mechanical gear 2
#3155 cms3: Coefficient for the mechanical gear 3
#3156 cms4: Coefficient for the mechanical gear 4
#13018 SP018/bit5 = 1 (Coil changeover)
#3153 cms1: Coefficient for the H coil
#3154 cms2: Coefficient for the L coil
#3155 cms3: Not used
#3156 cms4: Not used
---Setting range---
0 to 9999999 (0.00001%/rpm)
(PR) #3149 spsscfeed5 Observation speed 5
(PR) #3150 spsscfeed6 Observation speed 6
(PR) #3151 spsscfeed7 Observation speed 7

(PR) #3152 spsscfeed8 Observation speed 8
#3153-3156 cms1-cms4 Spindle viscosity friction coefficient 1 to 4

Set the spindle viscosity friction coefficient.
These parameters are used to estimate the estimated disturbance torque of spindle.
#13018 SP018/bit5 = 0 (Mechanical gear)
#3157 fms1: Coefficient for the mechanical gear 1
#3158 fms2: Coefficient for the mechanical gear 2
#3159 fms3: Coefficient for the mechanical gear 3
#3160 fms4: Coefficient for the mechanical gear 4
#13018 SP018/bit5 = 1 (Coil changeover)
#3157 fms1: Coefficient for the H coil
#3158 fms2: Coefficient for the L coil
#3159 fms3: Not used
#3160 fms4: Not used
---Setting range---
0 to 9999999 (0.0001%/Nm)
Set the responsiveness in detecting the disturbance torque.
---Setting range---
0 to 1000 (ms) (Default value: 0)
Calculate the efficiency between the motor current value and the output torque, and compensate the distur bance torque detection at acceleration/deceleration.
When set to "0", it controls as 100%.
---Setting range---
0 to 100 (%)
(Default value: 0)
Specify the stall torque of spindle-mode servo motor.
This value is used for calculating the power consumption of the spindle-mode servo motor.
---Setting range---
0.000 to 1000.000 (Nm)
Set the motor rotation speed to which the zero speed detection is executed. When the motor speed goes below the set speed, the zero speed detection turns ON. The standard setting value is "50". When the setting value is "0", it is on the standard setting value.
---Setting range---
0 to 1000 (r/min)
Set the motor speed to which the speed detection is executed. When the motor speed goes below the set speed, the speed detection turns ON. The standard setting value is 10% of the "#3001 slimt1" setting value.
When the setting value is "0", it is on the standard setting value.
---Setting range---
0 to 32767(r/min)
#3157-3160 fms1-fms4 Spindle coulomb friction coefficient 1 to 4
#3166 disttrq_t Disturbance torque detection filter time constant
#3167 spef Spindle motor efficency
#3168 StlTrqSPSV(PwrCal) Stall torque of spindle-mode servo motor for power computation
#3169 rotspzsp Spindle-mode rotary axis Motor zero speed (For spin dle-mode rotary axis only)
#3170 rotspsdts Spindle-mode rotary axis Speed detection setting value (For spindle-mode rotary axis only)

Specify the spindle load (%) at which the loadmeter displays a caution sign (yellow).
If spindle load exceeds the specified value, the loadmeter displays a caution (yellow).
If you wish to avoid showing the caution (yellow), set this parameter to be the same as "#3193 LdMeter thresholdR".
When "0" is set, the value becomes 100% (default).
---Setting range---
0 to 300(%)
Specify the spindle load (%) at which the loadmeter displays a warning sign (red).
If spindle load exceeds the specified value, the loadmeter displays a warning (red).
If you wish to avoid showing the warning (red), set this parameter to be the same as "#3194 LdMeter load max".
When "0" is set, the value becomes 150% (default).
---Setting range---
0 to 300(%)
Specify the maximum spindle load (%) for loadmeter display.
When "0" is set, the value becomes 200% (default).
---Setting range---
0 to 300(%)
Specify which of the spindle's machine group No. parameters to use for the machine groupwise alarm stop function.
0: "#3196 mgrspnum1" (Spindle's machine group No. 1)
1: "#3197 mgrspnum2" (Spindle's machine group No. 2)
Specify the machine group No. to which each spindle belongs. This parameter is enabled when the param eter "#3195 mgrsptyp" (Spindle's machine group setting type) is set to "0".
---Setting range---
0 to 32
Specify the machine group No. to which each spindle belongs, by setting the corresponding bit. This param eter is enabled when the parameter "#3195 mgrsptyp" (Spindle's machine group setting type) is set to "1".
---Setting range---
00 to FF
Set this in hexadecimal format.
Set the spindle speed for changing the 1st step's acceleration/deceleration time constant at gear 00.
---Setting range---
0 to 99999 (r/min)
Set the spindle speed for changing the 1st step's acceleration/deceleration time constant at gear 01.
---Setting range---
0 to 99999 (r/min)
(PR) #3192 LdMeter thresholdY Loadmeter: Caution (Yellow) threshold

(PR) #3193 LdMeter thresholdR Loadmeter: Warning (Red) threshold
(PR) #3194 LdMeter load max Loadmeter: Maximum spindle load
(PR) #3195 mgrsptyp Spindle's machine group setting type
(PR) #3196 mgrspnum1 Spindle's machine group No. 1
(PR) #3197 mgrspnum2 Spindle's machine group No. 2
#13501 vfths11 Variable speed thread multi-step accel/decel change over speed 1 (Gear00)
#13502 vfths12 Variable speed thread multi-step accel/decel change over speed 1 (Gear01)

Set the spindle speed for changing the 1st step's acceleration/deceleration time constant at gear 10.
---Setting range---
0 to 99999 (r/min)
Set the spindle speed for changing the 1st step's acceleration/deceleration time constant at gear 11.
---Setting range---
0 to 99999 (r/min)
Set the time constant to reach the variable speed thread multi-step acceleration/deceleration changeover speed 1 at gear 00.
---Setting range---
0 to 30000 (10 ms)
Set the time constant to reach the variable speed thread multi-step acceleration/deceleration changeover speed 1 at gear 01.
---Setting range---
0 to 30000 (10 ms)
Set the time constant to reach the variable speed thread multi-step acceleration/deceleration changeover speed 1 at gear 10.
---Setting range---
0 to 30000 (10 ms)
Set the time constant to reach the variable speed thread multi-step acceleration/deceleration changeover speed 1 at gear 11.
---Setting range---
0 to 30000 (10 ms)
Set the spindle speed for changing the 2nd step's acceleration/deceleration time constant at gear 00.
---Setting range---
0 to 99999 (r/min)
Set the spindle speed for changing the 2nd step's acceleration/deceleration time constant at gear 01.
---Setting range---
0 to 99999 (r/min)
Set the spindle speed for changing the 2nd step's acceleration/deceleration time constant at gear 10.
---Setting range---
0 to 99999 (r/min)
#13503 vfths13 Variable speed thread multi-step accel/decel change over speed 1 (Gear10)
#13504 vfths14 Variable speed thread multi-step accel/decel change over speed 1 (Gear11)
#13505 vftht11 Variable speed thread multi-step accel/decel change
time constant 1 (Gear00)
#13506 vftht12 Variable speed thread multi-step accel/decel change
time constant 1 (Gear01)
#13507 vftht13 Variable speed thread multi-step accel/decel change
time constant 1 (Gear10)
#13508 vftht14 Variable speed thread multi-step accel/decel change
time constant 1 (Gear11)
#13509 vfths21 Variable speed thread multi-step accel/decel change over speed 2 (Gear00)
#13510 vfths22 Variable speed thread multi-step accel/decel change over speed 2 (Gear01)
#13511 vfths23 Variable speed thread multi-step accel/decel change over speed 2 (Gear10)

Set the spindle speed for changing the 2nd step's acceleration/deceleration time constant at gear 11.
---Setting range---
0 to 99999 (r/min)
Set the time constant to reach the variable speed thread multi-step acceleration/deceleration changeover speed 2 at gear 00.
---Setting range---
0 to 30000 (10 ms)
Set the time constant to reach the variable speed thread multi-step acceleration/deceleration changeover speed 2 at gear 01.
---Setting range---
0 to 30000 (10 ms)
Set the time constant to reach the variable speed thread multi-step acceleration/deceleration changeover speed 2 at gear 10.
---Setting range---
0 to 30000 (10 ms)
Set the time constant to reach the variable speed thread multi-step acceleration/deceleration changeover speed 2 at gear 11.
---Setting range---
0 to 30000 (10 ms)
Set the time constant to reach the limit rotation speed at gear 00.
---Setting range---
0 to 30000 (10 ms)
Set the time constant to reach the limit rotation speed at gear 01.
---Setting range---
0 to 30000 (10 ms)
Set the time constant to reach the limit rotation speed at gear 10.
---Setting range---
0 to 30000 (10 ms)
Set the time constant to reach the limit rotation speed at gear 11.
---Setting range---
0 to 30000 (10 ms)

#13512 vfths24 Variable speed thread multi-step accel/decel change over speed 2 (Gear11)
#13513 vftht21 Variable speed thread multi-step accel/decel change
time constant 2 (Gear00)
#13514 vftht22 Variable speed thread multi-step accel/decel change
time constant 2 (Gear01)
#13515 vftht23 Variable speed thread multi-step accel/decel change
time constant 2 (Gear10)
#13516 vftht24 Variable speed thread multi-step accel/decel change
time constant 2 (Gear11)
#13517 vftht31 Variable speed thread multi-step accel/decel change
time constant 3 (Gear00)
#13518 vftht32 Variable speed thread multi-step accel/decel change
time constant 3 (Gear01)
#13519 vftht33 Variable speed thread multi-step accel/decel change
time constant 3 (Gear10)
#13520 vftht34 Variable speed thread multi-step accel/decel change
time constant 3 (Gear11)

Spindle synchronization acceleration/deceleration time constant (Gear: 01)
Specify the acceleration/deceleration time constant to be used when the rotation speed of spindle synchro nization command is changed with the 2nd gear selected under the spindle-mode servo control or spindle synchronization control.
---Setting range---
0 to 9999(ms)
Specify the spindle speed at which a changeover to the 1st step's acceleration/deceleration time constant is made when the 2nd step gear is selected.
---Setting range---
0 to 99999 (r/min)
Specify the spindle speed at which a changeover to the 2nd step's acceleration/deceleration time constant is made when the 2nd step gear is selected.
---Setting range---
0 to 99999 (r/min)
Specify the spindle speed at which a changeover to the 3rd step's acceleration/deceleration time constant is made when the 2nd step gear is selected.
---Setting range---
0 to 99999 (r/min)
Specify the spindle speed at which a changeover to the 4th step's acceleration/deceleration time constant is made when the 2nd step gear is selected.
---Setting range---
0 to 99999 (r/min)
Specify the spindle speed at which a changeover to the 5th step's acceleration/deceleration time constant is made when the 2nd step gear is selected.
---Setting range---
0 to 99999 (r/min)
Specify the spindle speed at which a changeover to the 6th step's acceleration/deceleration time constant is made when the 2nd step gear is selected.
---Setting range---
0 to 99999 (r/min)
Specify the spindle speed at which a changeover to the 7th step's acceleration/deceleration time constant is made when the 2nd step gear is selected.
---Setting range---
0 to 99999 (r/min)
#13521 spt2 Spindle synchronization acceleration/deceleration time
constant (Gear: 01)
#13522 sptc21 Spindle sync multistep acceleration/deceleration
changeover speed 1 (Gear: 01)
#13523 sptc22 Spindle sync multistep acceleration/deceleration
changeover speed 2 (Gear: 01)
#13524 sptc23 Spindle sync multistep acceleration/deceleration
changeover speed 3 (Gear: 01)
#13525 sptc24 Spindle sync multistep acceleration/deceleration
changeover speed 4 (Gear: 01)
#13526 sptc25 Spindle sync multistep acceleration/deceleration
changeover speed 5 (Gear: 01)
#13527 sptc26 Spindle sync multistep acceleration/deceleration
changeover speed 6 (Gear: 01)
#13528 sptc27 Spindle sync multistep acceleration/deceleration
changeover speed 7 (Gear: 01)

Time constant magnification for changeover speed 1 (Gear: 01)
Specify the acceleration/deceleration time constant to be used in a range of the spindle-mode servo control/ spindle synchronization multi-step acceleration/deceleration changeover speed 1 (sptc21) to the spindle sync multi-step acceleration/deceleration changeover speed 2 (sptc22) when the 2nd step gear is selected.
Set this as a magnification with respect to the spindle-mode servo control/spindle synchronization accelera tion/deceleration time constant (spt2).
---Setting range---
0 to 127
Time constant magnification for changeover speed 2 (Gear: 01)
Specify the acceleration/deceleration time constant to be used in a range of the spindle-mode servo control/ spindle synchronization multi-step acceleration/deceleration changeover speed 2 (sptc22) to the spindle sync multi-step acceleration/deceleration changeover speed 3 (sptc23) when the 2nd step gear is selected.
Set this as a magnification with respect to the spindle-mode servo control/spindle synchronization accelera tion/deceleration time constant (spt2).
---Setting range---
0 to 127
Time constant magnification for changeover speed 3 (Gear: 01)
Specify the acceleration/deceleration time constant to be used in a range of the spindle-mode servo control/

spindle synchronization multi-step acceleration/deceleration changeover speed 3 (sptc23) to the spindle
sync multi-step acceleration/deceleration changeover speed 4 (sptc24) when the 2nd step gear is selected.
Set this as a magnification with respect to the spindle-mode servo control/spindle synchronization accelera tion/deceleration time constant (spt2).
---Setting range---
0 to 127
Time constant magnification for changeover speed 4 (Gear: 01)
Specify the acceleration/deceleration time constant to be used in a range of the spindle-mode servo control/
spindle synchronization multi-step acceleration/deceleration changeover speed 4 (sptc24) to the spindle
sync multi-step acceleration/deceleration changeover speed 5 (sptc25) when the 2nd step gear is selected.
Set this as a magnification with respect to the spindle-mode servo control/spindle synchronization accelera tion/deceleration time constant (spt2).
---Setting range---
0 to 127
Time constant magnification for changeover speed 5 (Gear: 01)
Specify the acceleration/deceleration time constant to be used in a range of the spindle-mode servo control/
spindle synchronization multi-step acceleration/deceleration changeover speed 5 (sptc25) to the spindle
sync multi-step acceleration/deceleration changeover speed 6 (sptc26) when the 2nd step gear is selected.
Set this as a magnification with respect to the spindle-mode servo control/spindle synchronization accelera tion/deceleration time constant (spt2).
---Setting range---
0 to 127
#13529 spdiv21 Time constant magnification for changeover speed 1
(Gear: 01)
#13530 spdiv22 Time constant magnification for changeover speed 2
(Gear: 01)
#13531 spdiv23 Time constant magnification for changeover speed 3
(Gear: 01)
#13532 spdiv24 Time constant magnification for changeover speed 4
(Gear: 01)
#13533 spdiv25 Time constant magnification for changeover speed 5
(Gear: 01)

Time constant magnification for changeover speed 6 (Gear: 01)
Specify the acceleration/deceleration time constant to be used in a range of the spindle-mode servo control/
spindle synchronization multi-step acceleration/deceleration changeover speed 6 (sptc26) to the spindle
sync multi-step acceleration/deceleration changeover speed 7 (sptc27) when the 2nd step gear is selected.
Set this as a magnification with respect to the spindle-mode servo control/spindle synchronization accelera tion/deceleration time constant (spt2).
---Setting range---
0 to 127
Time constant magnification for changeover speed 7 (Gear: 01)
Specify the acceleration/deceleration time constant to be used for the spindle-mode servo control/spindle
synchronization multi-step acceleration/deceleration changeover speed 7 (sptc27) or a higher speed when
the 2nd step gear is selected. Set this as a magnification with respect to the spindle-mode servo control/spin dle synchronization acceleration/deceleration time constant (spt2).
---Setting range---
0 to 127
Spindle synchronization acceleration/deceleration time constant(Gear: 10)
Specify the acceleration/deceleration time constant to be used when the commanded spindle synchroniza tion rotation speed is changed with the 3rd gear selected during the spindle-mode servo control or spindle
synchronization control.
---Setting range---
0 to 9999(ms)
Specify the spindle speed at which a changeover to the 1st step's acceleration/deceleration time constant is
made when the 3rd step gear is selected.
---Setting range---
0 to 99999 (r/min)
Specify the spindle speed at which a changeover to the 2nd step's acceleration/deceleration time constant
is made when the 3rd step gear is selected.
---Setting range---
0 to 99999 (r/min)
Specify the spindle speed at which a changeover to the 3rd step's acceleration/deceleration time constant is
made when the 3rd step gear is selected.
---Setting range---
0 to 99999 (r/min)
Specify the spindle speed at which a changeover to the 4th step's acceleration/deceleration time constant is
made when the 3rd step gear is selected.
---Setting range---
0 to 99999 (r/min)
#13534 spdiv26 Time constant magnification for changeover speed 6
(Gear: 01)
#13535 spdiv27 Time constant magnification for changeover speed 7
(Gear: 01)
#13536 spt3 Spindle synchronization acceleration/deceleration time
constant(Gear: 10)
#13537 sptc31 Spindle sync multistep acceleration/deceleration
changeover speed 1 (Gear: 10)
#13538 sptc32 Spindle sync multistep acceleration/deceleration
changeover speed 2 (Gear: 10)
#13539 sptc33 Spindle sync multistep acceleration/deceleration
changeover speed 3 (Gear: 10)
#13540 sptc34 Spindle sync multistep acceleration/deceleration
changeover speed 4 (Gear: 10)

Specify the spindle speed at which a changeover to the 5th step's acceleration/deceleration time constant is
made when the 3rd step gear is selected.
---Setting range---
0 to 99999 (r/min)
Specify the spindle speed at which a changeover to the 6th step's acceleration/deceleration time constant is

made when the 3rd step gear is selected.
---Setting range---
0 to 99999 (r/min)
Specify the spindle speed at which a changeover to the 7th step's acceleration/deceleration time constant is
made when the 3rd step gear is selected.
---Setting range---
0 to 99999 (r/min)
Time constant magnification for changeover speed 1 (Gear: 10)
Specify the acceleration/deceleration time constant to be used in a range of the spindle-mode servo control/
spindle synchronization multi-step acceleration/deceleration changeover speed 1 (sptc31) to the spindle
sync multi-step acceleration/deceleration changeover speed 2 (sptc32) when the 3rd step gear is selected.
Set this as a magnification with respect to the spindle-mode servo control/spindle synchronization accelera tion/deceleration time constant (spt3).
---Setting range---
0 to 127
Time constant magnification for changeover speed 2 (Gear: 10)
Specify the acceleration/deceleration time constant to be used in a range of the spindle-mode servo control/
spindle synchronization multi-step acceleration/deceleration changeover speed 2 (sptc32) to the spindle
sync multi-step acceleration/deceleration changeover speed 3 (sptc33) when the 3rd step gear is selected.
Set this as a magnification with respect to the spindle-mode servo control/spindle synchronization accelera tion/deceleration time constant (spt3).
---Setting range---
0 to 127
Time constant magnification for changeover speed 3 (Gear: 10)
Specify the acceleration/deceleration time constant to be used in a range of the spindle-mode servo control/
spindle synchronization multi-step acceleration/deceleration changeover speed 3 (sptc33) to the spindle
sync multi-step acceleration/deceleration changeover speed 4 (sptc34) when the 3rd step gear is selected.
Set this as a magnification with respect to the spindle-mode servo control/spindle synchronization accelera tion/deceleration time constant (spt3).
---Setting range---
0 to 127
#13541 sptc35 Spindle sync multistep acceleration/deceleration
changeover speed 5 (Gear: 10)
#13542 sptc36 Spindle sync multistep acceleration/deceleration
changeover speed 6 (Gear: 10)
#13543 sptc37 Spindle sync multistep acceleration/deceleration
changeover speed 7 (Gear: 10)
#13544 spdiv31 Time constant magnification for changeover speed 1
(Gear: 10)
#13545 spdiv32 Time constant magnification for changeover speed 2
(Gear: 10)
#13546 spdiv33 Time constant magnification for changeover speed 3
(Gear: 10)

Time constant magnification for changeover speed 4 (Gear: 10)
Specify the acceleration/deceleration time constant to be used in a range of the spindle-mode servo control/
spindle synchronization multi-step acceleration/deceleration changeover speed 4 (sptc34) to the spindle
sync multi-step acceleration/deceleration changeover speed 5 (sptc35) when the 3rd step gear is selected.
Set this as a magnification with respect to the spindle-mode servo control/spindle synchronization accelera tion/deceleration time constant (spt3).
---Setting range---
0 to 127
Time constant magnification for changeover speed 5 (Gear: 10)
Specify the acceleration/deceleration time constant to be used in a range of the spindle-mode servo control/
spindle synchronization multi-step acceleration/deceleration changeover speed 5 (sptc35) to the spindle
sync multi-step acceleration/deceleration changeover speed 6 (sptc36) when the 3rd step gear is selected.
Set this as a magnification with respect to the spindle-mode servo control/spindle synchronization accelera tion/deceleration time constant (spt3).
---Setting range---
0 to 127
Time constant magnification for changeover speed 6 (Gear: 10)
Specify the acceleration/deceleration time constant to be used in a range of the spindle-mode servo control/
spindle synchronization multi-step acceleration/deceleration changeover speed 6 (sptc36) to the spindle
sync multi-step acceleration/deceleration changeover speed 7 (sptc37) when the 3rd step gear is selected.
Set this as a magnification with respect to the spindle-mode servo control/spindle synchronization accelera tion/deceleration time constant (spt3).
---Setting range---
0 to 127
Time constant magnification for changeover speed 7 (Gear: 10)
Specify the acceleration/deceleration time constant to be used for the spindle-mode servo control/spindle
synchronization multi-step acceleration/deceleration changeover speed 7 (sptc37) or a higher speed when
the 3rd step gear is selected. Set this as a magnification with respect to the spindle-mode servo control/spin dle synchronization acceleration/deceleration time constant (spt3).
---Setting range---
0 to 127
Spindle synchronization acceleration/deceleration time constant (Gear: 11)
Specify the acceleration/deceleration time constant to be used when the commanded spindle synchroniza tion rotation speed is changed with the 4th gear selected during the spindle-mode servo control or spindle
synchronization control.
---Setting range---
0 to 9999(ms)
Specify the spindle speed at which a changeover to the 1st step's acceleration/deceleration time constant is
made when the 4th step gear is selected.
---Setting range---
0 to 99999 (r/min)
#13547 spdiv34 Time constant magnification for changeover speed 4
(Gear: 10)
#13548 spdiv35 Time constant magnification for changeover speed 5
(Gear: 10)
#13549 spdiv36 Time constant magnification for changeover speed 6
(Gear: 10)
#13550 spdiv37 Time constant magnification for changeover speed 7
(Gear: 10)
#13551 spt4 Spindle synchronization acceleration/deceleration time

constant (Gear: 11)
#13552 sptc41 Spindle sync multistep acceleration/deceleration
changeover speed 1 (Gear: 11)

Specify the spindle speed at which a changeover to the 2nd step's acceleration/deceleration time constant
is made when the 4th step gear is selected.
---Setting range---
0 to 99999 (r/min)
Specify the spindle speed at which a changeover to the 3rd step's acceleration/deceleration time constant is
made when the 4th step gear is selected.
---Setting range---
0 to 99999 (r/min)
Specify the spindle speed at which a changeover to the 4th step's acceleration/deceleration time constant is
made when the 4th step gear is selected.
---Setting range---
0 to 99999 (r/min)
Specify the spindle speed at which a changeover to the 5th step's acceleration/deceleration time constant is
made when the 4th step gear is selected.
---Setting range---
0 to 99999 (r/min)
Specify the spindle speed at which a changeover to the 6th step's acceleration/deceleration time constant is
made when the 4th step gear is selected.
---Setting range---
0 to 99999 (r/min)
Specify the spindle speed at which a changeover to the 7th step's acceleration/deceleration time constant is
made when the 4th step gear is selected.
---Setting range---
0 to 99999 (r/min)
Time constant magnification for changeover speed 1 (Gear: 11)
Specify the acceleration/deceleration time constant to be used in a range of the spindle-mode servo control/
spindle synchronization multi-step acceleration/deceleration changeover speed 1 (sptc41) to the spindle
sync multi-step acceleration/deceleration changeover speed 2 (sptc42) when the 4th step gear is selected.
Set this as a magnification with respect to the spindle-mode servo control/spindle synchronization accelera tion/deceleration time constant (spt4).
---Setting range---
0 to 127
#13553 sptc42 Spindle sync multistep acceleration/deceleration
changeover speed 2 (Gear: 11)
#13554 sptc43 Spindle sync multistep acceleration/deceleration
changeover speed 3 (Gear: 11)
#13555 sptc44 Spindle sync multistep acceleration/deceleration
changeover speed 4 (Gear: 11)
#13556 sptc45 Spindle sync multistep acceleration/deceleration
changeover speed 5 (Gear: 11)
#13557 sptc46 Spindle sync multistep acceleration/deceleration
changeover speed 6 (Gear: 11)
#13558 sptc47 Spindle sync multistep acceleration/deceleration
changeover speed 7 (Gear: 11)
#13559 spdiv41 Time constant magnification for changeover speed 1
(Gear: 11)

Time constant magnification for changeover speed 2 (Gear: 11)
Specify the acceleration/deceleration time constant to be used in a range of the spindle-mode servo control/
spindle synchronization multi-step acceleration/deceleration changeover speed 2 (sptc42) to the spindle
sync multi-step acceleration/deceleration changeover speed 3 (sptc43) when the 4th step gear is selected.
Set this as a magnification with respect to the spindle-mode servo control/spindle synchronization accelera tion/deceleration time constant (spt4).
---Setting range---
0 to 127
Time constant magnification for changeover speed 3 (Gear: 11)
Specify the acceleration/deceleration time constant to be used in a range of the spindle-mode servo control/
spindle synchronization multi-step acceleration/deceleration changeover speed 3 (sptc43) to the spindle
sync multi-step acceleration/deceleration changeover speed 4 (sptc44) when the 4th step gear is selected.
Set this as a magnification with respect to the spindle-mode servo control/spindle synchronization accelera tion/deceleration time constant (spt4).
---Setting range---
0 to 127
Time constant magnification for changeover speed 4 (Gear: 11)
Specify the acceleration/deceleration time constant to be used in a range of the spindle-mode servo control/
spindle synchronization multi-step acceleration/deceleration changeover speed 4 (sptc44) to the spindle
sync multi-step acceleration/deceleration changeover speed 5 (sptc45) when the 4th step gear is selected.
Set this as a magnification with respect to the spindle-mode servo control/spindle synchronization accelera tion/deceleration time constant (spt4).
---Setting range---
0 to 127
Time constant magnification for changeover speed 5 (Gear: 11)
Specify the acceleration/deceleration time constant to be used in a range of the spindle-mode servo control/
spindle synchronization multi-step acceleration/deceleration changeover speed 5 (sptc45) to the spindle
sync multi-step acceleration/deceleration changeover speed 6 (sptc46) when the 4th step gear is selected.
Set this as a magnification with respect to the spindle-mode servo control/spindle synchronization accelera tion/deceleration time constant (spt4).
---Setting range---
0 to 127
Time constant magnification for changeover speed 6 (Gear: 11)
Specify the acceleration/deceleration time constant to be used in a range of the spindle-mode servo control/
spindle synchronization multi-step acceleration/deceleration changeover speed 6 (sptc46) to the spindle
sync multi-step acceleration/deceleration changeover speed 7 (sptc47) when the 4th step gear is selected.
Set this as a magnification with respect to the spindle-mode servo control/spindle synchronization accelera tion/deceleration time constant (spt4).
---Setting range---

0 to 127
#13560 spdiv42 Time constant magnification for changeover speed 2
(Gear: 11)
#13561 spdiv43 Time constant magnification for changeover speed 3
(Gear: 11)
#13562 spdiv44 Time constant magnification for changeover speed 4
(Gear: 11)
#13563 spdiv45 Time constant magnification for changeover speed 5
(Gear: 11)
#13564 spdiv46 Time constant magnification for changeover speed 6
(Gear: 11)

Time constant magnification for changeover speed 7 (Gear: 11)
Specify the acceleration/deceleration time constant to be used for the spindle-mode servo control/spindle
synchronization multi-step acceleration/deceleration changeover speed 7 (sptc47) or a higher speed when
the 4th step gear is selected. Set this as a magnification with respect to the spindle-mode servo control/spin dle synchronization acceleration/deceleration time constant (spt4).
---Setting range---
0 to 127
Select whether to enable turret gear change control (gear change at the spindle gear ratios SGRA1 to
SGRB4) for a spindle that is under semi-closed loop control.
0: Disable
1: Enable
This ratio is enabled under turret gear change control.
Specify the number of spindle-side gear teeth for gear selection command GI1=0/GI2=0.
When 0 is set, the operation will be the same as when 1 is set.
---Setting range---
0 to 32767
This ratio is enabled under turret gear change control.
Specify the number of spindle-side gear teeth for gear selection command GI1=1/GI2=0.
When 0 is set, the operation will be the same as when 1 is set.
---Setting range---
0 to 32767
This ratio is enabled under turret gear change control.
Specify the number of spindle-side gear teeth for gear selection command GI1=0/GI2=1.
When 0 is set, the operation will be the same as when 1 is set.
---Setting range---
0 to 32767
This ratio is enabled under turret gear change control.
Specify the number of spindle-side gear teeth for gear selection command GI1=1/GI2=1.
When 0 is set, the operation will be the same as when 1 is set.
---Setting range---
0 to 32767
This ratio is enabled under turret gear change control.
Specify the number of teeth of the motor shaft side gear 1 for gear selection command GI1=0/GI2=0.
When 0 is set, the operation will be the same as when 1 is set.
---Setting range---
0 to 32767
This ratio is enabled under turret gear change control.
Specify the number of teeth of the motor shaft side gear 1 for gear selection command GI1=1/GI2=0.
When 0 is set, the operation will be the same as when 1 is set.
---Setting range---
0 to 32767
#13565 spdiv47 Time constant magnification for changeover speed 7
(Gear: 11)
(PR) #43001 sgear_tret Turret gear change ON
#43002 SGRA1 Spindle-side gear ratio 1
#43003 SGRA2 Spindle-side gear ratio 2
#43004 SGRA3 Spindle-side gear ratio 3
#43005 SGRA4 Spindle-side gear ratio 4
#43006 SGRB1 Motor shaft-side gear ratio 1
#43007 SGRB2 Motor shaft-side gear ratio 2

This ratio is enabled under turret gear change control.
Specify the number of teeth of the motor shaft side gear 1 for gear selection command GI1=0/GI2=1.
When 0 is set, the operation will be the same as when 1 is set.
---Setting range---
0 to 32767
This ratio is enabled under turret gear change control.
Specify the number of teeth of the motor shaft side gear 1 for gear selection command GI1=1/GI2=1.
When 0 is set, the operation will be the same as when 1 is set.
---Setting range---
0 to 32767
Specify the maximum rotation speed in synchronous tapping multi-step acceleration/deceleration control
when gear 00 is selected.
Inclination of 3rd linear acceleration/deceleration control is determined by the ratio of smax_tap1(#43046)
and tapt31(#3045).
When "0" is set to smax_tap1, use smax1(#3005).
When smax_tap1 is smax1 or more, use smax1.
---Setting range---
0 to 99999 (r/min)
Specify the maximum rotation speed in synchronous tapping multi-step acceleration/deceleration control
when gear 01 is selected.
Inclination of 3rd linear acceleration/deceleration control is determined by the ratio of smax_tap2(#43047)
and tapt32(#3046).

When "0" is set to smax_tap2, use smax2 (#3006).
When smax_tap2 is smax2 or more, use smax2.
---Setting range---
0 to 99999 (r/min)
Specify the maximum rotation speed in synchronous tapping multi-step acceleration/deceleration control
when gear 10 is selected.
Inclination of 3rd linear acceleration/deceleration control is determined by the ratio of smax_tap3(#43048)
and tapt33(#3047).
When "0" is set to smax_tap3, use smax3 (#3007).
When smax_tap3 is smax3 or more, use smax3.
---Setting range---
0 to 99999 (r/min)
Specify the maximum rotation speed in synchronous tapping multi-step acceleration/deceleration control
when gear 11 is selected.
Inclination of 3rd linear acceleration/deceleration control is determined by the ratio of smax_tap4(#43049)
and tapt34(#3048).
When 0 is set to smax_tap4, use smax4(#3008).
When smax_tap4 is smax4 or more, use smax4.
---Setting range---
0 to 99999 (r/min)
Specify the equivalent load factor of the spindle motor that causes the warning at the start of automatic op eration.
The warning appears when the equivalent load factor has exceeded the specified value.
0: Disable the warning
1 to 200: Warning display threshold [%]
#43008 SGRB3 Motor shaft-side gear ratio 3
#43009 SGRB4 Motor shaft-side gear ratio 4
#43046 smax_tap1 Synchro tapping spindle Max rotation speed (Gear: 00)
#43047 smax_tap2 Synchro tapping spindle Max rotation speed (Gear: 01)
#43048 smax_tap3 Synchro tapping spindle Max rotation speed (Gear: 10)
#43049 smax_tap4 Synchro tapping spindle Max rotation speed (Gear: 11)
#43070 loadrate_warn Spindle motor equivalent load factor excess warning

This parameter is used when address P is omitted from the spindle speed fluctuation detection command
(G162). Specify a length of delay time from when G162 command is given to when the control detects a fluc tuation.
This delay time is also applied to a change in spindle speed command. A change in spindle speed command
means a difference in the final command given to the spindle drive unit.
---Setting range---
0 to 99.999 (s)
Specify the allowable spindle speed fluctuation rate to be applied to the spindle speed fluctuation detection
command (G162) from which address R is omitted.
When "0" is set, the allowable rate is 15%.
If a speed deviation with respect to the command speed is smaller than 45 r/min, the speed deviation is treat ed as 45 r/min.
---Setting range---
0 to 100 (%)
Specify the allowable spindle speed fluctuation range to be applied to the spindle speed fluctuation detection
command (G162) from which address I is omitted.
When "0" is set, the allowable range is treated as 45 r/min.
---Setting range---
0 to 999999 (r/min)
Specify the maximum number of revolutions for the Z phase detection of proximity-switch orientation.
If Z phase is not yet detected when the spindle has reached the specified number of revolutions, the opera tion error (M01 0301) occurs.
When this parameter is "0", the maximum number of revolutions is treated as 2.
---Setting range---
0 to 255 (revolutions)
Specify the number of spindle-side gear teeth for "Gear selection command (Control input 4/bit6, 5) = 00".
When 0 is set, extended gear ratio is disabled.
When not using, set to "0".
---Setting range---
0 to 2147483647
Specify the number of spindle-side gear teeth for "Gear selection command (Control input 4/bit6, 5) = 01".
When 0 is set, extended gear ratio is disabled.
When not using, set to "0".
---Setting range---
0 to 2147483647
Specify the number of spindle-side gear teeth for "Gear selection command (Control input 4/bit6, 5) = 10".
When 0 is set, extended gear ratio is disabled.
When not using, set to "0".
---Setting range---
0 to 2147483647
#43071 sp_spd_flc_dtc_p Delay time for starting spindle speed fluctuation detec tion
#43072 sp_spd_flc_dtc_r Allowable spindle speed fluctuation rate
#43073 sp_spd_flc_dtc_i Allowable spindle speed fluctuation range
#43074 zdet_num Maximum number of revolutions for Z phase detection
(PR) #43076 GRA1ex Spindle-side extended gear ratio 1
(PR) #43077 GRA2ex Spindle-side extended gear ratio 2
(PR) #43078 GRA3ex Spindle-side extended gear ratio 3

Specify the number of spindle-side gear teeth for "Gear selection command (Control input 4/bit6, 5) = 11".
When 0 is set, extended gear ratio is disabled.
When not using, set to "0".
---Setting range---
0 to 2147483647
Specify the number of motor-side gear teeth for "Gear selection command (Control input 4/bit6, 5) = 00".
When 0 is set, extended gear ratio is disabled.

When not using, set to "0".
---Setting range---
0 to 2147483647
Specify the number of motor-side gear teeth for "Gear selection command (Control input 4/bit6, 5) = 01".
When 0 is set, extended gear ratio is disabled.
When not using, set to "0".
---Setting range---
0 to 2147483647
Specify the number of motor-side gear teeth for "Gear selection command (Control input 4/bit6, 5) = 10".
When 0 is set, extended gear ratio is disabled.
When not using, set to "0".
---Setting range---
0 to 2147483647
Specify the number of motor-side gear teeth for "Gear selection command (Control input 4/bit6, 5) = 11".
When 0 is set, extended gear ratio is disabled.
When not using, set to "0".
---Setting range---
0 to 2147483647
Specify the motor temperature at which spindle protection starts.
When the spindle motor temperature reaches the set temperature or higher, the acceleration/deceleration
time constant is switched from that of S command to that for spindle protection.
Set a temperature that is the same as or higher than the spindle protection cancel temperature.
When 0 is set, the spindle acceleration/deceleration time constant is not switched according to the tempera ture.
---Setting range---
0 to 200 (C)
Specify the motor temperature at which spindle protection is cancelled.
When the spindle motor temperature drops below the set temperature, the acceleration/deceleration time
constant is switched from that for spindle protection to that of S command.
Set a temperature that is the same as or lower than the spindle protection start temperature.
When the set temperature is 0 or higher than the spindle protection start temperature, the cancel temperature
is set 10 degrees lower than the start temperature.
---Setting range---
0 to 200 (C)
(PR) #43079 GRA4ex Spindle-side extended gear ratio 4
(PR) #43080 GRB1ex Motor-side extended gear ratio 1
(PR) #43081 GRB2ex Motor-side extended gear ratio 2
(PR) #43082 GRB3ex Motor-side extended gear ratio 3
(PR) #43083 GRB4ex Motor-side extended gear ratio 4
#43084 protect_sp_st_tmp Spindle protection start temperature
#43085 protect_sp_rls_tmp Spindle protection cancel temperature

Specify the acceleration/deceleration time constant for S command (speed operation mode) to be applied to
the spindle motor (gear 00) that is being protected against increased temperature.
Set the linear acceleration/deceleration time up to limit rotation speed (slimt1).
When 0 or any value smaller than "#3101 sp_t1" is set, switchover of the time constant is disabled, and ac celeration/deceleration is performed with the time constant "#3101 sp_t1".
---Setting range---
0 to 30000 (ms)
Specify the acceleration/deceleration time constant for S command (speed operation mode) to be applied to
the spindle motor (gear 01) that is being protected against increased temperature.
Set the linear acceleration/deceleration time up to limit rotation speed (slimt2).
When 0 or any value smaller than "#3102 sp_t2" is set, switchover of the time constant is disabled, and ac celeration/deceleration is performed with the time constant "#3102 sp_t2".
---Setting range---
0 to 30000 (ms)
Specify the acceleration/deceleration time constant for S command (speed operation mode) to be applied to
the spindle motor (gear 10) that is being protected against increased temperature.
Set the linear acceleration/deceleration time up to limit rotation speed (slimt3).
When "0" or any value smaller than "#3103 sp_t3" is set, switchover of the time constant is disabled, and
acceleration/deceleration is performed with the time constant "#3103 sp_t3".
---Setting range---
0 to 30000 (ms)
Specify the acceleration/deceleration time constant for S command (speed operation mode) to be applied to
the spindle motor (gear 11) that is being protected against increased temperature.
Set the linear acceleration/deceleration time up to limit rotation speed (slimt4).
When "0" or any value smaller than "#3104 sp_t4" is set, switchover of the time constant is disabled, and
acceleration/deceleration is performed with the time constant "#3104 sp_t4".
---Setting range---
0 to 30000 (ms)
This parameter specifies the position loop gain that is applied when the spindle is controlled in C axis mode.
If the parameter is set to "0", the value of the spindle parameter "#13002 SP002 (PGN)" will be used.
---Setting range---
0 to 200 (rad/s)
When using the "Spindle control with pulse train output" function, subtract 1 from the number of pulses per
revolution of the spindle motor, and enter the result in this parameter.
(Example) When the number of pulses per revolution of the motor connected is 4096, enter "4095" in this
parameter.
---Setting range---
0 to 32767
#43086 protect_sp_t1 Acceleration/Deceleration time constant during spindle
protection (Gear: 00)
#43087 protect_sp_t2 Acceleration/Deceleration time constant during spindle
protection (Gear: 01)
#43088 protect_sp_t3 Acceleration/Deceleration time constant during spindle
protection (Gear: 10)
#43089 protect_sp_t4 Acceleration/Deceleration time constant during spindle
protection (Gear: 11)
#43095 SP002cax(PGNcax) Position loop gain for C axis mode

(PR) #43097 sprotpls Number of pulses per motor revolution

Specify the form of the pulse train to be output.
bit8: Output logic
Specify the logic of the pulse train to be output.
0: Positive logic (Active high)
1: Negative logic (Active low)
bit7-4: Multiplying factor
Specify the multiplying factor for the frequency of the pulse train.
0: 1-fold
1: 1/4-fold
bit3-0: Output mode
Specify the form of the pulse train for forward/reverse rotation.
0: A/B phase mode
1: PULSE/SIGN mode
2: CW/CCW mode
---Setting range---
0000 to FFFF (HEX)
Specify the maximum rotation speed of the spindle motor that should be controlled with the pulse train output.
---Setting range---
0 to 999999 (r/min)
Specify the time period to determine there is an error in feedback signal from the spindle encoder.
If the feedback signal from the spindle encoder does not change significantly when the parameterized time period has elapsed after start of output to the spindle, the system determines there is an error in the spindle encoder, and an alarm stop takes place.
If "0" is specified, the system behaves as if "200" was specified.
This parameter is only valid when "#3025 enc-on" (Spindle encoder) is "1".
---Setting range---
0 to 1000 (ms)
Adjust the value to be displayed and output as the equivalent load factor of the spindle motor using this pa rameter.
(Example) When converting to continuous rating:
Continuous rating / short-time rating * 100
---Setting range---
0 to 150 (%)
Note that when set to "0", 100% applies.
Hide (blank) the spindle unit temperature on the drive monitor screen.
0: Show
1: Hide
(Note) Regardless of the setting of "#1251 set23/bit1" (Spindle temperature display), the temperature of the spindle for which "1" is set in this parameter is hidden (blank).
(PR) #43098 plsspec Form of pulse train output
(PR) #43099 plsmot Maximum rotation speed of spindle motor controlled with pulse train output
#43100 plschk Time to check spindle encoder output for control with pulse train output
#43101 loadrate_ratio Spindle motor equivalent load factor rating ratio
#43105 sp_temp_hide Hide Spindle temperature

15.9 Spindle Parameters
Set the position loop gain for "Non-interpolation" control mode.
When the setting value increases, the command tracking ability will enhance and the positioning settling time can be shorter. However, the impact on the machine during acceleration/deceleration will increase.
Use the selection command, the control mode "bit 2, 1, 0 = 000" in control input 4.
(Note) The control mode is commanded by NC.
---Setting range---
1 to 200 (rad/s)
Set the position loop gain for "interpolation" control mode.
When the setting value increases, the command tracking ability will enhance and the positioning settling time can be shorter. However, the impact on the machine during acceleration/deceleration will increase.
Use the selection command, the control mode "bit 2, 1, 0 = 010 or 100" in control input 4.
(Note) The control mode is commanded by NC.
When carrying out the SHG control, set SP035/bitC to "1".
---Setting range---
1 to 200 (rad/s)
Set the position loop gain for "spindle synchronization" control mode.
When the setting value increases, the command tracking ability will enhance and the positioning settling time can be shorter. However, the impact on the machine during acceleration/deceleration will increase.
Use the selection command, the control mode "bit 2, 1, 0 = 001" in control input 4.
(Note 1) The control mode is commanded by NC.
When carrying out the SHG control, set SP036/bit4 to "1".
(Note 2) Set the same value for the basic and synchronous spindles in spindle synchronization.
---Setting range---
1 to 200 (rad/s)
Not used. Set to "0".
Set the speed loop gain.
Set this according to the load inertia size.
The higher setting value will increase the accuracy of control, however, vibration tends to occur.
If vibration occurs, adjust by lowering by 20 to 30%.
The final value should be 70 to 80% of the value at which the vibration stops.
---Setting range---
1 to 9999
Set the speed loop integral control gain.
The standard setting is "1900". Adjust the value by increasing/decreasing the value by about 100.
Raise this value to improve the contour tracking accuracy in high-speed cutting.

Lower this value when the position droop does not stabilize (when the vibration of 10 to 20Hz occurs).
---Setting range---
1 to 9999
Set this parameter when the limit cycle occurs in the full-closed loop or overshooting occurs in positioning.
When setting this parameter, make sure to set the torque offset "SP050(TOF)".
When not using, set to "0".
---Setting range---
0 to 32767
#13001 SP001 PGV Position loop gain non-interpolation mode
#13002 SP002 PGN Position loop gain interpolation mode
#13003 SP003 PGS Position loop gain spindle synchronization
#13004 SP004
#13005 SP005 VGN1 Speed loop gain 1
#13006 SP006 VIA1 Speed loop lead compensation 1
#13007 SP007 VIL1 Speed loop delay compensation 1

Normally SP005(VGN1) is used.
By setting "SP035/bit1, SP035/bit9 or SP036/bit1=1", gain 2 can be used according to the application.
Gain 2 can also be used by setting "Speed gain set 2 changeover request (control input 5/ bitC) = 1".
Refer to SP005(VGN1) for adjustment procedures.
---Setting range---
1 to 9999
Normally SP006(VIA1) is used.
By setting "SP035/bit1, SP035/bit9 or SP036/bit1=1", gain 2 can be used according to the application.
Gain 2 can also be used by setting "Speed gain set 2 changeover request (control input 5/ bitC) = 1".
Refer to SP006(VIA1) for adjustment procedures.
---Setting range---
1 to 9999
Normally SP007(VIL1) is used.
By setting "SP035/bit1, SP035/bit9 or SP036/bit1=1", gain 2 can be used according to the application.
Gain 2 can also be used by setting "Speed gain set 2 changeover request (control input 5/ bitC) = 1".
Refer to SP007(VIL1) for adjustment procedures.
---Setting range---
0 to 32767
Not used. Set to "0".
Not used. Set to "0".
Not used. Set to "0".
Set the minimum value for the variable excitation rate. The standard setting is "50".
Set to "0" when using an IPM spindle motor.
If noise including gear noise is loud, select a small value. However, a larger setting value is more effective
for impact response.
(Note) When setting a value at "50 or more", check if there is no problem with gear noise, motor excitation
noise, vibration during low-speed rotation or vibration when the servo is locked during orientation stop, etc.
When setting a value at "less than 50", check if there is no problem with the impact load response or rigidity
during servo lock.
---Setting range---
0 to 100 (%)
Normally, SP014(PY1) is used.
By setting "SP035/bit2, SP035/bitA or SP036/bit2=1", the excitation rate 2 can be used according to the ap plication.
The excitation rate 2 can also be used by setting "the minimum excitation rate 2 changeover request (control
input 5/ bitB) = 1". Refer to SP014(PY1) for adjustment procedures.
Set to "0" when using an IPM spindle motor.
---Setting range---
0 to 100 (%)
#13008 SP008 VGN2 Speed loop gain 2
#13009 SP009 VIA2 Speed loop lead compensation 2
#13010 SP010 VIL2 Speed loop delay compensation 2
#13011 SP011
#13012 SP012
#13013 SP013
#13014 SP014 PY1 Minimum excitation rate 1
#13015 SP015 PY2 Minimum excitation rate 2

Set the single-rotation position alignment deceleration rate for orientation stopping, phase alignment while
rotating and switching from non-interpolation mode to spindle synchronization mode while rotating.
When the load inertia is larger, the setting value should be smaller.
When the setting value is larger, the orientation in-position and single-rotation position alignment complete
faster, but the impact applied on the machine will increase.
To change the deceleration rate only during rotation command (command F T 0), set this parameter to gether with SP070 (KDDT).
---Setting range---
1 to 32767 (0.1(r/min)/ms)
Select the spindle specification.
A function is allocated to each bit.
Set this in hexadecimal format.
bit F-C : msr Motor series selection
0: 200V specification IM spindle motor
1: 200V specification IPM spindle motor
2: 400V specification IM spindle motor
3: 400V specification IPM spindle motor
4: 200V specification Tool spindle motor
bit B-5 :
Not used. Set to "0".
bit 4 : fdir Position feedback
Set the machine side encoder's installation polarity.

0: Forward polarity 1: Reverse polarity
bit 3 : vfb Speed feedback filter
0: Disable 1: Enable (4500Hz)
bit 2 : seqh READY ON sequence
0: Normal 1: High-speed
bit 1 : dfbx Dual feedback control
Control the position FB signal in full closed control by the combination of a motor side encoder and machine side encoder.
0: Stop 1: Start
Related parameters: SP051, SP052
bit 0 : fdir2 Speed feedback polarity
Set the motor side encoder's installation polarity by a built-in motor.
0: Forward polarity 1: Reverse polarity
#13016 SP016 DDT Phase alignment deceleration rate
(PR) #13017 SP017 SPEC1 Spindle specification 1
msr
fdir
vfb
seqh
fdir2
dfbx

Select the spindle specification.
A function is allocated to each bit.
Set this in hexadecimal format.
bit F-A :
Not used. Set to "0".
bit 9 : mpg Earth fault detection
0: Disable 1: Enable (standard)
Set "0" and it is constantly "Enable" for MDS-EJ-SP Series.
bit 8 : spsu Command speed limit value
0: 33,750 r/min 1: 135,000 r/min
bit 7-6 :
Not used. Set to "0".
bit 5 : mkch Coil switch function
0: Disable 1: Enable
bit 4-2 :
Not used. Set to "0".
bit 1 : oplp Open loop control
This allows the operation in which no encoder feedback signals are used.
It is used when adjusting the encoder, etc.
0: Disable 1: Enable
bit 0 :
Not used. Set to "0".
[For semi-closed loop]
Set the same value as SP020 (RNG2). (Refer to the explanation of SP020.)
[For full-closed loop]
Set the number of pulses per revolution of the machine side encoder.
When using the encoder interface unit MDS-EX-HR, use this with SP097(RNG1ex).
Encoder
OSE-1024 (ABZ pulse): SP019=4096, SP097=-1
TS5690(64 teeth): SP019 = 2000, SP097=0
TS5690(90 teeth): SP019 = 2880, SP097=0
TS5690(128 teeth): SP019 = 4000, SP097=0
TS5690(192 teeth): SP019 = 6000, SP097=0
TS5690(256 teeth): SP019 = 8000, SP097=0
TS5690(384 teeth): SP019 =12000, SP097=0
ERM280(1200 teeth): SP019 = 4800, SP097=0
ERM280(2048 teeth): SP019 = 8000, SP097=0
MPCI : SP019 = 7200, SP097=0
MBE205: SP019 = 2000, SP097=0
GEL2449M(524,288(p/rev)): SP019=0, SP097=8
MHS-04B Series(1,048,576(p/rev)): SP019=0, SP097=16
---Setting range---
When SP097=0, the setting range is from 0 to 32767 (kp)
When SP0970, the setting range is from 0 to 65535 (p)
(PR) #13018 SP018 SPEC2 Spindle specification 2
(PR) #13019 SP019 RNG1 Sub side encoder resolution
mpg
oplp
mkch
spsu

Set the number of pulses per revolution of the motor side encoder. Set the standard parameters for the motor with frame.
---Setting range---
When SP098=0, the setting range is from 0 to 32767 (kp)
When SP0980, the setting range is from 0 to 65535 (p)
Set the detection time constant of Overload 1 (Alarm 50). (For Mitsubishi Electric adjustment)
Normally, set to "60".
Set to "300" when using an IPM spindle motor.
---Setting range---
1 to 15300 (s)
Set the current detection level of "Overload 1" (Alarm 50) as a percentage against the motor short-time rated

output current. (For Mitsubishi Electric adjustment)
Normally, set to "120".
Set to "100" when using an IPM spindle motor.
---Setting range---
1 to 200 (Short-time rated %)
Set the excessive error detection width for the interpolation mode and spindle synchronization.
The standard setting is "120".
When set to "0", the excessive error detection will be ignored, so do not set to "0".
---Setting range---
1 to 32767 ()
Set the in-position detection width.
Set the positioning accuracy required to the machine.
Lower setting value increases the positioning accuracy, but makes the cycle time (settling time) longer.
The standard setting is "875".
---Setting range---
0 to 32767 (1/1000)
Use this when detecting an in-position different from normal in-position width such as advancing the in-posi tion signal. The adjustment procedure is the same as SP024 (INP).
The standard setting is "875".
---Setting range---
0 to 32767 (1/1000)
Set the maximum motor speed.
If the motor speed exceeds the set maximum speed, an overspeed alarm will occur.
---Setting range---
1 to 32767 (r/min)
Set the motor speed for detecting zero speed.
If the motor speed drops below the set speed, the zero speed signal turns ON.
The standard setting is "50".
---Setting range---
1 to 1000 (r/min)
(PR) #13020 SP020 RNG2 Main side encoder resolution
(PR) #13021 SP021 OLT Overload detection time constant
#13022 SP022 OLL Overload detection level
#13023 SP023 OD1 Excessive error detection width (interpolation mode -
spindle synchronization)
#13024 SP024 INP In-position width
#13025 SP025 INP2 2nd in-position width
(PR) #13026 SP026 TSP Maximum motor speed
#13027 SP027 ZSP Motor zero speed

Set the motor speed for detecting the speed.
If the motor speed drops below the set speed, the speed detection signal turns ON.
The standard setting is 10% of the maximum motor speed.
---Setting range---
10 to 32767 (r/min)
Set the hysteresis width in which the speed detection changes from ON to OFF.
If the setting value is small, the speed detection will chatter easily.
The standard setting is "30".
---Setting range---
10 to 1000 (r/min)
Set the specified speed of the specified speed output.
When carrying out digital output of the specified speed output, set SP229/bitC to "1".
It is not available for MDS-EJ-SP Series.
---Setting range---
0 to 32767 (r/min)
Set the control system of the spindle drive unit.
2200: Semi closed loop control
4200: Full closed loop control by using spindle side ABZ pulse output encoder
6200: Full closed loop control by using spindle side serial output encoder
#13028 SP028 SDTS Speed detection set value
#13029 SP029 SDTR Speed detection reset width
#13030 SP030 SDT2 2nd speed detection setting value
(PR) #13031 SP031 MTYP Motor type

MDS-E/EH Series: Power supply type
When connecting a power supply unit, set a code for each power supply unit.
bit F-C : amp
Set the power backup function to be used.
No function used : 0
Deceleration and stop function at power failure : 8
Retraction function at power failure: C
bit B-8 : rtyp
Not used. Set to "0".
bit 7-0 : ptyp External emergency stop setting
When the emergency stop input signal of the power supply unit is "disabled"
Power supply unit is not connected : 00
MDS-E-CV-37 / MDS-EH-CV-37 : 04
MDS-E-CV-75 / MDS-EH-CV-75 : 08
MDS-E-CV-110 / MDS-EH-CV-110 : 11
MDS-E-CV-185 / MDS-EH-CV-185 : 19
MDS-E-CV-300 / MDS-EH-CV-300 : 30
MDS-E-CV-370 / MDS-EH-CV-370 : 37
MDS-E-CV-450 / MDS-EH-CV-450 : 45
MDS-E-CV-550 / MDS-EH-CV-550 : 55
MDS-EH-CV-750 : 75

When the emergency stop input signal of the power supply unit is "enabled"
(Note) Set the power supply rotary switch to "4".
Power supply unit is not connected : 00
MDS-E-CV-37 / MDS-EH-CV-37 : 44
MDS-E-CV-75 / MDS-EH-CV-75 : 48
MDS-E-CV-110 / MDS-EH-CV-110 : 51
MDS-E-CV-185 / MDS-EH-CV-185 : 59
MDS-E-CV-300 / MDS-EH-CV-300 : 70
MDS-E-CV-370 / MDS-EH-CV-370 : 77
MDS-E-CV-450 / MDS-EH-CV-450 : 85
MDS-E-CV-550 / MDS-EH-CV-550 : 95
MDS-EH-CV-750 : B5
MDS-EM/EMH Series: Power supply type
Set as follows for the spindle drive section of the MDS-EM/EMH-SPV3.
bit F-C : amp
Not used. Set to "0".
bit B-8 : rtyp
Not used. Set to "0".
bit 7-0 : ptyp External emergency stop setting
Normal
MDS-EM: 20, MDS-EMH: 22, MDS-EM-SPV3-16040S: 16, MDS-EM-SPV3-320120: 37
External emergency stop function
MDS-EM: 60, MDS-EMH: 62, MDS-EM-SPV3-16040S: 56, MDS-EM-SPV3-320120: 77
(PR) #13032 SP032 PTYP Power supply type/ Regenerative resistor type
ptyp
rtyp
amp
ptyp
rtyp
amp

MDS-EJ-SP Series: Regenerative resistor type
Set the regenerative resistor type.
bit F-8 : amp(bit F-C) / rtyp(bit B-8)
Setting prohibited : 10-12
MR-RB12 or GZG200W39OHMK : 13
MR-RB32 or GZG200W120OHMK 3 units connected in parallel : 14
MR-RB30 or GZG200W39OHMK 3 units connected in parallel : 15
MR-RB50 or GZG300W39OHMK 3 units connected in parallel : 16
Setting prohibited : 17-1F
Setting prohibited : 20-23
FCUA-RB22 : 24
FCUA-RB37 : 25
FCUA-RB55 : 26
FCUA-RB75/2 1 unit : 27
R-UNIT1 : 28
R-UNIT2 : 29
R-UNIT3 : 2A
R-UNIT4 : 2B
R-UNIT5 : 2C
FCUA-RB75/2 2 units connected in parallel : 2D
FCUA-RB55/2 2 units connected in parallel : 2E
Setting prohibited : 2F
bit 7-4 : emgx External emergency stop function
Set the external emergency stop function.
0: Disable 4: Enable
bit 3-0 :
Not used. Set to "0".
emgx
rtyp
amp
0 00 0

Select the spindle specification.
A function is allocated to each bit.
Set this in hexadecimal format.
bit F : hfrf Higher harmonic suppression filter
0: Stop
1: Start
bit E-C :
Not used. Set to "0".
bit B-A : ovs Overshoot compensation
Set this parameter when overshooting occurs during positioning.
bitB,A=
00: Compensation stop
01: Setting prohibited
10: Setting prohibited
11: Compensation type 3
Set the compensation amount in SP043(OVS1) and SP042(OVS2).
bit 9-8 : lmc Lost motion compensation type2
Set this parameter when the protrusion at quadrant change is too large.
bit9,8=
00: Compensation stop
01: Setting prohibited

10: Compensation type 2
11: Setting prohibited
Set the compensation amount in SP048(LMC1) and SP041(LMC2).
bit 7 : lmc2a Lost motion compensation 2 timing
0: Normal 1: Change
bit 6 :
Not used. Set to "0".
bit 5-4 : vfct Jitter compensation pulse number
Suppress vibration by machine backlash when axis stops.
bit5,4=
00: Disable
01: 1 pulse
10: 2 pulse
11: 3 pulses
bit 3-0 :
Not used. Set to "0".
#13033 SP033 SFNC1 Spindle function 1
vfct

Select the spindle function.
A function is allocated to each bit.
Set this in hexadecimal format.
bit F-D : nfd5 Depth of Notch filter 5
Set the depth of Notch filter 5 (SP088).
bit F,E,D=
000: -
001: -18.1[dB]
010: -12.0[dB]
011: -8.5[dB]
100: -6.0[dB]
101: -4.1[dB]
110: -2.5[dB]
111: -1.2[dB]
bit C :
Not used. Set to "0".
bit B-9 : nfd4 Depth of Notch filter 4
Set the depth of Notch filter 4 (SP087).
bit B,A,9=
000: -
001: -18.1[dB]
010: -12.0[dB]
011: -8.5[dB]
100: -6.0[dB]
101: -4.1[dB]
110: -2.5[dB]
111: -1.2[dB]
bit 8 : pwm Current control
0: Standard current control 1: High frequency current control
bit 7-5 : nfd2 Depth of Notch filter 2
Set the depth of Notch filter 2 (SP046).
bit7,6,5=
000: -
001: -18.1[dB]
010: -12.0[dB]
011: -8.5[dB]
100: -6.0[dB]
101: -4.1[dB]
110: -2.5[dB]
111: -1.2[dB]
bit 4 : fhz3 Notch filter 3
0: Stop 1: Start (1125Hz)
#13034 SP034 SFNC2 Spindle function 2
fhz3

bit 3-1 : nfd1 Depth of Notch filter 1
Set the depth of Notch filter 1 (SP038).
bit3,2,1=
000: -
001: -18.1[dB]
010: -12.0[dB]
011: -8.5[dB]
100: -6.0[dB]
101: -4.1[dB]
110: -2.5[dB]
111: -1.2[dB]
bit 0 :
Not used. Set to "0".
Select the spindle function.
A function is allocated to each bit.
Set this in hexadecimal format.
bit F-D :
Not used. Set to "0".
bit C : shgn SHG control in interpolation mode
0: Stop 1: Start

When using the OMR-FF control, set to "0".
bit B :
Not used. Set to "0".
bit A : pyn Excitation rate selection in interpolation mode
0: Select Excitation rate 1 1: Select Excitation rate 2
bit 9 : vgn Speed loop gain set selection in interpolation mode
0: Select Set 1 1: Select Set 2
bit 8-7 :
Not used. Set to "0".
bit 6 : rtt_vgn Real-time tuning I in non-interpolation mode / speed gain adaptation stop
0: Stop 1: Start
bit 5-3 :
Not used. Set to "0".
bit 2 : pyin Excitation rate selection in non-interpolation mode
The excitation rate after the in-position can be selected.
0: Select Excitation rate 1 1: Select Excitation rate 2
bit 1 : vgin Speed loop gain set selection in non-interpolation mode
The speed loop gain set after the in-position can be selected.
0: Select Set 1 1: Select Set 2
bit 0 :
Not used. Set to "0".
(PR) #13035 SP035 SFNC3 Spindle function 3
pyin
vgin
rtt_vgn
vgn
pyn
shgn

Select the spindle function.
A function is allocated to each bit.
Set this in hexadecimal format.
bit F-8 :
Not used. Set to "0".
bit 7 : mksl Coil selection in spindle synchronization mode
0: Select the coil commanded during synchronization 1: Select high-speed coil
bit 6 : rtt_vgns Real-time tuning I in spindle synchronization mode / speed gain adaptation stop
0: Stop 1: Start
bit 5 :
Not used. Set to "0".
bit 4 : shgs SHG control in spindle synchronization mode
0: Stop 1: Start
When using the OMR-FF control, set to "0".
bit 3 :
Not used. Set to "0".
bit 2 : pys Excitation rate selection in spindle synchronization mode
0: Select Excitation rate 1 1: Select Excitation rate 2
bit 1 : vgs Speed loop gain set selection in spindle synchronization mode
0: Select Set 1 (SP005,SP006,SP007) 1: Select Set 2 (SP008,SP009,SP010)
bit 0 :
Not used. Set to "0".
Set the motor axis conversion total load inertia including motor itself in proportion to the motor inertia.
SV037(JL)=(Jm+Jl)/Jm100
Jm: Motor inertia
Jl: Motor axis conversion load inertia
---Setting range---
0 to 5000 (%)
Set the vibration frequency to suppress when machine vibration occurs.
(Enabled at 50 or more.)
When not using, set to "0".
Related parameters: SP034/bit3-1
---Setting range---
0 to 5000 (Hz)
Set this parameter when the lost motion compensation type2 timing does not match.
Adjust by increasing the value by 10 at a time.
---Setting range---
0 to 2000 (ms)
(PR) #13036 SP036 SFNC4 Spindle function 4
#13037 SP037 JL Load inertia scale
#13038 SP038 FHz1 Notch filter frequency 1
#13039 SP039 LMCD Lost motion compensation timing
vgs
pys
shgs
rtt_vgns
mksl

Set the non-sensitive band of the lost motion compensation in the feed forward control.
When "0" is set, 2/1000 is set. Adjust by increasing the value by 1/1000 at a time.
---Setting range---
-32768 to 32767 (1/1000)
Set this parameter with SP048(LMC1) only to vary the lost motion compensation amount depending on the
command directions.
Normally, set to "0".

---Setting range---
-1 to 200 (Short-time rated %)
Note that when SP227/bit2 is "1", the range will be -1 to 20000 (Short-time rated 0.01%).
Set this parameter with SP043(OVS1) only to vary the lost motion compensation amount depending on the command directions.
Normally, set to "0".
---Setting range---
-1 to 100 (Short-time rated %)
Note that when SP227/bit2 is "1", the range will be -1 to 10000 (Short-time rated 0.01%).
Set this parameter when overshooting occurs during positioning. This compensates the motor torque during positioning.
This is valid only when the overshooting compensation SP033 (SFNC1/ovs) is selected.
[Type 3 "When SP033/ bitB,A=11"]
Use this when performing overshoot compensation in the feed forward control during arc cutting mode.
Set the compensation amount based on the motor short-time rated current.
Increase the value in increments of 1% to find the value where overshooting ceases.
[To vary compensation amount depending on the direction]
When SV042 (OVS2) is "0", change the SP043 (OVS1) value in both +/- directions to compensate.
To change the compensation amount depending on the command direction, set this with SP042 (OVS2).
(SP043: + direction, SP042: - direction, However, the directions may be opposite depending on other set tings.)
When "-1" is set, the compensation will not be performed in the command direction.
---Setting range---
-1 to 100 (Short-time rated %)
Note that when SP227/bit2 is "1", the range will be -1 to 10000 (Short-time rated 0.01%).
Set the disturbance observer gain. The standard setting is "100".
To use the disturbance observer, also set SP037(JL), SP045(OBS1) and SP226/ bitE.
When not using, set to "0".
---Setting range---
0 to 500 (%)
Set the disturbance observer filter band.
Normally, set to "100".
To use the disturbance observer, also set SP037(JL), SP044(OBS2) and SP226/ bitE.
When not using, set to "0".
---Setting range---
0 to 1000 (rad/s)
#13040 SP040 LMCT Lost motion compensation non-sensitive band
#13041 SP041 LMC2 Lost motion compensation 2
#13042 SP042 OVS2 Overshooting compensation 2
#13043 SP043 OVS1 Overshooting compensation 1
#13044 SP044 OBS2 Disturbance observer gain
#13045 SP045 OBS1 Disturbance observer filter frequency

Set the vibration frequency to suppress when machine vibration occurs.
(Enabled at 50 or more.)
When not using, set to "0".
Related parameters: SP034/bit7-5
---Setting range---
0 to 5000 (Hz)
Set the inductive voltage compensation gain. Normally, set to "100".
Lower the gain when the current FB peak exceeds the current command peak.
---Setting range---
0 to 200 (%)
Set this parameter when the protrusion (that occurs due to the non-sensitive band by friction, torsion, back lash, etc.) at quadrant change is too large.
This sets the compensation torque at quadrant change (when an axis feed direction is reversed) by Short time rated %.
Whether to enable the lost motion compensation and the method can be set with other parameters.
[Type 2 "When SP033/bit9,8=10"]
Set the compensation amount based on the motor short-time rated current.
The standard setting is double of the friction torque. The compensation amount will be 0 when "0" is set.
Related parameters: SP033/bit9-8, SP039, SP040, SP041, SP227/bit2
[To vary compensation amount depending on the direction]
When SP041 (LMC2) is "0", change SP048 (LMC1) value in both of +/- directions to compensate.
To vary the compensation amount depending on the command direction, set this with SP041 (LMC2).
(SP048: + direction, SP041: - direction, However, the directions may be opposite depending on other set tings.)
When "-1" is set, the compensation will not be performed in the command direction.
---Setting range---
-1 to 200 (Short-time rated %)
Note that when SP227/bit2 is "1", the range will be -1 to 20000 (Short-time rated 0.01%).
When a relative error in the synchronous control is too large, set this parameter to the axis that is delaying.
The standard setting is "0". The standard setting in the SHG control is "50".
Adjust relative errors in acceleration/deceleration by increasing the value by 50.
---Setting range---
0 to 999 (%)
Set the imbalance torque.
---Setting range---
-100 to 100 (Short-time rated %)
Set the control time constant in dual feed back.
When the function is valid, the standard setting is "100". When "0" is set, the value is 1 ms.
When the time constant is increased, the operation will get closer to the semi-closed control and the limit of the position loop gain will be raised.
However, this cannot be used when the spindle slip occurs in machine configuration such as V-belt drive.
Related parameters: SP017/bit1, SP052
---Setting range---
0 to 9999 (ms)
#13046 SP046 FHz2 Notch filter frequency 2
#13047 SP047 EC Inductive voltage compensation gain
#13048 SP048 LMC1 Lost motion compensation 1

#13049 SP049 FFC Acceleration rate feed forward gain
#13050 SP050 TOF Torque offset
#13051 SP051 DFBT Dual feed back control time constant

Set the non-sensitive band in the dual feedback control.
Normally set to "0".
Related parameters: SP017/bit1, SP051
---Setting range---
0 to 9999 (1/1000)
Set the excessive error detection width in non-interpolation mode.
Standard setting value: ODS = Maximum motor speed [r/min] 6/PGV/2
When set to "0", the excessive error detection will not be performed.
---Setting range---
0 to 32767 ()
Set the overrun detection width in the full-closed loop control.
When the gap between the motor side encoder and the machine side encoder exceeds the set value, it is judged as an overrun and "Alarm 43" is detected.
When "-1" is set, if the differential velocity between the motor side encoder and the machine side encoder exceeds the 30% of the maximum motor speed, it will be judged as overrun and "Alarm 43" will be detected.
When "0" is set, overrun will be detected with 2.
In the full-closed loop control, normally set this parameter to "360". During V-belt drive, set to "-1".
---Setting range---
-1 to 32767 ()
Set the time required to forcibly execute READY OFF after the emergency stop is input.
Normally set to "5000".
When 5000ms or more is set for deceleration time constant at emergency stop(SP056), set the same value as SP056.
When using the power backup system (MDS-D/DH-PFU) and setting the value of this parameter to 5000ms or more, a communication error between NC and drive unit may occur when power restarts after a instanta neous power interrupt.
It is not a problem so turn the NC power ON again to start up.
When "0" is set, 7000ms is the actual value to be set.

Related parameters: SP056, SP230
---Setting range---
0 to 29900 (ms)
Set the time constant used for the deceleration control at emergency stop. Set the time required to stop from the maximum motor speed (TSP).
When "0" is set, the deceleration control is executed with "7000ms".
Related parameters: SP055, SP230
---Setting range---
0 to 29900 (ms)
Set the number of gear teeth on the spindle side when "the gear selection command (control input 4/bit6, 5)" is set to "00".
---Setting range---
1 to 32767
Set the number of gear teeth on the spindle side when "the gear selection command (control input 4/bit6, 5)" is set to "01".
---Setting range---
1 to 32767
#13052 SP052 DFBN Dual feedback control non-sensitive band
#13053 SP053 ODS Excessive error detection width (non-interpolation mode)
#13054 SP054 ORE Overrun detection width in closed loop control
#13055 SP055 EMGx Max. gate off delay time after emergency stop
#13056 SP056 EMGt Deceleration time constant at emergency stop
(PR) #13057 SP057 GRA1 Spindle side gear ratio 1
(PR) #13058 SP058 GRA2 Spindle side gear ratio 2

Set the number of gear teeth on the spindle side when "the gear selection command (control input 4/bit6, 5)" is set to "10".
---Setting range---
1 to 32767
Set the number of gear teeth on the spindle side when "the gear selection command (control input 4/bit6, 5)" is set to "11".
---Setting range---
1 to 32767
Set the number of gear teeth on the motor side when "the gear selection command (control input 4/bit6, 5)" is set to "00".
---Setting range---
1 to 32767
Set the number of gear teeth on the motor side when "the gear selection command (control input 4/bit6, 5)" is set to "01".
---Setting range---
1 to 32767
Set the number of gear teeth on the motor side when "the gear selection command (control input 4/bit6, 5)" is set to "10".
---Setting range---
1 to 32767
Set the number of gear teeth on the motor side when "the gear selection command (control input 4/bit6, 5)" is set to "11".
---Setting range---
1 to 32767
Set the torque limit value when the torque limit (spindle control input 1/bitA, 9, 8) is set to "001" (TL3, TL2, TL1 = 001).

---Setting range---
0 to 999 (Short-time rated %)
Set the torque limit value when the torque limit (spindle control input 1/bitA, 9, 8) is set to "010" (TL3, TL2,
TL1 = 010).
---Setting range---
0 to 999 (Short-time rated %)
Set the torque limit value when the torque limit (spindle control input 1/bitA, 9, 8) is set to "011" (TL3, TL2,
TL1 = 011).
---Setting range---
0 to 999 (Short-time rated %)
Set the torque limit value when the torque limit (spindle control input 1/bitA, 9, 8) is set to "100" (TL3, TL2,
TL1 = 100).
---Setting range---
0 to 999 (Short-time rated %)
(PR) #13059 SP059 GRA3 Spindle side gear ratio 3
(PR) #13060 SP060 GRA4 Spindle side gear ratio 4
(PR) #13061 SP061 GRB1 Motor side gear ratio 1
(PR) #13062 SP062 GRB2 Motor side gear ratio 2
(PR) #13063 SP063 GRB3 Motor side gear ratio 3
(PR) #13064 SP064 GRB4 Motor side gear ratio 4
#13065 SP065 TLM1 Torque limit 1
#13066 SP066 TLM2 Torque limit 2
#13067 SP067 TLM3 Torque limit 3
#13068 SP068 TLM4 Torque limit 4

Set the single-rotation position alignment completion width for phase alignment and changing from non-in terpolation to spindle synchronization mode during rotation.
Set the rotation error that is required to the machine.
When the setting value decreases, the rotation error will decrease, but the cycle time (settling time) will get
longer. The standard setting is "875".
---Setting range---
0 to 32767 (1/1000)
Set the scale for SP016 (DDT) to change the deceleration rate only during rotation command (command F
T 0).
When the setting value increases, the single-rotation position alignment will be completed faster, but the im pact to the machine will also increase. When not using, set to "0".
---Setting range---
0 to 255 (1/16-fold)
Set this parameter to adjust the deceleration time by changing the current limit value during deceleration de pending on the motor speed.
As shown below, set the lower limit rate of the current limit in SP071 (DIQM), and use with SP072 (DIQN).
When DIQM is set to 100%, the standard current limit value in deceleration (SP152) is applied.
---Setting range---
0 to 999 (%)
Set this parameter to adjust the deceleration time by changing the current limit value during deceleration de pending on the motor speed.
As shown below, set the lower limit rate of the current limit in SP071 (DIQM), and use with SP072 (DIQN).
When DIQM is set to 100%, the standard current limit value in deceleration (SP152) is applied.
---Setting range---
1 to 32767 (r/min)
#13069 SP069 PCMP Phase alignment completion width
#13070 SP070 KDDT Phase alignment deceleration rate scale
#13071 SP071 DIQM Variable current limit during deceleration, lower limit
value
#13072 SP072 DIQN Variable current limit during deceleration, break point
speed
0 DIQN
DIQM
100%
SP152
Motor speed
0 DIQN
DIQM
100%
SP152
Motor speed

If noise is bothersome during high speed rotation, it may be reduced by lowering the speed loop gain at high
speed.
Set this value to ensure the adequate response by suppressing noise and vibration at low speeds and in creasing the speed loop gain at high speeds for a high-speed spindle of machining center, etc.
As shown below, set the speed loop gain rate for the overspeed detection speed in SP073 (VGVN), and use
with SP074 (VGVS).
When not using, set to "0".
This function can be used when either Speed loop gain set 1 or Speed loop gain set 2 is selected.
---Setting range---
0 to 999 (%)
If noise is bothersome during high speed rotation, it may be reduced by lowering the speed loop gain at high
speed.
Set this value to ensure the adequate response by suppressing noise and vibration at low speeds and in creasing the speed loop gain at high speeds for a high-speed spindle of machining center, etc.
As shown below, set the speed loop gain rate for the overspeed detection speed in SP073 (VGVN), and use
with SP074 (VGVS).
When not using, set to "0".
This function can be used when either Speed loop gain set 1 or Speed loop gain set 2 is selected.
---Setting range---
0 to 32767 (r/min)
Set the slip frequency scale during deceleration.
Normally, set to "0". (For Mitsubishi Electric adjustment)
---Setting range---

0 to 255 (1/16-fold)
#13073 SP073 VGVN Variable speed gain target value
#13074 SP074 VGVS Variable speed gain change start speed
#13075 SP075 DWSH Slip compensation scale during regeneration high speed coil
VGVN
(SP073)
<100
VGVS
(SP074)
100
VGVN
(SP073)
>100
VGVS
(SP074)
100
Scale[%] Scale[%]
Motor speed
[r/min]
When lowering the speed loop gain at high speed When increasing the speed loop gain at high speed
Motor speed
[r/min] VLMT
(Motor limitation speed)
VLMT
(Motor limitation speed)
VGVN
(SP073)
<100
VGVS
(SP074)
100
VGVN
(SP073)
>100
VGVS
(SP074)
100
Scale[%] Scale[%]
Motor speed
[r/min]
When lowering the speed loop gain at high speed When increasing the speed loop gain at high speed
Motor speed
[r/min] VLMT
(Motor limitation speed)
VLMT
(Motor limitation speed)

Set the slip frequency scale at deceleration when using the low-speed coil.
Normally, set to "0". (For Mitsubishi Electric adjustment)
---Setting range---
0 to 255 (1/16-fold)
Set the current loop gain.
To use the coil switch function, set the current loop gain for when the high-speed coil is selected.
The setting value is determined by the motor's electrical characteristics so that the value is fixed to each mo tor used.
Set the value given in the spindle parameter list. (For Mitsubishi Electric adjustment)
---Setting range---
1 to 20480
Set the current loop gain.
To use the coil switch function, set the current loop gain for when the high-speed coil is selected.
The setting value is determined by the motor's electrical characteristics so that the value is fixed to each mo tor used.
Set the value given in the spindle parameter list. (For Mitsubishi Electric adjustment)
---Setting range---
1 to 20480
Set the current loop gain.
To use the coil switch function, set the current loop gain for when the high-speed coil is selected.
The setting value is determined by the motor's electrical characteristics so that the value is fixed to each mo tor used.
Set the value given in the spindle parameter list. (For Mitsubishi Electric adjustment)
---Setting range---
1 to 8192
Set the current loop gain.
To use the coil switch function, set the current loop gain for when the high-speed coil is selected.
The setting value is determined by the motor's electrical characteristics so that the value is fixed to each mo tor used.
Set the value given in the spindle parameter list. (For Mitsubishi Electric adjustment)
---Setting range---
1 to 8192
When using coil switch function, set the current loop gain for when the low-speed coil is selected.
The setting value is determined by the motor's electrical characteristics so that the value is fixed to each mo tor used.
Set the value given in the spindle parameter list. (For Mitsubishi Electric adjustment)
---Setting range---
1 to 20480
When using coil switch function, set the current loop gain for when the low-speed coil is selected.
The setting value is determined by the motor's electrical characteristics so that the value is fixed to each mo tor used.
Set the value given in the spindle parameter list. (For Mitsubishi Electric adjustment)
---Setting range---
1 to 20480
#13076 SP076 DWSL Slip compensation scale during regeneration low speed coil

#13077 SP077 IQA Q axis current lead compensation
#13078 SP078 IDA D axis current lead compensation
#13079 SP079 IQG Q axis current gain
#13080 SP080 IDG D axis current gain
#13081 SP081 IQAL Q axis current lead compensation low-speed coil
#13082 SP082 IDAL D axis current lead compensation low-speed coil

When using coil switch function, set the current loop gain for when the low-speed coil is selected.
The setting value is determined by the motor's electrical characteristics so that the value is fixed to each mo tor used.
Set the value given in the spindle parameter list. (For Mitsubishi Electric adjustment)
---Setting range---
1 to 8192
When using coil switch function, set the current loop gain for when the low-speed coil is selected.
The setting value is determined by the motor's electrical characteristics so that the value is fixed to each mo tor used.
Set the value given in the spindle parameter list. (For Mitsubishi Electric adjustment)
---Setting range---
1 to 8192
Not used. Set to "0".
Not used. Set to "0".
Set the vibration frequency to suppress when machine vibration occurs.
(Enabled at 50 or more.)
When not using, set to "0".
Related parameters: SP034/bitB-9
---Setting range---
0 to 5000 (Hz)
Set the vibration frequency to suppress when machine vibration occurs.
(Enabled at 50 or more.)
When not using, set to "0".
Related parameters: SP034/bitF-D
---Setting range---
0 to 5000 (Hz)
Set the magnification of the torque current stabilizing gain. (For Mitsubishi Electric adjustment)
When set to "0", the torque current stabilization is disabled.
When not using, set to "0".
---Setting range---
0 to 32767
Set the magnification of the excitation current stabilizing gain. (For Mitsubishi Electric adjustment)
When set to "0", the excitation current stabilization is disabled.
When not using, set to "0".
---Setting range---
0 to 32767
Not used. Set to "0".
Not used. Set to "0".
Not used. Set to "0".
#13083 SP083 IQGL Q axis current gain low-speed coil
#13084 SP084 IDGL D axis current gain low-speed coil
#13085 SP085
#13086 SP086
#13087 SP087 FHz4 Notch filter frequency 4
#13088 SP088 FHz5 Notch filter frequency 5
#13089 SP089 TMKQ Spindle output stabilizing gain Q axis
#13090 SP090 TMKD Spindle output stabilizing gain D axis
#13091 SP091
#13092 SP092
#13093 SP093

In the magnetic pole position detection function, the command motor speed and motor speed during the po sition command stop are monitored.
Set the command motor speed level and motor speed level during the position command stop in "r/min" unit.
When the command motor speed level is set to "0", the magnetic pole position error is detected at 10r/min.
Set to "10" as a standard setting when the magnetic pole position error detection function is enabled.
This detects the magnetic pole position error when the motor speed is "100r/min".
Ten-thousands digit, Thousands digit ---------- Command motor speed level (10r/min)
Hundreds digit, Tens digit, Ones digit ---------- Motor speed level (10r/min)
---Setting range---
0 to 31999
Set the magnification against delay/lead compensation (SP006) of the high-response acceleration/deceler ation (valid when SP226/ bitD is set to "1").
Normally, set to "0". Set this parameter to suppress overshooting when the speed is reached.
---Setting range---
0 to 10000 (0.01%)
When the spindle slows down due to multiple cutting, set the processable speed as percentage against the
NC command speed.
If the speed reduces below the tolerable range, the alarm 23 (Excessive speed error) will occur.
(E.g.) When set to 90 [%]
If S1000 is commanded, the speed reduced by 900r/min (=1000r/min 90%) is the allowable lower limit.
Thus if the spindle speed reduces to 100r/min or below, the alarm will occur.
When "0" is set, the magnification is the same as when "85" is set. When set to "-1", the allowable width will
be disabled.
---Setting range---
-1,0 to 100 (%)
When setting the machine side encoder resolution in pulse (p) unit, set the number of pulses to four bite data
of SP097 (high-order) and SP019 (low-order) in pulse (p) unit.
When SP097=0, the setting unit of SP019 is (kp).
Refer to SP019 for details.
Related parameters: SP019, SP020, SP098

---Setting range---
-1 to 32767
When setting the motor side encoder resolution in pulse (p) unit, set the number of pulses to four bite data of SP098 (high-order) and SP020 (low-order) in pulse (p) unit.
When SP098=0, the setting unit of SP020 is (kp).
Refer to SP020 for details.
Related parameters: SP019, SP020, SP097
---Setting range---
-1 to 32767
Not used. Set to "0".
#13094 SP094 MPV Magnetic pole error detection speed
#13095 SP095 VIAX Lead compensation scale during high-response accel eration/deceleration
#13096 SP096 SDW Speed slowdown allowable width
#13097 SP097 RNG1ex Extension sub side encoder resolution
#13098 SP098 RNG2ex Extension main side encoder resolution
#13099-
13105
SP099-SP105

Set the scale model gain (position response) in OMR-FF control.
Set the same value as SV002(PGN).
Increase the setting value to perform a high-speed machining such as a fine arc or to improve the path error.
Lower the value when vibration occurs during acceleration/deceleration.
Set to "0" when not using OMR-FF control.
---Setting range---
0 to 300 (rad/s)
Not used. Set to "0".
Set the current feed forward rate in OMR-FF control.
The standard setting is "10000".
Setting value of 0 is equal to "10000(100%)" setting.
Set to "0" when not using OMR-FF control.
---Setting range---
0 to 32767 (0.01%)
Set the current command value for when the open loop control is enabled.
When "0" is set, the state will be the same as when "50" is set.
When not using, set to "0".
The open loop control is enabled when "SP018/bit1" is set to "1".
---Setting range---
0 to 999 (Short-time rated %)
Set the time required to cut off the gate when turning OFF/ON the coil switch contactor.
The value should be longer than the coil switch contactor's OFF/ON time.
The standard setting is "150".
---Setting range---
0 to 3500 (ms)
Set the time required to limit the current immediately after the coil switch contactor ON/OFF is completed and the gate is turned ON.
The standard setting is "250".
---Setting range---
0 to 3500 (ms)
Set the time required to limit the current immediately after the coil switch contactor ON/OFF is completed and the gate is turned ON.
The standard setting is "120".
---Setting range---
0 to 999 (Short-time rated %)
Set the time to detect the speed excessive error alarm.
Set the time required to the machine.
The standard setting is "12".
---Setting range---
0 to 60 (s)
#13106 SP106 PGM OMR-FF scale model gain
#13107-
13111
SP107-SP111
#13112 SP112 IFF OMR-FF current feed forward gain
#13113 SP113 OPLP Current command value for open loop
#13114 SP114 MKT Coil changeover gate cutoff timer
#13115 SP115 MKT2 Coil changeover current limit timer
#13116 SP116 MKIL Coil changeover current limit value
#13117 SP117 SETM Excessive speed deviation timer

Set the magnetic pole shift amount of IPM spindle motor.
During DC excitation of the initial setup: Set the same value displayed in the "AFLT gain" on the NC monitor screen in SP225/bit4=1.
When not using, set to "0".
---Setting range---
-18000 to 18000 (electrical angle 0.01)
Not used. Set to "0".
Not used. Set to "0".
Set the position loop gain in the magnetic polar detection loop.
This is used in the initial magnetic polar detection when the IPM spindle motor is turned ON.
Set to "0" when using an IM spindle motor.
---Setting range---
0 to 32767
Set the speed loop gain in the magnetic polar detection loop.

This is used in the initial magnetic polar detection when the IPM spindle motor is turned ON.
Set to "0" when using an IM spindle motor.
---Setting range---
0 to 32767
Set the speed loop lead compensation in the magnetic polar detection loop.
This is used in the initial magnetic polar detection when the IPM spindle motor is turned ON.
Set to "0" when using an IM spindle motor.
---Setting range---
0 to 32767
Set the current limit value for the magnetic polar detection loop.
This is used in the initial magnetic polar detection when the IPM spindle motor is turned ON.
Set to "0" when using an IM spindle motor.
---Setting range---
0 to 999 (Short-time rated %)
Input the desired data number to D/A output channel.
When using the 2-axis drive unit, set "-1" to the axis that the data will not be output.
When the DC excitation is running:
Use in the DC excitation function.
DC excitation: Set the initial excitation level when SP225/bit4=1.
When "0" is set, the state will be the same as when "20" is set.
---Setting range---
-32768 to 32767
Input the desired data number to D/A output channel.
When using the 2-axis drive unit, set "-1" to the axis that the data will not be output.
When the DC excitation is running:
Use in the DC excitation function.
DC excitation: Set the final excitation level when SP225/bit4=1.
When "0" is set, the state will be the same as when "50" is set.
---Setting range---
-32768 to 32767
(PR) #13118 SP118 MSFT Magnetic pole shift amount
#13119 SP119
#13120 SP120
#13121 SP121 MP Kpp Magnetic pole detection position loop gain
#13122 SP122 MP Kvp Magnetic pole detection speed loop gain
#13123 SP123 MP Kvi Magnetic pole detection speed loop lead compensation
#13124 SP124 ILMTsp Magnetic pole detection current limit value
#13125 SP125 DA1NO D/A output ch1 data No. / Initial DC excitation level
#13126 SP126 DA2NO D/A output ch2 data No. / Final DC excitation level

Set the output scale in increments of 1/100.
When "0" is set, the scale is the same as when "100" is set.
When the DC excitation is running:
Use in the DC excitation function.
DC excitation: Set the initial excitation time when SP225/bit4=1.
When "0" is set, the state will be the same as when "10000" is set.
---Setting range---
-32768 to 32767 (1/100-fold)
Set the output scale in increments of 1/100.
When "0" is set, the scale is the same as when "100" is set.
---Setting range---
-32768 to 32767 (1/100-fold)
Set the unique constants for the spindle motor. (High-speed coil)
The setting value is determined by the motor's mechanical and electrical characteristics and specifications,
so normally set the value given in the spindle parameter list.
Set the unique constants for the spindle motor. (High-speed coil)
The setting value is determined by the motor's mechanical and electrical characteristics and specifications,
so normally set the value given in the spindle parameter list.
For IPM spindle motor
This parameter is used in initial magnetic pole detection of IPM spindle motor.
(1) Pulse application time: Set it in [s] unit.(0 < application time < 350)
(2) Pulse application coil: To select a low-speed coil, add 1000 to the pulse application time.
(3) Polarity of estimated magnetic pole: When it is set to the reverse polarity, add "-" to the total of (1) and (2).
E.g.: When performing 333s pulse-applied magnetic pole estimation in a low-speed coil and selecting the
reverse polarity for the estimated polarity
SP142 = -(333+1000) = -1333
Set the unique constants for the spindle motor. (High-speed coil)
The setting value is determined by the motor's mechanical and electrical characteristics and specifications,
so normally set the value given in the spindle parameter list.
Set the unique constants for the spindle motor. (Low-speed coil)
The setting value is determined by the motor's mechanical and electrical characteristics and specifications,
so normally set the value given in the spindle parameter list.
Set the standard output to be displayed as 100% in load meter using the short-time rated output ratio.
To display the continuous rated output as 100%, set as follows.
Continuous rated output/Short-time rated output 100
When "0" is set, the standard output to be displayed as 100% in load meter will be the short-time rated output.
(Note) When several output characteristics such as 15-minute rating and 30-minute rating are plotted on the
characteristics figure, set the change magnification for the characteristic with the highest rated output.
---Setting range---
0 to 100 (%)
#13127 SP127 DA1MPY D/A output ch1 output scale / Initial DC excitation time
#13128 SP128 DA2MPY D/A output ch2 output scale
(PR) #13129-
13141
SP129-SP141
(PR) #13142 SP142

(PR) #13143-
13160
SP143-SP160
(PR) #13161-
13192
SP161-SP192
#13193 SP193 LMR Change magnification for load meter standard output
(High-speed coil)

Set the base speed of the standard output to be displayed as 100% in load meter.
To display the continuous rated output as 100%, set the base speed of the continuous rated output as fol lows.
When "0" is set, the base speed of the short-time rated output will be applied.
(Note) When the speed is less than the base speed, the standard output to be displayed as 100% in load
meter changes with the motor speed.
---Setting range---
0 to 32767 (r/min)
Set the standard output to be displayed as 100% in load meter using the short-time rated output ratio.
To display the continuous rated output as 100%, set as follows.
Continuous rated output/Short-time rated output 100
When "0" is set, the standard output to be displayed as 100% in load meter will be the short-time rated output.
(Note) When several output characteristics such as 15-minute rating and 30-minute rating are plotted on the
characteristics figure, set the change magnification for the characteristic with the highest rated output.
---Setting range---
0 to 100 (%)
#13194 SP194 LMN Base speed for load meter standard output (High-speed
coil)
#13195 SP195 LMRL Change magnification for load meter standard output
(Low-speed coil)
SP194
(LMN)
(kW)
Base speed of short-time (r/min)
rated output
Output
Speed
Short-time rated output
Continuous rated output

Set the base speed of the standard output to be displayed as 100% in load meter.
To display the continuous rated output as 100%, set the base speed of the continuous rated output as fol lows.
When "0" is set, the base speed of the short-time rated output will be applied.
(Note) When the speed is less than the base speed, the standard output to be displayed as 100% in load
meter changes with the motor speed.
---Setting range---
0 to 32767 (r/min)
Not used. Set to "0".
#13196 SP196 LMNL Base speed for load meter standard output (Low-speed
coil)
#13197-
13198
SP197-SP198
SP196
(LMNL)
(kW)
Base speed of short-time (r/min)
rated output
Output
Speed
Short-time rated output
Continuous rated output

In case that machine resonance is induced when mounting a workpiece, the speed loop gain is switched au tomatically in response to inertia by setting the speed loop gain and workpiece inertia multiplier in advance.
The speed loop gain SP199(RTGM) changes in response to the estimated inertia ratio SP200(RTJX) based
on the speed loop gain SP005(VGN1) and the inertia multiplier SP037(JL) which were adjusted when no
workpiece was mounted.
When SP199 is set to "0", the adaptation of the speed loop gain will be disabled.
Related parameters: SP005, SP037, SP200
---Setting range---
0 to 5000 (%)
In case that machine resonance is induced when mounting a workpiece, the speed loop gain is switched au tomatically in response to inertia by setting the speed loop gain and workpiece inertia multiplier in advance.
The speed loop gain SP199(RTGM) changes in response to the estimated inertia ratio SP200(RTJX) based
on the speed loop gain SP005(VGN1) and the inertia multiplier SP037(JL) which were adjusted when no
workpiece was mounted.
When SP199 is set to "0", the adaptation of the speed loop gain will be disabled.
Related parameters: SP005, SP037, SP199
---Setting range---
0 to 32767 (%)
#13199 SP199 RTGM Real-time tuning: maximum adaptive gain multiplier
#13200 SP200 RTJX Real-time tuning: maximum adaptive inertia ratio

RTGM
(SP199)

JL
(SP037)
RTJX
(SP200)
VGN1
(SP005)
Speed control gain multiplier [%]
Estimated inertia ratio [%]

RTGM
(SP199)
JL
(SP037)
RTJX
(SP200)
VGN1
(SP005)
Speed control gain multiplier [%]
Estimated inertia ratio [%]

Not used. Set to "0".
Select the spindle functions.
Functions are allocated to each bit.
Set this in hexadecimal format.
bit F-C: ovsn Overshooting compensation type 3 non-sensitive band
Set the non-sensitive band of the overshooting compensation type 3 in increments of 2/1000.
In the feed forward control, set the non-sensitive band for the model position droop and ignore the model
overshooting. Set to "2/1000" as a standard.
bit B-9:
Not used. Set to "0".
bit 8: mken Coil switch allowance in deceleration control
This enables a coil changeover while decelerating after an emergency stop for a spindle motor with coil
changeover specification. A coil changeover may enable an excessive load inertia to stop within the maxi mum delay time.
0: Normal (Disable)
1: Enable
bit 7-6: thno
Select the thermistor characteristics.
When SP225/bit3=0 (N type) is selected
bit7,6=
00: For Mitsubishi Electric spindle motor
01: For Mitsubishi Electric spindle motor
10: PT3-51F
11: Setting prohibited
When SP225/bit3=1 (P type) is selected
bit7,6=
00: KTY84-130 (Manufactured by Philips)
01: Setting prohibited
10: Pt1000 (Platinum resistance temperature detector)
11: Setting prohibited
bit 5: ddir Proximity switch signal enable edge
0: Falling edge 1: Rising edge
bit 4: dcd DC excitation mode
0: Normal 1: Start
bit 3: thtyp
Select the thermistor type.
0: Type N thermistor (Mitsubishi Electric standard)
1: Type P thermistor or platinum resistance temperature detector
bit 2: mohn Thermistor temperature detection
0: Normal 1: Disable (Except for TS5690/5691)
bit 1-0:
Not used. Set to "0".
#13201-
13224
SP201-SP224
#13225 SP225 SFNC5 Spindle function 5
ddir
ovsn
dcd
mohn
mken
thtyp
thno

Select the spindle functions.
Functions are allocated to each bit.
Set this in hexadecimal format.
bit F :
Not used. Set to "0".
bit E : obs Disturbance observer
0: Normal 1: Enable
bit D : vup High response acceleration / deceleration
This suppresses a temporal delay which occurs when the target speed is attained from acceleration and
when the spindle stops from deceleration.
0: Normal acceleration/deceleration 1: High response acceleration/deceleration Enable

bit C : tqof Spindle output stabilization during acceleration
0: Normal 1: Disable
bit B-9 :
Not used. Set to "0".
bit 8 : r2c Temperature compensation adjustment indicator
0: Normal 1: Display
bit 7 :
Not used. Set to "0".
bit 6 : stod 4D-2 detection disabled during deceleration and stop
0: Normal 1: Alarm 4D-2 detection disabled during deceleration and stop
bit 5 : pon IPM spindle pulse application magnetic pole estimation
0: Normal 1: Enable
bit 4 :
Not used. Set to "0".
bit 3 : dd2 High-speed synchronous tapping 2
0: Normal 1: Enable
bit 2-0 :
Not used. Set to "0".
#13226 SP226 SFNC6 Spindle function 6
r2c
tqof
pon
stod
dd2
vup
obs

Select the spindle functions.
Functions are allocated to each bit.
Set this in hexadecimal format.
bit F-C : dis Digital signal input selection
0: No signal
4: Proximity switch signal detection
Other settings: setting prohibited
bit B-A : dos3 Digital signal output 3 selection (MDS-EJ-SP/SP2)
bitB,A=
00: Disable
01: Setting prohibited
10: Contactor control signal output
11: Setting prohibited
bit 9-3 :
Not used. Set to "0".
bit 2 : ccu Lost motion/overshoot compensation compensation amount setting unit
0: Short-time rated % 1: Short-time rated 0.01%
bit 1-0 :
Not used. Set to "0".
Not used. Set to "0000".
#13227 SP227 SFNC7 Spindle function 7
#13228 SP228 SFNC8 Spindle function 8
ccu
dos3
dis

Select the spindle functions.
Functions are allocated to each bit.
Set this in hexadecimal format.
bit F-E :
Not used. Set to "0".
bit D : rps Safely limited speed setting unit
0: Normal 1: 100/min
bit C : sdt2 Specified speed output digital signal 2 output
0: Normal 1: Enable
bit B-9 :
Not used. Set to "0".
bit 8 : sto Dedicated wiring STO function
Set this parameter to use dedicated wiring STO function.
0: Dedicated wiring STO function unused 1: Dedicated wiring STO function used
(Only for MDS-E/EH and MDS-EJ/EJH)
bit 7-1 :
Not used. Set to "0".
bit 0 : omrffon OMR-FF control enabled
0: Disable 1: Enable
Select the spindle functions.
Functions are allocated to each bit.
Set this in hexadecimal format.
bit F-C :
Not used. Set to "0".
bit B : pfdsr
Set the spindle stop operation at a power failure when the deceleration and stop function at power failure is enabled.
Normal (Coast to a stop at power failure) : 0
Deceleration and stop at power failure : 1
bit A-9 :
Not used. Set to "0".

bit 8 : nohis History of communication error alarm between NC and DRV(34,36,38,39)
0: Enable 1: Disable
bit 7 : cse Spindle C axis command speed monitoring function
0: Normal setting (function disabled) 1: Function enabled
bit 6-0 :
Not used. Set to "0".
Related parameters: SP055, SP056
#13229 SP229 SFNC9 Spindle function 9
#13230 SP230 SFNC10 Spindle function 10
sdt2
rps
sto
omrffon
cse
nohis
pfdsr

bit 3-0 : Sensitivity of estimated resonance frequency
Set the sensitivity of the estimated resonance frequency.
Smaller setting value enables to detect smaller vibration component
0: Normal setting 1: Sensitivity high to F: Sensitivity low.
Not used. Set to "0000".
When 100% is set, the voltage equivalent to the logical non-energized time will be compensated.
When "0" is set, 100% compensation will be performed.
Adjust in increments of 10% from the default value 100%.
If the value is too large, vibration or vibration noise may be generated.
---Setting range---
0 to 255 (%)
Not used. Set to "0".
Set the magnification in converting the thermistor temperature to the control compensation amount.
When "0" is set, the temperature compensation function is disabled.
When not using, or when using an IPM spindle motor, set to "0".
---Setting range---
0 to 400 (%)
Set the delay time constant from the thermistor temperature to the control compensation amount.
When "0" is set, the delay time constant is disabled.
When not using, or when using an IPM spindle motor, set to "0".
---Setting range---
0 to 150 (min)
Set the filter for the torque command.
The standard value is "500".
---Setting range---
0 to 5000 (rad/s)
Set the safely limited speed at the spindle end for the SLS (Safely Limited Speed) function.
When not using, set to "0".
---Setting range---
0 to 18000 (/min)
However, when SP229/bitD is set to "1", the setting range is from -32768 to 32767 (100/min).
#13231 SP231
#13232 SP232
#13233 SP233 IVC Voltage non-sensitive band compensation
#13234 SP234
(PR) #13235 SP235 R2H Temperature compensation gain
(PR) #13236 SP236 WIH Temperature compensation time constant
(PR) #13237 SP237 TCF Torque command filter
#13238 SP238 SSCFEED Safely limited speed

Set the motor's safely limited speed for the SLS (Safely Limited Speed) function.
When not using, set to "0".
---Setting range---
0 to 32767 (r/min)
(Note) The value of the safely limited speed and safely limited motor speed must satisfy the following relation.
If this relation is not satisfied, the parameter error (37 or E4) will occur. (Error parameter No. is 239.)
Checking this relation is executed when the drive unit is turned ON and parameter is changed and speed
observation mode (states when a speed observation command is turned ON) is entered.
Note that "1 (r/min)" is applied when the calculation result is "0 (r/min)"
Not used. Set to "0".
This is automatically set by the NC system.
#13239 SP239 SSCRPM Safely limited motor speed
(PR) #13240 SP240
(PR) #13241-
13256
SP241-SP256
SP238 :SSCFEED
360
X = SP239 :SSCRPM
SP057 :GRA1
SP061 :GRB1

15.10 Spindle-type Servo Parameters
[Exclusive for spindle-mode servo motor]
bit0: Selection of position loop gain when C axis is selected

0: Use the position loop gain (#52203 SV003, #52204 SV004, #52257 SV057)
1: Use the spindle sync control position loop gain (#52249 SV049, #52250 SV050, #52258 SV058)
bit1: Selection of sync tap cycle position loop gain
0: Use the position loop gain (#52203 SV003, #52204 SV004, #52257 SV057)
1: Use the spindle sync control position loop gain (#52249 SV049, #52250 SV050, #52258 SV058)
---Setting range---
00 to FFFF (HEX)
[Exclusive for spindle-mode servo motor]
Specify the motor rotation speed at which zero speed detection is carried out. When the actual motor speed drops to the specified speed or below, the zero speed detection signal turns ON. The standard setting value is "50". When the setting value is "0", it is on the standard setting value.
---Setting range---
0 to 1000 (r/min)
[Exclusive for spindle-mode servo motor]
Specify the motor speed at which speed detection is carried out. When the actual motor speed drops to the specified speed or below, the speed detection signal turns ON. The standard setting value is 10% of the "#3001 slimt1" setting value. When the setting value is "0", it is on the standard setting value.
---Setting range---
0 to 32767(r/min)
[Exclusive for spindle-mode servo motor]
Specify the torque limit value to be applied when Torque limit (Control input 1/bitA,9,8)=001.
---Setting range---
0 to 999 (Short-time rated %)
[Exclusive for spindle-mode servo motor]
Specify the torque limit value to be applied when Torque limit (Control input 1/bitA,9,8)=010.
---Setting range---
0 to 999 (Short-time rated %)
[Exclusive for spindle-mode servo motor]
Specify the torque limit value to be applied when Torque limit (Control input 1/bitA,9,8)=011.
---Setting range---
0 to 999 (Short-time rated %)
The description and setting range for these parameters are the same as Servo parameters "#2201 SV001" to "#2456 SV256". Refer to "15.7 Servo Parameters" for details.
(Note) Set the same value to "#52203 SV003(PGN)" for the reference and synchronized spindles in spindle synchronization.
#52001 SVSPEC Spindle-mode servo: Specification
#52002 svzsp Spindle-mode servo: Motor zero speed
#52003 svsdts Spindle-mode servo: Speed detection set value
#52004 svtlm1 Spindle-mode servo: Torque limit 1
#52005 svtlm2 Spindle-mode servo: Torque limit 2
#52006 svtlm3 Spindle-mode servo: Torque limit 3
#52201-52456 SV001-SV256 Spindle-type Servo Parameters

15.11 Rotary Axis Configuration Parameters
Set the name of the horizontal axis in the orthogonal coordinate system.
Set "0" when horizontal axis is not used.
---Setting range---
A,B,C,U,V,W,X,Y,Z
Two digits between A to Z and 1 to 9
0: Mechanical axis specifications
Set the name of the vertical axis in the orthogonal coordinate system.
Set "0" when vertical axis is not used.
---Setting range---
A,B,C,U,V,W,X,Y,Z
Two digits between A to Z and 1 to 9
0: Mechanical axis specifications
Set the name of the height axis in the orthogonal coordinate system.
Set "0" when height axis is not used.
---Setting range---
A,B,C,U,V,W,X,Y,Z
Two digits between A to Z and 1 to 9
0: Mechanical axis specifications
Select the coordinate to preset when issuing an origin zero command (G92X_Y_Z_;).
0: Tool center coordinate
1: Holder center coordinate
Select whether to enable the tool handle feed.
0: Enable (tool handle feed)
1: Disable (standard)
Select how to update the display of tool axis travel amount.
0: Update at ABS switch OFF
1: Update at every ON and OFF of ABS switch
Select the movement after passing a singular point.
0: Type 1
A/B axis rotation angle will be in the same sign direction as that when the tool center point control started.
1: Type 2
C axis rotation amount on the singular point will be smaller.
Set the angle for judging a position near the singular point.
When "0.000" is set, it will operate as 1.000 ().
---Setting range---
0.000 to 5.000 ()
Select the coordinate system for the programming coordinate.
0: Table coordinate system (coordinate system that rotates together with workpiece)
1: Workpiece coordinate system
(PR) #7900 RCDAX_I Orthogonal coordinate horizontal axis name
(PR) #7901 RCDAX_J Orthogonal coordinate vertical axis name
(PR) #7902 RCDAX_K Orthogonal coordinate height axis name

#7903 G92_CRD Origin zero set coordinate selection
#7904 NO_TIP Tool handle feed function selection
#7905 NO_ABS Selection of tool axis travel amount display at manual
ABS switch ON/OFF
#7906 PASSTYP Singular point passage type
#7907 CHK_ANG Near singular judgment angle
#7908 SLCT_PRG_COORD Programming coordinate system selection

Select whether to enable the mirror image on the posture vector (IJK) when Type 2 is selected in "#7906
PASSTYP".
0: Disable
1: Enable
Select the interpolation method.
When combining spline interpolation 2 and tool center point control, only the joint interpolation method is val id.
0: Joint interpolation method
1: Single axis rotation interpolation method
Select the reference point of the rotary axis.
0: The workpiece coordinate origin
1: The position at the time when tool center point command is issued
(Note) Even if the position is changed, it is not changed during tool center point control. It is changed when
next tool center point control will be commanded.
Select whether to enable the 3-dimensional manual feed
0: Enable (3-dimensional manual feed)
1: Disable (standard manual feed)
Select whether to suppress the machine speed fluctuation due to rotary axis movement.
0: Not suppress
1: Suppress
(Note) This parameter is disabled when SSS control is enabled.
Set the time constant for rotary axis prefilter.
Setting this parameter can smoothen the tool angle change (rotary axis' motion) under tool center point con trol.
Possible to do this setting on [High-accuracy parameter] screen, which you can reach by going to [Setup]
Screen and selecting [User parameter].
When set to "0", "Rotary axis prefiltering" will be disabled.
---Setting range---
0 to 200 (ms)
Set the basic position of rotary axis to establish the feature coordinate system when inclined surface machin ing is commanded.
* The position will not change when inclined surface machining is running. It will change when the next in clined surface machining is commanded.
0: At zero degree
1: At the start position
Select the compensation method of rotation center error.
0: Compensation with orthogonal axis only.
1: Compensation with orthogonal and rotary axes.
#7909 IJK_VEC_MR Posture vector mirror image selection
#7910 SLCT_INT_MODE Interpolation method selection
#7911 SLCT_STANDARD_POS Reference position of rotary axis
#7912 NO_MANUAL Selection of 3-dimensional manual feed
#7913 MCHN_SPEED_CTRL Machine speed fluctuation suppression
#7914 ROT_PREFILT Rotary axis prefilter time constant
#7915 SLCT_SLOPE_CRD_MOD Rotary axis basic position in inclined surface machin ing
#7916 ROT_ERR_MODE Rotation center error compensation method

Specify in which order to rotate the rotary axes when the address Q is unspecified in G53.6 and when the
number of simultaneous contour control axes is limited to 4.
0: In the order of primary and secondary rotary axes
1: In the order of secondary and primary rotary axes
Select the solution that defines the calculated angle of the primary rotary axis when address P is omitted from
G53.1 or G53.6 command.
0: Default solution of each machine type
1: Solution that makes the primary rotary axis value positive
2: Solution that makes the primary rotary axis value negative
Select in which axis direction to rotate the base-side rotary axis of the rotary head. When the base-side rotary
axis is tilting, use the tens place to select the axis around which the rotary axis is tilted.
0: Invalid
1: I axis
2: J axis
3: K axis
1x: Tilted around I axis
2x: Tilted around J axis
3x: Tilted around K axis
(Note) A value from 0 to 99 can be set from the screen. However when an invalid value is set, the operation
error (M01 0127) occurs at the power ON.
---Setting range---
0 to 3
12, 13, 21, 23, 31, 32
Set the tilt angle if the base-side rotary axis of the rotary head is tilted. Set the angle with the CCW direction
of the tilted plane being defined as the positive direction.
---Setting range---
-89.999 to 89.999 ()
Set the name of the tool rotating type base-side rotary axis.
---Setting range---
A,B,C,U,V,W,X,Y,Z
Two digits between A to Z and 1 to 9
0: Mechanical axis specifications
Set the rotation direction of the tool rotating type base-side rotary axis.

The rotation direction specifications vary according to the setting of "#1450 5axis_Spec/bit3" (Select specifi cations of rotation direction parameter).
- When "#1450 5axis_Spec/bit3" = "0"
The specifications vary for each function.
- When "#1450 5axis_Spec/bit3" = "1"
The specifications are common to the functions.
0: When the tool motion viewed from the workpiece is in right-hand screw direction, it is taken as the pos itive direction.
1: When the tool motion viewed from the workpiece is in left-hand screw direction, it is taken as the positive direction.
(PR) #7917 SLCT_G53_6_ROTAX G53.6 rotary axes rotation order
#7918 SLCT_ROTAX_ANS Selection of solution for defining primary rotary axis an gle
(PR) #7920 SLCT_T1 Rotary axis selection
(PR) #7921 TIANGT1 Tilt angle
(PR) #7922 ROTAXT1 Rotary axis name
#7923 DIR_T1 Rotation direction

Set the distance in the horizontal axis direction between the rotation centers of the tool-side rotary axis and the base-side rotary axis.
---Setting range---
-99999.999 to 99999.999 (mm)
Set the distance in the vertical axis direction between the rotation centers of the tool-side rotary axis and the base-side rotary axis.
---Setting range---
-99999.999 to 99999.999 (mm)
Set the distance in the height axis direction between the rotation centers of the tool-side rotary axis and the base-side rotary axis.
---Setting range---
-99999.999 to 99999.999 (mm)
Set the position deviation in the horizontal axis direction of the tool rotating type base-side rotary axis rotation center. When tool rotating type base rotary axis is I axis rotation, set the position deviation of J axis rotation. When tool rotating type base rotary axis is J axis rotation, set the position deviation of K axis rotation. When tool rotating type base rotary axis is K axis rotation, set the position deviation of I axis rotation.
* Radius value is need to be set.
---Setting range---
-99999.999 to 99999.999 (mm)
(Follow as "#1006 mcmpunit" (Machine error compensation unit))
Set the position deviation in the vertical axis direction of the tool rotating type base-side rotary axis rotation center. When tool rotating type base rotary axis is I axis rotation, set the position deviation of K axis rotation. When tool rotating type base rotary axis is J axis rotation, set the position deviation of I axis rotation. When tool rotating type base rotary axis is K axis rotation, set the position deviation of J axis rotation.
* Radius value is need to be set.
---Setting range---
-99999.999 to 99999.999 (mm)
(Follow as "#1006 mcmpunit" (Machine error compensation unit))
Select in which axis direction to rotate the tool-side rotary axis of the rotary head. When the tool-side rotary axis is tilting, use the tens place to select the axis around which the rotary axis is tilted.
0: Invalid
1: I axis
2: J axis
3: K axis
1x: Tilted around I axis
2x: Tilted around J axis
3x: Tilted around K axis
(Note) A value from 0 to 99 can be set from the screen. However when an invalid value is set, the operation error (M01 0127) occurs at the power ON.
---Setting range---
0 to 3
12, 13, 21, 23, 31, 32
#7924 COFST1H Horizontal axis rotation center offset
#7925 COFST1V Vertical axis rotation center offset
#7926 COFST1T Height axis rotation center offset
#7927 CERRT1H Horizontal axis rotation center position deviation
#7928 CERRT1V Vertical axis rotation center position deviation
(PR) #7930 LCT_T2 Rotary axis selection

Set the tilt angle if the tool-side rotary axis of the rotary head is tilted. Set the angle with the CCW direction of the tilted plane being defined as the positive direction.
---Setting range---
-89.999 to 89.999 ()
Set the name of the tool rotating type tool-side rotary axis.
---Setting range---
A,B,C,U,V,W,X,Y,Z
Two digits between A to Z and 1 to 9
0: Mechanical axis specifications
Set the rotation direction of the tool rotating type tool-side rotary axis.
The rotation direction specifications vary according to the setting of "#1450 5axis_Spec/bit3" (Select specifi cations of rotation direction parameter).
- When "#1450 5axis_Spec/bit3" = "0"
The specifications vary for each function.
- When "#1450 5axis_Spec/bit3" = "1"
The specifications are common to the functions.
0: When the tool motion viewed from the workpiece is in right-hand screw direction, it is taken as the pos itive direction.
1: When the tool motion viewed from the workpiece is in left-hand screw direction, it is taken as the positive direction.
Set the distance in the horizontal axis direction between the spindle holder center and the rotation center of the tool-side rotary axis.

---Setting range---
-99999.999 to 99999.999 (mm)
Set the distance in the vertical axis direction between the spindle holder center and the rotation center of the tool-side rotary axis.
---Setting range---
-99999.999 to 99999.999 (mm)
Set the distance in the height axis direction between the spindle holder center and the rotation center of the tool-side rotary axis.
---Setting range---
-99999.999 to 99999.999 (mm)
Set the position deviation in the horizontal axis direction of the tool rotating type tool-side rotary axis rotation center. When tool rotating type tool rotary axis is I axis rotation, set the position deviation of J axis rotation. When tool rotating type tool rotary axis is J axis rotation, set the position deviation of K axis rotation. When tool rotating type tool rotary axis is K axis rotation, set the position deviation of I axis rotation.
* Radius value is need to be set.
---Setting range---
-99999.999 to 99999.999 (mm)
(Follow as "#1006 mcmpunit" (Machine error compensation unit))
(PR) #7931 TIANGT2 Tilt angle
(PR) #7932 ROTAXT2 Rotary axis name
#7933 DIR_T2 Rotation direction
#7934 COFST2H Horizontal axis rotation center offset
#7935 COFST2V Vertical axis rotation center offset
#7936 COFST2T Height axis rotation center offset
#7937 CERRT2H Horizontal axis rotation center position deviation

Set the position deviation in the vertical axis direction of the tool rotating type tool-side rotary axis rotation center. When tool rotating type tool rotary axis is I axis rotation, set the position deviation of K axis rotation. When tool rotating type tool rotary axis is J axis rotation, set the position deviation of I axis rotation. When tool rotating type tool rotary axis is K axis rotation, set the position deviation of J axis rotation.
* Radius value is need to be set.
---Setting range---
-99999.999 to 99999.999 (mm)
(Follow as "#1006 mcmpunit" (Machine error compensation unit))
Select in which axis direction to rotate the base-side rotary axis of the rotary table. When the base-side rotary axis is tilting, use the tens place to select the axis around which the rotary axis is tilted.
0: Invalid
1: I axis
2: J axis
3: K axis
1x: Tilted around I axis
2x: Tilted around J axis
3x: Tilted around K axis
(Note) A value from 0 to 99 can be set from the screen. However when an invalid value is set, the operation error (M01 0127) occurs at the power ON.
---Setting range---
0 to 3
12, 13, 21, 23, 31, 32
Set the tilt angle if the base-side rotary axis of the rotary table is tilted. Set the angle with the CCW direction of the tilted plane being defined as the negative direction.
---Setting range---
-89.999 to 89.999 ()
Set the name of the table rotating type base-side rotary axis.
---Setting range---
A,B,C,U,V,W,X,Y,Z
Two digits between A to Z and 1 to 9
0: Mechanical axis specifications
Set the rotation direction for the table rotating type base-side rotary axis.
The rotation direction specifications vary according to the setting of "#1450 5axis_Spec/bit3" (Select specifi cations of rotation direction parameter).
- When "#1450 5axis_Spec/bit3" = "0"
The specifications vary for each function.
- When "#1450 5axis_Spec/bit3" = "1"
The specifications are common to the functions.
0: When the tool motion viewed from the workpiece is in right-hand screw direction, it is taken as the pos itive direction.
1: When the tool motion viewed from the workpiece is in left-hand screw direction, it is taken as the positive direction.
When all axes are at the machine zero point, set the distance in the horizontal axis direction from the machine zero point to the rotation center of the base-side rotary axis.
---Setting range---
-99999.999 to 99999.999 (mm)
#7938 CERRT2V Vertical axis rotation center position deviation
(PR) #7940 SLCT_W1 Rotary axis selection
(PR) #7941 TIANGW1 Tilt angle
(PR) #7942 ROTAXW1 Rotary axis name
#7943 DIR_W1 Rotation direction
#7944 COFSW1H Horizontal axis rotation center offset

When all axes are at the machine zero point, set the distance in the vertical axis direction from the machine zero point to the rotation center of the base-side rotary axis.
---Setting range---
-99999.999 to 99999.999 (mm)
When all axes are at the machine zero point, set the distance in the height axis direction from the machine zero point to the rotation center of the base-side rotary axis.
---Setting range---

-99999.999 to 99999.999 (mm)
Set the position deviation in the horizontal axis direction of the table rotating type base-side rotary axis rota tion center. When table rotating type base rotary axis is I axis rotation, set the position deviation of J axis rotation. When table rotating type base rotary axis is J axis rotation, set the position deviation of K axis rota tion. When table rotating type base rotary axis is K axis rotation, set the position deviation of I axis rotation.
* Radius value is need to be set.
---Setting range---
-99999.999 to 99999.999 (mm)
(Follow as "#1006 mcmpunit" (Machine error compensation unit))
Set the position deviation in the vertical axis direction of the table rotating type base-side rotary axis rotation center. When table rotating type base rotary axis is I axis rotation, set the position deviation of K axis rotation. When table rotating type base rotary axis is J axis rotation, set the position deviation of I axis rotation. When table rotating type base rotary axis is K axis rotation, set the position deviation of J axis rotation.
* Radius value is need to be set.
---Setting range---
-99999.999 to 99999.999 (mm)
(Follow as "#1006 mcmpunit" (Machine error compensation unit))
Select in which axis direction to rotate the workpiece-side rotary axis of the rotary table. When the workpiece side rotary axis is tilting, use the tens place to select the axis around which the rotary axis is tilted.
0: Invalid
1: I axis
2: J axis
3: K axis
1x: Tilted around I axis
2x: Tilted around J axis
3x: Tilted around K axis
(Note) A value from 0 to 99 can be set from the screen. However when an invalid value is set, the operation error (M01 0127) occurs at the power ON.
---Setting range---
0 to 3
12, 13, 21, 23, 31, 32
Set the tilt angle if the workpiece-side rotary axis of the rotary table is tilted. Set the angle with the CCW di rection of the tilted plane being defined as the negative direction.
---Setting range---
-89.999 to 89.999 ()
#7945 COFSW1V Vertical axis rotation center offset
#7946 COFSW1T Height axis rotation center offset
#7947 CERRW1H Horizontal axis rotation center position deviation
#7948 CERRW1V Vertical axis rotation center position deviation
(PR) #7950 SLCT_W2 Rotary axis selection
(PR) #7951 TIANGW2 Tilt angle

Set the name of the table rotating type workpiece-side rotary axis.
---Setting range---
A,B,C,U,V,W,X,Y,Z
Two digits between A to Z and 1 to 9
0: Mechanical axis specifications
Set the rotation direction for the table rotating type workpiece-side rotary axis.
The rotation direction specifications vary according to the setting of "#1450 5axis_Spec/bit3" (Select specifi cations of rotation direction parameter).
- When "#1450 5axis_Spec/bit3" = "0"
The specifications vary for each function.
- When "#1450 5axis_Spec/bit3" = "1"
The specifications are common to the functions.
0: When the tool motion viewed from the workpiece is in right-hand screw direction, it is taken as the pos itive direction.
1: When the tool motion viewed from the workpiece is in left-hand screw direction, it is taken as the positive direction.
When all axes are at the machine zero point, set the distance in the horizontal axis direction between rotation centers of the base-side rotary axis and the workpiece-side rotary axis.
---Setting range---
-99999.999 to 99999.999 (mm)
When all axes are at the machine zero point, set the distance in the vertical axis direction between rotation centers of the base-side rotary axis and the workpiece-side rotary axis.
---Setting range---
-99999.999 to 99999.999 (mm)
When all axes are at the machine zero point, set the distance in the height axis direction between rotation centers of the base-side rotary axis and the workpiece-side rotary axis.
---Setting range---
-99999.999 to 99999.999 (mm)
Set the position deviation in the horizontal axis direction of the table rotating type workpiece-side rotary axis rotation center. When table rotating type workpiece side rotary axis is I axis rotation, set the position deviation of J axis rotation. When table rotating type workpiece side rotary axis is J axis rotation, set the position devi ation of K axis rotation. When table rotating type workpiece side rotary axis is K axis rotation, set the position deviation of I axis rotation.
* Radius value is need to be set.
---Setting range---
-99999.999 to 99999.999 (mm)
(Follow as "#1006 mcmpunit" (Machine error compensation unit))
Set the position deviation in the vertical axis direction of the table rotating type workpiece-side rotary axis rotation center. When table rotating type workpiece side rotary axis is I axis rotation, set the position deviation of K axis rotation. When table rotating type workpiece side rotary axis is J axis rotation, set the position de viation of I axis rotation. When table rotating type workpiece side rotary axis is K axis rotation, set the position deviation of J axis rotation.
* Radius value is need to be set.
---Setting range---
-99999.999 to 99999.999 (mm)
(Follow as "#1006 mcmpunit" (Machine error compensation unit))
(PR) #7952 ROTAXW2 Rotary axis name
#7953 DIR_W2 Rotation direction
#7954 COFSW2H Horizontal axis rotation center offset
#7955 COFSW2V Vertical axis rotation center offset
#7956 COFSW2T Height axis rotation center offset
#7957 CERRW2H Horizontal axis rotation center position deviation

#7958 CERRW2V Vertical axis rotation center position deviation

When 1st rotary axis is I axis rotation, set the angular deviation of J axis rotation. When 1st rotary axis is J axis rotation, set the angular deviation of K axis rotation. When 1st rotary axis is K axis rotation, set the an gular deviation of I axis rotation.
---Setting range---
-1.000000 to 1.000000 (deg)
When 1st rotary axis is I axis rotation, set the angular deviation of K axis rotation. When 1st rotary axis is J axis rotation, set the angular deviation of I axis rotation. When 1st rotary axis is K axis rotation, set the angular deviation of J axis rotation.
---Setting range---
-1.000000 to 1.000000 (deg)
When 2nd rotary axis is I axis rotation, set the angular deviation of J axis rotation. When 2nd rotary axis is J axis rotation, set the angular deviation of K axis rotation. When 2nd rotary axis is K axis rotation, set the an gular deviation of I axis rotation.
---Setting range---
-1.000000 to 1.000000 (deg)
When 2nd rotary axis is I axis rotation, set the angular deviation of K axis rotation. When 2nd rotary axis is J axis rotation, set the angular deviation of I axis rotation. When 2nd rotary axis is K axis rotation, set the an gular deviation of J axis rotation.
---Setting range---
-1.000000 to 1.000000 (deg)
#7960 Rot1 Ang Geo Dev1 Angular deviation 1 of center line of 1st rotary axis
#7961 Rot1 Ang Geo Dev2 Angular deviation 2 of center line of 1st rotary axis
#7962 Rot2 Ang Geo Dev1 Angular deviation 1 of center line of 2nd rotary axis
#7963 Rot2 Ang Geo Dev2 Angular deviation 2 of center line of 2nd rotary axis

15.12 PLC Timer
Set the time for the timer used in the PLC program (ladder).
The 10ms timer and 100ms timer are identified by the command used.
(Note1) This setting value is valid when bit selection parameter "#6449/bit0" is set to "0".
(Note2) Setting the timer setting value from the setting and display unit
The timer T setting value can be set with the following two methods.
- Method to validate the setting value (Kn) programmed with the sequence program (fixed timer)
- Method to validate the setting value set from the setting and display unit (variable timer)
(Note3) As described bellow, the setting method of timer T and No. of points can be set with the bit selection parameters (#6454/bit0 to bit3).
- #6454/bit0=0, bit1=0, bit2=0, bit3=0
 No. of points: 0
 Range: None
 Setting method: All fixed timers
- #6454/bit0=1, bit1=0, bit2=0, bit3=0
 No. of points: 100
 Range: #16000 to #16099
 Setting method: Set above range with variable timers.
- #6454/bit0=0, bit1=1, bit2=0, bit3=0
 No. of points: 200
 Range: #16000 to #16199
 Setting method: Set above range with variable timers.
- #6454/bit0=1, bit1=1, bit2=0, bit3=0
 No. of points: 300
 Range: #16000 to #16299
 Setting method: Set above range with variable timers.
- #6454/bit0=0, bit1=0, bit2=1, bit3=0
 No. of points: 400
 Range: #16000 to #16399
 Setting method: Set above range with variable timers.
- #6454/bit0=1, bit1=0, bit2=1, bit3=0
 No. of points: 500
 Range: #16000 to #16499
 Setting method: Set above range with variable timers.
- #6454/bit0=0, bit1=1, bit2=1, bit3=0
 No. of points: 600
 Range: #16000 to #16599
 Setting method: Set above range with variable timers.
- #6454/bit0=1, bit1=1, bit2=1, bit3=0
 No. of points: All points
 Range: #16000 to #16703
 Setting method: All variable timers
---Setting range---
0 to 32767(x 10ms or x 100ms)
#16000-
16703
T0 - T703 PLC timer <10ms/100ms>

15.13 PLC Integrated Timer
Set the time for the integrated timer used with the PLC program (ladder).
(Note1) This setting value is valid when bit selection parameter "#6449/bit0" is set to "0".
(Note2) Setting the timer setting value from the setting and display unit
The timer ST setting value can be set with the following two methods.
- Method to validate the setting value (Kn) programmed with the sequence program
 (fixed timer)
- Method to validate the setting value set from the setting and display unit (variable integrated timer)
(Note3) As described bellow, the setting method of timer ST and No. of points can be set with the bit selection parameters (#6453/bit5 to bit7).

- #6453/bit5=0, bit6=0, bit7=0
 No. of points: 0
 Range: None
 Setting method: All fixed integrated timers
- #6453/bit5=1, bit6=0, bit7=0
 No. of points: 20
 Range: #17000 to #17019
 Setting method: Set above range with variable integrated timer.
- #6453/bit5=0, bit6=1, bit7=0
 No. of points: 40
 Range: #17000 to #17039
 Setting method: Set above range with variable integrated timer.
- #6453/bit5=1, bit6=1, bit7=0
 No. of points: All points
 Range: #17000 to #17063
 Setting method: All variable integrated timers
---Setting range---
0 to 32767(x 100ms)
#17000-
17063
ST0 - ST63 PLC integrated timer <100ms INC.>

15.14 PLC Counter
Set the time for the counter used with the PLC program (ladder).
(Note1) This setting value is valid when bit selection parameter "#6449/bit1" is set to "0".
(Note2) Setting the counter setting value from the setting and display unit
The counter C setting value can be set with the following two methods.
- Method to validate the setting value (Kn) programmed with the sequence program (fixed counter)
- Method to validate the setting value set from the setting and display unit (variable counter)
(Note3) As described bellow, the setting method of counter C and No. of points can be set with the bit se lection parameters (#6454/bit4 to bit7).
- #6454/bit4=0, bit5=0, bit6=0, bit7=0
 No. of points: 0
 Range: None
 Setting method: All fixed counters
- #6454/bit4=1, bit5=0, bit6=0, bit7=0
 No. of points: 40
 Range: #17200 to #17239
 Setting method: Set above range with variable counter.
- #6454/bit4=0, bit5=1, bit6=0, bit7=0
 No. of points: 80
 Range: #17200 to #17279
 Setting method: Set above range with variable counter.
- #6454/bit4=1, bit5=1, bit6=0, bit7=0
 No. of points: 120
 Range: #17200 to #17319
 Setting method: Set above range with variable counter.
- #6454/bit4=0, bit5=0, bit6=1, bit7=0
 No. of points: 160
 Range: #17200 to #17359
 Setting method: Set above range with variable counter.
- #6454/bit4=1, bit5=0, bit6=1, bit7=0
 No. of points: 200
 Range: #17200 to #17399
 Setting method: Set above range with variable counter.
- #6454/bit4=0, bit5=1, bit6=1, bit7=0
 No. of points: 240
 Range: #17200 to #17439
 Setting method: Set above range with variable counter.
- #6454/bit4=1, bit5=1, bit6=1, bit7=0
 No. of points: All points
 Range: #17200 to #17455
 Setting method: All variable counters
---Setting range---
0 to 32767
#17200-
17455
C000 - C255 Counter

15.15 PLC Constants
Set the value to be set in the data type R register used in the PLC program (ladder).
Even if the data is set in the R register that corresponds to the PLC side when this parameter is displayed,
the screen will not change. Enter a different screen once, and then select this screen again.
---Setting range---
-2 to the power of 31 to 2 to the power of 31 -1
Set the value to be set in the data type R register(R8300 to R9799) used in the PLC program (ladder).
The area is valid for the number of PLC constant extension points "#1326 PLC Const Ext. Num" setting value,
starting with #18151.
Even if the data is set in the R register that corresponds to the PLC side when this parameter is displayed,
the screen will not change. Enter a different screen once, and then select this screen again.
#18151 to #18900 is used as the PLC constant extended area.
The area is valid for the number of PLC constant extension points ("#1326 PLC Const Ext. Num" setting val ue), starting with #18151.
---Setting range---
-2 to the power of 31 to 2 to the power of 31 -1
#18001-

18150
R7500,7501 - R7798,7799 PLC constant (Base area)
#18151-
18900
R8300,8301 - R9798,9799 PLC constant (Extension area)

15.16 PLC Bit Selection
(Note) Even if the data is set in the R register(R7800 to R7897) that corresponds to the PLC side when this parameter is displayed, the screen will not change. Enter a different screen once, and then select this screen again. #6449 to #6496 are PLC operation parameters used by MITSUBISHI.
Refer to "PLC Development Manual" and "PLC Programming Manual" for details.
These bit type parameters are used in the user PLC (ladder).
bit7: Control unit thermal alarm valid
bit6: Setting and display unit thermal management valid (This function may not be available for some NC models.)
bit5: Set to "0".
bit4: Battery alarm/warning detection disabled
(Note) When the parameter is set to "1", the "Battery alarm" signal and the "Battery warning" signal will not be turned ON, and the alarm messages will not be displayed.
bit3: Counter C retention
bit2: Integrated timer ST retention
bit1: PLC counter program valid
bit0: PLC timer program valid
bit7: Set to "0".
bit6: External alarm message display (This function may not be available for some NC models.)
bit5: Alarm/operator change (This function may not be available for some NC models.)
bit4: Full screen display of message (This function may not be available for some NC models.)
bit3: Set to "0".
bit2: Operator message valid
bit1: Alarm message display interface
1: R method
0: F method
bit0: Alarm message valid
bit7-3: Set to "0".
bit2: Built-in edit function edit invalid (This function may not be available for some NC models.)
bit1: Set to "0".
bit0: Built-in edit function valid (This function may not be available for some NC models.)
bit7: Set to "0".
bit6: Branch destination label check valid
bit5: Set to "0".
bit4: Serial handy terminal communication valid
bit3-0: Set to "0".
bit7-5: Integrated timer ST Variable/fixed Number of points setting
bit4: Set to "0".
bit3: Operation by the menu [Ladder Monitor]
0: Screen can transit to PLC on-board screen after MTB password is input.
1: Screen can transit to PLC on-board screen without MTB password input.
bit2-0: Message language change code
#6401-6448 R7800-Low - R7823-High Bit selection
#6449 R7824-Low Bit selection
#6450 R7824-High Bit selection
#6451 R7825-Low Bit selection
#6452 R7825-High Bit selection
#6453 R7826-Low Bit selection

bit7-4: Counter C Variable/fixed Number of points setting
bit3-0: Timer T Variable/fixed Number of points setting
bit7: Enable ladder program writing during RUN
bit6: Enable ladder program writing during RUN (in high-speed processing)
bit5-4: Set to "0".
bit3: Display type switching for operator message
1: R method
0: F method
bit2-0: R device access variables decimal point valid region
bit7-5: Set to "0".
bit4: Motor insulation deterioration detection ON
bit3: Set to "0".
bit2: PLS/PLF instruction Holding PLC in STOP state valid
bit1-0: Set to "0".
High-speed input specification 1
High-speed input specification 2
High-speed output specification 1
High-speed output specification 2
High-speed input specification 3
High-speed input specification 4
Set to "0".
Set to "0".
Set to "0".
High-speed output specification 3
High-speed output specification 4
Set to "0".
This is reserved for debugging by MITSUBISHI. Set to "0".
These bit type parameters are used in the user PLC (ladder).
#6454 R7826-High Bit selection

#6455 R7827-Low Bit selection
#6456 R7827-High Bit selection
#6457-6458 R7828-Low - R7828-High Bit selection
#6459-6460 R7829-Low - R7829-High Bit selection
#6461-6462 R7830-Low - R7830-High Bit selection
#6463-6464 R7831-Low - R7831-High Bit selection
#6465-6466 R7832-Low - R7832-High Bit selection
#6467-6468 R7833-Low - R7833-High Bit selection
#6469-6470 R7834-Low - R7834-High Bit selection
#6471 R7835-Low Bit selection
#6472 R7835-High Bit selection
#6473-6474 R7836-Low - R7836-High Bit selection
#6475-6476 R7837-Low - R7837-High Bit selection
#6477-6480 R7838-Low - R7839-High Bit selection
#6481-6496 R7840-Low - R7847-High Bit selection
#6497-6596 R7848-Low - R7897-High Bit selection

15.17 Machine Error Compensation Parameters
Select the method to set the machine error compensation data.
0: Absolute amount method
1: Incremental amount method
Set the name of the base axis for machine error compensation.
(1) For the pitch error compensation, set the name (#1013 axname) of the axis to be compensated.
(2) For the relative position compensation, set the name (#1013 axname) of the axis to be used as the refer ence.
For a system configured with a single part system, set the axis name only.
For a system configured with multiple part systems, set the part system number and the axis name.
(Example) Z axis of the 2nd part system: 2Z
This parameter can also be set with the axis name and the serial number.
(Example) When $1: with C axis, $2: without C axis, and $3: with C axis, the C axis of the 3rd part system
($3) is set with "C2".
To set a PLC axis as the base axis, set it with P and the serial number of the PLC axis.
(Example) 3rd PLC axis: P3
---Setting range---
Axis name, e.g. X, Y, Z, U, V, W, A, B and C
Part system number + Axis name, e.g. 1X, 1Y, 1Z, 2X, 2Y and 2Z
Axis name + Serial number of the axis, e.g. X1, Y1, Z1, P1, P2 and P3
Set the name of the compensation axis for machine error compensation.
(1) For the pitch error compensation, set the same axis name as in "#4001 cmpax".
(2) For the relative position compensation, set the name (#1013 axname) of the axis to be actually compen sated.
For a system configured with a single part system, set the axis name only.
For a system configured with multiple part systems, set the part system number and the axis name.
(Example) Z axis of the 2nd part system: 2Z
This parameter can also be set with the axis name and the serial number.
(Example) When $1: with C axis, $2: without C axis, and $3: with C axis, the C axis of the 3rd part system
($3) is set with "C2".
To set a PLC axis as the compensation axis, set it with P and the serial number of the PLC axis.
(Example) 3rd PLC axis: P3
---Setting range---
Axis name, e.g. X, Y, Z, U, V, W, A, B and C
Part system number + Axis name, e.g. 1X, 1Y, 1Z, 2X, 2Y and 2Z
Axis name + Serial number of the axis, e.g. X1, Y1, Z1, P1, P2 and P3
(PR) #4000 Pinc Machine error compensation increment method
#4001 cmpax Base axis <n-th axis>
#4002 drcax Compensation axis <n-th axis>

Set the compensation data No. corresponding to the reference position. As the reference position is actually
the base position, there is no compensation No. Therefore set the number that is decremented by 1.
(Note) When bidirectional pitch error compensation is enabled, set compensation data No. corresponding to
reference point in shifting in plus direction.
---Setting range---
4101 to 5999
Set the compensation data No. at the farthest end on the negative side.
(Note) When the axis moves in positive direction with bidirectional pitch error compensation enabled, set
compensation data No. of which locates on the nearest point to negative side. The compensation point
should be set with even number.
---Setting range---
4101 to 5999
Set the compensation data No. at the farthest end on the positive side.
(Note) When the axis moves in negative direction with bidirectional pitch error compensation enabled, set
compensation data No. of which locates on the nearest point to positive side. The compensation point
should be set with even number.
---Setting range---
4101 to 5999
Set the scale factor for the compensation amount.
---Setting range---
0 to 99
Set the interval to divide the basic axis.
Each compensation data will be the compensation amount for each of these intervals.
---Setting range---
0.001 to 9999.999 (mm)
Select whether to enable bidirectional pitch error compensation.
0: Disable
1: Enable
When bidirectional pitch error compensation is enabled, set the compensation amount of the reference po sition when the axis moves to the position from the opposite direction of the zero point return.

(Note) The actual compensation amount will be the value obtained by multiplying the setting value with the compensation scale.
---Setting range---
-32768 to 32767
Set the compensation amount for each axis.
(Note) The actual compensation amount will be the value obtained by multiplying the setting value with the compensation scale.
---Setting range---
-32768 to 32767
#4003 rdvno Division point number at reference position <n-th axis>
#4004 mdvno Division point number at the most negative side <n-th axis>
#4005 pdvno Division point number at the most positive side <n-th axis>
#4006 sc Compensation scale factor <n-th axis>
#4007 spcdv Division interval <n-th axis>
#4008 twopc Bidirectional pitch error compensation <n-th axis>
#4009 refcmp Reference position compensation amount <n-th axis>
#4101-5999

15.18 Macro List
Set the M code used for calling out the macro with the M command.
Select codes to be entered other than the codes basically required by the machine and M codes of M0, M1, M2, M30, M96 through M99, and M198.
This is valid when "#1195 Mmac" is set to "1".
---Setting range---
0 to 9999
Specify the macro call type.
0: Equivalent to M98 P****;
1: Equivalent to G65 P****;
2: Equivalent to G66 P****;
3: Equivalent to G66.1 P****;
4: Equivalent to G144 D0 A****; (Sub part system control II complete wait method) (for L system only)
5: Equivalent to G144 D1 A****; (Sub part system control II parallel process method) (for L system only)
Others: Equivalent to M98 P****;
Set the No. of the program or file name to be called out. The file name can contain up to 32 characters.
---Setting range---
Program name or file name (up to 32 characters)
The setting method is same as "#7001".
The setting method is same as "#7002".
The setting method is same as "#7003".
The setting method is same as "#7001".
The setting method is same as "#7002".
The setting method is same as "#7003".
The setting method is same as "#7001".
The setting method is same as "#7002".
The setting method is same as "#7003".
The setting method is same as "#7001".
The setting method is same as "#7002".
The setting method is same as "#7003".
The setting method is same as "#7001".
#7001 M[01] Code
#7002 M[01] TYPE
#7003 M[01] Program No.
#7011 M[02] Code
#7012 M[02] Type
#7013 M[02] Program No.
#7021 M[03] Code
#7022 M[03] Type
#7023 M[03] Program No.
#7031 M[04] Code
#7032 M[04] Type
#7033 M[04] Program No.
#7041 M[05] Code
#7042 M[05] Type
#7043 M[05] Program No.
#7051 M[06] Code

The setting method is same as "#7002".
The setting method is same as "#7003".
The setting method is same as "#7001".
The setting method is same as "#7002".
The setting method is same as "#7003".
The setting method is same as "#7001".
The setting method is same as "#7002".
The setting method is same as "#7003".
The setting method is same as "#7001".
The setting method is same as "#7002".
The setting method is same as "#7003".
The setting method is same as "#7001".
The setting method is same as "#7002".
The setting method is same as "#7003".
Set the type for when calling out the macro with the 2nd miscellaneous command.
The macro will be called out with the "#1170 M2name" address command when "#1198 M2mac" is set to "1".

The setting method is same as "M call macro".
---Setting range---
0 to 3
Set the program No. for when calling out the macro with the 2nd miscellaneous command.
The macro will be called out with the "#1170 M2name" address command when "#1198 M2mac" is set to "1".
The setting method is same as "M call macro".
---Setting range---
Program name or file name (up to 32 characters)
Set the G code to be used when calling the macro with a G command.
Do not set a G code used in the system.
G101 to G110 and G200 to G202 are user macro I codes. However, if a parameter is set for the G code call code, the G code call will have the priority, and these cannot be used as the user macro I.
---Setting range---
1 to 999
#7052 M[06] Type
#7053 M[06] Program No.
#7061 M[07] Code
#7062 M[07] Type
#7063 M[07] Program No.
#7071 M[08] Code
#7072 M[08] Type
#7073 M[08] Program No.
#7081 M[09] Code
#7082 M[09] Type
#7083 M[09] Program No.
#7091 M[10] Code
#7092 M[10] Type
#7093 M[10] Program No.
#7102 M2mac Type
#7103 M2mac Program No.
#7201 G[01] Code

Specify the macro call type.
0: Equivalent to M98 P****;
1: Equivalent to G65 P****;
2: Equivalent to G66 P****;
3: Equivalent to G66.1 P****;
Set the No. of the program or file name to be called out. The file name can contain up to 32 characters.
---Setting range---
Program name or file name (up to 32 characters)
The setting method is same as "#7201".
The setting method is same as "#7202".
The setting method is same as "#7203".
The setting method is same as "#7201".
The setting method is same as "#7202".
The setting method is same as "#7203".
The setting method is same as "#7201".
The setting method is same as "#7202".
The setting method is same as "#7203".
The setting method is same as "#7201".
The setting method is same as "#7202".
The setting method is same as "#7203".
The setting method is same as "#7201".
The setting method is same as "#7202".
The setting method is same as "#7203".
The setting method is same as "#7201".
The setting method is same as "#7202".
The setting method is same as "#7203".
#7202 G[01] Type
#7203 G[01] Program No.
#7211 G[02] Code
#7212 G[02] Type
#7213 G[02] Program No.
#7221 G[03] Code
#7222 G[03] Type
#7223 G[03] Program No.
#7231 G[04] Code
#7232 G[04] Type
#7233 G[04] Program No.
#7241 G[05] Code
#7242 G[05] Type
#7243 G[05] Program No.
#7251 G[06] Code
#7252 G[06] Type
#7253 G[06] Program No.
#7261 G[07] Code
#7262 G[07] Type
#7263 G[07] Program No.

The setting method is same as "#7201".
The setting method is same as "#7202".
The setting method is same as "#7203".
The setting method is same as "#7201".
The setting method is same as "#7202".

The setting method is same as "#7203".
The setting method is same as "#7201".
The setting method is same as "#7202".
The setting method is same as "#7203".
Set the type No. for when calling the macro with an S command.
This is valid when "#1196 Smac" is set to "1".
The setting method is same as "M call macro".
---Setting range---
0 to 3
Set the program No. for when calling the macro with an S command.
This is valid when "#1196 Smac" is set to "1".
The setting method is same as "M call macro".
---Setting range---
Program name or file name (up to 32 characters)
Set the type for when calling the macro with a T command.
This is valid when "#1197 Tmac" is set to "1".
The setting method is same as "M call macro".
---Setting range---
0 to 3
Set the program No. for when calling the macro with a T command.
This is valid when "#1197 Tmac" is set to "1".
The setting method is same as "M call macro".
---Setting range---
Program name or file name (up to 32 characters)
#7271 G[08] Code
#7272 G[08] Type
#7273 G[08] Program No.
#7281 G[09] Code
#7282 G[09] Type
#7283 G[09] Program No.
#7291 G[10] Code
#7292 G[10] Type
#7293 G[10] Program No.
#7302 Smac Type
#7303 Smac Program No.
#7312 Tmac Type
#7313 Tmac Program No.

Specify the macro program number to be called with the T code input through a manual numerical value com mand.
When a nonzero value is set in the parameter, macro call is executed irrespective of the setting of "#1197
Tmac".
---Setting range---
Program name or file name (up to 32 characters)
(Setting is cleared when "0" is set)
Specify the macro call type.
0: Equivalent to M98 P****;
1: Equivalent to G65 P****;
2: Equivalent to G66 P****;
3: Equivalent to G66.1 P****;
Specify the figures in the hundreds and higher places of the macro program No. to be called.
---Setting range---
90 to 99, or 1000100 to 1999999
(Note) To set the program No. to "1000100 to 1999999", set the macro call out type to 0 (M98) or 1 (G65).
The setting method is same as "#7322".
The setting method is same as "#7323".
The setting method is same as "#7322".
The setting method is same as "#7323".
The setting method is same as "#7322".
The setting method is same as "#7323".
The setting method is same as "#7322".
The setting method is same as "#7323".
The setting method is same as "#7322".
The setting method is same as "#7323".
The setting method is same as "#7322".
The setting method is same as "#7323".
The setting method is same as "#7322".
#7314 Man Tmac prg No.
#7322 G200 type
#7323 G200 program No.
#7332 G300 type
#7333 G300 program No.
#7342 G400 type
#7343 G400 program No.
#7352 G500 type
#7353 G500 program No.
#7362 G600 type
#7363 G600 program No.
#7372 G700 type
#7373 G700 program No.
#7382 G800 type
#7383 G800 program No.
#7392 G900 type

The setting method is same as "#7323".

The ASCII code macro parameters (#7402 to 7405) are validated.
0: Disable
1: Enable
Set the ASCII code used to call macros with the ASCII code.
L system: A,B,D,F,H,I,J,K,M,Q,R,S,T
M system: A,B,F,H,I,K,M,Q,R,S,T
Set the macro call type.
0: M98
1: G65
2: G66
3: G66.1
Set the program No. called with macro call.
---Setting range---
Program name or file name (up to 32 characters)
When the call type is "0", set the variable No. set after the ASCII code.
---Setting range---
100 to 149
The ASCII code macro parameters (#7412 to 7415) are validated.
0: Disable
1: Enable
Set the ASCII code used to call macros with the ASCII code.
L system: A,B,D,F,H,I,J,K,M,Q,R,S,T
M system: A,B,F,H,I,K,M,Q,R,S,T
Set the macro call type.
0: M98
1: G65
2: G66
3: G66.1
Set the program No. called with macro call.
---Setting range---
Program name or file name (up to 32 characters)
When the call type is "0", set the variable No. set after the ASCII code.
---Setting range---
100 to 149
#7393 G900 program No.
#7401 ASCII[01] Valid
#7402 ASCII[01] Code
#7403 ASCII[01] Type
#7404 ASCII[01] Program No.
#7405 ASCII[01] Variable
#7411 ASCII[02] Valid
#7412 ASCII[02] Code
#7413 ASCII[02] Type
#7414 ASCII[02] Program No.
#7415 ASCII[02] Variable

Specify the initial G code to be used when the macro call via G command is set all at once.
---Setting range---
0 to 9999
Select the type of the macro call.
0: equivalent to M98 P****;
1: equivalent to G65 P****;
2: equivalent to G66 P****;
3: equivalent to G66.1 P****;
Others: equivalent to M98 P****;
Specify the initial program No. to be used when the macro call via G command is set all at once.
This parameter cannot be specified with the file name.
When the parameter is set to "0", the batch settings of the macro call via G command will be invalid.
---Setting range---
0 to 99999999
Specify the number of sequential macro programs to be called when the macro call via G command is set all
at once.
When the parameter is set to "0", the batch settings of the macro call via G command will be invalid.
---Setting range---
0 to 255
Specify the initial G code to be used when the macro call via G command with decimal point is set all at once.
---Setting range---
0.0 to 999.9
Select the type of the macro call.
0: equivalent to M98 P****;
1: equivalent to G65 P****;
2: equivalent to G66 P****;
3: equivalent to G66.1 P****;
Others: equivalent to M98 P****;
Specify the initial program No. to be used when the macro call via G command with decimal point is set all
at once.
This parameter cannot be specified with the file name.
When the parameter is set to "0", the batch settings of the macro call via G command with decimal point will
be invalid.
---Setting range---
0 to 99999999
Specify the number of sequential macro programs to be called when the macro call via G command with dec imal point is set all at once.
When the parameter is set to "0", the batch settings of the macro call via G command with decimal point will
be invalid.
---Setting range---
0 to 255

#7421 Gmac initial Gcode
#7422 Gmac batch type
#7423 Gmac initial prog.
#7424 Gmac qty of macros
#7431 Gm.n initial Gcode
#7432 Gm.n batch type
#7433 Gm.n initial prog.
#7434 Gm.n qty of macros

Specify the G code to be used for the macro call via G command with decimal point. Specify it with one dec imal place.
When the parameter is set to "0.0", the macro call via G command with decimal point will be invalid.
---Setting range---
0.0 to 999.9
Select the type of the macro call.
0: equivalent to M98 P****;
1: equivalent to G65 P****;
2: equivalent to G66 P****;
3: equivalent to G66.1 P****;
Others: equivalent to M98 P****;
Specify the number of the program or the name of the file to be called up.
The file name can be up to 32 characters long.
---Setting range---
Program name or file name (up to 32 characters long)
The setting method is same as "#56501".
The setting method is same as "#56502".
The setting method is same as "#56503".
The setting method is same as "#56501".
The setting method is same as "#56502".
The setting method is same as "#56503".
The setting method is same as "#56501".
The setting method is same as "#56502".
The setting method is same as "#56503".
The setting method is same as "#56501".
The setting method is same as "#56502".
The setting method is same as "#56503".
The setting method is same as "#56501".
The setting method is same as "#56502".
#56501 Gm.n[01] code
#56502 Gm.n[01] type
#56503 Gm.n[01] prog. No.
#56511 Gm.n[02] code
#56512 Gm.n[02] type
#56513 Gm.n[02] prog. No.
#56521 Gm.n[03] code
#56522 Gm.n[03] type
#56523 Gm.n[03] prog. No.
#56531 Gm.n[04] code
#56532 Gm.n[04] type
#56533 Gm.n[04] prog. No.
#56541 Gm.n[05] code
#56542 Gm.n[05] type
#56543 Gm.n[05] prog. No.
#56551 Gm.n[06] code
#56552 Gm.n[06] type

The setting method is same as "#56503".
The setting method is same as "#56501".
The setting method is same as "#56502".
The setting method is same as "#56503".
The setting method is same as "#56501".
The setting method is same as "#56502".
The setting method is same as "#56503".
The setting method is same as "#56501".
The setting method is same as "#56502".
The setting method is same as "#56503".
The setting method is same as "#56501".
The setting method is same as "#56502".
The setting method is same as "#56503".
#56553 Gm.n[06] prog. No.
#56561 Gm.n[07] code
#56562 Gm.n[07] type
#56563 Gm.n[07] prog. No.
#56571 Gm.n[08] code
#56572 Gm.n[08] type
#56573 Gm.n[08] prog. No.
#56581 Gm.n[09] code
#56582 Gm.n[09] type
#56583 Gm.n[09] prog. No.
#56591 Gm.n[10] code
#56592 Gm.n[10] type
#56593 Gm.n[10] prog. No.

15.19 Position Switches
Specify whether to perform position switch area checking at high speeds.
0: Do not perform position switch area checking at high speed (do it the same as before).
1: Perform position switch area checking at high speed.
"n" represents the position switch No. (n=1 to 24)
Specify the name of the axis for which a position switch is provided.
---Setting range---
X, Y, Z, U, V, W, A, B, or C axis address
"n" represents the position switch No. (n=1 to 24)
When the machine enters the range between imaginary dog positions 1 and 2, a signal is output to the PLC.
For the device No., refer to "PLC Interface Manual".
---Setting range---
-99999.999 to 99999.999 (mm)
"n" represents the position switch No. (n=1 to 24)
When the machine enters the range between imaginary dog positions 1 and 2, a signal is output to the PLC.
For the device No., refer to "PLC Interface Manual".
---Setting range---
-99999.999 to 99999.999 (mm)
"n" represents the position switch No. (n=1 to 24)
When position switch area checking at high speed is selected, specify the mode of area checking, i.e., wheth er to use the command type machine position or encoder feedback position, for each position switch.
0: Use the command type machine position as the machine position for position switch area checking.
1: Use the encoder feedback position as the machine position for position switch area checking.
(Note) This parameter is valid only when "1" set in "#7500 Pcheck".
#7500 Pcheck High-speed switching of position switch
#7501+10(n-1) PSWn axis Axis name
#7502+10(n-1) PSWn dog1 Imaginary dog position 1
#7503+10(n-1) PSWn dog2 Imaginary dog position 2
#7504+10(n-1) PSWn check Selection of area check method

15.20 RIO Device Allocation Parameters
Select whether the fixed allocation method or arbitrary allocation method is used to assign devices to each remote I/O unit station.
0: Fixed allocation
1: Arbitrary allocation
Specify the channel No. of the 1st remote I/O unit station.
* When 0 is set, all the RIO allocation parameters of the 1st station will be disabled.
---Setting range---
0, 1 to 3
Specify the station No. of the 1st remote I/O unit station.
* Set this parameter to be the same as the rotary switch of the remote I/O unit to which PLC devices are assigned.
---Setting range---
0 to 63
Specify the name of DI allocation devices for the 1st remote I/O unit station.
* When 0 is set, this will be left blank.
---Setting range---
0, X, R, ZR
Specify the head device No. of DI allocation devices for the 1st remote I/O unit station.
For device X: Hexadecimal
For others: Decimal
* This parameter changes to "0" if you change the device name "DI dev name #1".
* Specify "DI dev name #1" ahead of this parameter.
* The devices corresponding to the occupied station of the operation panel cannot be set.
---Setting range---
Decimal: 0 to 65535
Hexadecimal: 0 to FFFF
Specify the name of DO allocation devices for the 1st remote I/O unit station.
* When 0 is set, this will be left blank.
---Setting range---
0, Y, R, ZR
Specify the head device No. of DO allocation devices for the 1st remote I/O unit station.
For device Y: Hexadecimal
For others: Decimal
* This parameter changes to "0" if you change the device name "DO dev name #1".
* Specify "DO dev name #1" ahead of this parameter.
* The devices corresponding to the occupied station of the operation panel cannot be set.
---Setting range---
Decimal: 0 to 65535
Hexadecimal: 0 to FFFF
(PR) #53001 RIO dev assign RIO device allocation method
(PR) #53011 RIO CH No. #1 Remote I/O channel No. for allocation
(PR) #53012 RIO Station No. #1 Remote I/O station No. for allocation
(PR) #53013 DI dev name #1 DI device name #1
(PR) #53014 DI dev No. #1 DI device number #1
(PR) #53015 DO dev name #1 DO device name #1
(PR) #53016 DO dev No. #1 DO device number #1

Select at which speed to input 32 points of input data to the 1st remote I/O unit station: PLC high-speed or PLC medium-speed.
0: PLC medium-speed
1: PLC high-speed
Select at which speed to output 32 points of output data from the 1st remote I/O unit station: PLC high-speed or PLC medium-speed.
0: PLC medium-speed

1: PLC high-speed
(PR) #53017 DI Hi-Spd #1 High-speed input designation #1
(PR) #53018 DO Hi-Spd #1 High-speed output designation #1

Parameter Nos and Names for the RIO device 2nd and following stations are shown below.
Refer to the description of RIO 1st station by replacing its station No. (or # No) for details of each parameter.
Parameter list for RIO device 2nd and following stations
RIO CH No. RIO Sta.
No.
DI dev
name
DI dev No. DO dev
name
DO dev No. DI Hi-Spd DO Hi-Spd
#1
Station
No.: 1
#53011
RIO CH No. #1
#53012
RIO Sta. No.
#1
#53013
DI dev name
#1
#53014
DI dev No. #1
#53015
DO dev name
#1
#53016
DO dev No.
#1
#53017
DI Hi-Spd #1
#53018
DO Hi-Spd
#1
#2
Station
No.: 2
#53021
RIO CH No. #2
#53022
RIO Sta. No.
#2
#53023
DI dev name
#2
#53024
DI dev No. #2
#53025
DO dev name
#2
#53026
DO dev No.
#2
#53027
DI Hi-Spd #2
#53028
DO Hi-Spd
#2
#3
Station
No.: 3
#53031
RIO CH No. #3
#53032
RIO Sta. No.
#3
#53033
DI dev name
#3
#53034
DI dev No. #3
#53035
DO dev name
#3
#53036
DO dev No.
#3
#53037
DI Hi-Spd #3
#53038
DO Hi-Spd
#3

#4
Station
No.: 4
#53041
RIO CH No. #4
#53042
RIO Sta. No.
#4
#53043
DI dev name
#4
#53044
DI dev No. #4
#53045
DO dev name
#4
#53046
DO dev No.
#4
#53047
DI Hi-Spd #4
#53048
DO Hi-Spd
#4
#5
Station
No.: 5
#53051
RIO CH No. #5
#53052
RIO Sta. No.
#5
#53053
DI dev name
#5
#53054
DI dev No. #5
#53055
DO dev name
#5
#53056
DO dev No.
#5
#53057
DI Hi-Spd #5
#53058
DO Hi-Spd
#5
#6
Station
No.: 6
#53061
RIO CH No. #6
#53062
RIO Sta. No.
#6
#53063
DI dev name
#6
#53064
DI dev No. #6
#53065
DO dev name
#6
#53066
DO dev No.
#6
#53067
DI Hi-Spd #6
#53068
DO Hi-Spd
#6
#7
Station
No.: 7
#53071
RIO CH No. #7
#53072
RIO Sta. No.
#7
#53073
DI dev name
#7
#53074
DI dev No. #7
#53075
DO dev name
#7

#53076
DO dev No.
#7
#53077
DI Hi-Spd #7
#53078
DO Hi-Spd
#7
#8
Station
No.: 8
#53081
RIO CH No. #8
#53082
RIO Sta. No.
#8
#53083
DI dev name
#8
#53084
DI dev No. #8
#53085
DO dev name
#8
#53086
DO dev No.
#8
#53087
DI Hi-Spd #8
#53088
DO Hi-Spd
#8
#9
Station
No.: 9
#53091
RIO CH No. #9
#53092
RIO Sta. No.
#9
#53093
DI dev name
#9
#53094
DI dev No. #9
#53095
DO dev name
#9
#53096
DO dev No.
#9
#53097
DI Hi-Spd #9
#53098
DO Hi-Spd
#9
#10
Station
No.: 10
#53101
RIO CH No.
#10
#53102
RIO Sta. No.
#10
#53103
DI dev name
#10
#53104
DI dev No.
#10
#53105
DO dev name
#10
#53106
DO dev No.
#10
#53107
DI Hi-Spd
#10
#53108
DO Hi-Spd
#10
#11
Station
No.: 11
#53111
RIO CH No.

#11
#53112
RIO Sta. No.
#11
#53113
DI dev name
#11
#53114
DI dev No.
#11
#53115
DO dev name
#11
#53116
DO dev No.
#11
#53117
DI Hi-Spd
#11
#53118
DO Hi-Spd
#11
#12
Station
No.: 12
#53121
RIO CH No.
#12
#53122
RIO Sta. No.
#12
#53123
DI dev name
#12
#53124
DI dev No.
#12
#53125
DO dev name
#12
#53126
DO dev No.
#12
#53127
DI Hi-Spd
#12
#53128
DO Hi-Spd
#12
#13
Station
No.: 13
#53131
RIO CH No.
#13
#53132
RIO Sta. No.
#13
#53133
DI dev name
#13
#53134
DI dev No.
#13
#53135
DO dev name
#13
#53136
DO dev No.
#13
#53137
DI Hi-Spd
#13
#53138
DO Hi-Spd
#13
#14
Station
No.: 14
#53141
RIO CH No.
#14
#53142
RIO Sta. No.
#14
#53143
DI dev name
#14

#53144
DI dev No.
#14
#53145
DO dev name
#14
#53146
DO dev No.
#14
#53147
DI Hi-Spd
#14
#53148
DO Hi-Spd
#14
#15
Station
No.: 15
#53151
RIO CH No.
#15
#53152
RIO Sta. No.
#15
#53153
DI dev name
#15
#53154
DI dev No.
#15
#53155
DO dev name
#15
#53156
DO dev No.
#15
#53157
DI Hi-Spd
#15
#53158
DO Hi-Spd
#15
#16
Station
No.: 16
#53161
RIO CH No.
#16
#53162
RIO Sta. No.
#16
#53163
DI dev name
#16
#53164
DI dev No.
#16
#53165
DO dev name
#16
#53166
DO dev No.
#16
#53167
DI Hi-Spd
#16
#53168
DO Hi-Spd
#16
#17
Station
No.: 17
#53171
RIO CH No.
#17
#53172
RIO Sta. No.
#17
#53173
DI dev name
#17
#53174
DI dev No.
#17
#53175
DO dev name
#17
#53176

DO dev No.
#17
#53177
DI Hi-Spd
#17
#53178
DO Hi-Spd
#17
#18
Station
No.: 18
#53181
RIO CH No.
#18
#53182
RIO Sta. No.
#18
#53183
DI dev name
#18
#53184
DI dev No.
#18
#53185
DO dev name
#18
#53186
DO dev No.
#18
#53187
DI Hi-Spd
#18
#53188
DO Hi-Spd
#18

#19
Station
No.: 19
#53191
RIO CH No.
#19
#53192
RIO Sta. No.
#19
#53193
DI dev name
#19
#53194
DI dev No.
#19
#53195
DO dev name
#19
#53196
DO dev No.
#19
#53197
DI Hi-Spd
#19
#53198
DO Hi-Spd
#19
#20
Station
No.: 20
#53201
RIO CH No.
#20
#53202
RIO Sta. No.
#20
#53203
DI dev name
#20
#53204
DI dev No.
#20
#53205
DO dev name
#20
#53206
DO dev No.
#20
#53207
DI Hi-Spd

#20
#53208
DO Hi-Spd
#20
#21
Station
No.: 21
#53211
RIO CH No.
#21
#53212
RIO Sta. No.
#21
#53213
DI dev name
#21
#53214
DI dev No.
#21
#53215
DO dev name
#21
#53216
DO dev No.
#21
#53217
DI Hi-Spd
#21
#53218
DO Hi-Spd
#21
#22
Station
No.: 22
#53221
RIO CH No.
#22
#53222
RIO Sta. No.
#22
#53223
DI dev name
#22
#53224
DI dev No.
#22
#53225
DO dev name
#22
#53226
DO dev No.
#22
#53227
DI Hi-Spd
#22
#53228
DO Hi-Spd
#22
#23
Station
No.: 23
#53231
RIO CH No.
#23
#53232
RIO Sta. No.
#23
#53233
DI dev name
#23
#53234
DI dev No.
#23
#53235
DO dev name
#23
#53236
DO dev No.
#23
#53237
DI Hi-Spd
#23
#53238
DO Hi-Spd
#23
#24
Station
No.: 24

#53241
RIO CH No.
#24
#53242
RIO Sta. No.
#24
#53243
DI dev name
#24
#53244
DI dev No.
#24
#53245
DO dev name
#24
#53246
DO dev No.
#24
#53247
DI Hi-Spd
#24
#53248
DO Hi-Spd
#24
#25
Station
No.: 25
#53251
RIO CH No.
#25
#53252
RIO Sta. No.
#25
#53253
DI dev name
#25
#53254
DI dev No.
#25
#53255
DO dev name
#25
#53256
DO dev No.
#25
#53257
DI Hi-Spd
#25
#53258
DO Hi-Spd
#25
#26
Station
No.: 26
#53261
RIO CH No.
#26
#53262
RIO Sta. No.
#26
#53263
DI dev name
#26
#53264
DI dev No.
#26
#53265
DO dev name
#26
#53266
DO dev No.
#26
#53267
DI Hi-Spd
#26
#53268
DO Hi-Spd
#26
#27
Station
No.: 27
#53271
RIO CH No.
#27
#53272
RIO Sta. No.
#27
#53273

DI dev name
#27
#53274
DI dev No.
#27
#53275
DO dev name
#27
#53276
DO dev No.
#27
#53277
DI Hi-Spd
#27
#53278
DO Hi-Spd
#27
#28
Station
No.: 28
#53281
RIO CH No.
#28
#53282
RIO Sta. No.
#28
#53283
DI dev name
#28
#53284
DI dev No.
#28
#53285
DO dev name
#28
#53286
DO dev No.
#28
#53287
DI Hi-Spd
#28
#53288
DO Hi-Spd
#28
#29
Station
No.: 29
#53291
RIO CH No.
#29
#53292
RIO Sta. No.
#29
#53293
DI dev name
#29
#53294
DI dev No.
#29
#53295
DO dev name
#29
#53296
DO dev No.
#29
#53297
DI Hi-Spd
#29
#53298
DO Hi-Spd
#29
#30
Station
No.: 30
#53301
RIO CH No.
#30
#53302
RIO Sta. No.
#30
#53303
DI dev name
#30
#53304
DI dev No.
#30
#53305
DO dev name

#30
#53306
DO dev No.
#30
#53307
DI Hi-Spd
#30
#53308
DO Hi-Spd
#30
#31
Station
No.: 31
#53311
RIO CH No.
#31
#53312
RIO Sta. No.
#31
#53313
DI dev name
#31
#53314
DI dev No.
#31
#53315
DO dev name
#31
#53316
DO dev No.
#31
#53317
DI Hi-Spd
#31
#53318
DO Hi-Spd
#31
#32
Station
No.: 32
#53321
RIO CH No.
#32
#53322
RIO Sta. No.
#32
#53323
DI dev name
#32
#53324
DI dev No.
#32
#53325
DO dev name
#32
#53326
DO dev No.
#32
#53327
DI Hi-Spd
#32
#53328
DO Hi-Spd
#32
#33
Station
No.: 33
#53331
RIO CH No.
#33
#53332
RIO Sta. No.
#33
#53333
DI dev name
#33
#53334
DI dev No.
#33
#53335
DO dev name
#33
#53336
DO dev No.
#33
#53337
DI Hi-Spd
#33

#53338
DO Hi-Spd
#33
#34
Station
No.: 34
#53341
RIO CH No.
#34
#53342
RIO Sta. No.
#34
#53343
DI dev name
#34
#53344
DI dev No.
#34
#53345
DO dev name
#34
#53346
DO dev No.
#34
#53347
DI Hi-Spd
#34
#53348
DO Hi-Spd
#34
#35
Station
No.: 35
#53351
RIO CH No.
#35
#53352
RIO Sta. No.
#35
#53353
DI dev name
#35
#53354
DI dev No.
#35
#53355
DO dev name
#35
#53356
DO dev No.
#35
#53357
DI Hi-Spd
#35
#53358
DO Hi-Spd
#35
#36
Station
No.: 36
#53361
RIO CH No.
#36
#53362
RIO Sta. No.
#36
#53363
DI dev name
#36
#53364
DI dev No.
#36
#53365
DO dev name
#36
#53366
DO dev No.
#36
#53367
DI Hi-Spd
#36
#53368
DO Hi-Spd
#36
#37
Station
No.: 37
#53371

RIO CH No.
#37
#53372
RIO Sta. No.
#37
#53373
DI dev name
#37
#53374
DI dev No.
#37
#53375
DO dev name
#37
#53376
DO dev No.
#37
#53377
DI Hi-Spd
#37
#53378
DO Hi-Spd
#37
RIO CH No. RIO Sta.
No.
DI dev
name
DI dev No. DO dev
name
DO dev No. DI Hi-Spd DO Hi-Spd

#38
Station
No.: 38
#53381
RIO CH No.
#38
#53382
RIO Sta. No.
#38
#53383
DI dev name
#38
#53384
DI dev No.
#38
#53385
DO dev name
#38
#53386
DO dev No.
#38
#53387
DI Hi-Spd
#38
#53388
DO Hi-Spd
#38
#39
Station
No.: 39
#53391
RIO CH No.
#39
#53392
RIO Sta. No.
#39
#53393
DI dev name
#39
#53394
DI dev No.
#39
#53395
DO dev name
#39
#53396
DO dev No.
#39
#53397
DI Hi-Spd
#39
#53398
DO Hi-Spd
#39
#40

Station
No.: 40
#53401
RIO CH No.
#40
#53402
RIO Sta. No.
#40
#53403
DI dev name
#40
#53404
DI dev No.
#40
#53405
DO dev name
#40
#53406
DO dev No.
#40
#53407
DI Hi-Spd
#40
#53408
DO Hi-Spd
#40
#41
Station
No.: 41
#53411
RIO CH No.
#41
#53412
RIO Sta. No.
#41
#53413
DI dev name
#41
#53414
DI dev No.
#41
#53415
DO dev name
#41
#53416
DO dev No.
#41
#53417
DI Hi-Spd
#41
#53418
DO Hi-Spd
#41
#42
Station
No.: 42
#53421
RIO CH No.
#42
#53422
RIO Sta. No.
#42
#53423
DI dev name
#42
#53424
DI dev No.
#42
#53425
DO dev name
#42
#53426
DO dev No.
#42
#53427
DI Hi-Spd
#42
#53428
DO Hi-Spd
#42
#43
Station
No.: 43
#53431
RIO CH No.
#43
#53432
RIO Sta. No.

#43
#53433
DI dev name
#43
#53434
DI dev No.
#43
#53435
DO dev name
#43
#53436
DO dev No.
#43
#53437
DI Hi-Spd
#43
#53438
DO Hi-Spd
#43
#44
Station
No.: 44
#53441
RIO CH No.
#44
#53442
RIO Sta. No.
#44
#53443
DI dev name
#44
#53444
DI dev No.
#44
#53445
DO dev name
#44
#53446
DO dev No.
#44
#53447
DI Hi-Spd
#44
#53448
DO Hi-Spd
#44
#45
Station
No.: 45
#53451
RIO CH No.
#45
#53452
RIO Sta. No.
#45
#53453
DI dev name
#45
#53454
DI dev No.
#45
#53455
DO dev name
#45
#53456
DO dev No.
#45
#53457
DI Hi-Spd
#45
#53458
DO Hi-Spd
#45
#46
Station
No.: 46
#53461
RIO CH No.
#46
#53462
RIO Sta. No.
#46
#53463
DI dev name
#46
#53464
DI dev No.
#46

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DO Hi-Spd
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Station
No.: 47
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DO Hi-Spd
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Station
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DO Hi-Spd
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Station
No.: 49
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RIO Sta. No.
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DO dev No.
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DI Hi-Spd
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DO Hi-Spd
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Station
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DO Hi-Spd
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Station
No.: 51
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RIO CH No.
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RIO Sta. No.
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DO dev No.
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DI Hi-Spd
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DO Hi-Spd
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Station
No.: 52
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DI Hi-Spd
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DO Hi-Spd
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#53
Station

No.: 53
#53531
RIO CH No.
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RIO Sta. No.
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DI dev name
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DO dev name
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DO dev No.
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DI Hi-Spd
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DO Hi-Spd
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Station
No.: 54
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RIO CH No.
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RIO Sta. No.
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DI dev name
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DI Hi-Spd
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DO Hi-Spd
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Station
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#53551
RIO CH No.
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DI Hi-Spd
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DO Hi-Spd
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Station
No.: 56
#53561
RIO CH No.
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#53562
RIO Sta. No.
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DI dev name
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DO dev No.
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DI Hi-Spd
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DO Hi-Spd
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RIO CH No. RIO Sta.
No.
DI dev
name
DI dev No. DO dev
name
DO dev No. DI Hi-Spd DO Hi-Spd

#57
Station
No.: 57
#53571
RIO CH No.
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#53572
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DI dev name
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DO dev name
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DO dev No.
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DI Hi-Spd
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DO Hi-Spd
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Station
No.: 58
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RIO CH No.
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RIO Sta. No.
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DI dev No.
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DO dev No.
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DI Hi-Spd
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DO Hi-Spd
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#59
Station
No.: 59
#53591
RIO CH No.
#59

#53592
RIO Sta. No.
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DI dev name
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DI dev No.
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#53595
DO dev name
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DO dev No.
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DI Hi-Spd
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DO Hi-Spd
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Station
No.: 60
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RIO Sta. No.
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DI Hi-Spd
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DO Hi-Spd
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Station
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RIO Sta. No.
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DI dev name
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DO dev name
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DO dev No.
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DI Hi-Spd
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DO Hi-Spd
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Station
No.: 62
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RIO CH No.
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RIO Sta. No.
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DI dev name
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DI dev No.
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DO dev name
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DO dev No.
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DI Hi-Spd
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DO Hi-Spd
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Station
No.: 63
#53631
RIO CH No.
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RIO Sta. No.
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DI dev name
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DO dev name
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DO dev No.
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DI Hi-Spd
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DO Hi-Spd
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Station
No.: 64
#53641
RIO CH No.
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RIO Sta. No.
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DO Hi-Spd
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Station
No.: 65
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RIO CH No.
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RIO Sta. No.
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DI dev name
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DO dev No.

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DI Hi-Spd
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DO Hi-Spd
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Station
No.: 66
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RIO Sta. No.
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DO dev No.
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DI Hi-Spd
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Station
No.: 67
#53671
RIO CH No.
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RIO Sta. No.
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DI dev name
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DO dev name
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DO dev No.
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DI Hi-Spd
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DO Hi-Spd
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Station
No.: 68
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RIO Sta. No.
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DI dev name
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DO dev name
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DO dev No.
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DI Hi-Spd
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DO Hi-Spd
#68

#69
Station
No.: 69
#53691
RIO CH No.
#69
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RIO Sta. No.
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#53693
DI dev name
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DI dev No.
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#53695
DO dev name
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DO dev No.
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DI Hi-Spd
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DO Hi-Spd
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Station
No.: 70
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RIO CH No.
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RIO Sta. No.
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DI dev No.
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DO dev name
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DO dev No.
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DO Hi-Spd
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Station
No.: 71
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DI dev name
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DO dev name
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DO dev No.
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DI Hi-Spd
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DO Hi-Spd
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Station
No.: 72
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RIO CH No.
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RIO Sta. No.
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DI dev name
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DI dev No.
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DO dev name
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DO dev No.
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DI Hi-Spd
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DO Hi-Spd
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Station
No.: 73
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RIO Sta. No.
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DI dev name
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DI dev No.
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DO dev name
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DO dev No.
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DI Hi-Spd
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DO Hi-Spd
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Station
No.: 74
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RIO CH No.
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RIO Sta. No.
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DI dev name
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DI dev No.
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#53745
DO dev name
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DO dev No.
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DI Hi-Spd
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DO Hi-Spd
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#75
Station
No.: 75
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RIO CH No.
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DI dev name
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DI dev No.

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DO dev name
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DO dev No.
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DI Hi-Spd
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DO Hi-Spd
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RIO CH No. RIO Sta.
No.
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name
DI dev No. DO dev
name
DO dev No. DI Hi-Spd DO Hi-Spd

#76
Station
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RIO CH No.
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DI dev name
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DO dev name
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DO dev No.
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DI Hi-Spd
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#53768
DO Hi-Spd
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Station
No.: 77
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RIO Sta. No.
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DO dev No.
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DO Hi-Spd
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Station
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DI dev name

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DO dev name
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DO dev No.
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DI Hi-Spd
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DO Hi-Spd
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Station
No.: 79
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DO dev name
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DO dev No.
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DO Hi-Spd
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Station
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DO Hi-Spd
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Station
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Station
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DO dev No.
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Station
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DO dev No.
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DO Hi-Spd
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Station
No.: 84
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DO dev No.
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DI Hi-Spd
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DO Hi-Spd
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Station
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Station
No.: 86
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DO dev name
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DO dev No.
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DO Hi-Spd
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Station
No.: 87
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DO dev name
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DO dev No.
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DO Hi-Spd
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Station
No.: 88
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RIO CH No.

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RIO Sta. No.
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DO dev No.
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DO Hi-Spd
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Station
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DO dev name
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DO dev No.
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DO Hi-Spd
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Station
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DO dev No.
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Station
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DO Hi-Spd
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Station
No.: 92
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RIO Sta. No.
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DI dev No.
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DO dev name
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#53926
DO dev No.
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DI Hi-Spd
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#53928
DO Hi-Spd
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#93
Station
No.: 93
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RIO CH No.
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RIO Sta. No.
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DI dev No.
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DO dev name
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DO dev No.
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DI Hi-Spd
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#53938
DO Hi-Spd
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#94
Station
No.: 94
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RIO CH No.
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#53942
RIO Sta. No.
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DI dev name
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DI dev No.
#94
#53945
DO dev name
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#53946

DO dev No.
#94
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DI Hi-Spd
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#53948
DO Hi-Spd
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RIO CH No. RIO Sta.
No.
DI dev
name
DI dev No. DO dev
name
DO dev No. DI Hi-Spd DO Hi-Spd

#95
Station
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RIO CH No.
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DO dev name
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DO dev No.
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DI Hi-Spd
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#53958
DO Hi-Spd
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Station
No.: 96
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RIO CH No.
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RIO Sta. No.
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DI dev No.
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DO dev name
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DO dev No.
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DI Hi-Spd
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DO Hi-Spd
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Station
No.: 97
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DO dev No.
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DI Hi-Spd
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DO Hi-Spd
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Station
No.: 98
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RIO CH No.
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RIO Sta. No.
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DI dev name
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DI dev No.
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#53985
DO dev name
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DO dev No.
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DI Hi-Spd
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DO Hi-Spd
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Station
No.: 99
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RIO CH No.
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RIO Sta. No.
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DI dev name
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DO dev name
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DO dev No.
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DI Hi-Spd
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DO Hi-Spd
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Station
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RIO CH No.
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RIO Sta. No.
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DO dev name
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DO dev No.
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DI Hi-Spd

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Station
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DI dev No.
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DO dev No.
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DI Hi-Spd
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DO Hi-Spd
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Station
No.: 102
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RIO Sta. No.
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DO dev No.
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DI Hi-Spd
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DO Hi-Spd
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Station
No.: 103
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RIO Sta. No.
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DI dev No.
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DO dev name
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#54036
DO dev No.
#103
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DI Hi-Spd
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#54038
DO Hi-Spd
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Station
No.: 104

#54041
RIO CH No.
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RIO Sta. No.
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DI dev name
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#54044
DI dev No.
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#54045
DO dev name
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DO dev No.
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#54047
DI Hi-Spd
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#54048
DO Hi-Spd
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#105
Station
No.:105
#54051
RIO CH No.
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RIO Sta. No.
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DI dev name
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DI dev No.
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#54055
DO dev name
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DO dev No.
#105
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DI Hi-Spd
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#54058
DO Hi-Spd
#105
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Station
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#54138
DO Hi-Spd
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No.
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DI dev No. DO dev
name
DO dev No. DI Hi-Spd DO Hi-Spd

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RIO Sta. No.

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DO Hi-Spd
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RIO Sta. No.
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DO Hi-Spd
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DO Hi-Spd
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DO Hi-Spd
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No.

DI dev
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name
DO dev No. DI Hi-Spd DO Hi-Spd

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Station
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DO Hi-Spd
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Station
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RIO Sta. No.
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DO dev No.
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DO Hi-Spd

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DO Hi-Spd
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Station
No.: 138
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RIO Sta. No.
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DO Hi-Spd
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Station
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#54391
RIO CH No.
#139

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DO dev name
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DO Hi-Spd
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DO Hi-Spd
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Station
No.: 142
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#54422
RIO Sta. No.
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DO dev No.
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DO dev No.
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RIO Sta. No.
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DO dev No.
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RIO Sta. No.
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DO dev No.

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DO Hi-Spd
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Station
No.: 146
#54461
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RIO Sta. No.
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DO dev name
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DO dev No.
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DO Hi-Spd
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Station
No.: 147
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No.
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name
DO dev No. DI Hi-Spd DO Hi-Spd

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Station
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Station
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Station
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#54648

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Station
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RIO Sta. No.
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#54654
DI dev No.
#165
#54655
DO dev name
#165
#54656
DO dev No.
#165
#54657
DI Hi-Spd
#165
#54658
DO Hi-Spd
#165
#166
Station
No.: 166
#54661
RIO CH No.
#166
#54662
RIO Sta. No.
#166
#54663
DI dev name
#166
#54664
DI dev No.
#166
#54665
DO dev name
#166
#54666
DO dev No.
#166
#54667
DI Hi-Spd
#166
#54668
DO Hi-Spd
#166
#167
Station
No.: 167
#54671
RIO CH No.
#167
#54672
RIO Sta. No.
#167
#54673
DI dev name
#167
#54674
DI dev No.
#167
#54675
DO dev name
#167
#54676
DO dev No.
#167
#54677
DI Hi-Spd
#167
#54678
DO Hi-Spd
#167
#168
Station
No.: 168
#54681
RIO CH No.

#168
#54682
RIO Sta. No.
#168
#54683
DI dev name
#168
#54684
DI dev No.
#168
#54685
DO dev name
#168
#54686
DO dev No.
#168
#54687
DI Hi-Spd
#168
#54688
DO Hi-Spd
#168
#169
Station
No.: 169
#54691
RIO CH No.
#169
#54692
RIO Sta. No.
#169
#54693
DI dev name
#169
#54694
DI dev No.
#169
#54695
DO dev name
#169
#54696
DO dev No.
#169
#54697
DI Hi-Spd
#169
#54698
DO Hi-Spd
#169
#170
Station
No.: 170
#54701
RIO CH No.
#170
#54702
RIO Sta. No.
#170
#54703
DI dev name
#170
#54704
DI dev No.
#170
#54705
DO dev name
#170
#54706
DO dev No.
#170
#54707
DI Hi-Spd
#170
#54708
DO Hi-Spd
#170
RIO CH No. RIO Sta.
No.
DI dev
name
DI dev No. DO dev
name
DO dev No. DI Hi-Spd DO Hi-Spd

#171
Station

No.: 171
#54711
RIO CH No.
#171
#54712
RIO Sta. No.
#171
#54713
DI dev name
#171
#54714
DI dev No.
#171
#54715
DO dev name
#171
#54716
DO dev No.
#171
#54717
DI Hi-Spd
#171
#54718
DO Hi-Spd
#171
#172
Station
No.: 172
#54721
RIO CH No.
#172
#54722
RIO Sta. No.
#172
#54723
DI dev name
#172
#54724
DI dev No.
#172
#54725
DO dev name
#172
#54726
DO dev No.
#172
#54727
DI Hi-Spd
#172
#54728
DO Hi-Spd
#172
#173
Station
No.: 173
#54731
RIO CH No.
#173
#54732
RIO Sta. No.
#173
#54733
DI dev name
#173
#54734
DI dev No.
#173
#54735
DO dev name
#173
#54736
DO dev No.
#173
#54737
DI Hi-Spd
#173
#54738
DO Hi-Spd
#173
#174
Station
No.: 174
#54741
RIO CH No.
#174
#54742
RIO Sta. No.
#174

#54743
DI dev name
#174
#54744
DI dev No.
#174
#54745
DO dev name
#174
#54746
DO dev No.
#174
#54747
DI Hi-Spd
#174
#54748
DO Hi-Spd
#174
#175
Station
No.: 175
#54751
RIO CH No.
#175
#54752
RIO Sta. No.
#175
#54753
DI dev name
#175
#54754
DI dev No.
#175
#54755
DO dev name
#175
#54756
DO dev No.
#175
#54757
DI Hi-Spd
#175
#54758
DO Hi-Spd
#175
#176
Station
No.: 176
#54761
RIO CH No.
#176
#54762
RIO Sta. No.
#176
#54763
DI dev name
#176
#54764
DI dev No.
#176
#54765
DO dev name
#176
#54766
DO dev No.
#176
#54767
DI Hi-Spd
#176
#54768
DO Hi-Spd
#176
#177
Station
No.: 177
#54771
RIO CH No.
#177
#54772
RIO Sta. No.
#177
#54773
DI dev name
#177
#54774
DI dev No.
#177
#54775

DO dev name
#177
#54776
DO dev No.
#177
#54777
DI Hi-Spd
#177
#54778
DO Hi-Spd
#177
#178
Station
No.: 178
#54781
RIO CH No.
#178
#54782
RIO Sta. No.
#178
#54783
DI dev name
#178
#54784
DI dev No.
#178
#54785
DO dev name
#178
#54786
DO dev No.
#178
#54787
DI Hi-Spd
#178
#54788
DO Hi-Spd
#178
#179
Station
No.: 179
#54791
RIO CH No.
#179
#54792
RIO Sta. No.
#179
#54793
DI dev name
#179
#54794
DI dev No.
#179
#54795
DO dev name
#179
#54796
DO dev No.
#179
#54797
DI Hi-Spd
#179
#54798
DO Hi-Spd
#179
#180
Station
No.: 180
#54801
RIO CH No.
#180
#54802
RIO Sta. No.
#180
#54803
DI dev name
#180
#54804
DI dev No.
#180
#54805
DO dev name
#180
#54806
DO dev No.
#180
#54807
DI Hi-Spd

#180
#54808
DO Hi-Spd
#180
#181
Station
No.: 181
#54811
RIO CH No.
#181
#54812
RIO Sta. No.
#181
#54813
DI dev name
#181
#54814
DI dev No.
#181
#54815
DO dev name
#181
#54816
DO dev No.
#181
#54817
DI Hi-Spd
#181
#54818
DO Hi-Spd
#181
#182
Station
No.: 182
#54821
RIO CH No.
#182
#54822
RIO Sta. No.
#182
#54823
DI dev name
#182
#54824
DI dev No.
#182
#54825
DO dev name
#182
#54826
DO dev No.
#182
#54827
DI Hi-Spd
#182
#54828
DO Hi-Spd
#182
#183
Station
No.: 183
#54831
RIO CH No.
#183
#54832
RIO Sta. No.
#183
#54833
DI dev name
#183
#54834
DI dev No.
#183
#54835
DO dev name
#183
#54836
DO dev No.
#183
#54837
DI Hi-Spd
#183
#54838
DO Hi-Spd
#183
#184
Station
No.: 184

#54841
RIO CH No.
#184
#54842
RIO Sta. No.
#184
#54843
DI dev name
#184
#54844
DI dev No.
#184
#54845
DO dev name
#184
#54846
DO dev No.
#184
#54847
DI Hi-Spd
#184
#54848
DO Hi-Spd
#184
#185
Station
No.: 185
#54851
RIO CH No.
#185
#54852
RIO Sta. No.
#185
#54853
DI dev name
#185
#54854
DI dev No.
#185
#54855
DO dev name
#185
#54856
DO dev No.
#185
#54857
DI Hi-Spd
#185
#54858
DO Hi-Spd
#185
#186
Station
No.: 186
#54861
RIO CH No.
#186
#54862
RIO Sta. No.
#186
#54863
DI dev name
#186
#54864
DI dev No.
#186
#54865
DO dev name
#186
#54866
DO dev No.
#186
#54867
DI Hi-Spd
#186
#54868
DO Hi-Spd
#186
RIO CH No. RIO Sta.
No.
DI dev
name
DI dev No. DO dev
name
DO dev No. DI Hi-Spd DO Hi-Spd

15.21 Open Parameters
Set LONG data.
#29001 to #29896 are used as parameter range where C language modules can be used arbitrarily.
Set DOUBLE data.
#29901 to #29996 are used as parameter range where C language modules can be used arbitrarily.
#29001-
29896
Open param 1
#29901-
29996
Open param 2

15.22 Device Open Parameters
<Data typ>
Set the data format (BYTE, WORD, DWORD, WORD(BIT)) of the assignment area.
0: WORD
1: DWORD
2: BYTE
3: WORD(BIT)
<Data no>
Set the number of data in the assignment area. The number to be designated varies depending on the unit designated by the data format.
0 to 3000
(Depends on the device assignment and data format.)
<Disp typ>
Designate the status of data display format, display restrictions and input protection.
bit0: Cancellation of protection for input
Select whether to check the input protection for the data protection key 2 on the group details screen.
(Note) The name of data protection key differs between machine tool builders. Refer to manuals issued by each machine tool builder for details.
0: Check
1: Not check
bit1: Cancellation of restriction on display
Select whether to display the group details screen even when a machine tool builder password is not entered.
0: Not display
1: Display
bit4: BCD format
Display the data of the group details screen in BCD format.
0: Disabled
1: Enabled
bit5: BIT format
Display the data of the group details screen in BIT format.
0: Disabled
1: Enabled
bit6: HEX format (Hexadecimal format)
Display the data of the group details screen in HEX format.
0: Disabled
1: Enabled
bit7: Sign (Decimal format only)
Select whether to display the data of the group details screen in a decimal format with/without a sign.
0: With sign
1: Without sign
#40001-
40100
Device Open Parameters

15.23 SRAM Open Parameters
<Data typ>
Set the data type (CHAR, SHORT, LONG, DOUBLE) of the assignment area.
1: CHAR
2: SHORT
3: LONG
4: DOUBLE
<Data no>
Set the number of data in the assignment area. The number to be designated varies depending on the unit and free area designated by the data format.
0 to 9999999 (Depends on the data format and free area)
<Disp typ>
Designate the status of data display format, display restrictions and input protection.
bit0: Cancellation of protection for input
Select whether to check the input protection for the data protection key 2 on the group details screen.
(Note) The name of data protection key differs between machine tool builders. Refer to manuals issued by each machine tool builder for details.
0: Check
1: Not check
bit1: Cancellation of restriction on display
Select whether to display the group details screen even when a machine tool builder password is not entered.
0: Not display
1: Display
bit4: BCD format
Display the data of the group details screen in BCD format.
0: Disable
1: Enable
bit5: BIT format

Display the data of the group details screen in BIT format.
0: Disable
1: Enable
bit6: HEX format (Hexadecimal format)
Display the data of the group details screen in HEX format.
0: Disable
1: Enable
bit7: Sign (Decimal format only)
Select whether to display the data of the group details screen in a decimal format with/without a sign.
0: With sign
1: Without sign
#41001-
41100
SRAM Open Parameters

15.24 CC-Link Parameters
Set the station No. of the CC-Link I/F unit.
"n" represents the expansion slot No. (n=1 to 3)
-1: Invalid
0: Master station
1 to 64: Slave station
---Master station---
Set a value within the setting range.
---Local/standby master station---
Set a value within the setting range.
---Setting range---
-1 to 64
Select the transmission rate and operation mode of the CC-Link I/F unit.
"n" represents the expansion slot No. (n=1 to 3)
<Online mode>
0: 156Kbps
1: 625Kbps
2: 2.5Mbps
3: 5Mbps
4: 10Mbps
<Circuit test mode>
5: 156Kbps
6: 625Kbps
7: 2.5Mbps
8: 5Mbps
9: 10Mbps
<Hardware test mode>
10: 156Kbps
11: 625Kbps
12: 2.5Mbps
13: 5Mbps
14: 10Mbps
(Note) Perform hardware test after removing the CC-Link cable.
---Master station---
Set a value within the setting range.
---Local/standby master station---
Set a value within the setting range.
---Setting range---
0 to 14
(PR) #24001+40(n-1) SLn station No. CC-Link station No.
(PR) #24002+40(n-1) SLn line-spd&Mode CC-Link transmission rate and mode

Select whether to clear or hold the data input from the data link faulty station.
"n" represents the expansion slot No. (n=1 to 3)
0: Clear
1: Hold
(Note) Refer to "CC-Link System Master/Local Module User's Manual (SH-080394E)" for the details of the functions.
---Master station---
Set to "0" or "1".
---Local/standby master station---
Set to "0" or "1".
Set whether to refresh or compulsorily clear the slave stations at PLC STOP.
"n" represents the expansion slot No. (n=1 to 3)
0: Refresh
1: Compulsorily clear
(Note) Refer to "CC-Link System Master/Local Module User's Manual (SH-080394E)" for the details of the functions.
---Master station---
Set to "0" or "1".
---Local/standby master station---
Set to "0" or "1".
Set the number of occupied local and standby master stations.
"n" represents the expansion slot No. (n=1 to 3)
---Master station---
Set to "0".
---Local/standby master station---
Set to either of "1" to "4".
---Setting range---

0 to 4
Set the magnification for the extended cyclic operation of the local station whose type corresponds to Ver.2.
"n" represents the expansion slot No. (n=1 to 3)
Set "1" for the local station whose type corresponds to Ver.1.
This function is out of specifications when the protocol version is Ver.1. The setting for the local station is fixed to "1".
---Master station---
Set to "0".
---Local/standby master station---
Set to either of "1", "2", "4" or "8".
---Setting range---
0, 1, 2, 4, 8 (times)
(PR) #24003+40(n-1) SLn set fault sta Setting of data link faulty station
#24004+40(n-1) SLn PLC stop set Setting at PLC STOP
(PR) #24005+40(n-1) SLn occ stations Number of occupied stations
(PR) #24006+40(n-1) SLn extended cyc Extended cyclic setting

Set the total number of remote stations, local stations, intelligent device stations, standby master station and reserved stations connected to the master station.
"n" represents the expansion slot No. (n=1 to 3)
---Master station---
Set to either of "1" to "64".
---Local/standby master station---
Set to "0".
---Setting range---
0 to 64 (modules)
Set the number of retries for when a communication error occurs.
"n" represents the expansion slot No. (n=1 to 3)
---Master station---
Set to either of "1" to "7".
---Local/standby master station---
Set to "0".
---Setting range---
0 to 7 (times)
Set the total number of remote stations, local stations, intelligent device stations and standby master station that can be returned to system operation by a single link scan.
"n" represents the expansion slot No. (n=1 to 3)
(Note) Refer to "CC-Link System Master/Local Module User's Manual (SH-080394E)" for the details of the functions.
---Master station---
Set to either of "1" to "10".
---Local/standby master station---
Set to "0".
---Setting range---
0 to 10 (modules)
Set the station No. of the standby master station.
"n" represents the expansion slot No. (n=1 to 3)
Set "0" when no standby master station is provided.
---Master station---
Set a value within the setting range.
---Local/standby master station---
Set "0" (fixed) for the local station.
Set "1" (fixed) for the standby station.
---Setting range---
0 to 64
#24007+40(n-1) SLn conn modules Number of connected modules
#24008+40(n-1) SLn num of retries Number of retries
#24009+40(n-1) SLn auto ret mdls Number of automatic return modules
(PR) #24010+40(n-1) SLn STBY master st Standby master station

Set the data link status for when the master station failure occurs.
"n" represents the expansion slot No. (n=1 to 3)
0: Fixed to stop
(Note) Refer to "CC-Link System Master/Local Module User's Manual (SH-080394E)" for the details of the functions.
---Master station---
Set to "0" (fixed).
---Local/standby master station---
Set to "0".
Select whether to synchronize the link scan with one ladder scan.
"n" represents the expansion slot No. (n=1 to 3)
0: Fixed to synchronize
---Master station---
Set to "0" (fixed).
---Local/standby master station---
Set to "0".
Set the delay time.
"n" represents the expansion slot No. (n=1 to 3)
0: (Fixed value)
---Master station---
Set to "0" (fixed).
---Local/standby master station---
Set to "0".
Set the refresh device name of the remote input (RX) to be automatically refreshed.

(Example) X
"n" represents the expansion slot No. (n=1 to 3)
Set "0" when no setting is required.
---Master station---
Set a value within the setting range.
---Local/standby master station---
Set a value within the setting range.
---Setting range---
0, X, M, L, B, D, W, R
#24011+40(n-1) SLn ope at NC down Operation at NC down
#24012+40(n-1) SLn scan mode Scan mode
#24013+40(n-1) SLn delay time Delay time
#24014+40(n-1) SLn RX dev name Remote input (RX) refresh device name
M800/M80/E80 Series Alarm/Parameter Manual
15 Machine Parameters
651 IB-1501279-S
Set the refresh device No. of the remote input (RX) to be automatically refreshed.
"n" represents the expansion slot No. (n=1 to 3)
(Note 1) When setting parameters in ALL.PRM with using the parameter input/output function, input the de vice No. of decimal digit.
(Example) When setting "X400" for the remote input (RX) refresh device No., input as follows;
#24014+40(n-1): "X"
#24015+40(n-1): "1024"
(Note 2) When the refresh device name has been set, the refresh device No. will be "0".
Confirm the refresh device No. after changing the refresh device name.
If you specify bit devices, set them in increments of 16 points.
The operation will not be guaranteed unless the address is set in increments of 16 points.
(Example) 1000
---Master station---
Set a value within the setting range.
---Local/standby master station---
Set a value within the setting range.
---Setting range---
X: 0 to 5FF
M: 0 to 10239
L: 0 to 511
B: 0 to 1FFF
D: 0 to 2047
W: 0 to 1FFF
R: 8300 to 9799, 9800 to 9899
Set the refresh device name of the remote output (RY) to be automatically refreshed.
(Example) Y
"n" represents the expansion slot No. (n=1 to 3)
Set "0" when no setting is required.
---Master station---
Set a value within the setting range.
---Local/standby master station---
Set a value within the setting range.
---Setting range---
0, Y, M, L, B, D, W, R
#24015+40(n-1) SLn RX dev No. Remote input (RX) refresh device No.
#24016+40(n-1) SLn RY dev name Remote output (RY) refresh device name
M800/M80/E80 Series Alarm/Parameter Manual
15 Machine Parameters
IB-1501279-S 652
Set the refresh device No. of the remote output (RY) to be automatically refreshed.
"n" represents the expansion slot No. (n=1 to 3)
(Note 1) When setting parameters in ALL.PRM with using the parameter input/output function, input the de vice No. of decimal digit.
(Example) When setting "X400" for the remote input (RX) refresh device No., input as follows;
#24014+40(n-1): "X"
#24015+40(n-1): "1024"
(Note 2) When the refresh device name has been set, the refresh device No. will be "0".
Confirm the refresh device No. after changing the refresh device name.
If you specify bit devices, set them in increments of 16 points.
The operation will not be guaranteed unless the address is set in increments of 16 points.
(Example) 1000
---Master station---
Set a value within the setting range.
---Local/standby master station---
Set a value within the setting range.
---Setting range---
Y: 0 to 5FF
M: 0 to 10239
L: 0 to 511
B: 0 to 1FFF
D: 0 to 2047
W: 0 to 1FFF
R: 8300 to 9799, 9800 to 9899
Set the refresh device name of the remote register (RWr) to be automatically refreshed.
(Example) W
"n" represents the expansion slot No. (n=1 to 3)
Set "0" when no setting is required.
---Master station---
Set a value within the setting range.
---Local/standby master station---
Set a value within the setting range.
---Setting range---
0, M, L, B, D, W, R
#24017+40(n-1) SLn RY dev No. Remote output (RY) refresh device No.

#24018+40(n-1) SLn RWr dev name Remote register (RWr) refresh device name

Set the refresh device No. of the remote register (RWr) to be automatically refreshed.
"n" represents the expansion slot No. (n=1 to 3)
(Note 1) When setting parameters in ALL.PRM with using the parameter input/output function, input the de vice No. of decimal digit.
(Example) When setting "X400" for the remote input (RX) refresh device No., input as follows;
#24014+40(n-1): "X"
#24015+40(n-1): "1024"
(Note 2) When the refresh device name has been set, the refresh device No. will be "0".
Confirm the refresh device No. after changing the refresh device name.
If you specify bit devices, set them in increments of 16 points.
The operation will not be guaranteed unless the address is set in increments of 16 points.
(Example) 1FF0
---Master station---
Set a value within the setting range.
---Local/standby master station---
Set a value within the setting range.
---Setting range---
M: 0 to 10239
L: 0 to 511
B: 0 to 1FFF
D: 0 to 2047
W: 0 to 1FFF
R: 8300 to 9799, 9800 to 9899
Set the refresh device name of the remote register (RWw) to be automatically refreshed.
(Example) W
"n" represents the expansion slot No. (n=1 to 3)
Set "0" when no setting is required.
---Master station---
Set a value within the setting range.
---Local/standby master station---
Set a value within the setting range.
---Setting range---
0, M, L, B, D, W, R
#24019+40(n-1) SLn RWr dev No. Remote register (RWr) refresh device No.
#24020+40(n-1) SLn RWw dev name Remote register (RWw) refresh device name

Set the refresh device No. of the remote register (RWw) to be automatically refreshed.
"n" represents the expansion slot No. (n=1 to 3)
(Note 1) When setting parameters in ALL.PRM with using the parameter input/output function, input the de vice No. of decimal digit.
(Example) When setting "X400" for the remote input (RX) refresh device No., input as follows;
#24014+40(n-1): "X"
#24015+40(n-1): "1024"
(Note 2) When the refresh device name has been set, the refresh device No. will be "0".
Confirm the refresh device No. after changing the refresh device name.
If you specify bit devices, set them in increments of 16 points.
The operation will not be guaranteed unless the address is set in increments of 16 points.
(Example) 1FF0
---Master station---
Set a value within the setting range.
---Local/standby master station---
Set a value within the setting range.
---Setting range---
M: 0 to 10239
L: 0 to 511
B: 0 to 1FFF
D: 0 to 2047
W: 0 to 1FFF
R: 8300 to 9799, 9800 to 9899
Set the refresh device name of the special relay (SB) to be automatically refreshed.
(Example) SB
"n" represents the expansion slot No. (n=1 to 3)
Set "0" when no setting is required.
---Master station---
Set a value within the setting range.
---Local/standby master station---
Set a value within the setting range.
---Setting range---
0, M, L, B, D, W, R, SB
#24021+40(n-1) SLn RWw dev No. Remote register (RWw) refresh device No.
#24022+40(n-1) SLn SB dev name Special relay (SB) refresh device name

Set the refresh device No. of the special relay (SB) to be automatically refreshed.
"n" represents the expansion slot No. (n=1 to 3)
(Note 1) When setting parameters in ALL.PRM with using the parameter input/output function, input the de vice No. of decimal digit.
(Example) When setting "X400" for the remote input (RX) refresh device No., input as follows;
#24014+40(n-1): "X"
#24015+40(n-1): "1024"
(Note 2) When the refresh device name has been set, the refresh device No. will be "0".
Confirm the refresh device No. after changing the refresh device name.
If you specify bit devices, set them in increments of 16 points.
The operation will not be guaranteed unless the address is set in increments of 16 points.

(Example) 1F0
---Master station---
Set a value within the setting range.
---Local/standby master station---
Set a value within the setting range.
---Setting range---
M: 0 to 10239
L: 0 to 511
B: 0 to 1FFF
D: 0 to 2047
W: 0 to 1FFF
SB: 0 to 1FF
R: 8300 to 9799, 9800 to 9899
Set the refresh device name of the special relay (SW) to be automatically refreshed.
"n" represents the expansion slot No. (n=1 to 3)
(Example) SW
Set "0" when no setting is required.
---Master station---
Set a value within the setting range.
---Local/standby master station---
Set a value within the setting range.
---Setting range---
0, M, L, B, D, W, R, SW
#24023+40(n-1) SLn SB dev No. Special relay (SB) refresh device No.
#24024+40(n-1) SLn SW dev name Special relay (SW) refresh device name

Set the refresh device No. of the special relay (SW) to be automatically refreshed.
"n" represents the expansion slot No. (n=1 to 3)
(Note 1) When setting parameters in ALL.PRM with using the parameter input/output function, input the de vice No. of decimal digit.
(Example) When setting "X400" for the remote input (RX) refresh device No., input as follows;
#24014+40(n-1): "X"
#24015+40(n-1): "1024"
(Note 2) When the refresh device name has been set, the refresh device No. will be "0".
Confirm the refresh device No. after changing the refresh device name.
If you specify bit devices, set them in increments of 16 points.
(Example) 1F0
---Master station---
Set a value within the setting range.
---Local/standby master station---
Set a value within the setting range.
---Setting range---
M: 0 to 10239
L: 0 to 511
B: 0 to 1FFF
D: 0 to 2047
W: 0 to 1FFF
SW: 0 to 1FF
R: 8300 to 9799, 9800 to 9899
Select the CC-Link version mode that has been set to the slide switch SW1-2 on the CC-Link unit (HN566/
HN567).
"n" represents the expansion slot No. (n=1 to 3)
0: Ver.2
1: Ver.1
Ver.2 mode has been set to SW1-2 as default.
---Master station---
Set to "0" or "1".
---Local/standby master station---
Set to "0" or "1".
Set the type of the connected remote station, local station, intelligent device station and standby master sta tion.
0: No setting
1: Ver.1 remote I/O station
2: Ver.1 remote device station
3: Ver.1 intelligent device station
4: Ver.2 remote device station
5: Ver.2 intelligent device station
"m" means the m-th connected station in ascending order of station No. (m=1 to 64)
---Master station---
Set to either of "0" to "5".
---Local/standby master station---
Set to "0".
#24025+40(n-1) SLn SW dev No. Special relay (SW) refresh device No.
(PR) #24026+40(n-1) SLn Protocol Ver Protocol version
#24121+15(m-1) CNm station type Station type

Select the magnification for the extended cycling operation of the connected remote, local and intelligent sta tions.
Set "1" when the protocol version is Ver.1.
Set "0" when no setting is required.
"m" means the m-th connected station in ascending order of station No. (m=1 to 64)
---Master station---
Set a value within the setting range.
---Local/standby master station---
Set to "0".
---Setting range---
0, 1, 2, 4, 8 (times)

Set the number of the occupied stations by the connected remote, local and intelligent stations.
Set 1 for 8 points I/O and 16 points I/O.
Set "0" when no setting is required.
"m" means the m-th connected station in ascending order of station No. (m=1 to 64)
---Master station---
Set a value within the setting range.
---Local/standby master station---
Set to "0".
---Setting range---
0 to 4 (stations occupied)
Set the station No. of the connected remote, local and intelligent stations.
Set "0" when no setting is required.
"m" means the m-th connected station in ascending order of station No. (m=1 to 64)
---Master station---
Set a value within the setting range.
---Local/standby master station---
Set to "0".
---Setting range---
0 to 64
#24122+15(m-1) CNm extended cyc Extended cyclic setting
#24123+15(m-1) CNm occ stations Number of occupied stations
#24124+15(m-1) CNm station No. Station No.

Select the number of points of the connected remote station.
"m" means the m-th connected station in ascending order of station No. (m=1 to 64)
The details of setting values differ with each protocol version and station type.
Protocol: Ver.2 (station type: Ver.1, remote I/O station)
0: 0 point (reserved station)
1: 8 points
2: 8 points + 8 points reserved
3: 16 points
4: 32 points
Setting "0" is valid only for the reserved station. When "0" is set for the other stations, the number of points will be 32.
Set the value so that the total number of points of remote I/O stations connected in series will be multiple of 16.
(Example 1) 2 units of 8 points I/O: Set "1" for each
(Example 2) 3 units of 8 points I/O: Set "1" for the first and the second I/O, "2" for the third.
Protocol: Ver.2 (station type: Ver.1 except remote I/O station)
0: 0 point (reserved station)
1 to 4: Automatically calculated
Setting "0" is valid only for the reserved station. When "0" is set for the other stations, the number of points will be automatically calculated.
Unless 0 is set, the number of points will be automatically calculated with the number of occupied stations and the setting value of the extended cycling.
Protocol: Ver.1 (for all station types)
0 to 4: Automatically calculated
"0" cannot be set even for the reserved station.
Automatically calculated with the setting value of the number of occupied stations.
---Master station---
Set a value corresponding to the protocol version and the station type.
---Local/standby master station---
Set to "0".
Set the reserved/error invalid station.
"m" means the m-th connected station in ascending order of station No. (m=1 to 64)
0: No setting
1: Reserved station
2: Error invalid station
(Note) Refer to "CC-Link System Master/Local Module User's Manual (SH-080394E)" for the details of the functions.
---Master station---
Set either of "0" to "2".
---Local/standby master station---
Set to "0".
#24125+15(m-1) CNm remote sta pt Remote station points
#24126+15(m-1) CNm set rsvd sta Reserved station

Set the allocation of the buffer memory size to the local station, standby master station and intelligent device station when in transient transmission.
"m" means the m-th connected station in ascending order of station No. (m=1 to 64)
Set "0" when no setting is required.
(Note) The total size of the send/receive buffers must be 4096 (words) or less.
---Master station---
Set a value within the setting range.
---Local/standby master station---
Set to "0".
---Setting range---
0, 64 to 4096 (words)
Set the allocation of the buffer memory size to the local station, standby master station and intelligent device station when in transient transmission.
"m" means the m-th connected station in ascending order of station No. (m=1 to 64)
Set "0" when no setting is required.
(Note) The total size of the send/receive buffers must be 4096 (words) or less.
---Master station---

Set a value within the setting range.
---Local/standby master station---
Set to "0".
---Setting range---
0, 64 to 4096 (words)
Set the allocation of the buffer memory size to the local station, standby master station and intelligent device
station when in transient transmission.
"m" means the m-th connected station in ascending order of station No. (m=1 to 64)
Set "0" when no setting is required.
---Master station---
Set a value within the setting range.
---Local/standby master station---
Set to "0".
---Setting range---
0, 128 to 4096 (words)
#24131+15(m-1) CNm send size Send buffer size
#24132+15(m-1) CNm receive size Receive buffer size
#24133+15(m-1) CNm auto bfr size Automatic update buffer size

15.25 PLC Axis Indexing Parameters
Set the axis No. to be controlled as auxiliary axis using auxiliary axis interface.
When "0" is set, the axis will not operate as auxiliary axis.
---Setting range---
0 to 8: (M800W/M800S Series)
0 to 4: (M80/M80W Series)
0 to 1: (E80)
Set the number of stations.
For linear axis, this value is expressed by: number of divisions = number of stations -1.
Setting "0" or "1" sets the number of stations to 2.
---Setting range---
0 to 360
The bits that are not explained here must be set to "0".
bit3:
0: Automatic reach signal isn't interlocked with the start signal.
1: Automatic reach signal is interlocked with the start signal.
bit4:
0: Automatic reach signal is turned ON again.
1: Automatic reach signal isn't turned ON again.
bit5:
0: Station No. Output within fixed position.
1: Station No. Constantly output.
bit9:
0: Rotation direction determined by operation control signal (DIR)
1: Rotation direction in the shortcut direction
bitE:
0: Rotation direction in operation control signal (DIR) or in the shortcut direction
1: Rotation direction in the arbitrary position command sign direction
bitF:
0: Stopper direction is in the positioning direction.
1: Stopper direction is in the sign direction of the stopper amount.
The bits that are not explained here must be set to "0".
bit4:
0: Uniform assignment
1: Arbitrary coordinate assignment
Set the movement stroke length for linear axes.
(Note 1) Setting "0.000" causes an MCP alarm at the power ON.
(Note 2) This parameter is meaningless at the non-uniform index or random position command.
---Setting range---
0.000 to 99999.999 (mm)
(PR) #12800 chgauxno Auxiliary axis number
(PR) #12801 aux_station Number of indexing stations
(PR) #12802 aux_Cont1 Control parameter 1
(PR) #12803 aux_Cont2 Control parameter 2
(PR) #12804 aux_tleng Linear axis stroke length

Set the distance (offset) from the reference position to station 1.
---Setting range---
-99999.999 to 99999.999 (or mm)
Set the feedrate during automatic operation when "operation parameter group n" is selected.
"#12810 aux_Aspeed1" is regarded as the clamp value for the automatic operation speeds and manual op eration speeds of all operation groups.
A speed exceeding "aux_Aspeed1" cannot be commanded, even if it is set in a parameter.
(Note) Setting "0" causes an operation error at the "Operation start" signal's ON.
---Setting range---
0 to 100000 (/min or mm/min)
Set the feedrate during manual operation or JOG operation when "operation parameter group n" is selected.
(Note) Setting "0" causes an operation error at the "Operation start" signal's ON.
---Setting range---
0 to 100000 (/min or mm/min)
Set the linear acceleration/deceleration time for "Operation parameter group 1 automatic operation speed"
(clamp speed) when "operation parameter group n" is selected.
When "#12818+10(n-1) aux_smgstn" is "F", S-shape acceleration/deceleration is carried out.
When operating at a speed less than the clamp speed, if "#1361 aux_acc" is set to "0", the axis will accel erate/decelerate with the time constant set in this parameter. If "#1361 aux_acc" is set to "1", the axis will
accelerate/decelerate at the constant inclination determined by this parameter and "aux_Aspeed1".
Setting "0" cancels acceleration/deceleration: The axis will move with the time constant "0".

---Setting range---
0 to 4000 (ms)
Set the total time of the non-linear parts in the S-pattern acceleration/deceleration.
In the handle feed operation mode, this setting value is regarded as time constant for the linear acceleration/
deceleration.
(Note) If this parameter is set to "0" while "#12818 aux_smgst1"is set to "F", an MCP alarm will occur.
---Setting range---
0 to 4000 (ms)
Set the motor output torque limit value when "operation parameter group n" is selected.
When setting 500%, the torque is limited at the maximum torque of the motor specifications. Set 500%, when
torque is not particularly needed to be limited.
In the stopper positioning operation mode, this will be regarded as torque limit value when positioning to the
stopper starting coordinates.
---Setting range---
0 to 500 (%)
#12805 aux_ST.offset Station offset
#12810+10(n-1) aux_Aspeedn Operation parameter group n Automatic operation
speed
#12811+10(n-1) aux_Mspeedn Operation parameter group n Manual operation speed
#12812+10(n-1) aux_timen.1 Operation parameter group n Acceleration/deceleration
time constant 1
#12813+10(n-1) aux_timen.2 Operation parameter group n Acceleration/deceleration
time constant 2
#12814+10(n-1) aux_TLn Operation parameter group n Torque limit value

Set the excessive error detection width when "operation parameter group n" is selected.
The excessive error alarm (S03 0052) will be detected when the position droop becomes larger than this set ting value.
In the stopper positioning operation mode, this will be regarded as excessive error detection width when po sitioning to the stopper starting coordinates.
---Setting range---
0 to 32767(or mm)
Set the tolerable value at which "set position reached" (JST) or "automatic set position reached" (JSTA) sig nal is output when "operation parameter group n" is selected.
"Set position reached" (JST) indicates that the machine position is at any station.
During automatic operation, "automatic set position reached" (JSTA) is also output under the same condition.
These signals will turn OFF when the machine position moves away from the station over this value.
---Setting range---
0.000 to 99999.999 (or mm)
Set the tolerable value at which "near set position" (NEAR) signal is output when "operation parameter group
n" is selected.
"Near set position" (NEAR) indicates that the machine position is near any station position. This value is gen erally set wider than the set position output width.
During operations, this is related to the special commands when the station selection is set to "0".
---Setting range---
0.000 to 99999.999 (or mm)
Select the acceleration/deceleration type when "operation parameter group n" is selected.
0, 1: Linear acceleration/deceleration
F: S-pattern acceleration/deceleration
Set the station 2 coordinate value when arbitrary coordinate assignment is selected.
The station 1 coordinate value is fixed at "0.000" (machine coordinate zero point).
---Setting range---
-99999.999 to 99999.999 (or mm)
Set the station 3 coordinate value when arbitrary coordinate assignment is selected.
The station 1 coordinate value is fixed at "0.000" (machine coordinate zero point).
---Setting range---
-99999.999 to 99999.999 (or mm)
Set the station 4 coordinate value when arbitrary coordinate assignment is selected.
The station 1 coordinate value is fixed at "0.000" (machine coordinate zero point).
---Setting range---
-99999.999 to 99999.999 (or mm)
Set the station 5 coordinate value when arbitrary coordinate assignment is selected.
The station 1 coordinate value is fixed at "0.000" (machine coordinate zero point).
---Setting range---
-99999.999 to 99999.999 (or mm)
#12815+10(n-1) aux_ODn Operation parameter group n Excessive error detection
width
#12816+10(n-1) aux_justn Operation parameter group n Set position output width
#12817+10(n-1) aux_nearn Operation parameter group n Near set position output
width
(PR) #12818+10(n-1) aux_smgstn Operation parameter group n Acceleration/Deceleration
type
#12850 aux_stpos2 Station 2 coordinate
#12851 aux_stpos3 Station 3 coordinate
#12852 aux_stpos4 Station 4 coordinate
#12853 aux_stpos5 Station 5 coordinate

Set the station 6 coordinate value when arbitrary coordinate assignment is selected.
The station 1 coordinate value is fixed at "0.000" (machine coordinate zero point).
---Setting range---
-99999.999 to 99999.999 (or mm)
Set the station 7 coordinate value when arbitrary coordinate assignment is selected.
The station 1 coordinate value is fixed at "0.000" (machine coordinate zero point).
---Setting range---
-99999.999 to 99999.999 (or mm)
Set the station 8 coordinate value when arbitrary coordinate assignment is selected.
The station 1 coordinate value is fixed at "0.000" (machine coordinate zero point).
---Setting range---

-99999.999 to 99999.999 (or mm)
Set the station 9 coordinate value when arbitrary coordinate assignment is selected.
The station 1 coordinate value is fixed at "0.000" (machine coordinate zero point).
---Setting range---
-99999.999 to 99999.999 (or mm)
Set the station 10 coordinate value when arbitrary coordinate assignment is selected.
The station 1 coordinate value is fixed at "0.000" (machine coordinate zero point).
---Setting range---
-99999.999 to 99999.999 (or mm)
Set the station 11 coordinate value when arbitrary coordinate assignment is selected.
The station 1 coordinate value is fixed at "0.000" (machine coordinate zero point).
---Setting range---
-99999.999 to 99999.999 (or mm)
Set the station 12 coordinate value when arbitrary coordinate assignment is selected.
The station 1 coordinate value is fixed at "0.000" (machine coordinate zero point).
---Setting range---
-99999.999 to 99999.999 (or mm)
Set the station 13 coordinate value when arbitrary coordinate assignment is selected.
The station 1 coordinate value is fixed at "0.000" (machine coordinate zero point).
---Setting range---
-99999.999 to 99999.999 (or mm)
Set the station 14 coordinate value when arbitrary coordinate assignment is selected.
The station 1 coordinate value is fixed at "0.000" (machine coordinate zero point).
---Setting range---
-99999.999 to 99999.999 (or mm)
#12854 aux_stpos6 Station 6 coordinate
#12855 aux_stpos7 Station 7 coordinate
#12856 aux_stpos8 Station 8 coordinate
#12857 aux_stpos9 Station 9 coordinate
#12858 aux_stpos10 Station 10 coordinate
#12859 aux_stpos11 Station 11 coordinate
#12860 aux_stpos12 Station 12 coordinate
#12861 aux_stpos13 Station 13 coordinate
#12862 aux_stpos14 Station 14 coordinate

Set the station 15 coordinate value when arbitrary coordinate assignment is selected.
The station 1 coordinate value is fixed at "0.000" (machine coordinate zero point).
---Setting range---
-99999.999 to 99999.999 (or mm)
Set the station 16 coordinate value when arbitrary coordinate assignment is selected.
The station 1 coordinate value is fixed at "0.000" (machine coordinate zero point).
---Setting range---
-99999.999 to 99999.999 (or mm)
Set the station 17 coordinate value when arbitrary coordinate assignment is selected.
The station 1 coordinate value is fixed at "0.000" (machine coordinate zero point).
---Setting range---
-99999.999 to 99999.999 (or mm)
Set the station 18 coordinate value when arbitrary coordinate assignment is selected.
The station 1 coordinate value is fixed at "0.000" (machine coordinate zero point).
---Setting range---
-99999.999 to 99999.999 (or mm)
Set the station 19 coordinate value when arbitrary coordinate assignment is selected.
The station 1 coordinate value is fixed at "0.000" (machine coordinate zero point).
---Setting range---
-99999.999 to 99999.999 (or mm)
Set the station 20 coordinate value when arbitrary coordinate assignment is selected.
The station 1 coordinate value is fixed at "0.000" (machine coordinate zero point).
---Setting range---
-99999.999 to 99999.999 (or mm)
Select the criterion for the output of position switches 1 to 15.
bit0 to E correspond to position switches 1 to 15.
0: Judged by the machine position of the command system.
1: Judged by the machine FB position (actual position).
(Note) The bits that are not explained here must be set to "0".
Set "PSW1 area setting" 1 and 2 to specify the area where the position switch 1 will turn ON when the ma chine is positioned.
Whether the value of setting 1 is larger than setting 2 (or vice versa) does not affect the position switch op eration.
For rotary axes, the output turns ON in the area excluding 0.000 degree.
---Setting range---
-99999.999 to 99999.999 (or mm)
#12863 aux_stpos15 Station 15 coordinate
#12864 aux_stpos16 Station 16 coordinate
#12865 aux_stpos17 Station 17 coordinate
#12866 aux_stpos18 Station 18 coordinate
#12867 aux_stpos19 Station 19 coordinate
#12868 aux_stpos20 Station 20 coordinate
#12870 aux_PSWcheck PSW detection method
#12871 aux_PSW1dog1 PSW1 area setting 1

Set "PSW1 area setting" 1 and 2 to specify the area where the position switch 1 will turn ON when the ma chine is positioned.
Whether the value of setting 1 is larger than setting 2 (or vice versa) does not affect the position switch op eration.
For rotary axes, the output turns ON in the area excluding 0.000 degree.
---Setting range---
-99999.999 to 99999.999 (or mm)
Set "PSW2 area setting" 1 and 2 to specify the area where the position switch 2 will turn ON when the ma chine is positioned.

Whether the value of setting 1 is larger than setting 2 (or vice versa) does not affect the position switch op eration.
For rotary axes, the output turns ON in the area excluding 0.000 degree.
---Setting range---
-99999.999 to 99999.999 (or mm)
Set "PSW2 area setting" 1 and 2 to specify the area where the position switch 2 will turn ON when the ma chine is positioned.
Whether the value of setting 1 is larger than setting 2 (or vice versa) does not affect the position switch op eration.
For rotary axes, the output turns ON in the area excluding 0.000 degree.
---Setting range---
-99999.999 to 99999.999 (or mm)
Set "PSW3 area setting" 1 and 2 to specify the area where the position switch 3 will turn ON when the ma chine is positioned.
Whether the value of setting 1 is larger than setting 2 (or vice versa) does not affect the position switch op eration.
For rotary axes, the output turns ON in the area excluding 0.000 degree.
---Setting range---
-99999.999 to 99999.999 (or mm)
Set "PSW3 area setting" 1 and 2 to specify the area where the position switch 3 will turn ON when the ma chine is positioned.
Whether the value of setting 1 is larger than setting 2 (or vice versa) does not affect the position switch op eration.
For rotary axes, the output turns ON in the area excluding 0.000 degree.
---Setting range---
-99999.999 to 99999.999 (or mm)
Set "PSW4 area setting" 1 and 2 to specify the area where the position switch 4 will turn ON when the ma chine is positioned.
Whether the value of setting 1 is larger than setting 2 (or vice versa) does not affect the position switch op eration.
For rotary axes, the output turns ON in the area excluding 0.000 degree.
---Setting range---
-99999.999 to 99999.999 (or mm)
#12872 aux_PSW1dog2 PSW1 area setting 2
#12873 aux_PSW2dog1 PSW2 area setting 1
#12874 aux_PSW2dog2 PSW2 area setting 2
#12875 aux_PSW3dog1 PSW3 area setting 1
#12876 aux_PSW3dog2 PSW3 area setting 2
#12877 aux_PSW4dog1 PSW4 area setting 1

Set "PSW4 area setting" 1 and 2 to specify the area where the position switch 4 will turn ON when the ma chine is positioned.
Whether the value of setting 1 is larger than setting 2 (or vice versa) does not affect the position switch op eration.
For rotary axes, the output turns ON in the area excluding 0.000 degree.
---Setting range---
-99999.999 to 99999.999 (or mm)
Set "PSW5 area setting" 1 and 2 to specify the area where the position switch 5 will turn ON when the ma chine is positioned.
Whether the value of setting 1 is larger than setting 2 (or vice versa) does not affect the position switch op eration.
For rotary axes, the output turns ON in the area excluding 0.000 degree.
---Setting range---
-99999.999 to 99999.999 (or mm)
Set "PSW5 area setting" 1 and 2 to specify the area where the position switch 5 will turn ON when the ma chine is positioned.
Whether the value of setting 1 is larger than setting 2 (or vice versa) does not affect the position switch op eration.
For rotary axes, the output turns ON in the area excluding 0.000 degree.
---Setting range---
-99999.999 to 99999.999 (or mm)
Set "PSW6 area setting" 1 and 2 to specify the area where the position switch 6 will turn ON when the ma chine is positioned.
Whether the value of setting 1 is larger than setting 2 (or vice versa) does not affect the position switch op eration.
For rotary axes, the output turns ON in the area excluding 0.000 degree.
---Setting range---
-99999.999 to 99999.999 (or mm)
Set "PSW6 area setting" 1 and 2 to specify the area where the position switch 6 will turn ON when the ma chine is positioned.
Whether the value of setting 1 is larger than setting 2 (or vice versa) does not affect the position switch op eration.
For rotary axes, the output turns ON in the area excluding 0.000 degree.
---Setting range---
-99999.999 to 99999.999 (or mm)
Set "PSW7 area setting" 1 and 2 to specify the area where the position switch 7 will turn ON when the ma chine is positioned.
Whether the value of setting 1 is larger than setting 2 (or vice versa) does not affect the position switch op eration.
For rotary axes, the output turns ON in the area excluding 0.000 degree.
---Setting range---
-99999.999 to 99999.999 (or mm)
#12878 aux_PSW4dog2 PSW4 area setting 2
#12879 aux_PSW5dog1 PSW5 area setting 1
#12880 aux_PSW5dog2 PSW5 area setting 2
#12881 aux_PSW6dog1 PSW6 area setting 1
#12882 aux_PSW6dog2 PSW6 area setting 2
#12883 aux_PSW7dog1 PSW7 area setting 1

Set "PSW7 area setting" 1 and 2 to specify the area where the position switch 7 will turn ON when the ma chine is positioned.
Whether the value of setting 1 is larger than setting 2 (or vice versa) does not affect the position switch op eration.
For rotary axes, the output turns ON in the area excluding 0.000 degree.
---Setting range---
-99999.999 to 99999.999 (or mm)
Set "PSW8 area setting" 1 and 2 to specify the area where the position switch 8 will turn ON when the ma chine is positioned.
Whether the value of setting 1 is larger than setting 2 (or vice versa) does not affect the position switch op eration.
For rotary axes, the output turns ON in the area excluding 0.000 degree.
---Setting range---
-99999.999 to 99999.999 (or mm)
Set "PSW8 area setting" 1 and 2 to specify the area where the position switch 8 will turn ON when the ma chine is positioned.
Whether the value of setting 1 is larger than setting 2 (or vice versa) does not affect the position switch op eration.
For rotary axes, the output turns ON in the area excluding 0.000 degree.
---Setting range---
-99999.999 to 99999.999 (or mm)
Set "PSW9 area setting" 1 and 2 to specify the area where the position switch 9 will turn ON when the ma chine is positioned.

Whether the value of setting 1 is larger than setting 2 (or vice versa) does not affect the position switch op eration.
For rotary axes, the output turns ON in the area excluding 0.000 degree.
---Setting range---
-99999.999 to 99999.999 (or mm)
Set "PSW9 area setting" 1 and 2 to specify the area where the position switch 9 will turn ON when the ma chine is positioned.
Whether the value of setting 1 is larger than setting 2 (or vice versa) does not affect the position switch op eration.
For rotary axes, the output turns ON in the area excluding 0.000 degree.
---Setting range---
-99999.999 to 99999.999 (or mm)
Set "PSW10 area setting" 1 and 2 to specify the area where the position switch 10 will turn ON when the
machine is positioned.
Whether the value of setting 1 is larger than setting 2 (or vice versa) does not affect the position switch op eration.
For rotary axes, the output turns ON in the area excluding 0.000 degree.
---Setting range---
-99999.999 to 99999.999 (or mm)
#12884 aux_PSW7dog2 PSW7 area setting 2
#12885 aux_PSW8dog1 PSW8 area setting 1
#12886 aux_PSW8dog2 PSW8 area setting 2
#12887 aux_PSW9dog1 PSW9 area setting 1
#12888 aux_PSW9dog2 PSW9 area setting 2
#12889 aux_PSW10dog1 PSW10 area setting 1

Set "PSW10 area setting" 1 and 2 to specify the area where the position switch 10 will turn ON when the
machine is positioned.
Whether the value of setting 1 is larger than setting 2 (or vice versa) does not affect the position switch op eration.
For rotary axes, the output turns ON in the area excluding 0.000 degree.
---Setting range---
-99999.999 to 99999.999 (or mm)
Set "PSW11 area setting" 1 and 2 to specify the area where the position switch 11 will turn ON when the
machine is positioned.
Whether the value of setting 1 is larger than setting 2 (or vice versa) does not affect the position switch op eration.
For rotary axes, the output turns ON in the area excluding 0.000 degree.
---Setting range---
-99999.999 to 99999.999 (or mm)
Set "PSW11 area setting" 1 and 2 to specify the area where the position switch 11 will turn ON when the
machine is positioned.
Whether the value of setting 1 is larger than setting 2 (or vice versa) does not affect the position switch op eration.
For rotary axes, the output turns ON in the area excluding 0.000 degree.
---Setting range---
-99999.999 to 99999.999 (or mm)
Set "PSW12 area setting" 1 and 2 to specify the area where the position switch 12 will turn ON when the
machine is positioned.
Whether the value of setting 1 is larger than setting 2 (or vice versa) does not affect the position switch op eration.
For rotary axes, the output turns ON in the area excluding 0.000 degree.
---Setting range---
-99999.999 to 99999.999 (or mm)
Set "PSW12 area setting" 1 and 2 to specify the area where the position switch 12 will turn ON when the
machine is positioned.
Whether the value of setting 1 is larger than setting 2 (or vice versa) does not affect the position switch op eration.
For rotary axes, the output turns ON in the area excluding 0.000 degree.
---Setting range---
-99999.999 to 99999.999 (or mm)
Set "PSW13 area setting" 1 and 2 to specify the area where the position switch 13 will turn ON when the
machine is positioned.
Whether the value of setting 1 is larger than setting 2 (or vice versa) does not affect the position switch op eration.
For rotary axes, the output turns ON in the area excluding 0.000 degree.
---Setting range---
-99999.999 to 99999.999 (or mm)
#12890 aux_PSW10dog2 PSW10 area setting 2
#12891 aux_PSW11dog1 PSW11 area setting 1
#12892 aux_PSW11dog2 PSW11 area setting 2
#12893 aux_PSW12dog1 PSW12 area setting 1
#12894 aux_PSW12dog2 PSW12 area setting 2
#12895 aux_PSW13dog1 PSW13 area setting 1

Set "PSW13 area setting" 1 and 2 to specify the area where the position switch 13 will turn ON when the
machine is positioned.
Whether the value of setting 1 is larger than setting 2 (or vice versa) does not affect the position switch op eration.
For rotary axes, the output turns ON in the area excluding 0.000 degree.
---Setting range---
-99999.999 to 99999.999 (or mm)
Set "PSW14 area setting" 1 and 2 to specify the area where the position switch 14 will turn ON when the
machine is positioned.
Whether the value of setting 1 is larger than setting 2 (or vice versa) does not affect the position switch op eration.
For rotary axes, the output turns ON in the area excluding 0.000 degree.
---Setting range---
-99999.999 to 99999.999 (or mm)
Set "PSW14 area setting" 1 and 2 to specify the area where the position switch 14 will turn ON when the
machine is positioned.
Whether the value of setting 1 is larger than setting 2 (or vice versa) does not affect the position switch op eration.
For rotary axes, the output turns ON in the area excluding 0.000 degree.
---Setting range---
-99999.999 to 99999.999 (or mm)
Set "PSW15 area setting" 1 and 2 to specify the area where the position switch 15 will turn ON when the

machine is positioned.
Whether the value of setting 1 is larger than setting 2 (or vice versa) does not affect the position switch op eration.
For rotary axes, the output turns ON in the area excluding 0.000 degree.
---Setting range---
-99999.999 to 99999.999 (or mm)
Set "PSW15 area setting" 1 and 2 to specify the area where the position switch 15 will turn ON when the
machine is positioned.
Whether the value of setting 1 is larger than setting 2 (or vice versa) does not affect the position switch op eration.
For rotary axes, the output turns ON in the area excluding 0.000 degree.
---Setting range---
-99999.999 to 99999.999 (or mm)
Set the command stroke of the stopper operation in the stopper positioning.
---Setting range---
0.000 to 359.999(or mm)
Set the standby time from the stopper starting coordinate positioning to the stopper operation start in the
stopper positioning.
---Setting range---
0 to 9999 (ms)
#12896 aux_PSW13dog2 PSW13 area setting 2
#12897 aux_PSW14dog1 PSW14 area setting 1
#12898 aux_PSW14dog2 PSW14 area setting 2
#12899 aux_PSW15dog1 PSW15 area setting 1
#12900 aux_PSW15dog2 PSW15 area setting 2
#12910 aux_push Stopper amount
#12911 aux_pusht1 Stopper standby time
M800/M80/E80 Series Alarm/Parameter Manual
15 Machine Parameters
IB-1501279-S 670
Set the time from the completion of the stopper operation to the changeover of the stopper torque in the stop per positioning.
---Setting range---
0 to 9999(ms)
Set the time from the completion of the stopper operation to the output of the "automatic set position reached"
(JSTA), "set position reached" (JST) or "near set position" (NEAR) signal in the stopper positioning.
---Setting range---
0 to 9999(ms)
#12912 aux_pusht2 Stopper torque release time
#12913 aux_pusht3 Set position signal output delay time
M800/M80/E80 Series Alarm/Parameter Manual
15 Machine Parameters
671 IB-1501279-S
15.26 Machine Type Parameters
Select the type of lathe: horizontal or vertical.
0: Horizontal-type lathe
1: Vertical-type lathe
Select the linear axis direction to move the turret along for each part system.
Horizontal-type lathe (right-handed)
1: Front upper position
2: Front lower position
3: Rear upper position
4: Rear lower position
Horizontal-type lathe (left-handed)
11: Front upper position
12: Front lower position
13: Rear upper position
14: Rear lower position
Vertical-type lathe (right-handed)
21: Front left position
22: Front right position
Vertical-type lathe (left-handed)
31: Front left position
32: Front right position
(Note) Upper/lower position of horizontal-type lathe and right/left position of vertical-type lathe are the names
indicating the turret position with general machine configuration.
Select a number corresponding to the actual machine configuration and the axis direction to this param eter.
Axis configuration follows the base axis I, J, K (parameters #1026 to #1028).
Select which of the following parameters to use as tool rotation axis-related parameters: Rotary axis config uration parameters or 3D check parameters.
0: Rotary axis configuration parameters
1: 3D check parameters
Specify the name of tool rotation axis using the 2nd axis name.
---Setting range---
Two alphanumeric characters (A to Z and 1 to 9)
Select about which axis the tool rotation axis rotates.
(Note) When "#12624 tool rot ax name" (Tool rotation axis name) is not set, this parameter is disabled.
If "0: Disable" is selected when "#12624 tool rot ax name" is set, this parameter is treated as "2: J axis".
0: Disable
1: I axis
2: J axis
3: K axis
(PR) #12621 machine type Select machine type (For L system only)
(PR) #12622 turret move dir Select turret move direction (For L system only)
(PR) #12623 tool rot ax para Select tool rotation axis parameters (For L system only)
(PR) #12624 tool rot ax name Tool rotation axis name (For L system only)
(PR) #12625 tool rot ax type Select tool rotation axis (For L system only)
M800/M80/E80 Series Alarm/Parameter Manual
15 Machine Parameters
IB-1501279-S 672
Select the tool rotation axis direction.
(Note) When "#12624 tool rot ax name" is not set, this parameter is disabled.

0: Right-handed system
1: Left-handed system
Specify the spindle No. of the front side work spindle.
When this parameter is set to 0, the spindle No.is treated as 1.
---Setting range---
0 to the number of spindles
Specify the spindle No. of the rear side work spindle.
If there is no rear-side work spindle, set this parameter to 0.
---Setting range---
0 to the number of spindles
Specify the rotation direction of the front side work spindle.
0: Right-handed system
1: Left-handed system
Specify the rotation direction of the rear side work spindle.
0: Right-handed system
1: Left-handed system
Specify the M code allocated to the front chuck closing.
---Setting range---
0 to 99999999
Specify the M code allocated to the back chuck closing.
---Setting range---
0 to 99999999
Specify the position from the machine zero point in the X axis direction of front chuck.
---Setting range---
-99999.999 to 99999.999 (mm)
Specify the position from the machine zero point in the Y axis direction of front chuck.
---Setting range---
-99999.999 to 99999.999 (mm)
Specify the position from the machine zero point in the Z axis direction of front chuck.
---Setting range---
-99999.999 to 99999.999 (mm)
Specify the position from the machine zero point in the X axis direction of back chuck.
---Setting range---
-99999.999 to 99999.999 (mm)
(PR) #12626 tool rot dir Tool rotation axis direction (For L system only)
(PR) #12627 main sp no Front spindle No. (For L system only)
(PR) #12628 sub sp no Rear spindle No. (For L system only)
(PR) #12629 main sp rot dir Front spindle rotation direction (For L system only)
(PR) #12630 sub sp rot dir Rear spindle rotation direction (For L system only)
(PR) #12631 main chuck close M Front chuck close M code (For L system only)
(PR) #12632 sub chuck close M Back chuck close M code(For L system only)
(PR) #12633 main chuck pos X Front chuck position X (For L system only)
(PR) #12634 main chuck pos Y Front chuck position Y (For L system only)
(PR) #12635 main chuck pos Z Front chuck position Z (For L system only)
(PR) #12636 sub chuck pos X Back chuck position X (For L system only)

Specify the position from the machine zero point in the Y axis direction of back chuck.
---Setting range---
-99999.999 to 99999.999 (mm)
Specify the position from the machine zero point in the Z axis direction of back chuck.
---Setting range---
-99999.999 to 99999.999 (mm)
Specify the name of the axis to move the front chuck with 2nd axis name.
---Setting range---
Two digits between A to Z and 1 to 9
Specify the name of the axis to move the back chuck with 2nd axis name.
---Setting range---
Two digits between A to Z and 1 to 9
Set the center position of the table in the horizontal axis direction using the machine position.
---Setting range---
-99999.999 to 99999.999 (mm)
Set the center position of the table in the vertical axis direction using the machine position.
---Setting range---
-99999.999 to 99999.999 (mm)
Set the center position of the table in the height axis direction using the machine position.
---Setting range---
-99999.999 to 99999.999 (mm)
(PR) #12637 sub chuck pos Y Back chuck position Y (For L system only)
(PR) #12638 sub chuck pos Z Back chuck position Z (For L system only)
(PR) #12639 main chuck ax name Front chuck moving axis name (For L system only)
(PR) #12640 sub chuck ax name Back chuck moving axis name (For L system only)
(PR) #12650 table center posH Horizontal axis table center position (For M system on ly)
(PR) #12651 table center posV Vertical axis table center position (For M system only)
(PR) #12652 table center posT Height axis table center position (For M system only)

15.27 Machining Time Parameters
Specify the M code for calculating the machining time. (n=1 to 50)
---Setting range---
0 to 99999999
Specify the execution time of the M code. (n=1 to 50)
---Setting range---
0 to 60000 (ms)
Specify the M code for calculating the machining time.
Set the M code that takes different time for each part system. (n=1 to 10)

---Setting range---
0 to 99999999
Specify the execution time of the M code.
Different values can be set for each part system. (n=1 to 10)
---Setting range---
0 to 60000 (ms)
Specify the 2nd miscellaneous function code for calculating the machining time. (n=1 to 10)
---Setting range---
0 to 99999999
Specify the execution time of the 2nd miscellaneous function code. (n=1 to 10)
---Setting range---
0 to 60000 (ms)
Specify the execution time of the T code for each part system.
---Setting range---
0 to 60000 (ms)
Specify the average execution time of the M code for which individual setting is not performed.
---Setting range---
0 to 60000 (ms)
Specify the average execution time of the 2nd miscellaneous function code for which individual setting is not performed.
---Setting range---
0 to 60000 (ms)
#42801+2(n-1) M[n] Code M code for calculating machining time
#42802+2(n-1) M[n] ExeTime Execution time of M code for calculating machining time
#42901+2(n-1) M[50+n] Code M code for calculating machining time (for each part system)
#42902+2(n-1) M[50+n] ExeTime Execution time of M code for calculating machine time (for each part system)
#42931+2(n-1) M2[n] Code 2nd miscellaneous function code for calculating ma chining time
#42932+2(n-1) M2[n] ExeTime Execution time of 2nd m. function code for calculating machining time
#42951 T Code ExeTime Execution time of T code for calculating machining time
#42952 M Code StdExeTime Standard execution time of M code for calculating ma chining time
#42953 M2 Code StdExeTime Standard execution time of 2nd m. function code for cal culating machine time

Specify the S code execution time of the 1st spindle.
---Setting range---
0 to 60000 (ms)
Specify the S code execution time of the 2nd spindle.
---Setting range---
0 to 60000 (ms)
Specify the S code execution time of the 3rd spindle.
---Setting range---
0 to 60000 (ms)
Specify the S code execution time of the 4th spindle.
---Setting range---
0 to 60000 (ms)
Specify the S code execution time of the 5th spindle.
---Setting range---
0 to 60000 (ms)
Specify the S code execution time of the 6th spindle.
---Setting range---
0 to 60000 (ms)
Specify the S code execution time of the 7th spindle.
---Setting range---
0 to 60000 (ms)
Specify the S code execution time of the 8th spindle.
---Setting range---
0 to 60000 (ms)
#42961 S Code ExeTime 1 S code execution time for machining time calculation (1st spindle)
#42962 S Code ExeTime 2 S code execution time for machining time calculation (2nd spindle)
#42963 S Code ExeTime 3 S code execution time for machining time calculation (3rd spindle)
#42964 S Code ExeTime 4 S code execution time for machining time calculation (4th spindle)
#42965 S Code ExeTime 5 S code execution time for machining time calculation (5th spindle)
#42966 S Code ExeTime 6 S code execution time for machining time calculation (6th spindle)
#42967 S Code ExeTime 7 S code execution time for machining time calculation (7th spindle)
#42968 S Code ExeTime 8 S code execution time for machining time calculation (8th spindle)

15.28 Safety Common Parameters
Select whether to enable the safety related I/O observation.
0: Disable
1: Enable
Select whether to enable the safely limited speed observation.
0: Disable
1: Enable

Select whether to enable the safely limited position observation.
0: Disable
1: Enable
Select whether to enable the safe speed monitor.
0: Disable
1: Enable
Select whether to enable the safe cam.
0: Disable
1: Enable
Select whether to enable the safe operating stop.
0: Disable
1: Enable
(*) When SS2 is executed, SOS is activated irrespective of this parameter.
Select whether to enable the safe stop 1.
0: Disable
1: Enable
(*) Irrespective of this parameter, when a smart safety observation error is detected, SS1 may be activated depending on the setting of "#51102 SF_Stoptype".
Select whether to enable the safe stop 2.
0: Disable
1: Enable
Select whether to enable the safe torque off.
0: Disable
1: Enable
(*) Irrespective of this parameter, when a smart safety observation error is detected, STO may be activated depending on the setting of "#51102 SF_Stoptype".
Select whether to enable the safe brake control.
0: Disable
1: Enable
(PR) #51001 SIO_Enable Enable safety related I/O observation
(PR) #51002 SLS_Enable Enable SLS observation
(PR) #51003 SLP_Enable Enable SLP observation
(PR) #51004 SSM_Enable Enable Safe speed monitor
(PR) #51005 SCA_Enable Enable safe cam
(PR) #51006 SOS_Enable Enable Safe operating stop
(PR) #51007 SS1_Enable Enable Safe stop 1
(PR) #51008 SS2_Enable Enable Safe stop 2
(PR) #51009 STO_Enable Enable Safe torque off
(PR) #51010 SBC_Enable Safe brake control enabled

Set the time that elapses before the next SBT incomplete signal (SBTNFEXm / SBTNFMOm) turns ON after completing the brake test.
When set "0", the interval will be 8 hours.
---Setting range---
0 to 255 hours
Set the tolerable time for inconsistency between CPUs status. (When the status is inconsistent for more than tolerable time, the alarm occurs and the motor power shuts OFF.)
When set "0", the inconsistency tolerable time is 100 ms.
---Setting range---
0 to 5000 (ms)
Set the safety password.
Setting: 7 or 8 uppercase alphanumeric characters
If no password is set, turn ON the machine parameter setup mode to set the safety parameters.
---Setting range---
7 or 8 uppercase alphanumeric characters
Select whether to enable the simple test mode in which the drive safety function operation can be checked without connecting any smart safety observation-capable drive unit.
0: Disable the drive safety function simple test mode
1: Enable the drive safety function simple test mode
Specify the maximum number of storable steps for safety sequence.
The maximum number of executable steps will be double the maximum number of storable steps.
0: 6144 steps
1 to 32: (Setting value) K steps
---Setting range---
0 (default)
1 to 32 (K steps)
(PR) #51011 SBT_INT SBT interval
(PR) #51012 CRSCHK_TOL Cross-check status inconsistency tolerable time
#51013 SF_PSWD Safe password
(PR) #51015 safe_drv_test Drive safety function easy test mode
(PR) #51017 SLAD_Step Maximum number of steps in safety ladder

15.29 Safety Axis Parameters
Exclude the axis from the smart safety observation target.
0: Enable smart safety observation
1: Disable smart safety observation
(Note) The settings of "#51101 SF_Disable" and "#51301 SF_SDisable" must be the same within a multi hybrid drive unit.
Select which of the safe stop methods to use when an error is detected in the smart safety observation.
0: STO
1: SS1
Specify the upper limits of machine-end speed determined as safe for each of SLS speed tolerances 1 to 4.
If the SLS detection delay time has elapsed with the command/FB speed exceeding the safely-limited speed while SLS is ON, a safe stop (SS1 or STO) is executed. The safely-limited speed to be applied to SLS is calculated using the following equation.

Safely-limited speed = SLS speed tolerance x SLS speed override / 100
---Setting range---
0 to 999999 (mm/min or /min)
Specify the speed overrides 1 to 16 with respect to SLS speed tolerances 1 to 4. For details refer to SLS speed tolerances 1 to 4.
---Setting range---
0 to 100 (%)
Specify the speed clamp ratio that is applied while SLS is ON. Set the ratio to about 80 to 90%. While SLS is ON, the command speed is clamped at the following speed:
Clamp speed = Safely-limited speed x SLS speed clamp ratio / 100
(Safely-limited speed = SLS speed tolerance x SLS speed override / 100)
---Setting range---
0 to 100 (%)
Specify a period of time to detect a speed error while SLS is ON. A safe stop (SS1 or STO) is executed if the period of time set in this parameter has elapsed with the command/FB speed exceeding the safely-limited speed.
---Setting range---
0 to 9999 (ms)
Specify a period of time to detect a deceleration error that is caused due to change of the safely-limited speed at the start of or during SLS. If you have changed the safely-limited speed at the start of or during SLS, and the time set in this parameter has elapsed with the command/FB speed exceeding the safely-limited speed, a safe stop (SS1 or STO) is executed. When set to "0", the detection time is treated as 200(ms).
---Setting range---
0 to 99999 (ms)
(PR) #51101 SF_Disable Disable smart safety observation
(PR) #51102 SF_Stoptype Stop method at error
(PR) #51103-
51106
SLS_Speed1-4 SLS speed tolerance 1-4
(PR) #51107-
51122
SLS_Override1-16 SLS speed override 1-16
(PR) #51123 SLS_Clamp SLS speed clamp ratio
#51124 SLS_T1 SLS detection delay time
#51125 SLS_T2 SLS deceleration observation time

"n" represents the SLP position tolerance No. (n=1 to 4)
Specify the upper and lower limits of machine position, which is determined as safe, for each of SLP position tolerances 1(+) to 4(+). If the SLP detection delay time has elapsed while SLP is ON with the command/FB position outside the SLP position tolerance range, a safe stop (SS1 or STO) is executed.
*SLP is not available for a rotation-type rotary axis.
---Setting range---
-99999.999 to +99999.999 (mm)
"n" represents the SLP position tolerance No. (n=1 to 4)
Specify the upper and lower limits of machine position, which is determined as safe, for each of SLP position tolerances 1(-) to 4(-). If the SLP detection delay time has elapsed while SLP is ON with the command/FB position outside the SLP position tolerance range, a safe stop (SS1 or STO) is executed.
*SLP is not available for a rotation-type rotary axis.
---Setting range---
-99999.999 to +99999.999 (mm)
Specify a period of time to detect a machine position error while SLP is ON. If the time set in this parameter has elapsed with the command/FB position outside the SLP position tolerance range, a safe stop (SS1 or STO) is executed.
---Setting range---
0 to 9999 (ms)
Specify the upper limits of machine-end speed determined as safe for each of SSM speeds 1 to 4. If the com mand/FB speed is at the safe speed or lower while SSM is ON, the Under SSM safe speed signal turns ON. If the command/FB speed exceeds the safe speed, the Under SSM safe speed signal turns OFF. The safe speed to be applied to SSM is calculated using the following equation.
(When the Under SSM safe speed signal is ON)
Safe speed = SSM speed
(When the Under SSM safe speed signal is OFF)
Safe speed = SSM speed - SSM hysteresis width
---Setting range---
0 to 999999 (mm/min or /min)
Specify the hysteresis widths that correspond to SSM speeds 1 to 4. For details refer to SSM speeds 1 to 4.
---Setting range---
0 to 999999 (mm/min or /min)
"n" represents the SCA position No. (n=1 to 16)
Specify the upper and lower limits of machine position determined as safe for each of SCA positions 1(+) to 16(+). If the command/FB position is in the SCA safe position or smaller while SCA is ON, the Safe cam po sition signal turns OFF. If the position has exceeded the SCA safe position, the Safe cam position signal turns ON. The SCA safe position is calculated using the following equation.
(When the Safe cam position signal is ON)
SCA safe position = SCA position (+) SCA hysteresis width
(When the Safe cam position signal is OFF)
SCA safe position = SCA position (+)
---Setting range---
-99999.999 to +99999.999 (mm)
(PR) #51126+2(n-1) SLP_PositionPn SLP position tolerance n (+)
(PR) #51127+2(n-1) SLP_PositionMn SLP position tolerance n (-)
#51134 SLP_T1 SLP detection delay time
(PR) #51135-
51138
SSM_Speed1-4 SSM speed 1-4
#51139-
51142
SSM_Hysteresis1-4 SSM hysteresis width 1-4

(PR) #51143+2(n-1) SCA_PositionPn SCA position n (+)

"n" represents the SCA position No. (n=1 to 16)
Specify the upper and lower limits of machine position determined as safe for each of SCA positions 1(-) to 16(-). If the command/FB position is in the SCA safe position or smaller while SCA is ON, the Safe cam po sition signal turns OFF. If the position has exceeded the SCA safe position, the Safe cam position signal turns ON. The SCA safe position is calculated using the following equation.
(When the Safe cam position signal is ON)
SCA safe position = SCA position (-) SCA hysteresis width
(When the Safe cam position signal is OFF)
SCA safe position = SCA position (-)
---Setting range---
-99999.999 to +99999.999 (mm)
Specify the hysteresis widths that correspond to SCA positions 1 to 16. For details refer to SCA positions 1(+/-) to 16(+/-).
---Setting range---
0 to 99999.999 (mm)
Specify the upper limit of machine-end speed determined as a safe operating stop.
If the SOS_V detection delay time has elapsed with the command/FB speed exceeding the speed of this parameter while SOS is ON, a safe stop (SS1 or STO) is executed.
The point of time at which the command/FB speed drops to that of this parameter or lower while SS1/SS2 is ON is treated as a standstill.
*When this parameter is set to 0, "SOS speed error" may occur even though the axis is at a standstill.
---Setting range---
0 to 9999 (mm/min or /min)
Specify a period of time to detect a speed error while SOS is ON. If the period of time set in this parameter has elapsed with the command/FB speed exceeding the SOS stop speed while SOS is ON, a safe stop (SS1 or STO) is executed.
---Setting range---
0 to 9999 (ms)
Specify the upper limit of machine-end position deviation determined as a safe operating stop. If the SOS_PD detection delay time has elapsed with the position deviation (difference between the command and FB posi tions) exceeding that of this parameter while SOS is ON, a safe stop (SS1 or STO) is executed.
*When this parameter is set to 0, "SOS position deviation error" may occur even though the axis is at a stand still.
---Setting range---
0 to 9999.999 (mm or)
Specify a period of time to detect a position deviation error while SOS is ON. If a period of time set in this parameter has elapsed with the position deviation (difference between the command and FB positions) ex ceeding the SOS position deviation tolerance while SOS is ON, a safe stop (SS1 or STO) is executed.
---Setting range---
0 to 9999 (ms)
Specify the upper limit of machine-end travel distance (minus side) determined as a safe operating stop. If the SOS_P detection delay time has elapsed with the command/FB travel distance in the minus direction ex ceeding that of this parameter while SOS is ON, a safe stop (SS1 or STO) is executed.
*When this parameter is set to 0, "SOS travel distance error" may occur even though the axis is at a standstill.
---Setting range---
0 to 9999.999 (mm or)
(PR) #51144+2(n-1) SCA_PositionMn SCA position n (-)
#51175 SCA_Hysteresis SCA hysteresis width
(PR) #51176 SOS_Speed SOS stop speed
#51177 SOS_T1 SOS_V detection delay time
(PR) #51178 SOS_Droop SOS position deviation tolerance
#51179 SOS_T2 SOS_PD detection delay time
(PR) #51180 SOS_PositionM SOS travel distance tolerance (-)

Specify the upper limit of machine-end travel distance (plus side) determined as a safe operating stop. If the SOS_P detection delay time has elapsed with the command/FB travel distance in the plus direction exceed ing that of this parameter while SOS is ON, a safe stop (SS1 or STO) is executed.
*When this parameter is set to 0, "SOS travel distance error" may occur even though the axis is at a standstill.
---Setting range---
0 to 9999.999 (mm or)
Specify a period of time to detect a travel distance error while SOS is ON. If the period of time set in this parameter has elapsed with the command/FB travel distance exceeding the SOS travel distance tolerance (+/-) while SOS is ON, a safe stop (SS1 or STO) is executed.
---Setting range---
0 to 9999 (ms)
Specify a period of time to detect a deceleration error while SS1 is ON. If the time set in this parameter has elapsed with the command/FB speed exceeding the SOS stop speed, STO is activated.
---Setting range---
0 to 99999 (ms)
Specify a period of time to detect a deceleration error while SS2 is ON. If the time set in this parameter has elapsed with the command/FB speed exceeding the SOS stop speed, STO is activated.
---Setting range---
0 to 99999 (ms)
Specify a period of time to wait from when the drive unit receives an STO request from the NC until when STO is actually executed. Set this time so that the brake is activated within this period of time. When set to "0", the STO execution standby time is treated as 200 ms.
---Setting range---
0 to 20000 (ms)
0: Disable
1: Enable
0: Disable
1: Enable
Set the current limit value in the brake test in proportion to the stall current. When set to "0", the alarm occurs at the start of the brake test. (The test does not start.)
---Setting range---
0 to 100 (%)
Set the wait time of output of movement command for brake test from NC since receiving SBT starting signal (SBTSTEXm / SBTSTMOm). When set to "0", the commanded wait time is 400 ms.

---Setting range---
0 to 30000 (ms)
Set the movement amount to command to the test target axis at the time of brake test. When set to "0", the
alarm occurs at the start of the brake test. (The test does not start.)
---Setting range---
-99999.999 to 99999.999 (mm or)
(PR) #51181 SOS_PositionP SOS travel distance tolerance (+)
#51182 SOS_T3 SOS_P detection delay time
#51183 SS1_T1 SS1 deceleration observation time
#51184 SS2_T1 SS2 deceleration observation time
(PR) #51185 STO_EXEWT Waiting time before STO execution
(PR) #51186 SBTEX_Enable External brake SBT enabled
(PR) #51187 SBTMO_Enable Motor brake SBT enabled
#51191 SBT_ILIM SBT current limit value
(PR) #51192 SBT_CMDWT SBT command wait time
(PR) #51193 SBT_FD SBT command movement amount

Set the command speed to command to the test target axis at the time of brake test. When set to "0", the
alarm occurs at the start of the brake test. (The test does not start.)
---Setting range---
0 to 1000000 (mm/min or /min)
Set the time to continue the observation of axis movement amount after the output of movement command
for test at the time of brake test. When set to "0", the observation time is 1000 ms.
---Setting range---
0 to 30000 (ms)
Set the tolerable movement amount of the test target axis at the time of brake test. (The alarm occurs if the
movement amount during the test exceeds this parameter value.) When set "0", the tolerable movement
amount is 100 mm (or).
---Setting range---
0 to 99999.999 (mm or)
Sets the tolerable value of the difference (error amount) between [saved position at power shut OFF] and
[restored position at power ON] in SLP/SCA encoder diagnosis during power OFF. When this above differ ence exceeds the tolerable value, the system starts in STO status. When set "0", the tolerable value is as in
below formula.
Tolerable movement amount = SV018(PIT) * 0.9
---Setting range---
0 to 99999.999 (mm)
Enables the encoder diagnosis during power OFF to use SLP/SCA for the axes connected with Multi revolu tion safety encoder.
0: Disable the encoder diagnosis during power OFF to use SLP/SCA for the axes connected with Multi rev olution safety encoder
1: Enable the encoder diagnosis during power OFF to use SLP/SCA for the axes connected with Multi rev olution safety encoder
* As for the axes not connected with Multi revolution safety encoder, the above diagnosis will be enabled
regardless of the setting value of this parameter.
* The above diagnosis will not be executed when SLP/SCA are disabled. (Both SLP_Enable and SCA_En able are 0.)
Sets the tolerable value of the position deviation (the difference between the commanded position generated
inside NC and the feedback position received from drive unit) in the position deviation diagnosis. When the
position deviation exceeds the tolerable value, the Safe stop (SS1/STO) will be carried out. When "0" is set,
the tolerable value is as in below formula.
Tolerable value = SV018(PIT) * 2.0
---Setting range---
0 to 32767 (mm or)
(PR) #51194 SBT_FDRATE SBT command speed
(PR) #51195 SBT_OBTIM SBT observation time
(PR) #51196 SBT_TOL SBT tolerable movement amount
(PR) #51197 SLP/SCA_FDTOL SLP/SCA tolerable movement amount during power
OFF
(PR) #51198 MlRtAbsSEnc_FDChk SLP/SCA encoder diagnosis during power OFF applica tion for Multi revolution safety encoder
#51199 SF_PDCHK_TOL Servo axis position deviation diagnosis tolerable value

Specify the Safety axiss specification by turning ON the corresponding bit. Input the hexadecimal value for
this parameter.
bit0-2: Not used
bit3: Motor brake connection status
0: Motor brake connected
1: Motor brake not connected
bit4-F: Not used
* If the settings of encoder type (bit0, bit1) are different from the actually connected ones, the servo alarm 4D
is output.
---Setting range---
0x0000 to 0xFFFF
For a safety encoder-connected axis, set the safety encoder type. When the Multi revolution part is connect ed to the safety encoder that is outside the certification of safety standards, and in SLP/SCA enabled, SLP/
SCA encorder diagnosis during power OFF will be carried out regardless of the setting value of #51198 Ml RtAbsSEnc_FDChk.
0: Safety encoder that is outside the safety certification for Multi revolution
1: Safety encoder that is certified with safety standards for Multi revolution
Specify a length of time it takes to complete deceleration stop when safety external emergency stop is im plemented.
When not executing deceleration stop, set the parameter to "0".
When executing deceleration stop, subtract "#51185 STO_EXEWT" from "#2256 SV056" and set the differ ence in the parameter.
---Setting range---
0 to 20000 (ms)
(PR) #51200 SFSPEC1 Safety specification 1
(PR) #51201 SENCTYP Safety encoder type
(PR) #51202 SEMG_STO_WT STO delay time for safety external emergency stop

15.30 Safety Spindle Parameters

Exclude the axis from the smart safety observation target.
0: Enable smart safety observation
1: Disable smart safety observation
(Note) The settings of "#51101 SF_Disable" and "#51301 SF_SDisable" must be the same within a multi hybrid drive unit.
Select which of the safe stop methods to use when an error is detected in the smart safety observation.
0: STO
1: SS1
Specify the upper limits of machine-end speed determined as safe for each of SLS speed tolerances 1 to 4.
If the SLS detection delay time has elapsed with the command/FB speed exceeding the safely-limited speed
while SLS is ON, a safe stop (SS1 or STO) is executed. The safely-limited speed to be applied to SLS is
calculated using the following equation.
Safely-limited speed = SLS speed tolerance x SLS speed override / 100
---Setting range---
0 to 999999.9 (r/min)
Specify the speed overrides 1 to 16 with respect to SLS speed tolerances 1 to 4. For details refer to SLS
speed tolerances 1 to 4.
---Setting range---
0 to 100 (%)
Specify the speed clamp ratio that is applied while SLS is ON. Set the ratio to about 80 to 90%. While SLS
is ON, the command speed is clamped at the following speed:
Clamp speed = Safely-limited speed x SLS speed clamp ratio / 100
(Safely-limited speed = SLS speed tolerance x SLS speed override / 100)
---Setting range---
0 to 100 (%)
Specify a period of time to detect a speed error while SLS is ON. A safe stop (SS1 or STO) is executed if the
period of time set in this parameter has elapsed with the command/FB speed exceeding the safely-limited
speed.
---Setting range---
0 to 9999 (ms)
Specify a period of time to detect a deceleration error that is caused due to change of the safely-limited speed
at the start of or during SLS. If you have changed the safely-limited speed at the start of or during SLS, and
the time set in this parameter has elapsed with the command/FB speed exceeding the safely-limited speed,
a safe stop (SS1 or STO) is executed. When set to "0", the detection time is treated as 200(ms).
---Setting range---
0 to 99999 (ms)
(PR) #51301 SF_SDisable Disable smart safety observation
(PR) #51302 SF_SStoptype Stop method at error
(PR) #51303-
51306
SLS_SSpeed1-4 SLS speed tolerance 1-4
(PR) #51307-
51322
SLS_SOverride1-16 SLS speed override 1-16
(PR) #51323 SLS_Sclamp SLS speed clamp ratio
#51324 SLS_ST1 SLS detection delay time
#51325 SLS_ST2 SLS deceleration observation time

Specify the upper limits of machine-end speed determined as safe for each of SSM speeds 1 to 4. If the com mand/FB speed is at the safe speed or lower while SSM is ON, the Under SSM safe speed signal turns ON.
If the command/FB speed exceeds the safe speed, the Under SSM safe speed signal turns OFF. The safe
speed to be applied to SSM is calculated using the following equation.
(When the Under SSM safe speed signal is ON)
Safe speed = SSM speed
(When the Under SSM safe speed signal is OFF)
Safe speed = SSM speed - SSM hysteresis width
---Setting range---
0 to 999999.9 (r/min)
Specify the hysteresis widths that correspond to SSM speeds 1 to 4. For details refer to SSM speeds 1 to 4.
---Setting range---
0 to 999999.9 (r/min)
Specify the upper limit of machine-end speed determined as a safe operating stop.
If the SOS_V detection delay time has elapsed with the command/FB speed exceeding that of this pa rameter while SOS is ON, a safe stop (SS1 or STO) is executed.
The point of time at which the command/FB speed drops to that of this parameter or lower while SS1/
SS2 is ON is treated as a standstill.
*When this parameter is set to 0, "SOS speed error" may occur even though the spindle is at a standstill.
---Setting range---
0 to 9999.9 (r/min)
Specify a period of time to detect a speed error while SOS is ON. If the period of time set in this parameter
has elapsed with the command/FB speed exceeding the SOS stop speed while SOS is ON, a safe stop (SS1
or STO) is executed.
---Setting range---
0 to 9999 (ms)
Specify the upper limit of machine-end position deviation determined as a safe operating stop. If the SOS_PD
detection delay time has elapsed with the position deviation (difference between the command and FB posi tions) exceeding that of this parameter while SOS is ON, a safe stop (SS1 or STO) is executed.
*When this parameter is set to 0, "SOS position deviation error" may occur even though the spindle is at a
standstill.
---Setting range---
0 to 9999 ()
Specify a period of time to detect a position deviation error while SOS is ON. If a period of time set in this
parameter has elapsed with the position deviation (difference between the command and FB positions) ex ceeding the SOS position deviation tolerance while SOS is ON, a safe stop (SS1 or STO) is executed.
---Setting range---
0 to 9999 (ms)
Specify the upper limit of machine-end travel distance (minus side) determined as a safe operating stop. If
the SOS_P detection delay time has elapsed with the command/FB travel distance in the minus direction ex ceeding that of this parameter while SOS is ON, a safe stop (SS1 or STO) is executed.
*When this parameter is set to 0, "SOS travel distance error" may occur even though the spindle is at a stand still.
---Setting range---
0 to 9999 ()

(PR) #51326-
51329
SSM_SSpeed1-4 SSM speed 1-4
#51330-
51333
SSM_SHysteresis1-4 SSM hysteresis width 1-4
(PR) #51334 SOS_SSpeed SOS stop speed
#51335 SOS_ST1 SOS_V detection delay time
(PR) #51336 SOS_SDroop SOS position deviation tolerance
#51337 SOS_ST2 SOS_PD detection delay time
(PR) #51338 SOS_SPositionM SOS travel distance tolerance (-)

Specify the upper limit of machine-end travel distance (plus side) determined as a safe operating stop. If the
SOS_P detection delay time has elapsed with the command/FB travel distance in the plus direction exceed ing that of this parameter while SOS is ON, a safe stop (SS1 or STO) is executed.
*When this parameter is set to 0, "SOS travel distance error" may occur even though the spindle is at a stand still.
---Setting range---
0 to 9999 ()
Specify a period of time to detect a travel distance error while SOS is ON. If the period of time set in this
parameter has elapsed with the command/FB travel distance exceeding the SOS travel distance tolerance
(+/-) while SOS is ON, a safe stop (SS1 or STO) is executed.
---Setting range---
0 to 9999 (ms)
Specify a period of time to detect a deceleration error while SS1 is ON. If the time set in this parameter has
elapsed with the command/FB speed exceeding the SOS stop speed, STO is activated.
---Setting range---
0 to 99999 (ms)
Specify a period of time to detect a deceleration error while SS2 is ON. If the time set in this parameter has
elapsed with the command/FB speed exceeding the SOS stop speed, STO is activated.
---Setting range---
0 to 99999 (ms)
Specify a period of time to wait from when the drive unit receives an STO request from the NC until when
STO is actually executed. Set this time so that the brake is activated within this period of time. When set to
"0", the STO execution standby time is treated as 200 ms.
---Setting range---
0 to 20000 (ms)
Set the waiting time for starting the position deviation diagnosis at Spindle non-interpolation mode. The di agnosis of the position deviation at Spindle non-interpolation mode starts after the commanded speed be comes consistent and after
the time set by this parameter passes. It stops while the command speed is
changing. When set to "0", the Spindle position deviation diagnosis waiting time is 20000 ms.
---Setting range---
0 to 30000 (ms)
Sets the tolerable value of the position deviation (the difference between the commanded position generated
inside NC and the feedback position received from drive unit) in the position deviation diagnosis. When the
position deviation exceeds the tolerable value, the Safe stop (SS1/STO) will be carried out. When set to "0",
the tolerable value is 1080.
---Setting range---
0 to 32767 ()
Specify a length of time it takes to complete deceleration stop when safety external emergency stop is im plemented.
When not executing deceleration stop, set the parameter to "0".
When executing deceleration stop, subtract "#51343 STO_SEXEWT" from "#13056 SP056" and set the dif ference in the parameter.
---Setting range---
0 to 29900 (ms)
(PR) #51339 SOS_SPositionP SOS travel distance tolerance (+)
#51340 SOS_ST3 SOS_P detection delay time
#51341 SS1_ST1 SS1 deceleration observation time
#51342 SS2_ST1 SS2 deceleration observation time
(PR) #51343 STO_SEXEWT Waiting time before STO execution
#51344 SF_PDCHK_ST1 Spindle position deviation diagnosis waiting time
#51345 SF_PDCHK_STOL Spindle position deviation diagnosis tolerable value
(PR) #51347 SEMG_STO_SWT STO delay time for safety external emergency stop

15.31 Safety I/O Assignment Parameters
Specify the channel No. to which the nth safety I/O unit is connected. (n=1 to 8)
* When set to "0", the RIO assignment parameters of the nth station are all disabled.
---Setting range---
0, 1 to 3
Specify the station No. of the nth safety I/O unit. (n=1 to 8)
* Set this parameter to the same value as of the rotary switch on the safety I/O unit to which the device is
assigned.
---Setting range---
0 to 63
Specify the name of the DI assignment devices of the nth safety I/O unit. (n=1 to 8)
* When set to "0", the name is left blank.
---Setting range---
0, X, ZR
Specify the head device No. of DI assignment devices of the nth safety I/O unit. (n=1 to 8)
Device X: hexadecimal and on a 32-point basis (a multiple of 32)
Device ZR: decimal and on a 2-point basis (an even number)
* This parameter changes to "0" if you change the device name "DI dev name #n".
* Specify "DI dev name #n" ahead of this parameter.
---Setting range---
X: 0 to 1E0 (hexadecimal)
ZR: 0 to 62 (decimal)
Specify the name of the DO assignment devices of the nth safety I/O unit. (n=1 to 8)
* When set to "0", the name is left blank.

---Setting range---
0, Y, ZR
Specify the head device No. of the DO assignment devices of the nth safety I/O unit. (n=1 to 8)
Device Y: hexadecimal and on a 32-point basis (a multiple of 32)
Device ZR: decimal and on a 2-point basis (an even number)
* The setting of this parameter changes to "0" if you change the device name of "DO dev name #n".
* Specify "DO dev name #n" ahead of this parameter.
---Setting range---
Y: 0 to 1E0 (hexadecimal)
ZR: 64 to 126 (decimal)
Specify the No. of I/O channel to connect the safety I/O unit that receives the emergency stop signal. When
specifying the channel No. and station No. of the emergency stop signal, set any of the safety I/O units spec ified by the parameters RIO CH No. and RIO Station No. When set to "0", the designation of emergency stop signal device by EMG_Dev1 is disabled, irrespective of the settings of EMG_Dev1_stn and EMG_Dev1_bit.
---Setting range---
0 to 3
(PR) #51501+10(n-1) RIO CH No. #n Target channel number #n
(PR) #51502+10(n-1) RIO Station No. #n Target station number #n
(PR) #51503+10(n-1) DI dev name #n DI device name #n
(PR) #51504+10(n-1) DI dev No. #n DI device number #n
(PR) #51505+10(n-1) DO dev name #n DO device name #n
(PR) #51506+10(n-1) DO dev No. #n DO device number #n
(PR) #51582 EMG_Dev1_ch Emergency stop signal 1 channel No.

Specify the No. of station to connect the safety I/O unit that receives the emergency stop signal.
---Setting range---
0 to 63
Specify the bit No. of the safety I/O unit that receives the emergency stop signal.
---Setting range---
0 to 7
Specify the No. of I/O channel to connect the safety I/O unit that receives the emergency stop signal. When
specifying the channel No. and station No. of the emergency stop signal, set any of the safety I/O units spec ified by the parameters RIO CH No. and RIO Station No. When set to "0", the designation of emergency stop signal device by EMG_Dev2 is disabled, irrespective of the settings of EMG_Dev2_stn and EMG_Dev2_bit.
---Setting range---
0 to 3
Specify the No. of station to connect the safety I/O unit that receives the emergency stop signal.
---Setting range---
0 to 63
Specify the bit No. of the safety I/O unit that receives the emergency stop signal.
---Setting range---
0 to 7
Specify the allowed time of inconsistency between the PLC1 and PLC2 side input signals. Specify this in in crements of 10 (ms). When set to "0", the allowed safety signal compare time is 300 (ms).
---Setting range---
0 to 500 (10 ms)
Specify the allowed time of inconsistency between the PLC1 and PLC2 side output signals. Specify this in
increments of 10 (ms). When set to "0", the allowed safety signal compare time is 300 (ms).
---Setting range---
0 to 50 (10 ms)
Select the DO control method and PLC status of when a safety signal observation error occurs.
0: PLC is set in RUN state and DO is controlled through user safety sequence
1: PLC is set in STOP state and all DOs are OFF.
Specify the allowed time of inconsistency between the PLC1 and PLC2 side output signals. Specify this in
increments of 10 (ms). When set to "0", the allowed safety signal compare time is 300 (ms).
Set tolerable time more than 300 (ms), when an output signal is controlled with 100 (ms) timer.
---Setting range---
0 to 500 (10 ms)
(PR) #51583 EMG_Dev1_stn Emergency stop signal 1 station No.
(PR) #51584 EMG_Dev1_bit Emergency stop signal 1 bit No.
(PR) #51585 EMG_Dev2_ch Emergency stop signal 2 channel No.
(PR) #51586 EMG_Dev2_stn Emergency stop signal 2 station No.
(PR) #51587 EMG_Dev2_bit Emergency stop signal 2 bit No.
(PR) #51591 SIO_DIDelay Allowed input signal compare time
(PR) #51592 SIO_DODelay Allowed output signal compare time
(PR) #51593 SIO_DOErrtype DO control method at diagnostic error
(PR) #51594 SIO_DODelay2 Allowed output signal compare time 2

15.32 EtherNet/IP Parameters
15.32.1 EtherNet/IP Parameters Scanner 1
(Note) Numeric portion of "N001" included in each parameter name varies depending on the parameter No.
Specify the No. of the device that is assigned to node. (n=1 to 64)
---Setting range---
1 to 128
Specify the position No. that is assigned to node. (n=1 to 64)
---Setting range---
0 to 63
Specify the PLC project No. that is assigned to node. (n=1 to 64)
This number is set as the project No. of PLC device to which the node input/output/connection status is as signed.
---Setting range---
1 to 6
Specify the name of PLC device to which Implicit Message input data is transferred. (n=1 to 64)
Example) X
---Setting range---
X, M, L, SB, B, SW, D, R, W
Specify the top No. of PLC device to which Implicit Message input data is transferred. (n=1 to 64)
If you specify bit devices, set them in increments of 16 points.

Example) 100
---Setting range---
X: 0 to 5F0
M: 0 to 61424
L: 0 to 32752
SB: 0 to 7FF0
B: 0 to EFF0
SW: 0 to 7FFF
D: 0 to 32767
W: 0 to 7FFF
R: 8300 to 9799, 9800 to 9899, 18300 to 19799, 19800 to 19899, 28300 to 29799, 29800 to 29899
Specify the size (bytes) of Implicit Message input data that is transferred to PLC device. (n=1 to 64)
Example) 1
---Setting range---
0 to 509 (bytes)
* Up to 5000 bytes in total for all nodes
#80000+20(n-1) N001 Device Number Scanner function Implicit Message: device No.
#80001+20(n-1) N001 Position No. Scanner function Implicit Message: position No.
#80002+20(n-1) N001 Project No. Scanner function Implicit Message: PLC project No.
#80003+20(n-1) N001 in dev name Scanner function Implicit Message: PLC device name
(IN (T->O))
#80004+20(n-1) N001 in dev No. Scanner function Implicit Message: PLC device top No.
(IN (T->O))
#80005+20(n-1) N001 in dev size Scanner function Implicit Message: PLC device size (IN
(T->O))

Specify the name of PLC device to which Implicit Message output data is transferred. (n=1 to 64)
Example) Y
---Setting range---
Y, M, L, SB, B, SW, D, R, W
Specify the top No. of PLC device to which Implicit Message output data is transferred. (n=1 to 64)
If you specify bit devices, set them in increments of 16 points.
Example) 100
---Setting range---
Y: 0 to 5F0
M: 0 to 61424
L: 0 to 32752
SB: 0 to 7FF0
B: 0 to EFF0
SW: 0 to 7FFF
D: 0 to 32767
W: 0 to 7FFF
R: 8300 to 9799, 9800 to 9899, 18300 to 19799, 19800 to 19899, 28300 to 29799, 29800 to 29899
Specify the size (bytes) of Implicit Message output data that is transferred to PLC device. (n=1 to 64)
Example) 1
---Setting range---
0 to 505 (bytes)
* Up to 5000 bytes in total for all nodes
Specify the name of PLC device to which connection status of the device assigned to node is transferred.
(n=1 to 64)
Example) M
---Setting range---
M, L, SB, B, SW, D, R, W
Specify the top No. of PLC device to which connection status of the device assigned to node is transferred.
(n=1 to 64)
6 bytes of data starting from the specified device No. are occupied.
Example) 1024
---Setting range---
M: 0 to 61424
L: 0 to 32752
SB: 0 to 7FF0
B: 0 to EFF0
SW: 0 to 7FFF
D: 0 to 32767
W: 0 to 7FFF
R: 8300 to 9799, 9800 to 9899, 18300 to 19799, 19800 to 19899, 28300 to 29799, 29800 to 29899
#80006+20(n-1) N001 out dev name Scanner function Implicit Message: PLC device name
(OUT (O->T))
#80007+20(n-1) N001 out dev No. Scanner function Implicit Message: PLC device top No.
(OUT (O->T))
#80008+20(n-1) N001 out dev size Scanner function Implicit Message: PLC device size
(OUT (O->T))
#80009+20(n-1) N001 sts dev name Scanner function Implicit Message: connection status
assign PLC device name
#80010+20(n-1) N001 sts dev No. Scanner function Implicit Message: connection status
assign PLC device No.

This parameter specifies the high-speed refresh input area size for the node. (n = 1 to 64)
When the setting is greater than that of PLC device size (IN (T->O)) of the same node, an alarm will be is sued.
When the total size of the high-speed refresh input areas for all the nodes and all the areas is greater than 8
(bytes), an alarm will be issued.
---Setting range---
0 to 8
(*) Up to 8 (bytes) in total for all nodes

This parameter specifies the high-speed refresh output area size for the node. (n = 1 to 64)
When the setting is greater than that of PLC device size (OUT (O->T)) of the same node, an alarm will be issued.
When the total size of the high-speed refresh output areas for all the nodes and all the areas is greater than 8 (bytes), an alarm will be issued.
---Setting range---
0 to 8
(*) Up to 8 (bytes) in total for all nodes
Select which data is sent to the hardware connected when the NC enters the PLC STOP mode, the set PLC device value or the cleared data (the data cleared to "0").
0: Send the PLC device value
1: Send the data cleared to "0"
#80011+20(n-1) N001 High in size High-speed refresh area size (IN (T->O))
#80012+20(n-1) N001 High out size High-speed refresh area size (OUT (O->T))
#81565 PLC Stop Output Setting of output at PLC STOP

15.32.2 EtherNet/IP Parameters Scanner 2
(Note) Numeric portion of "CH01" included in each parameter name varies depending on the parameter No.
Specify the PLC project No. that is assigned to node. (c=1 to 16)
This number is set as the project No. of PLC device to which the node input/output/control structure is as signed.
---Setting range---
1 to 6
Specify the name of PLC device to which "Explicit Message control structure" is assigned. (c=1 to 16)
Example) M
---Setting range---
M, L, SB, B, SW, D, R, W
Specify the top No. of PLC device to which "Explicit Message control structure" is assigned. (c=1 to 16)
If you specify bit devices, set them in increments of 16 points.
Example) 2048
---Setting range---
M: 0 to 61424
L: 0 to 32752
SB: 0 to 7FF0
B: 0 to EFF0
SW: 0 to 7FFF
D: 0 to 32767
W: 0 to 7FFF
R: 8300 to 9799, 9800 to 9899, 18300 to 19799, 19800 to 19899, 28300 to 29799, 29800 to 29899
#81280+10(c-1) CH01 Project No. Scanner function Explicit Message: PLC project No.
#81281+10(c-1) CH01 ctrl dev name Scanner function Explicit Message: control structure assign PLC device name
#81282+10(c-1) CH01 ctrl dev No. Scanner function Explicit Message: ctrl structure as sign PLC device top No.

15.32.3 EtherNet/IP Parameters Adapter 1
(Note) Numeric portion of "A1" included in each parameter name varies depending on the parameter No.
Specify the PLC project No. that is assigned to Adapter Implicit (IN/OUT) area. (a=1 to 6)
This number is set as the project No. of PLC device for input/output to/from Adapter Implicit (IN/OUT) area.
---Setting range---
1 to 6
Specify the offset (bytes) from the head of Adapter Implicit (IN) area. (a=1 to 6)
The data starting from the specified offset is sent from Adapter Implicit (IN) area to PLC device.
Example) 100
---Setting range---
0 to 499 (bytes)
Specify the name of PLC device to which Adapter Implicit (IN) area data is transferred. (a=1 to 6)
Example) X
---Setting range---
X, M, L, SB, B, SW, D, R, W
Specify the top No. of PLC device to which Adapter Implicit (IN) area data is transferred. (a=1 to 6)
If you specify bit devices, set them in increments of 16 points.
Example) 200
---Setting range---
X: 0 to 5F0
M: 0 to 61424
L: 0 to 32752
SB: 0 to 7FF0
B: 0 to EFF0
SW: 0 to 7FFF
D: 0 to 32767
W: 0 to 7FFF
R: 8300 to 9799, 9800 to 9899, 18300 to 19799, 19800 to 19899, 28300 to 29799, 29800 to 29899
Specify the size (bytes) of Adapter Implicit (IN) area data that is transferred to PLC device. (a=1 to 6)
Example) 1
---Setting range---
0 to 500 (bytes)
* Up to 500 bytes in total for all areas
Specify the offset (bytes) from the head of Adapter Implicit (OUT) area. (a=1 to 6)
The PLC device data starting from the specified offset is sent to Adapter Implicit (OUT) area.
Example) 100
---Setting range---
0 to 499 (bytes)
#81440+20(a-1) Imp A1 Proj No. Adapter function Implicit Message: PLC project No.
#81441+20(a-1) Imp A1in offset Adapter function Implicit Message: IN area top offset
#81442+20(a-1) Imp A1in dev name Adapter function Implicit Message: PLC device name

(IN)
#81443+20(a-1) Imp A1in dev No. Adapter function Implicit Message: PLC device top No.
(IN)
#81444+20(a-1) Imp A1in dev size Adapter function Implicit Message: PLC device size (IN)
#81445+20(a-1) Imp A1out offset Adapter function Implicit Message: OUT area top offset

Specify the name of PLC device that is sent to Adapter Implicit (OUT) area. (a=1 to 6)
Example) Y
---Setting range---
Y, M, L, SB, B, SW, D, R, W
Specify the top No. of PLC device that is sent to Adapter Implicit (OUT) area. (a=1 to 6)
If you specify bit devices, set them in increments of 16 points.
Example) 200
---Setting range---
Y: 0 to 5F0
M: 0 to 61424
L: 0 to 32752
SB: 0 to 7FF0
B: 0 to EFF0
SW: 0 to 7FFF
D: 0 to 32767
W: 0 to 7FFF
R: 8300 to 9799, 9800 to 9899, 18300 to 19799, 19800 to 19899, 28300 to 29799, 29800 to 29899
Specify the size (bytes) of PLC device that is sent to Adapter Implicit (OUT) area. (a=1 to 6)
Example) 1
---Setting range---
0 to 500 (bytes)
* Up to 500 bytes in total for all areas
This parameter specifies the size of the high-speed refresh area in the I/O (IN) area. (a = 1 to 6)
When the setting is greater than that of PLC device size (IN) of the same area, an alarm will be issued.
When the total size of the high-speed refresh input areas for all the nodes and all the areas is greater than 8 (bytes), an alarm will be issued.
---Setting range---
0 to 8
(*) Up to 8 (bytes) in total for all areas
This parameter specifies the size of the high-speed refresh area in the I/O (OUT) area. (a = 1 to 6)
When the setting is greater than that of PLC device size (OUT) of the same area, an alarm will be issued.
When the total size of the high-speed refresh output areas for all the nodes and all the areas is greater than 8 (bytes), an alarm will be issued.
---Setting range---
0 to 8
(*) Up to 8 (bytes) in total for all areas
Specify the No. of PLC project to which connection status is transferred.
---Setting range---
1 to 6
#81446+20(a-1) Imp A1out dev name Adapter function Implicit Message: PLC device name
(OUT)
#81447+20(a-1) Imp A1out dev No. Adapter function Implicit Message: PLC device top No.
(OUT)
#81448+20(a-1) Imp A1out dev size Adapter function Implicit Message: PLC device size
(OUT)
#81449+20(a-1) Imp A1High in size High-speed refresh area size (IN)
#81450+20(a-1) Imp A1High outsize High-speed refresh area size (OUT)
#81560 Imp sts Proj No. Connection status assigned PLC project No.

Specify the name of PLC device to which connection status is transferred.
Example) M
---Setting range---
M, L, SB, B, SW, D, R, W
Specify the top No. of PLC device to which connection status is transferred.
6 bytes of data starting from the specified device No. are occupied.
---Setting range---
M: 0 to 61424
L: 0 to 32752
SB: 0 to 7FF0
B: 0 to EFF0
SW: 0 to 7FFF
D: 0 to 32767
W: 0 to 7FFF
R: 8300 to 9799, 9800 to 9899, 18300 to 19799, 19800 to 19899, 28300 to 29799, 29800 to 29899
#81561 Impsts dev name Connection status assigned PLC device name
#81562 Imp sts dev No. Connection status assigned PLC device top No.

15.32.4 EtherNet/IP Parameters Adapter 2
(Note) Numeric portion of "A1" included in each parameter name varies depending on the parameter No.
Specify the PLC project No. that is assigned to Adapter Explicit (IN/OUT) area. (a=1 to 6)
This number is set as the project No. of PLC device for input/output to/from Adapter Explicit (IN/OUT) area.
---Setting range---
1 to 6
Specify the offset (bytes) from the head of Adapter Explicit (IN) area. (a=1 to 6)
The data starting from the specified offset is sent from Adapter Explicit (IN) area to PLC device.
Example) 100

---Setting range---
0 to 1388
Specify the name of PLC device to which Adapter Explicit (IN) area data is transferred. (a=1 to 6)
Example) M
---Setting range---
M, L, SB, B, SW, D, R, W
Specify the top No. of PLC device to which Adapter Explicit (IN) area data is transferred. (a=1 to 6)
If you specify bit devices, set them in increments of 16 points.
Example) 512
---Setting range---
M: 0 to 61424
L: 0 to 32752
SB: 0 to 7FF0
B: 0 to EFF0
SW: 0 to 7FFF
D: 0 to 32767
W: 0 to 7FFF
R: 8300 to 9799, 9800 to 9899, 18300 to 19799, 19800 to 19899, 28300 to 29799, 29800 to 29899
Specify the size (bytes) of Adapter Explicit (IN) area data that is transferred to PLC device. (a=1 to 6)
Example) 1
---Setting range---
0 to 1389 (bytes)
* Up to 1389 bytes in total for all areas
Specify the offset (bytes) from the head of Adapter Explicit (OUT) area. (a=1 to 6)
The PLC device data starting from the specified offset is sent to Adapter Explicit (OUT) area.
Example) 100
---Setting range---
0 to 1388
#81570+20(a-1) Exp A1 Proj No. Adapter function Explicit Message: PLC project No.
#81571+20(a-1) Exp A1in offset Adapter function Explicit Message: IN area top offset
#81572+20(a-1) Exp A1in dev name Adapter function Explicit Message: PLC device name
(IN)
#81573+20(a-1) Exp A1in dev No. Adapter function Explicit Message: PLC device top No.
(IN)
#81574+20(a-1) Exp A1in dev size Adapter function Explicit Message: PLC device size (IN)
#81575+20(a-1) Exp A1out offset Adapter function Explicit Message: OUT area top offset

Specify the name of PLC device that is sent to Adapter Explicit (OUT) area. (a=1 to 6)
Example) B
---Setting range---
M, L, SB, B, SW, D, R, W
Specify the top No. of PLC device that is sent to Adapter Explicit (OUT) area. (a=1 to 6)
Example) 200
---Setting range---
M: 0 to 61424
L: 0 to 32752
SB: 0 to 7FF0
B: 0 to EFF0
SW: 0 to 7FFF
D: 0 to 32767
W: 0 to 7FFF
R: 8300 to 9799, 9800 to 9899, 18300 to 19799, 19800 to 19899, 28300 to 29799, 29800 to 29899
Specify the size (bytes) of PLC device that is sent to Adapter Explicit (OUT) area. (a=1 to 6)
Example) 1
---Setting range---
0 to 1389 (bytes)
* Up to 1389 bytes in total for all areas
#81576+20(a-1) Exp A1out dev name Adapter function Explicit Message: PLC device name
(OUT)
#81577+20(a-1) Exp A1out dev No. Adapter function Explicit Message: PLC device top No.
(OUT)
#81578+20(a-1) Exp A1out dev size Adapter function Explicit Message: PLC device size
(OUT)

15.33 CC-Link IE Field Parameters
15.33.1 CC-Link IE Field Network 1
(Note) Numeric portion of "N01" included in each parameter name varies depending on the parameter No.
Example: #82060+10(k-1) "#1 N01 Link-d name" (k = 1 to 64)
Select the slot of the CC-Link IE field network expansion unit to which you apply the CCIEF common param eters #82000 to #82695.
(Note) If you select the same slot as of "#82700 #2 Slot No.", the parameters #82000 to #82695 are applied
to the slot with higher priority.
---Setting range---
0: No setting (Disable)
1: EXT3
2: EXT4
(*) For M80/M800S/E80
1: EXT1
2: EXT2
Specify the station type of the CC-Link IE field network expansion unit.
0: Master station
1: Local station
Specify the network No. of the CC-Link IE field network expansion unit.
---Setting range---
0 to 239

0: No setting
Specify the number of stations other than master stations.
If the NC acts as a local station, set "0" in the parameter.
If you set a reserved station, include it in the count.
---Setting range---
0 to 64
0: No setting
Specify the station No. of the CC-Link IE field network expansion unit.
For a master station, the station No. is 0, irrespective of the parameter.
* If the NC acts as a master station, the maximum value of the station No. which can be set to the slave station is "64". If the NC acts as a master station and also the NC is connected as a local station, set "64" or less to the station No.
---Setting range---
0 to 120
Specify the communication mode.
0: Online mode
1: Offline mode
2: H/W test mode
(PR) #82000 #1 Slot No. Selection of parameter application slot
(PR) #82001 #1 Network Type Network type
(PR) #82002 #1 Network No. Network No.
#82003 #1 Total Stations Total number of slave stations
(PR) #82004 #1 Station No. Station No. (local station)
(PR) #82005 #1 Mode Communication mode

Select whether to hold or clear the input data from the slave station where a data link error occurred.
0: Clear
1: Hold
Select whether to hold or clear the cyclic data output when the PLC is put in STOP status.
0: Output
1: Clear
Select whether or not to use the loopback function.
When ring topology is selected as the method of connecting with other stations, select "1" (Use).
For the other connection methods, select "0" (Not use).
If the NC acts as a local station, set "0" in the parameter.
If the NC acts as a local station, it operates according to the loopback function setting of master station.
0: Not use
1: Use
Specify the number of SB link devices for link refresh.
Set the number in increments of 16.
---Setting range---
0 to 512
Specify the start device No. of SB link devices that perform link refresh.
Set the number in increments of 16.
---Setting range---
0 to 1F0 (hexadecimal)
Specify the project No. of PLC devices that perform link refresh with the SB link devices.
---Setting range---
0 to 6
0: No setting
Specify the name of PLC devices that perform link refresh with the SB link devices.
---Setting range---
0, M, L, B, D, W, R, SB
0: No setting
Specify the start device No. of PLC devices that perform link refresh with the SB link devices.
If you specify bit devices, set them in increments of 16 points.
---Setting range---
M: 0 to 61424
L: 0 to 32752
B: 0 to EFF0
D: 0 to 32767
W: 0 to 7FFF
SB: 0 to 7FF0
R: 8300 to 9799, 9800 to 9899, 18300 to 19799, 19800 to 19899, 28300 to 29799, 29800 to 29899
#82006 #1 DLink Fault St. Data link error station setting
#82007 #1 PLC Stop Output Output setting at PLC STOP
#82008 #1 Loopback Func Loopback function setting
#82040 #1 SB Link-d size Number of SB link devices
#82041 #1 SB Link-d DNo. Start device No. of SB link devices
#82042 #1 Refr-d PNo.(SB) Refresh device project No. for SB link device
#82043 #1 Refr-d name(SB) Refresh device name for SB link device
#82044 #1 Refr-d DNo.(SB) Refresh device start device No. for SB link device

Specify the number of SW link devices for link refresh.
Set the number in increments of 4.
---Setting range---
0 to 512
Specify the start device No. of SW link devices that perform link refresh.
Set the number in increments of 4.
---Setting range---
0 to 1FC (hexadecimal)
Specify the project No. of PLC devices that perform link refresh with the SW link devices.
---Setting range---
0 to 6

0: No setting
Specify the name of PLC devices that perform link refresh with the SW link devices.
---Setting range---
0, M, L, B, D, W, R, SW
0: No setting
Specify the start device No. of PLC devices that perform link refresh with the SW link devices.
If you specify bit devices, set them in increments of 16 points.
---Setting range---
M: 0 to 61424
L: 0 to 32752
B: 0 to EFF0
D: 0 to 32767
W: 0 to 7FFF
SW: 0 to 7FF0
R: 8300 to 9799, 9800 to 9899, 18300 to 19799, 19800 to 19899, 28300 to 29799, 29800 to 29899
Specify the link device name. (k=1 to 64)
---Setting range---
0, RX, RY, RWr, RWw
0: No setting
Specify the number of link devices. (k=1 to 64)
If you designate RX/RY, set the number in increments of 16.
If you designate RWr/RWw, set the number in increments of 4.
---Setting range---
RX, RY: 0 to 16384
RWr, RWw: 0 to 8192
#82050 #1 SW Link-d size Number of SW link devices
#82051 #1 SW Link-d DNo. Start device No. of SW link devices
#82052 #1 Refr-d PNo.(SW) Refresh device project No. for SW link device
#82053 #1 Refr-d name(SW) Refresh device name for SW link device
#82054 #1 Refr-d DNo.(SW) Refresh device start device No. for SW link device
#82060+10(k-1) #1 N01 Link-d name Link device name
#82061+10(k-1) #1 N01 Link-d size Number of link devices

Specify the start device number of the link devices. (k=1 to 64)
If you designate RX/RY, set the number in increments of 16.
If you designate RWr/RWw, set the number in increments of 4.
---Setting range---
RX, RY: 0 to 3FF0
RWr, RWw: 0 to 1FFC (hexadecimal)
Specify the project No. of PLC devices that perform link refresh with the link devices. (k=1 to 64)
---Setting range---
0 to 6
0: No setting
Specify the name of PLC devices that perform link refresh with the link devices. (k=1 to 64)
---Setting range---
RX: 0, X, M, L, B, D, W, R
RY: 0, Y, M, L, B, D, W, R
RWr, RWw: 0, M, L, B, D, W, R
0: No setting
Specify the start device No. of PLC devices that perform link refresh with the link devices. (k=1 to 64)
If you specify bit devices, set them in increments of 16 points.
---Setting range---
X: 0 to 5F0
Y: 0 to 5F0
M: 0 to 61424
L: 0 to 32752
B: 0 to EFF0
D: 0 to 32767
W: 0 to 7FFF
R: 8300 to 9799, 9800 to 9899, 18300 to 19799, 19800 to 19899, 28300 to 29799, 29800 to 29899
#82062+10(k-1) #1 N01 Link-d DNo. Link device start device No.
#82063+10(k-1) #1 N01 Refr-d PNo. Refresh device project No.
#82064+10(k-1) #1 N01 Refr-d name Refresh device name
#82065+10(k-1) #1 N01 Refr-d DNo. Refresh device start device No.

15.33.2 CC-Link IE Field Network 2
(Note) Numeric portion of "N01" included in each parameter name varies depending on the parameter No.
Example: #82760+10(k-1) "#2 N01 Link-d name" (k = 1 to 64)
Select the slot of the CC-Link IE field network expansion unit to which you apply the CCIEF common param eters #82700 to #83395.
(Note) If you select the same slot as of "#82000 #1 Slot No.", the parameters #82000 to #82695 are applied
to the slot with higher priority.
---Setting range---
0: No setting (Disable)
1: EXT3
2: EXT4
(*) For M80/M800S/E80
1: EXT1
2: EXT2
Specify the station type of the CC-Link IE field network expansion unit.
---Setting range---
0: Master station
1: Local station
Specify the network No. of the CC-Link IE field network expansion unit.
---Setting range---

0 to 239
0: No setting
Specify the number of stations other than master stations.
If the NC acts as a local station, set "0" in the parameter.
If you set a reserved station, include it in the count.
---Setting range---
0 to 64
0: No setting
Specify the station No. of the CC-Link IE field network expansion unit.
For a master station, the station No. is 0, irrespective of the parameter.
* If the NC acts as a master station, the maximum value of the station No. which can be set to the slave station is "64". If the NC acts as a master station and also the NC is connected as a local station, set "64" or less to the station No.
---Setting range---
0 to 120
Specify the communication mode.
0: Online mode
1: Offline mode
2: H/W test mode
Select whether to hold or clear the input data from the station where a data link error occurred.
0: Clear
1: Hold
(PR) #82700 #2 Slot No. Selection of parameter application slot
(PR) #82701 #2 Network Type Network type
(PR) #82702 #2 Network No. Network No.
#82703 #2 Total Stations Total number of slave stations
(PR) #82704 #2 Station No. Station No. (local station)
(PR) #82705 #2 Mode Communication mode
#82706 #2 DLink Fault St. Data link error station setting

Select whether to hold or clear the cyclic data output when the PLC is put in STOP status.
0: Clear
1: Hold
Select whether or not to use the loopback function.
When ring topology is selected as the method of connecting with other stations, select "1" (Use).
For the other connection methods, select "0" (Not use).
If the NC acts as a local station, set "0" in the parameter.
If the NC acts as a local station, it operates according to the loopback function setting of master station.
0: Not use
1: Use
Specify the number of SB link devices for link refresh.
Set the number in increments of 16.
---Setting range---
0 to 512
Specify the start device No. of SB link devices that perform link refresh.
Set the number in increments of 16.
---Setting range---
0 to 1F0 (hexadecimal)
Specify the project No. of PLC devices that perform link refresh with the SB link devices.
---Setting range---
0 to 6
0: No setting
Specify the name of PLC devices that perform link refresh with the SB link devices.
---Setting range---
0, M, L, B, D, W, R, SB
0: No setting
Specify the start device No. of PLC devices that perform link refresh with the SB link devices.
If you specify bit devices, set them in increments of 16 points.
---Setting range---
M: 0 to 61424
L: 0 to 32752
B: 0 to EFF0
D: 0 to 32767
W: 0 to 7FFF
SB: 0 to 7FF0
R: 8300 to 9799, 9800 to 9899, 18300 to 19799, 19800 to 19899, 28300 to 29799, 29800 to 29899
Specify the number of SW link devices for link refresh.
Set the number in increments of 4.
---Setting range---
0 to 512
#82707 #2 PLC Stop Output Output setting at PLC STOP
#82708 #2 Loopback Func Loopback function setting
#82740 #2 SB Link-d size Number of SB link devices
#82741 #2 SB Link-d DNo. Start device No. of SB link devices
#82742 #2 Refr-d PNo.(SB) Refresh device project No. for SB link device
#82743 #2 Refr-d name(SB) Refresh device name for SB link device
#82744 #2 Refr-d DNo.(SB) Refresh device start device No. for SB link device
#82750 #2 SW Link-d size Number of SW link devices

Specify the start device No. of SW link devices that perform link refresh.
Set the number in increments of 4.
---Setting range---
0 to 1FC (hexadecimal)
Specify the project No. of PLC devices that perform link refresh with the SW link devices.

---Setting range---
0 to 6
0: No setting
Specify the name of PLC devices that perform link refresh with the SW link devices.
---Setting range---
0, M, L, B, D, W, R, SW
0: No setting
Specify the start device No. of PLC devices that perform link refresh with the SW link devices.
If you specify bit devices, set them in increments of 16 points.
---Setting range---
M: 0 to 61424
L: 0 to 32752
B: 0 to EFF0
D: 0 to 32767
W: 0 to 7FFF
SW: 0 to 7FF0
R: 8300 to 9799, 9800 to 9899, 18300 to 19799, 19800 to 19899, 28300 to 29799, 29800 to 29899
Specify the link device name. (k=1 to 64)
---Setting range---
0, RX, RY, RWr, RWw
0: No setting
Specify the number of link devices. (k=1 to 64)
If you designate RX/RY, set the number in increments of 16.
If you designate RWr/RWw, set the number in increments of 4.
---Setting range---
RX, RY: 0 to 16384
RWr, RWw: 0 to 8192
Specify the start device number of the link devices. (k=1 to 64)
If you designate RX/RY, set the number in increments of 16.
If you designate RWr/RWw, set the number in increments of 4.
---Setting range---
RX, RY: 0 to 3FF0
RWr, RWw: 0 to 1FFC (hexadecimal)
#82751 #2 SW Link-d DNo. Start device No. of SW link devices
#82752 #2 Refr-d PNo.(SW) Refresh device project No. for SW link device
#82753 #2 Refr-d name(SW) Refresh device name for SW link device
#82754 #2 Refr-d DNo.(SW) Refresh device start device No. for SW link device
#82760+10(k-1) #2 N01 Link-d name Link device name
#82761+10(k-1) #2 N01 Link-d size Number of link devices
#82762+10(k-1) #2 N01 Link-d DNo. Link device start device No.

Specify the project No. of PLC devices that perform link refresh with the link devices. (k=1 to 64)
---Setting range---
0 to 6
0: No setting
Specify the name of PLC devices that perform link refresh with the link devices. (k=1 to 64)
---Setting range---
RX: 0, X, M, L, B, D, W, R
RY: 0, Y, M, L, B, D, W, R
RWr, RWw: 0, M, L, B, D, W, R
0: No setting
Specify the start device No. of PLC devices that perform link refresh with the link devices. (k=1 to 64)
If you specify bit devices, set them in increments of 16 points.
---Setting range---
X: 0 to 5F0
Y: 0 to 5F0
M: 0 to 61424
L: 0 to 32752
B: 0 to EFF0
D: 0 to 32767
W: 0 to 7FFF
R: 8300 to 9799, 9800 to 9899, 18300 to 19799, 19800 to 19899, 28300 to 29799, 29800 to 29899
#82763+10(k-1) #2 N01 Refr-d PNo. Refresh device project No.
#82764+10(k-1) #2 N01 Refr-d name Refresh device name
#82765+10(k-1) #2 N01 Refr-d DNo. Refresh device start device No.

15.33.3 CC-Link IE Field Master Parameters
(Note) Numeric portion of "CN01" included in each parameter name varies depending on the parameter No.
Example: #83400+10(n-1) "CN01 Station No." (n = 1 to 64)
Specify the station No. of slave station connected to the network. (n=1 to 64)
There is no need to number the stations sequentially. (duplication is not acceptable)
---Setting range---
0 to 64
0: No setting
Specify the station type for slave stations. (n=1 to 64)
Set the same station type as that of the units that are actually connected to the network.
---Setting range---
0: No setting
1: Remote I/O station
2: Remote device station
3: Intelligent device station
4: Local station
Specify the number of RX/RY link devices that perform link refresh with slave stations. (n=1 to 64)
Set the number in increments of 16.

---Setting range---
Local or intelligent device station: 0 to 2048
Remote device station: 0 to 128
Remote I/O station: 0 to 64
Specify the start device No. of RX/RY link devices that perform link refresh with slave stations. (n=1 to 64)
Set the number in increments of 16.
---Setting range---
0 to 3FF0 (hexadecimal)
Specify the number of RWr/RWw link devices that perform link refresh with slave stations. (n=1 to 64)
Set the number in increments of 4.
---Setting range---
Local or intelligent device station: 0 to 1024
Remote device station: 0 to 64
Remote I/O station: Setting is disabled (fixed to 0)
Specify the start device No. of RWr/RWw link devices that perform link refresh with slave stations. (n=1 to 64)
Set the number in increments of 4.
---Setting range---
0 to 1FFC (hexadecimal)
#83400+10(n-1) CN01 Station No. Station No. (slave station)
#83401+10(n-1) CN01 Station Type Station type (slave station)
#83402+10(n-1) CN01 RX/RY size Number of RX/RY link devices
#83403+10(n-1) CN01 RX/RY DNo. Start device No. of RX/RY link devices
#83404+10(n-1) CN01 RWr/RWw size Number of RWr/RWw link devices
#83405+10(n-1) CN01 RWr/RWw DNo. Start device No. of RWr/RWw link devices

Designate the station as reserved station or error invalid station. (n=1 to 64)
---Setting range---
0: No setting
1: Reserved station
2: Error invalid station
#83406+10(n-1) CN01 Set rsvd sts Reserved/Error invalid station setting

15.33.4 CC-Link IE Field Network Basic
Select whether to enable the CC-Link IE Field Network Basic communication.
0: Disabled
1: Enabled
Select whether the local station acts as a master or a slave station.
When operating it as a master station, set the parameters #85010 to #85092.
When operating it as a slave station, set the parameters #85180 to #85189.
0: Master station
1: Slave station
Select whether to execute emergency stop or indicate a warning when an error occurs in the CC-Link IE Field Network Basic communication.
0: Emergency stop
1: Warning indication
Select whether to clear the input data (RX for master station, RY for slave station) or retain the last value when a data link error occurs.
0: Clear
1: Hold
Select whether to retain or clear the output data (RY for master station, RX for slave station) when the PLC enters STOP status.
0: Output
1: Clear
Specify the number of slave devices to be connected to the CC-Link IE Field Network Basic communication (master).
---Setting range---
0 to 4 (0: No setting)
Specify the length of timeout for cyclic communication in milliseconds.
---Setting range---
0 or 20 to 65535 (0: 100ms)
Specify the number of timeouts for cyclic communication.
If the number of consecutive timeouts exceeds the setting, the slave station is disconnected.
---Setting range---
0, 3, 5, 10 (0: 3 times)
(PR) #85000 Enable CCIEF Basic Enable the CC-Link IE Field Network Basic communica tion.
(PR) #85001 Station Type Specify the station type of the CC-Link IE Field Network Basic communication.
(PR) #85002 Err Switch Select the behavior when an error occurs in the CC-Link IE Field Network Basic communication.
#85003 DLink Fault St. Setting of data link faulty station in the CC-Link IE Field Network Basic communication.
#85004 PLC Stop Output Select whether to enable the CC-Link IE Field Network Basic communication in PLC stop status.
#85010 Total Slaves Number of devices to be connected to the CC-Link IE Field Network Basic communication (master).
#85012 Timeout Value Timeout for the CC-Link IE Field Network Basic commu nication (master)
#85013 Timeout Count Number of times of timeout for the CC-Link IE Field Net work Basic communication (master)

Specify the number of stations occupied by the 1st slave device. Up to 4 stations can be occupied by one slave device.
Example: When the 1st device occupies four stations, stations occupied by the 2nd device start from the 5th station.

1st device occupying four stations (1st to 4th stations)
2nd device occupying one station (5th station)
---Setting range---
0 to 4 (0: No setting)
Select whether to set the 1st slave device as reserved station.
When set as reserved station, communication with the slave device is not performed. This enables you to reserve the stations that are to be used in the future.
(The reserved station is available in version D4 or later systems. Set "0" for D3 or earlier systems.)
Example: When the 1st device occupies four reserved stations, stations occupied by the 2nd device start from the 5th station. Communication is not performed for the 1st to 4th stations.
1st device (reserved station) occupying four stations (1st to 4th stations) (Communication is not performed)
2nd device occupying one station (5th station)
---Setting range---
0: No setting
1: Reserved station
Specify the IP address of the 1st slave device.
Set the slave's IP address in the same network as the parameter "#1926 Global IP address". It is not possible to communication with a device on a different network.
---Setting range---
0.0.0.0,0.0.0.1 to 223.255.255.254 (0.0.0.0: No setting)
Specify the project No. of PLC devices for which link refresh is performed with the link devices of the 1st slave device.
---Setting range---
0 to 6 (0: No setting)
Specify the name of PLC devices for which link refresh is performed with the link devices "RX" of the 1st slave device.
Link refresh-enabled devices
X, M, L, B, D, W and R
---Setting range---
0, X, M, L, B, D, W or R (0: No setting)
#85020 N01 Occupied St. Number of stations occupied by the 1st slave device
#85022 N01 Set rsvd St. Reserved station setting of the 1st slave device
#85023 N01 IP Address IP address of 1st slave device
#85024 N01 Refr-d PNo. Refresh device project No. for 1st slave device
#85025 N01 Refr-d to RX Refresh device name for 1st slave device (RX)

Specify the starting device No. of PLC devices for which link refresh is performed with the link devices "RX" of the 1st slave device.
If you specify bit devices, set them in increments of 16 points.
---Setting range---
X: 0 to 5F0
M: 0 to 61424
L: 0 to 32752
B: 0 to EFF0
D: 0 to 32767
W: 0 to 7FFF
R: 8300 to 9799, 9800 to 9899, 18300 to 19799, 19800 to 19899, 28300 to 29799, 29800 to 29899
Specify the name of PLC devices for which link refresh is performed with the link devices "RY" of the 1st slave device.
Link refresh-enabled devices
Y, M, L, B, D, W and R
---Setting range---
0, Y, M, L, B, D, W or R (0: No setting)
Specify the starting device No. of PLC devices for which link refresh is performed with the link devices "RY" of the 1st slave device.
If you specify bit devices, set them in increments of 16 points.
---Setting range---
Y: 0 to 5F0
M: 0 to 61424
L: 0 to 32752
B: 0 to EFF0
D: 0 to 32767
W: 0 to 7FFF
R: 8300 to 9799, 9800 to 9899, 18300 to 19799, 19800 to 19899, 28300 to 29799, 29800 to 29899
Specify the name of PLC devices for which link refresh is performed with the link devices "RWr" of the 1st slave device.
Link refresh-enabled devices
M, L, B, D, W and R
---Setting range---
0, M, L, B, D, W or R (0: No setting)
#85026 N01 Refr-No to RX Refresh device start device No. for 1st slave device (RX)
#85027 N01 Refr-d to RY Refresh device name for 1st slave device (RY)
#85028 N01 Refr-No to RY Refresh device start device No. for 1st slave device (RY)
#85029 N01 Refr-d to RWr Refresh device name for 1st slave device (RWr)

Specify the starting device No. of PLC devices for which link refresh is performed with the link devices "RWr" of the 1st slave device.
If you specify bit devices, set them in increments of 16 points.
---Setting range---
M: 0 to 61424
L: 0 to 32752
B: 0 to EFF0
D: 0 to 32767
W: 0 to 7FFF

R: 8300 to 9799, 9800 to 9899, 18300 to 19799, 19800 to 19899, 28300 to 29799, 29800 to 29899
Specify the name of PLC devices for which link refresh is performed with the link devices "RWw" of the 1st slave device.
Link refresh-enabled devices
M, L, B, D, W and R
---Setting range---
0, M, L, B, D, W or R (0: No setting)
Specify the starting device No. of PLC devices for which link refresh is performed with the link devices "RWw" of the 1st slave device.
If you specify bit devices, set them in increments of 16 points.
---Setting range---
M: 0 to 61424
L: 0 to 32752
B: 0 to EFF0
D: 0 to 32767
W: 0 to 7FFF
R: 8300 to 9799, 9800 to 9899, 18300 to 19799, 19800 to 19899, 28300 to 29799, 29800 to 29899
Specify the number of stations occupied by the 2nd slave device. Up to 4 stations can be occupied by one slave device.
---Setting range---
0 to 4 (0: No setting)
Select whether to set the 2nd slave device as reserved station.
(The reserved station is available in version D4 or later systems. Set "0: No setting" for version D3 or earlier systems.)
---Setting range---
0: No setting
1: Reserved station
Specify the IP address of the 2nd slave device.
---Setting range---
0.0.0.0,0.0.0.1 to 223.255.255.254 (0.0.0.0: No setting)
#85030 N01 Refr-No to RWr Refresh device start device No. for 1st slave device (RWr)
#85031 N01 Refr-d to RWw Refresh device name for 1st slave device (RWw)
#85032 N01 Refr-No to RWw Refresh device start device No. for 1st slave device (RWw)
#85040 N02 Occupied St. Number of stations occupied by 2nd slave device
#85042 N02 Set rsvd St. Reserved station setting of the 2nd slave device
#85043 N02 IP Address IP address of 2nd slave device

Specify the project No. of PLC devices for which link refresh is performed with the link devices of the 2nd slave device.
---Setting range---
0 to 6 (0: No setting)
Specify the name of PLC devices for which link refresh is performed with the link devices "RX" of the 2nd slave device.
---Setting range---
0, X, M, L, B, D, W or R (0: No setting)
Specify the starting device No. of PLC devices for which link refresh is performed with the link devices "RX" of the 2nd slave device.
---Setting range---
X: 0 to 5F0
M: 0 to 61424
L: 0 to 32752
B: 0 to EFF0
D: 0 to 32767
W: 0 to 7FFF
R: 8300 to 9799, 9800 to 9899, 18300 to 19799, 19800 to 19899, 28300 to 29799, 29800 to 29899
Specify the name of PLC devices for which link refresh is performed with the link devices "RY" of the 2nd slave device.
---Setting range---
0, Y, M, L, B, D, W or R (0: No setting)
Specify the starting device No. of PLC devices for which link refresh is performed with the link devices "RY" of the 2nd slave device.
---Setting range---
Y: 0 to 5F0
M: 0 to 61424
L: 0 to 32752
B: 0 to EFF0
D: 0 to 32767
W: 0 to 7FFF
R: 8300 to 9799, 9800 to 9899, 18300 to 19799, 19800 to 19899, 28300 to 29799, 29800 to 29899
Specify the name of PLC devices for which link refresh is performed with the link devices "RWr" of the 2nd slave device.
---Setting range---
0, M, L, B, D, W or R (0: No setting)
#85044 N02 Refr-d PNo. Refresh device project No. for 2nd slave device
#85045 N02 Refr-d to RX Refresh device name for 2nd slave device (RX)
#85046 N02 Refr-No to RX Refresh device start device No. for 2nd slave device (RX)
#85047 N02 Refr-d to RY Refresh device name for 2nd slave device (RY)
#85048 N02 Refr-No to RY Refresh device start device No. for 2nd slave device (RY)
#85049 N02 Refr-d to RWr Refresh device name for 2nd slave device (RWr)

Specify the starting device No. of PLC devices for which link refresh is performed with the link devices "RWr" of the 2nd slave device.
---Setting range---
M: 0 to 61424
L: 0 to 32752
B: 0 to EFF0
D: 0 to 32767
W: 0 to 7FFF
R: 8300 to 9799, 9800 to 9899, 18300 to 19799, 19800 to 19899, 28300 to 29799, 29800 to 29899
Specify the name of PLC devices for which link refresh is performed with the link devices "RWw" of the 2nd slave device.
---Setting range---
0, M, L, B, D, W or R (0: No setting)
Specify the starting device No. of PLC devices for which link refresh is performed with the link devices "RWw" of the 2nd slave device.
---Setting range---
M: 0 to 61424
L: 0 to 32752
B: 0 to EFF0
D: 0 to 32767
W: 0 to 7FFF
R: 8300 to 9799, 9800 to 9899, 18300 to 19799, 19800 to 19899, 28300 to 29799, 29800 to 29899
Specify the number of stations occupied by the 3rd slave device. Up to 4 stations can be occupied by one slave device.
---Setting range---
0 to 4 (0: No setting)
Select whether to set the 3rd slave device as reserved station.
(The reserved station is available in version D4 or later systems. Set "0: No setting" for version D3 or earlier systems.)
---Setting range---
0: No setting
1: Reserved station
Specify the IP address of the 3rd slave device.
---Setting range---
0.0.0.0,0.0.0.1 to 223.255.255.254 (0.0.0.0: No setting)
Specify the project No. of PLC devices for which link refresh is performed with the link devices of the 3rd slave device.
---Setting range---
0 to 6 (0: No setting)
#85050 N02 Refr-No to RWr Refresh device start device No. for 2nd slave device (RWr)
#85051 N02 Refr-d to RWw Refresh device name for 2nd slave device (RWw)
#85052 N02 Refr-No to RWw Refresh device start device No. for 2nd slave device (RWw)
#85060 N03 Occupied St. Number of stations occupied by 3rd slave device
#85062 N03 Set rsvd St. Reserved station setting of the 3rd slave device
#85063 N03 IP Address IP address of 3rd slave device
#85064 N03 Refr-d PNo. Refresh device project No. for 3rd slave device

Specify the name of PLC devices for which link refresh is performed with the link devices "RX" of the 3rd slave device.
---Setting range---
0, X, M, L, B, D, W or R (0: No setting)
Specify the starting device No. of PLC devices for which link refresh is performed with the link devices "RX" of the 3rd slave device.
---Setting range---
X: 0 to 5F0
M: 0 to 61424
L: 0 to 32752
B: 0 to EFF0
D: 0 to 32767
W: 0 to 7FFF
R: 8300 to 9799, 9800 to 9899, 18300 to 19799, 19800 to 19899, 28300 to 29799, 29800 to 29899
Specify the name of PLC devices for which link refresh is performed with the link devices "RY" of the 3rd slave device.
---Setting range---
0, Y, M, L, B, D, W or R (0: No setting)
Specify the starting device No. of PLC devices for which link refresh is performed with the link devices "RY" of the 3rd slave device.
---Setting range---
Y: 0 to 5F0
M: 0 to 61424
L: 0 to 32752
B: 0 to EFF0
D: 0 to 32767
W: 0 to 7FFF
R: 8300 to 9799, 9800 to 9899, 18300 to 19799, 19800 to 19899, 28300 to 29799, 29800 to 29899
Specify the name of PLC devices for which link refresh is performed with the link devices "RWr" of the 3rd slave device.
---Setting range---
0, M, L, B, D, W or R (0: No setting)
Specify the starting device No. of PLC devices for which link refresh is performed with the link devices "RWr" of the 3rd slave device.
---Setting range---
M: 0 to 61424
L: 0 to 32752

B: 0 to EFF0
D: 0 to 32767
W: 0 to 7FFF
R: 8300 to 9799, 9800 to 9899, 18300 to 19799, 19800 to 19899, 28300 to 29799, 29800 to 29899
#85065 N03 Refr-d to RX Refresh device name for 3rd slave device (RX)
#85066 N03 Refr-No to RX Refresh device start device No. for 3rd slave device
(RX)
#85067 N03 Refr-d to RY Refresh device name for 3rd slave device (RY)
#85068 N03 Refr-No to RY Refresh device start device No. for 3rd slave device
(RY)
#85069 N03 Refr-d to RWr Refresh device name for 3rd slave device (RWr)
#85070 N03 Refr-No to RWr Refresh device start device No. for 3rd slave device
(RWr)

Specify the name of PLC devices for which link refresh is performed with the link devices "RWw" of the 3rd slave device.
---Setting range---
0, M, L, B, D, W or R (0: No setting)
Specify the starting device No. of PLC devices for which link refresh is performed with the link devices "RWw" of the 3rd slave device.
---Setting range---
M: 0 to 61424
L: 0 to 32752
B: 0 to EFF0
D: 0 to 32767
W: 0 to 7FFF
R: 8300 to 9799, 9800 to 9899, 18300 to 19799, 19800 to 19899, 28300 to 29799, 29800 to 29899
Specify the number of stations occupied by the 4th slave device. Up to 4 stations can be occupied by one slave device.
---Setting range---
0 to 4 (0: No setting)
Select whether to set the 4th slave device as reserved station.
(The reserved station is available in version D4 or later systems. Set "0: No setting" for version D3 or earlier systems.)
---Setting range---
0: No setting
1: Reserved station
Specify the IP address of the 4th slave device.
---Setting range---
0.0.0.0,0.0.0.1 to 223.255.255.254 (0.0.0.0: No setting)
Specify the project No. of PLC devices for which link refresh is performed with the link devices of the 4th slave device.
---Setting range---
0 to 6 (0: No setting)
Specify the name of PLC devices for which link refresh is performed with the link devices "RX" of the 4th slave device.
---Setting range---
0, X, M, L, B, D, W or R (0: No setting)
#85071 N03 Refr-d to RWw Refresh device name for 3rd slave device (RWw)
#85072 N03 Refr-No to RWw Refresh device start device No. for 3rd slave device
(RWw)
#85080 N04 Occupied St. Number of stations occupied by 4th slave device
#85082 N04 Set rsvd St. Reserved station setting of the 4th slave device
#85083 N04 IP Address IP address of 4th slave device
#85084 N04 Refr-d PNo. Refresh device project No. for 4th slave device
#85085 N04 Refr-d to RX Refresh device name for 4th slave device (RX)

Specify the starting device No. of PLC devices for which link refresh is performed with the link devices "RX" of the 4th slave device.
---Setting range---
X: 0 to 5F0
M: 0 to 61424
L: 0 to 32752
B: 0 to EFF0
D: 0 to 32767
W: 0 to 7FFF
R: 8300 to 9799, 9800 to 9899, 18300 to 19799, 19800 to 19899, 28300 to 29799, 29800 to 29899
Specify the name of PLC devices for which link refresh is performed with the link devices "RY" of the 4th slave device.
---Setting range---
0, Y, M, L, B, D, W or R (0: No setting)
Specify the starting device No. of PLC devices for which link refresh is performed with the link devices "RY" of the 4th slave device.
---Setting range---
Y: 0 to 5F0
M: 0 to 61424
L: 0 to 32752
B: 0 to EFF0
D: 0 to 32767
W: 0 to 7FFF
R: 8300 to 9799, 9800 to 9899, 18300 to 19799, 19800 to 19899, 28300 to 29799, 29800 to 29899
Specify the name of PLC devices for which link refresh is performed with the link devices "RWr" of the 4th slave device.
---Setting range---

0, M, L, B, D, W or R (0: No setting)
Specify the starting device No. of PLC devices for which link refresh is performed with the link devices "RWr" of the 4th slave device.
---Setting range---
M: 0 to 61424
L: 0 to 32752
B: 0 to EFF0
D: 0 to 32767
W: 0 to 7FFF
R: 8300 to 9799, 9800 to 9899, 18300 to 19799, 19800 to 19899, 28300 to 29799, 29800 to 29899
Specify the name of PLC devices for which link refresh is performed with the link devices "RWw" of the 4th slave device.
---Setting range---
0, M, L, B, D, W or R (0: No setting)
#85086 N04 Refr-No to RX Refresh device start device No. for 4th slave device (RX)
#85087 N04 Refr-d to RY Refresh device name for 4th slave device (RY)
#85088 N04 Refr-No to RY Refresh device start device No. for 4th slave device (RY)
#85089 N04 Refr-d to RWr Refresh device name for 4th slave device (RWr)
#85090 N04 Refr-No to RWr Refresh device start device No. for 4th slave device (RWr)
#85091 N04 Refr-d to RWw Refresh device name for 4th slave device (RWw)

Specify the starting device No. of PLC devices for which link refresh is performed with the link devices "RWw" of the 4th slave device.
---Setting range---
M: 0 to 61424
L: 0 to 32752
B: 0 to EFF0
D: 0 to 32767
W: 0 to 7FFF
R: 8300 to 9799, 9800 to 9899, 18300 to 19799, 19800 to 19899, 28300 to 29799, 29800 to 29899
Specify the number of stations occupied for the CC-Link IE Field Network Basic communication (slave).
Up to 4 stations can be occupied.
---Setting range---
0 to 4 (0: No setting)
Specify the project No. of PLC devices for which link refresh is performed with the link devices of CC-Link IE Field Network Basic communication (slave).
---Setting range---
0 to 6 (0: No setting)
Specify the name of PLC devices for which link refresh is performed with the link devices "RX" of CC-Link IE Field Network Basic communication (slave).
Link refresh-enabled devices
Y, M, L, B, D, W and R
---Setting range---
0, Y, M, L, B, D, W or R (0: No setting)
Specify the starting device No. of PLC devices for which link refresh is performed with the link devices "RX" of CC-Link IE Field Network Basic communication (slave).
If you specify bit devices, set them in increments of 16 points.
---Setting range---
Y: 0 to 5F0
M: 0 to 61424
L: 0 to 32752
B: 0 to EFF0
D: 0 to 32767
W: 0 to 7FFF
R: 8300 to 9799, 9800 to 9899, 18300 to 19799, 19800 to 19899, 28300 to 29799, 29800 to 29899
Specify the name of PLC devices for which link refresh is performed with the link devices "RY" of CC-Link IE Field Network Basic communication (slave).
Link refresh-enabled devices
X, M, L, B, D, W and R
---Setting range---
0, X, M, L, B, D, W or R (0: No setting)
#85092 N04 Refr-No to RWw Refresh device start device No. for 4th slave device (RWw)
#85180 S Occupied St. Number of stations occupied for the CC-Link IE Field Network Basic communication (slave)
#85181 S Refr-d PNo. Refresh device project No. for slave function
#85182 S Refr-d to RX Refresh device name for slave function (RX)
#85183 S Refr-No to RX Refresh device start device No. for slave function (RX)
#85184 S Refr-d to RY Refresh device name for slave function (RY)

Specify the starting device No. of PLC devices for which link refresh is performed with the link devices "RY" of CC-Link IE Field Network Basic communication (slave).
If you specify bit devices, set them in increments of 16 points.
---Setting range---
X: 0 to 5F0
M: 0 to 61424
L: 0 to 32752
B: 0 to EFF0
D: 0 to 32767
W: 0 to 7FFF
R: 8300 to 9799, 9800 to 9899, 18300 to 19799, 19800 to 19899, 28300 to 29799, 29800 to 29899
Specify the name of PLC devices for which link refresh is performed with the link devices "RWr" of CC-Link IE Field Network Basic communication (slave).

Link refresh-enabled devices
M, L, B, D, W and R
---Setting range---
0, M, L, B, D, W or R (0: No setting)
Specify the starting device No. of PLC devices for which link refresh is performed with the link devices "RWr"
of CC-Link IE Field Network Basic communication (slave).
If you specify bit devices, set them in increments of 16 points.
---Setting range---
M: 0 to 61424
L: 0 to 32752
B: 0 to EFF0
D: 0 to 32767
W: 0 to 7FFF
R: 8300 to 9799, 9800 to 9899, 18300 to 19799, 19800 to 19899, 28300 to 29799, 29800 to 29899
Specify the name of PLC devices for which link refresh is performed with the link devices "RWw" of CC-Link
IE Field Network Basic communication (slave).
Link refresh-enabled devices
M, L, B, D, W and R
---Setting range---
0, M, L, B, D, W or R (0: No setting)
Specify the starting device No. of PLC devices for which link refresh is performed with the link devices "RWw"
of CC-Link IE Field Network Basic communication (slave).
If you specify bit devices, set them in increments of 16 points.
---Setting range---
M: 0 to 61424
L: 0 to 32752
B: 0 to EFF0
D: 0 to 32767
W: 0 to 7FFF
R: 8300 to 9799, 9800 to 9899, 18300 to 19799, 19800 to 19899, 28300 to 29799, 29800 to 29899
#85185 S Refr-No to RY Refresh device start device No. for slave function (RY)
#85186 S Refr-d to RWr Refresh device name for slave function (RWr)
#85187 S Refr-No to RWr Refresh device start device No. for slave function (RWr)
#85188 S Refr-d to RWw Refresh device name for slave function (RWw)
#85189 S Refr-No to RWw Refresh device start device No. for slave function
(RWw)

15.34 PROFIBUS-DP Parameters
Select whether to allocate the devices to PX or PY of PROFIBUS-DP. (n=1 to 64)
(Note) If 0 is set, the PROFIBUS allocation parameters of the n-th set are all disabled.
0: Disable
1: PX
2: PY
Select the section of PROFIBUS-DP I/O data (PX/PY) to which the devices are allocated. (n=1 to 64)
---Setting range---
0 to 31
Select the device that is allocated to the section of PROFIBUS-DP I/O data(PX/PY). (n=1 to 64)
(Note) The setting range varies according to the value of "#n I/O reg".
---Setting range---
X, Y, M, L, B, D, R or W
When "#n I/O reg" is "1", "Y" is out of the setting range.
When "#n I/O reg" is "2", "X" is out of the setting range.
Select the 32 bytes of devices to which PROFIBUS-DP I/O data is allocated. Specify the starting device num ber. (n=1 to 64)
* If the set value is out of the following ranges, an alarm occurs at the start of NC.
Hexadecimal setting:
X: 0 to 1C0, 300 to 500
Y: 0 to 1C0, 300 to 500
B: 0 to DF00
W: 0 to 2FF0
Decimal setting:
M: 0 to 61184
L: 0 to 768
D: 0 to 4080
R: 8300 to 9884, 18300 to 19884, 28300 to 29884
(Note) Due to the multi-project function, if the number of the first project points is smaller than the default
value, the range becomes narrower corresponding to the number of the first project points.
---Setting range---
The setting range varies according to the value of "#n dev name".
X, Y, B, W: 0 to FFFF
M, L, D, R: 0 to 65535
When the PLC of the NC unit is in the STOP state or error state, select the value to send to the slave device,
either the value of the PLC device allocated by NC parameters or the value cleared to "0".
0: Send the PLC device value
1: Send the data cleared to "0"
(PR) #57000+4(n-1) #n I/O reg PROFIBUS I/O area
(PR) #57001+4(n-1) #n sect No. PROFIBUS section number
(PR) #57002+4(n-1) #n dev name PROFIBUS device name
(PR) #57003+4(n-1) #n dev No. PROFIBUS device number
#57300 PLC Stop Output Setting of output at PLC STOP

15.35 FL-net Parameters
Specify the node name for the NC to be used in FL-net communication.
This parameter is used for response of message transmission.
The communication is possible even when the node name is unspecified.

---Setting range---
Up to 10 characters in length, containing alphanumeric characters and symbols
0: No setting
Specify the length of token watchdog time.
Set the value in increments of 1 ms.
This parameter has the following 2 uses.
(1) Monitoring local node
When a token cannot be issued within the token watchdog time set by this parameter and a time-out oc curs, "token watchdog time error flag" in "local node management information" is turned to "1" (ON).
When the time-out is counted for 3 consecutive times, the node is released from the network and the sys tem alarm (Z103) occurs. When a time-out occurs, set the larger value than current value to this param eter.
(2) Monitoring other node
Check the release of the other nodes based on token watchdog time for each node, and the token is to
be re-issued.
Calculate the token watchdog time with the following formula.
[Calculation method]
Token watchdog time =
(Total number of cyclic frames for local nodes + 2) 2.0 ms
+ (Total number of cyclic frames for local nodes + 2) the allowable minimum frame interval time
(*) The maximum data size for 1 packet is 1024 bytes.
---Setting range---
1 to 255 (ms)
Specify the allowable minimum frame interval time.
The minimum frame interval time is ensured the time from the end of a frame to the subsequent frame to be
sent.
This parameter has the following 2 uses.
(1) Time until any frame is sending from local node after the local node address token was received
(2) Transmission interval for cyclic frames or message frames
Note that this does not apply between the token frame and the preceding cyclic frame.
The largest value of the allowable minimum frame interval time within the network is used for all devices.
When any restriction is needed for the configuration of devices or communication path, set "1" or larger value
to this parameter. Set "0" when no restriction is needed.
---Setting range---
0: No setting
1 to 9: 1 (ms)
10 to 19: 2 (ms)
20 to 29: 3 (ms)
30 to 39: 4 (ms)
40 to 49: 5 (ms)
50: 6 (ms)
#88000 Node name Node name
#88001 Token Wdog Time Token watchdog time
#88002 Min. Frame Time Minimum permissible frame interval

Select which data is sent to the hardware connected when the NC enters the PLC STOP mode, the set PLC
device value or the cleared data (the data cleared to "0").
0: Send the PLC device value
1: Send the data cleared to "0"
Specify the start address (word) in the local node area of the common memory area 1.
The sum of the start address and its size cannot exceed 200 (HEX).
---Setting range---
0 to 1FF (word) (hexadecimal)
Specify the size (word) of the local node area of the common memory area 1.
When "0" is set, the data will not be transmitted.
The sum of the start address and its size cannot exceed 200 (HEX).
---Setting range---
0 to 512 (words)
Specify the project number of PLC device to be assigned to the local node area of the common memory area
1.
---Setting range---
1 to 6
0: No setting
Specify the PLC device name to be assigned to the local node area of the common memory area 1.
(Example) Y
When the setting of this parameter is changed, the value of "#88014 CyC1 My dev No." is cleared to "0".
---Setting range---
Y, M, L, SB, B, SW, D, R, W
0: No setting
Specify the start number of PLC device to be assigned to the local node area of the common memory area 1.
If you specify bit devices, set them with numbers divisible by 16 (in increments of 16 points).
(Example) 100
---Setting range---
Y: 0 to 5F0
M: 0 to 61424
L: 0 to 32752
SB: 0 to 7FF0
B: 0 to EFF0
SW: 0 to 7FFF
D: 0 to 32767
W: 0 to 7FFF
R: 8300 to 9799, 9800 to 9899, 18300 to 19799, 19800 to 19899, 28300 to 29799, 29800 to 29899
#88003 PLC Stop Output Setting of output at PLC STOP
#88010 CyC1 My Addr Start address in local node area of common memory
area 1
#88011 CyC1 My Size Size of local node area in common memory area 1
#88012 CyC1 My Proj. No. PLC project number for local node area in common
memory area 1
#88013 CyC1 My dev name PLC device name for local node area in common mem ory area 1

#88014 CyC1 My dev No. Start number of PLC device for local node area in com mon memory area 1

Specify the start address (word) in the other node area 1 of the common memory area 1.
The sum of the start address and its size cannot exceed 200 (HEX).
---Setting range---
0 to 1FF (word) (hexadecimal)
Specify the size (word) of the other node area 1 of the common memory area 1.
When "0" is set, the data will not be transmitted.
The sum of the start address and its size cannot exceed 200 (HEX).
---Setting range---
0 to 512 (words)
Specify the project number of PLC device to be assigned to the other node area 1 of the common memory area 1.
---Setting range---
1 to 6
0: No setting
Specify the PLC device name to be assigned to the other node area 1 of the common memory area 1.
(Example) X
When the setting of this parameter is changed, the value of "#88024 CyC1 A1 dev No." is cleared to "0".
---Setting range---
X, M, L, SB, B, SW, D, R, W
0: No setting
Specify the start number of PLC device to be assigned to the other node area 1 of the common memory area 1.
If you specify bit devices, set them with numbers divisible by 16 (in increments of 16 points).
(Example) 100
---Setting range---
X: 0 to 5F0
M: 0 to 61424
L: 0 to 32752
SB: 0 to 7FF0
B: 0 to EFF0
SW: 0 to 7FFF
D: 0 to 32767
W: 0 to 7FFF
R: 8300 to 9799, 9800 to 9899, 18300 to 19799, 19800 to 19899, 28300 to 29799, 29800 to 29899
Specify the start address (word) in the other node area 2 of the common memory area 1.
The sum of the start address and its size cannot exceed 200 (HEX).
---Setting range---
0 to 1FF (word) (hexadecimal)
#88020 CyC1 A1 Addr Start address in other node area 1 of common memory area 1
#88021 CyC1 A1 Size Size of other node area 1 in common memory area 1
#88022 CyC1 A1 Proj. No. PLC project number for other node area 1 in common memory area 1
#88023 CyC1 A1 dev name PLC device name for other node area 1 in common memory area 1
#88024 CyC1 A1 dev No. Start number of PLC device for other node area 1 in common memory area 1
#88030 CyC1 A2 Addr Start address in other node area 2 of common memory area 1

Specify the size (word) of the other node area 2 of the common memory area 1.
When "0" is set, the data will not be transmitted.
The sum of the start address and its size cannot exceed 200 (HEX).
---Setting range---
0 to 512 (words)
Specify the project number of PLC device to be assigned to the other node area 2 of the common memory area 1.
---Setting range---
1 to 6
0: No setting
Specify the PLC device name to be assigned to the other node area 2 of the common memory area 1.
(Example) X
When the setting of this parameter is changed, the value of "#88034 CyC1 A2 dev No." is cleared to "0".
---Setting range---
X, M, L, SB, B, SW, D, R, W
0: No setting
Specify the start number of PLC device to be assigned to the other node area 2 of the common memory area 1.
If you specify bit devices, set them with numbers divisible by 16 (in increments of 16 points).
(Example) 100
---Setting range---
X: 0 to 5F0
M: 0 to 61424
L: 0 to 32752
SB: 0 to 7FF0
B: 0 to EFF0
SW: 0 to 7FFF
D: 0 to 32767
W: 0 to 7FFF
R: 8300 to 9799, 9800 to 9899, 18300 to 19799, 19800 to 19899, 28300 to 29799, 29800 to 29899
Specify the start address (word) in the local node area of the common memory area 2.
The sum of the start address and its size cannot exceed 2000 (HEX).

---Setting range---
0 to 1FFF (word) (hexadecimal)
Specify the size (word) of the local node area of the common memory area 2.
When "0" is set, the data will not be transmitted.
The sum of the start address and its size cannot exceed 2000 (HEX).
---Setting range---
0 to 8192 (words)
#88031 CyC1 A2 Size Size of other node area 2 in common memory area 1
#88032 CyC1 A2 Proj. No. PLC project number for other node area 2 in common
memory area 1
#88033 CyC1 A2 dev name PLC device name for other node area 2 in common
memory area 1
#88034 CyC1 A2 dev No. Start number of PLC device for other node area 2 in
common memory area 1
#88040 CyC2 My Addr Start address in local node area of common memory
area 2
#88041 CyC2 My Size Size of local node area in common memory area 2

Specify the project number of PLC device to be assigned to the local node area of the common memory area
2.
---Setting range---
1 to 6
0: No setting
Specify the PLC device name to be assigned to the local node area of the common memory area 2.
(Example) Y
When the setting of this parameter is changed, the value of "#88044 CyC2 My dev No." is cleared to "0".
---Setting range---
Y, M, L, SB, B, SW, D, R, W
0: No setting
Specify the start number of PLC device to be assigned to the local node area of the common memory area 2.
If you specify bit devices, set them with numbers divisible by 16 (in increments of 16 points).
(Example) 100
---Setting range---
Y: 0 to 5F0
M: 0 to 61424
L: 0 to 32752
SB: 0 to 7FF0
B: 0 to EFF0
SW: 0 to 7FFF
D: 0 to 32767
W: 0 to 7FFF
R: 8300 to 9799, 9800 to 9899, 18300 to 19799, 19800 to 19899, 28300 to 29799, 29800 to 29899
Specify the start address (word) in the other node area 1 of the common memory area 2.
The sum of the start address and its size cannot exceed 2000 (HEX).
---Setting range---
0 to 1FFF (word) (hexadecimal)
Specify the size (word) of the other node area 1 of the common memory area 2.
When "0" is set, the data will not be transmitted.
The sum of the start address and its size cannot exceed 2000 (HEX).
---Setting range---
0 to 8192 (words)
Specify the project number of PLC device to be assigned to the other node area 1 of the common memory
area 2.
---Setting range---
1 to 6
0: No setting
#88042 CyC2 My Proj. No. PLC project number for local node area in common
memory area 2
#88043 CyC2 My dev name PLC device name for local node area in common mem ory area 2
#88044 CyC2 My dev No. Start number of PLC device for local node area in com mon memory area 2
#88050 CyC2 A1 Addr Start address in other node area 1 of common memory
area 2
#88051 CyC2 A1 Size Size of other node area 1 in common memory area 2
#88052 CyC2 A1 Proj. No. PLC project number for other node area 1 in common
memory area 2

Specify the PLC device name to be assigned to the other node area 1 of the common memory area 2.
(Example) X
When the setting of this parameter is changed, the value of "#88054 CyC2 A1 dev No." is cleared to "0".
---Setting range---
X, M, L, SB, B, SW, D, R, W
0: No setting
Specify the start number of PLC device to be assigned to the other node area 1 of the common memory area
2.
If you specify bit devices, set them with numbers divisible by 16 (in increments of 16 points).
(Example) 100
---Setting range---
X: 0 to 5F0
M: 0 to 61424
L: 0 to 32752
SB: 0 to 7FF0
B: 0 to EFF0
SW: 0 to 7FFF
D: 0 to 32767

W: 0 to 7FFF
R: 8300 to 9799, 9800 to 9899, 18300 to 19799, 19800 to 19899, 28300 to 29799, 29800 to 29899
Specify the start address (word) in the other node area 2 of the common memory area 2.
The sum of the start address and its size cannot exceed 2000 (HEX).
---Setting range---
0 to 1FFF (word) (hexadecimal)
Specify the size (word) of the other node area 2 of the common memory area 2.
When "0" is set, the data will not be transmitted.
The sum of the start address and its size cannot exceed 2000 (HEX).
---Setting range---
0 to 8192 (words)
Specify the project number of PLC device to be assigned to the other node area 2 of the common memory area 2.
---Setting range---
1 to 6
0: No setting
Specify the PLC device name to be assigned to the other node area 2 of the common memory area 2.
(Example) X
When the setting of this parameter is changed, the value of "#88064 CyC2 A2 dev No." is cleared to "0".
---Setting range---
X, M, L, SB, B, SW, D, R, W
0: No setting
#88053 CyC2 A1 dev name PLC device name for other node area 1 in common memory area 2
#88054 CyC2 A1 dev No. Start number of PLC device for other node area 1 in common memory area 2
#88060 CyC2 A2 Addr Start address in other node area 2 of common memory area 2
#88061 CyC2 A2 Size Size of other node area 2 in common memory area 2
#88062 CyC2 A2 Proj. No. PLC project number for other node area 2 in common memory area 2
#88063 CyC2 A2 dev name PLC device name for other node area 2 in common memory area 2

Specify the start number of PLC device to be assigned to the other node area 2 of the common memory area 2.
If you specify bit devices, set them with numbers divisible by 16 (in increments of 16 points).
(Example) 100
---Setting range---
X: 0 to 5F0
M: 0 to 61424
L: 0 to 32752
SB: 0 to 7FF0
B: 0 to EFF0
SW: 0 to 7FFF
D: 0 to 32767
W: 0 to 7FFF
R: 8300 to 9799, 9800 to 9899, 18300 to 19799, 19800 to 19899, 28300 to 29799, 29800 to 29899
Specify the project number of the PLC device that stores the local node management information.
---Setting range---
1 to 6
0: No setting
Specify the name of the PLC device that stores the Local node management information.
(Example) M
When the setting of this parameter is changed, the value of "#88072 My sts dev No." is cleared to "0".
---Setting range---
M, L, SB, B, SW, D, R, W
0: No setting
Specify the number of the PLC device that stores the Local node management information.
If you specify bit devices, set them with numbers divisible by 16 (in increments of 16 points).
The eight bytes of area starting from the specified device are occupied.
(Example) 1024
---Setting range---
M: 0 to 61424
L: 0 to 32752
SB: 0 to 7FF0
B: 0 to EFF0
SW: 0 to 7FFF
D: 0 to 32767
W: 0 to 7FFF
R: 8300 to 9799, 9800 to 9899, 18300 to 19799, 19800 to 19899, 28300 to 29799, 29800 to 29899
Specify the project number of the PLC device that stores the list of participating nodes.
---Setting range---
1 to 6
0: No setting
#88064 CyC2 A2 dev No. Start number of PLC device for other node area 2 in common memory area 2
#88070 My sts Proj. No. PLC project number for Local node management infor mation
#88071 My sts dev name PLC device name for Local node management informa tion
#88072 My sts dev No. PLC device number for Local node management infor mation
#88080 N List Proj. No. PLC project number for List of participating nodes

Specify the name of the PLC device that stores the List of participating nodes.
(Example) M

When the setting of this parameter is changed, the value of "#88082 N List dev No." is cleared to "0".
---Setting range---
M, L, SB, B, SW, D, R, W
0: No setting
Specify the number of the PLC device that stores the List of participating nodes.
If you specify bit devices, set them with numbers divisible by 16 (in increments of 16 points).
The 32 bytes of area starting from the specified device are occupied.
(Example) 1024
---Setting range---
M: 0 to 61424
L: 0 to 32752
SB: 0 to 7FF0
B: 0 to EFF0
SW: 0 to 7FFF
D: 0 to 32767
W: 0 to 7FFF
R: 8300 to 9799, 9800 to 9899, 18300 to 19799, 19800 to 19899, 28300 to 29799, 29800 to 29899
Specify the project number of the PLC device that stores the WARNING information.
---Setting range---
1 to 6
0: No setting
Specify the name of the PLC device that stores the WARNING information.
(Example) M
When the setting of this parameter is changed, the value of "#88092 Warning dev No." is cleared to "0".
---Setting range---
M, L, SB, B, SW, D, R, W
0: No setting
Specify the number of the PLC device that stores the WARNING information.
If you specify bit devices, set them with numbers divisible by 16 (in increments of 16 points).
The 32 bytes of area starting from the specified device are occupied.
(Example) 1024
---Setting range---
M: 0 to 61424
L: 0 to 32752
SB: 0 to 7FF0
B: 0 to EFF0
SW: 0 to 7FFF
D: 0 to 32767
W: 0 to 7FFF
R: 8300 to 9799, 9800 to 9899, 18300 to 19799, 19800 to 19899, 28300 to 29799, 29800 to 29899
#88081 N List dev name PLC device name for List of participating nodes
#88082 N List dev No. PLC device number for List of participating nodes
#88090 Warnig Proj. No. PLC project number for WARNING information
#88091 Warnig dev name PLC device name for WARNING information
#88092 Warnig dev No. PLC device number for WARNING information

Specify the project number of the PLC device that stores the ALARM information.
---Setting range---
1 to 6
0: No setting
Specify the name of the PLC device that stores the ALARM information.
(Example) M
When the setting of this parameter is changed, the value of "#88102 Alarm dev No." is cleared to "0".
---Setting range---
M, L, SB, B, SW, D, R, W
0: No setting
Specify the number of the PLC device that stores the ALARM information.
If you specify bit devices, set them with numbers divisible by 16 (in increments of 16 points).
The 32 bytes of area starting from the specified device are occupied.
(Example) 1024
---Setting range---
M: 0 to 61424
L: 0 to 32752
SB: 0 to 7FF0
B: 0 to EFF0
SW: 0 to 7FFF
D: 0 to 32767
W: 0 to 7FFF
R: 8300 to 9799, 9800 to 9899, 18300 to 19799, 19800 to 19899, 28300 to 29799, 29800 to 29899
Specify the project number of the PLC device that stores the RUN/STOP information.
---Setting range---
1 to 6
0: No setting
Specify the name of the PLC device that stores the RUN/STOP information.
(Example) M
When the setting of this parameter is changed, the value of "#88112 Run Stop dev No." is cleared to "0".
---Setting range---
M, L, SB, B, SW, D, R, W
0: No setting
#88100 Alarm Proj. No. PLC project number for ALARM information
#88101 Alarm dev name PLC device name for ALARM information
#88102 Alarm dev No. PLC device number for ALARM information
#88110 Run Stop Proj. No. PLC project number for RUN/STOP information
#88111 Run Stop dev name PLC device name for RUN/STOP information

Specify the number of the PLC device that stores the RUN/STOP information.
If you specify bit devices, set them with numbers divisible by 16 (in increments of 16 points).
The 32 bytes of area starting from the specified device are occupied.
(Example) 1024
---Setting range---
M: 0 to 61424
L: 0 to 32752
SB: 0 to 7FF0
B: 0 to EFF0
SW: 0 to 7FFF
D: 0 to 32767
W: 0 to 7FFF
R: 8300 to 9799, 9800 to 9899, 18300 to 19799, 19800 to 19899, 28300 to 29799, 29800 to 29899
Specify the project number of the PLC device that stores the information of completion of common memory setting.
---Setting range---
1 to 6
0: No setting
Specify the name of the PLC device that stores the information of Completion of common memory setting.
(Example) M
When the setting of this parameter is changed, the value of "#88122 CM Comp. dev No." is cleared to "0".
---Setting range---
M, L, SB, B, SW, D, R, W
0: No setting
Specify the number of the PLC device that stores the information of completion of common memory setting.
If you specify bit devices, set them with numbers divisible by 16 (in increments of 16 points).
The eight bytes of area starting from the specified device are occupied.
(Example) 1024
---Setting range---
M: 0 to 61424
L: 0 to 32752
SB: 0 to 7FF0
B: 0 to EFF0
SW: 0 to 7FFF
D: 0 to 32767
W: 0 to 7FFF
R: 8300 to 9799, 9800 to 9899, 18300 to 19799, 19800 to 19899, 28300 to 29799, 29800 to 29899
Specify the project number of the PLC device that stores the information of common memory data valid.
---Setting range---
1 to 6
0: No setting
#88112 Run Stop dev No. PLC device number for RUN/STOP information
#88120 CM Comp. Proj. No. PLC project number for info. of Completion of common
memory setting
#88121 CM Comp. dev name PLC device name for information of Completion of com mon memory setting
#88122 CM Comp. dev No. PLC device number for information of Completion of
common memory setting
#88130 CM Valid Proj. No. PLC project number for information of Common memo ry data valid

Specify the name of the PLC device that stores the information of Common memory data valid.
(Example) M
When the setting of this parameter is changed, the value of "#88132 CM Valid dev No." is cleared to "0".
---Setting range---
M, L, SB, B, SW, D, R, W
0: No setting
Specify the number of the PLC device that stores the information of common memory data valid.
If you specify bit devices, set them with numbers divisible by 16 (in increments of 16 points).
The 32 bytes of area starting from the specified device are occupied.
(Example) 1024
---Setting range---
M: 0 to 61424
L: 0 to 32752
SB: 0 to 7FF0
B: 0 to EFF0
SW: 0 to 7FFF
D: 0 to 32767
W: 0 to 7FFF
R: 8300 to 9799, 9800 to 9899, 18300 to 19799, 19800 to 19899, 28300 to 29799, 29800 to 29899
Specify the project number of the PLC device that stores the network management information.
---Setting range---
1 to 6
0: No setting
Specify the name of the PLC device that stores the Network management information.
(Example) M
When the setting of this parameter is changed, the value of "#88142 Net sts dev No." is cleared to "0".
---Setting range---
M, L, SB, B, SW, D, R, W
0: No setting
#88131 CM Valid dev name PLC device name for information of Common memory
data valid
#88132 CM Valid dev No. PLC device number for information of Common memo ry data valid
#88140 Net sts Proj. No. PLC project number for Network management informa tion
#88141 Net sts dev name PLC device name for Network management information

Specify the number of the PLC device that stores the Network management information.
If you specify bit devices, set them with numbers divisible by 16 (in increments of 16 points).
The four bytes of area starting from the specified device are occupied.
(Example) 1024
---Setting range---
M: 0 to 61424
L: 0 to 32752
SB: 0 to 7FF0
B: 0 to EFF0
SW: 0 to 7FFF
D: 0 to 32767
W: 0 to 7FFF
R: 8300 to 9799, 9800 to 9899, 18300 to 19799, 19800 to 19899, 28300 to 29799, 29800 to 29899
#88142 Net sts dev No. PLC device number for Network management informa tion

15.36 NC Axis Switch Parameters
The description and setting range for these parameters are the same as Servo parameters "#2201 SV001"
to "#2456 SV256". Refer to "15.7 Servo Parameters" for details.
Specify by two characters the name of the axis to be changed in NC axis switchover.
The first character must be a letter because it is used as a command address. The second character must
be a number.
---Setting range---
2-character string consisting of A to Z followed by 1 to 9
(When "0" is set, change is not reflected.)
#71001-
71256
SV001-SV256 NC axis switch parameters
#71257 Hotaxname NC axis name change

15.37 Spindle Switch Parameters
The description and setting range for these parameters are the same as Spindle parameters "#13001 SP001"
to "#13240 SP240". Refer to "15.9 Spindle Parameters" for details.
#71501-
71740
SP001-SP240 Spindle switch parameters

Revision History
Date of
revision
Manual No. Revision details
May 2015 IB(NA)1501279-A First edition created.
Sep. 2015 IB(NA)1501279-B The descriptions were revised corresponding to S/W version A4 of Mitsubishi Electric
CNC M800/M80 series.
The following chapters were added/revised.
- 15.22 Device Open Parameters
- 15.23 SRAM Open Parameters
The following chapters were revised.
- 1 Operation Errors (M)
- 3 Servo/Spindle Alarms (S)
- 5 System Alarms (Z)
- 6 Absolute Position Detection System Alarms (Z7*)
- 10 User PLC Alarms (U)
- 14 User Parameters
- 15 Machine Parameters
Other mistakes were corrected.
Mar. 2016 IB(NA)1501279-C The descriptions were revised corresponding to S/W version B2 of Mitsubishi Electric
CNC M800/M80 series.
The following chapters were revised.
- 1 Operation Errors (M)
- 2 Stop Codes (T)
- 4 MCP Alarms (Y)
- 5 System Alarms (Z)
- 10 User PLC Alarms (U)
- 12 Program Errors (P)
- 13 Smart Safety Observation Alarm (V)
- 14 User Parameters
- 15 Machine Parameters
Other mistakes were corrected.
Oct. 2016 IB(NA)1501279-D The descriptions were revised corresponding to S/W version C1 of Mitsubishi Electric
CNC M800/M80 series.
The descriptions were revised corresponding to S/W version A1 of Mitsubishi Electric
CNC C80 series.
The following chapters were added.
- 14 Multi CPU Errors (A) [C80]
- 16.32 Multi CPU Parameters [C80]
The following chapters were revised.
- 1 Operation Errors (M)
- 2 Stop Codes (T)
- 3 Servo/Spindle Alarms (S)
- 4 MCP Alarms (Y)
- 5 System Alarms (Z)

- 7 Distance-coded Reference Scale Errors (Z8*)
- 8 Emergency Stop Alarms (EMG)
- 10 User PLC Alarms (U)
- 12 Program Errors (P)
- 13 Smart Safety Observation Alarm (V)
- 15 User Parameters
- 16 Machine Parameters

Other mistakes were corrected.

Date of
revision
Manual No. Revision details

Mar. 2017 IB(NA)1501279-E The descriptions were revised corresponding to S/W version C3 of Mitsubishi Electric CNC M800/M80 series.
The following chapters were revised.
- 1 Operation Errors (M)
- 2 Stop Codes (T)
- 4 MCP Alarms (Y)
- 5 System Alarms (Z)
- 12 Program Errors (P)
- 13 Smart Safety Observation Alarm (V)
- 15 User Parameters
- 16 Machine Parameters

The following chapter was deleted.
- 16.26 Rotary-axis Angle Deviation Parameters [M8]

Other mistakes were corrected.

Aug. 2017 IB(NA)1501279-F The descriptions were revised corresponding to S/W version A2 of Mitsubishi Electric CNC C80 series.
The following chapters were revised.
- 4 MCP Alarms (Y)
- 5 System Alarms (Z)
- 8 Emergency Stop Alarms (EMG)
- 10 User PLC Alarms (U)
- 13 Smart Safety Observation Alarm (V)
- 15 User Parameters
- 16 Machine Parameters

Other mistakes were corrected.

Nov. 2017 IB(NA)1501279-G The descriptions were revised corresponding to S/W version C7 of Mitsubishi Electric CNC M800/M80 series.
The following chapters were added.
- 15.16 Tolerance Parameters[M8]
- 16.27 Machining Time Parameters[M8]
- 16.33 PROFIBUS-DP Parameters[M8]

The following chapters were revised.
- 1 Operation Errors (M)
- 2 Stop Codes (T)
- 4 MCP Alarms (Y)
- 5 System Alarms (Z)
- 12 Program Errors (P)
- 15 User Parameters
- 16 Machine Parameters

Other mistakes were corrected.

Mar. 2018 IB(NA)1501279-H The descriptions were revised corresponding to Mitsubishi Electric CNC E80 series.
The descriptions were revised corresponding to S/W version D1 of Mitsubishi Electric CNC M800/M80 series.
The following chapters were added.
- 16.32 EtherNet/IP Parameters [M8]
- 16.33 CC Link IE Field Parameters [M8]

The following chapter numbers were changed.
- 16.34 PROFIBUS-DP Parameters [M80]
- 16.35 Multi CPU Parameters [C80]

The following chapters were revised.
- 1 Operation Errors (M)
- 3 Servo/Spindle Alarms
- 4 MCP Alarms (Y)
- 5 System Alarms (Z)
- 12 Program Errors (P)
- 15 User Parameters
- 16 Machine Parameters

Other mistakes were corrected.

Aug. 2018 IB(NA)1501279-J The descriptions were revised corresponding to S/W version B0 of Mitsubishi Electric CNC C80 series.
The following chapters were revised.
- 1 Operation Errors (M)
- 2 Stop Codes (T)
- 10 User PLC Alarms (U)
- 12 Program Errors (P)
- 15 User Parameters
- 16 Machine Parameters

Other mistakes were corrected.

Apr. 2019 IB(NA)1501279-K The contents of "M800/M80/E80/C80 Series Alarm/Parameter Manual" (IB-1501279-J) were divided to create the respective manuals, "M800/M80/E80 Series" and "C80 Series".
The descriptions were revised corresponding to S/W version E0 of Mitsubishi Electric CNC M800/M80/E80 series.
The following chapters were added.
- 15.33.4 CC-Link IE Field Network Basic
- 15.35 PROFINET Parameters

The following chapters were revised.

- 1 Operation Errors (M)
- 5 System Alarms (Z)
- 6 Absolute Position Detection System Alarms (Z7*)
- 8 Emergency Stop Alarms (EMG)
- 10 User PLC Alarms (U)
- 12 Program Errors (P)
- 14 User Parameters
- 15 Machine Parameters

Other mistakes were corrected.

Date of
revision
Manual No. Revision details

Sep. 2019 IB(NA)1501279-L The descriptions were revised corresponding to S/W version E1 of Mitsubishi Electric CNC M800/M80/E80 series.
The following chapters were added.
- 15.36 FL-net Parameters

The following chapters were revised.
- 4 MCP Alarms (Y)
- 5 System Alarms (Z)
- 6 Absolute Position Detection System Alarms (Z7*)
- 10 User PLC Alarms (U)
- 13 Smart Safety Observation Alarm (V)
- 14 User Parameters
- 15 Machine Parameters

Other mistakes were corrected.

Jun. 2020 IB(NA)1501279-M The descriptions were revised corresponding to S/W version F1 of Mitsubishi Electric CNC M800/M80/E80 series.
The following chapters were revised.
- 1 Operation Errors (M)
- 2 Stop Codes (T)
- 3 Servo/Spindle Alarms (S)
- 4 MCP Alarms (Y)
- 12 Program Errors (P)
- 14 User Parameters
- 15 Machine Parameters

Other mistakes were corrected.

Mar. 2021 IB(NA)1501279-N The descriptions were revised corresponding to S/W version F4 of Mitsubishi Electric CNC M800/M80/E80 series.
The following chapters were revised.
- 1 Operation Errors (M)
- 3 Servo/Spindle Alarms (S)
- 5 System Alarms (Z)
- 6 Absolute Position Detection System Alarms (Z7*)
- 7 Distance-coded Reference Scale Errors (Z8*)
- 12 Program Errors (P)
- 13 Smart Safety Observation Alarm (V)
- 14 User Parameters
- 15 Machine Parameters

Other mistakes were corrected.

Jul. 2022 IB(NA)1501279-P The descriptions were revised corresponding to S/W version F8 of Mitsubishi Electric CNC M800/M80/E80 series.
The following chapters were revised.
- 1 Operation Errors (M)
- 3 Servo/Spindle Alarms (S)
- 4 MCP Alarms (Y)
- 5 System Alarms (Z)
- 6 Absolute Position Detection System Alarms (Z7*)
- 7 Distance-coded Reference Scale Errors (Z8*)
- 10 User PLC Alarms (U)
- 12 Program Errors (P)
- 14 User Parameters
- 15 Machine Parameters

Other mistakes were corrected.

Date of
revision
Manual No. Revision details

Aug. 2023 IB(NA)1501279-Q The descriptions were revised corresponding to S/W version FB of Mitsubishi Electric CNC M800/M80/E80 series.
The following chapters were added.
- 15.36 NC Axis Switch Parameters
- 15.37 Spindle Switch Parameters

The following chapters were revised.
- 1 Operation Errors (M)
- 5 System Alarms (Z)
- 12 Program Errors (P)
- 14 User Parameters
- 15 Machine Parameters

Other mistakes were corrected.

Jan. 2024 IB(NA)1501279-R The descriptions were revised corresponding to S/W version FC of Mitsubishi Electric CNC M800/M80/E80 series.
The following chapters were revised.
- 1 Operation Errors (M)
- 12 Program Errors (P)
- 14 User Parameters
- 15 Machine Parameters

Other mistakes were corrected.

Jun. 2024 IB(NA)1501279-S The descriptions were revised corresponding to S/W version FD of Mitsubishi Electric CNC M800/M80/E80 series.

The following chapters were revised.
- 1 Operation Errors (M)
- 2 Stop Codes (T)
- 3 Servo/Spindle Alarms (S)
- 4 MCP Alarms (Y)
- 9 Computer Link Errors (L)
- 10 User PLC Alarms (U)
- 12 Program Errors (P)
- 14 User Parameters
- 15 Machine Parameters

Other mistakes were corrected.

Date of
revision
Manual No. Revision details

Global Service Network

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Minneapolis, MN Service Satellite
Detroit, MI Service Satellite South Germany Service Center (Stuttgart)
Grand Rapids, MI Service Satellite SCHELMENWASENSTRASSE 16-20, 70567 STUTTGART, GERMANY
Cleveland, OH Service Satellite TEL: + 49-711-770598-123 / FAX: +49-711-770598-141
St. Louis, MO Service Satellite
Indianapolis, IN Service Saltellite France Service Center (Paris)
2 RUE DE LUNION, 92565 RUEIL-MALMAISON CEDEX, FRANCE
TEL: +33-1-41-02-83-13 / FAX: +33-1-49-01-07-25

South/East Region Service Center (Georgia)

1845 SATELLITE BOULEVARD STE. 450, DULUTH, GEORGIA 30097, U.S.A. France Service Satellite (Lyon)
9154-852-876-1+ XAF / 9254-852-876-1+ LET ECNARF TSEIRP TNIAS 00896 DONOM SEUQCAJ EELLA ,042
Charleston, SC Service Satellite TEL: +33-1-41-02-83-13 / FAX: +33-1-49-01-07-25
Charlotte, NC Service Satellite
Raleigh, NC Service Satellite Italy Service Center (Milan)
Dallas, TX Service Satellite VIA ENERGY PARK 14, VIMERCATE 20871 (MB) ITALY
Houston, TX Service Satellite TEL: +39-039-6053-342 / FAX: +39-039-6053-206
Hartford, CT Service Satellite
Knoxville, TN Service Satellite Italy Service Satellite (Padova)
Nashville, TN Service Satellite VIA G. SAVELLI, 24 - 35129 PADOVA, ITALY
Huntsville, AL Satellite TEL: +39-039-6053-342 / FAX: +39-039-6053-206
Pittsburg, PA Service Satellite
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Miami, FL Satelite TRAVELLERS LANE, HATFIELD, HERTFORDSHIRE, AL10 8XB, U.K.
Lafayette, LA Service Satellite TEL: +44-1707-288-780 / FAX: +44-1707-278-695
Allentown, PA Satelite

Spain Service Center

CTRA. RUBI, 76-80 8174 SAINT CUGAT DEL VALLES, BARCELONA, SPAIN

Western Region Service Center (California) TEL: +34-935-65-2236 / FAX: +34-935-89-1579

5900-B KATELLA AVE. - 5900-A KATELLA AVE. CYPRESS, CALIFORNIA 90630, U.S.A.
TEL: +1-714-699-2625 / FAX: +1-847-478-2650 Poland Service Center
San Francisco, CA Satelite UL.KRAKOWSKA 50, 32-083 BALICE, POLAND
Seattle, WA Service Satellite TEL: +48-12-347-6500 / FAX: +48-12-630-4701
Denver, CO Service Satellite

Hungary Service Center

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Parque Tecnolgico Innovacin Quertaro, Lateral Carretera Estatal 431, Km 2+200, Lote 91 Modulos 1 y 2 UMRANIYE, ISTANBUL, TURKEY
hcaM al adneicaH ocixM ,oratreuQ ,suqraM lE ,64267 PC ,arro 74-44-166-612-09+ :XAF / 0052-969-612-09+ :LET
TEL: +52-442-153-6050
Monterrey, NL Service Satellite Czech Republic Service Center
Mexico City, DF Service Satellite MITSUBISHI ELECTRIC EUROPE B.V. PRAGUE OFFICE
Pekask 621/7, 155 00 PRAHA 5, CZECH REPUBLIC
TEL: +420-734-402-587
BRAZIL

Sweden Service Center

MITSUBISHI ELECTRIC DO BRASIL COMRCIO E SERVIOS LTDA. HAMMARBACKEN 14, P.O.BOX 750 SE-19127, SOLLENTUNA, SWEDEN
Votorantim Office TEL: +46-8-6251200 / FAX: +46-8-6251014
AV. GISELE CONSTANTINO,1578, PARQUE BELA VISTA, VOTORANTIM-SP, BRAZIL CEP:18.110-650
TEL: +55-15-3023-9000 Bulgaria Service Center
Blumenau, Santa Catarina Office AKHNATON Ltd. (Service Partner)
4 ANDREJ LJAPCHEV BLVD. POB 21, BG-1756 SOFIA, BULGARIA
TEL: +359-2-8176009 / FAX: +359-2-9744061

Ukraine Service Center (Kiev)

CSC Automation Ltd. (Service Partner)
4 B, YEVHENA SVERSTYUKA STR., 02002 KIEV, UKRAINE
TEL: +380-44-494-3344 / FAX: +380-44-494-3366

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20 WATERFORD OFFICE PARK, WATERFORD DRIVE, CNR OF WITKOPPEN ROAD,
FOURWAYS JOHANNESBURG SOUTH AFRICA
TEL: +27-11-658-8100 / FAX: +27-11-658-8101

ASEAN CHINA

)RETNEC AF NAESA(.DTL .ETP AISA CIRTCELE IHSIBUSTIM)RETNEC AF ANIHC(.DTL)ANIHC(NOITAMOTUA CIRTCELE IHSIBUSTIM

Singapore Service Center CNC Call Center
349951 EROPAGNIS GNIDLIUB CIRTCELE IHSIBUSTIM DAOR ARDNAXELA 703 0315-129-004-68+ :LET
TEL: +65-6473-2308 / FAX: +65-6476-7439
Shanghai Service Center
NO.1386 HONG QIAO ROAD, CHANG NING QU, SHANGHAI 200336, CHINA
PHILIPPINES TEL: +86-21-2322-3030 / FAX: +86-21-2322-3000*8422
Qingdao Service Center
MELCO FACTORY AUTOMATION PHILIPPINES INC. Suzhou Service Center
Head Office Wuhan Service Center
128 LOPEZ RIZAL STREET, BRGY., HIGHWAY HILLS, MANDALUYONG CITY , MM PHILIPPINES 1550 Ningbo Service Center
TEL: +63-2-8256-8042 / FAX: +632-8637-2294 Hefei Service Center
Beijing Service Center
Philippines Service Center Tianjin Service Center
KM.23 WEST SERVICE ROAD SSH, CUPANG ,MUNTINLUPA CITY, PHILIPPINES Xian Service Center
TEL: +63-2-8807-0420 / FAX: +63-2-8842-5202 Dalian Service Center
Chengdu Service Center
VIETNAM Shenzhen Service Center
LEVEL8, GALAXY WORLD TOWER B, 1 YABAO ROAD, LONGGANG DISTRICT,
MITSUBISHI ELECTRIC VIETNAM CO., LTD. SHENZHEN 518129, CHINA
Vietnam Ho Chi Minh Service Center TEL: +86-755-2399-8272 / FAX: +86-755-8229-3686
11TH & 12TH FLOOR, VIETTEL TOWER B, 285 CACH MANG THANG 8 STREET, WARD 12, DISTRICT 10, Dongguan Service Center
HO CHI MINH CITY, VIETNAM Xiamen Service Center
TEL: +84-28-3910-5945 / FAX: +84-28-3910-5947
Vietnam Hanoi Service Center KOREA
14TH FLOOR, CAPITAL TOWER, 109 TRAN HUNG DAO STREET, CUA NAM WARD,
HOAN KIEM DISTRICT, HA NOI CITY, VIETNAM MITSUBISHI ELECTRIC AUTOMATION KOREA CO., LTD. (KOREA FA CENTER)
TEL: +84-24-3937-8075 / FAX: +84-24-3937-8076 Korea Seoul Service Center
8F GANGSEO HANGANG XI-TOWER A, 401 YANGCHEON-RO, GANGSEO-GU,
SEOUL 07528 KOREA
INDONESIA TEL: +82-2-3660-9631 / FAX: +82-2-3664-8668
PT. MITSUBISHI ELECTRIC INDONESIA Korea Daegu Service Center
Indonesia Service Center (Cikarang) 2F KT BLDG. 8, HOGUK-RO, BUK-GU, DAEGU 41518, KOREA
JL. KENARI RAYA BLOK G2-07A, DELTA SILICON 5, LIPPO CIKARANG - BEKASI 17550, INDONESIA TEL: +82-53-382-7401 / FAX: +82-53-382-7412
TEL: +62-21-2961-7797 / FAX: +62-21-2961-7794
Korea Changwon Technical Center
#205, 888, CHANGWON-DAERO, SEONGSAN-GU, CHANGWON-SI,
MALAYSIA GYEONGSANGNAM-DO, 51532, KOREA
TEL: +82-55-261-5559 / FAX: +82-55-261-5558
MITSUBISHI ELECTRIC SALES MALAYSIA SDN. BHD.
Malaysia Service Center (Kuala Lumpur Service Center)
LOT 11, JALAN 219, P.O BOX 1036, 46860 PETALING JAYA, SELANGOR DARUL EHSAN, MALAYSIA TAIWAN
TEL: +60-3-7626-5032
MITSUBISHI ELECTRIC TAIWAN CO., LTD. (TAIWAN FA CENTER)
Johor Bahru Service Center Taiwan Taichung Service Center
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TEL: 07-3642250 / 2256 TEL: +886-4-2359-0688 / FAX: +886-4-2359-0689
Pulau Pinang Service Center Taiwan Taipei Service Center
25-G, Pusat Perniagaan Perdana Jaya, Jalan Permatang Rawa, 14000 Bukit Mertajam, Pulau Pinang 11F, NO.88, SEC.6, ZHONGSHAN N. RD., SHILIN DIST., TAIPEI CITY 11155, TAIWAN
5381-015-4-06+ :xaF / 8381-015-4-06+ :LET 3345-3382-2-688+ :XAF / 0345-3382-2-688+ :LET
Taiwan Tainan Service Center
THAILAND 11F-1, NO.30, ZHONGZHENG S. RD., YONGKANG DIST., TAINAN CITY 71067, TAIWAN
TEL: +886-6-252-5030 / FAX: +886-6-252-5031
MITSUBISHI ELECTRIC FACTORY AUTOMATION (THAILAND) CO., LTD.
Thailand Service Center (Bangkok)
101, TRUE DIGITAL PARK OFFICE, 5TH FLOOR, SUKHUMVIT ROAD, BANGCHAK, PHRA KHANONG, OCEANIA
BANGKOK, 10260 THAILAND
TEL: +66-2-092-8600 / FAX: +66-2-043-1231-33 MITSUBISHI ELECTRIC AUSTRALIA PTY. LTD.
Oceania Service Center
348 VICTORIA ROAD, RYDALMERE, N.S.W. 2116 AUSTRALIA
INDIA TEL: +61-2-9684-7269/ FAX: +61-2-9684-7245
MITSUBISHI ELECTRIC INDIA PVT., LTD.
Service Head office and South India Service Center (Bangalore)
CNC eXPerience Park, PLOT NO. 57/A, PEENYA PHASE 3,
PEENYA INDUSTRIAL AREA, BANGALORE 560058, KARNATAKA, INDIA
TEL : +91-80-4655-2121
Chennai Service Satellite
Coimbatore Service Satellite
Hyderabad Service Satellite
North India Service Center (Gurgaon)
PLOT 517, GROUND FLOOR, UDYOG VIHAR PHASE-III, GURUGRAM 122008, HARYANA, INDIA
TEL : +91-124-463-0300
Ludhiana Service Satellite
Panthnagar Service Satellite
Delhi Service Satellite
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West India Service Center (Pune)
ICC-Devi GAURAV TECHNOLOGY PARK, UNIT NO.402, FOURTH FLOOR, NORTH WING,
SURVEY NUMBER 191-192 (P), NEXT to INDIAN CARD CLOTHING COMPANY Ltd,
OPP. VALLABH NAGAR, PIMPRI, PUNE- 411 018, MAHARASHTRA, INDIA
TEL : +91-20-6819-2274
Kolhapur Service Satellite
Aurangabad Service Satellite
Mumbai Service Satellite
West India Service Center (Ahmedabad)
204-209, 2ND FLOOR, 31FIVE, CORPORATE ROAD PRAHLADNAGAR,
AHMEDABAD -380015, GUJARAT, INDIA
TEL : + 91-79-6777-7888

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Notice

Every effort has been made to keep up with software and hardware revisions in the contents described in this manual. However, please understand that in some unavoidable cases simultaneous revision is not possible.

Please contact your Mitsubishi Electric dealer with any questions or comments regarding the use of this product.

Duplication Prohibited

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IB(NA)1501279(ENG)-S(2406)MEE

Made in JAPAN

IB-1501279

M800/M80/E80 Series

100-444

Specifications are subject to change without notice.

MODEL

Manual No.

MODEL

CODE

HEAD OFFICE : TOKYO BLDG.,2-7-3 MARUNOUCHI,CHIYODA-KU,TOKYO 100-8310,JAPAN

IB-1501505(ENG)-N

Specifications Manual (Function)

M800/M80/E80/C80 Series

Numerical Control (CNC)

Introduction

This manual describes the specifications of Mitsubishi Electric CNC.

Supported models are as follows:

Abbreviations in this manual are as follows:

To safely use this CNC unit, thoroughly study the "Precautions for Safety" on the next page before use.

Be sure to keep this manual always at hand.

At the beginning of each item, a table indicating it's specification according to the model.

M : Machining center system

L : Lathe system

: Standard

: Optional

: Selection

In this manual, the following abbreviations might be used.

MTB: Machine tool builder

The items that are not described in this manual must be interpreted as "not possible".

This manual is written on the assumption that all the applicable functions are included. Some of them, however, may not be available for your NC system.

Refer to the specifications issued by the machine tool builder before use.

Some screens and functions may differ depending on each NC system (or version), and some functions may not be possible. Please confirm the specifications before starting to use.

To protect the availability, integrity and confidentiality of the NC system against cyber-attacks including unauthorized access, denial-of-service (DoS) (*1) attack, and computer virus from external sources via a network, take security measures such as firewall, VPN, and anti-virus software.

(*1) Denial-of-service (DoS): refers to a type of cyber-attack that disrupts services by overloading the system or by exploiting a vulnerability of the system.

Mitsubishi Electric assumes no responsibility for any problems caused to the NC system by any type of cyber-attacks including DoS attack, unauthorized access and computer virus.

General precautions

(1) When the contents of this manual is updated, the version (A, B, ...) on the cover will be incremented.

Also refer to the manuals on "Manual List" as necessary.

Supported models Abbreviations in this manual

M800W Series M850W, M830W

M800S Series M850S, M830S

M80W Series M80W

M80 Series M80 TypeA, M80 TypeB

E80 Series E80 TypeA, E80 TypeB

C80 Series C80

Abbreviations Supported models

M800, M800 Series M800W Series/M800S Series

M80, M80 Series M80W Series/M80 Series

M800/M80, M800/M80 Series M800W Series/M800S Series/M80W Series/M80 Series

M8, M8 Series M800W Series/M800S Series/M80W Series/M80 Series/E80 Series

CAUTION

Manual List

Manuals related to M800/M80/E80/C80 Series are listed as follows.

These manuals are written on the assumption that all optional functions are added to the targeted model.

Some functions or screens may not be available depending on the machine or specifications set by MTB. (Confirm the specifications before use.)

The manuals issued by MTB take precedence over these manuals.

Manual IB No. Purpose and Contents

M800/M80/E80 Series

Instruction Manual IB-1501274 Operation guide for NC

Explanation for screen operation, etc.

C80 Series

Instruction Manual IB-1501453 Operation guide for NC

Explanation for screen operation, etc.

M800/M80/E80/C80 Series

Programming Manual

(Lathe System) (1/2)

IB-1501275 G code programming for lathe system

Basic functions, etc.

M800/M80/E80/C80 Series
Programming Manual
(Lathe System) (2/2)
IB-1501276 G code programming for lathe system
Functions for multi-part system, high-accuracy function, etc.
M800/M80/E80/C80 Series
Programming Manual
(Machining Center System) (1/2)
IB-1501277 G code programming for machining center system
Basic functions, etc.
M800/M80/E80/C80 Series
Programming Manual
(Machining Center System) (2/2)
IB-1501278 G code programming for machining center system
Functions for multi-part system, high-accuracy function, etc.
M800/M80/E80 Series
Alarm/Parameter Manual IB-1501279 Alarms
Parameters
C80 Series
Alarm/Parameter Manual IB-1501560 Alarms
Parameters
Manuals for MTBs (NC)
Manuals for MTBs (drive section)
Manual IB No. Purpose and Contents
M800/M80/E80/C80 Series
Specifications Manual (Function) IB-1501505 Model selection
Outline of various functions
M800/M80/E80/C80 Series
Specifications Manual (Hardware) IB-1501506 Model selection
Specifications of hardware unit
M800W/M80W Series
Connection and Setup Manual IB-1501268 Detailed specifications of hardware unit
Installation, connection, wiring, setup (startup/adjustment)
M800S/M80/E80 Series
Connection and Setup Manual IB-1501269 Detailed specifications of hardware unit
Installation, connection, wiring, setup (startup/adjustment)
C80 Series
Connection and Setup Manual IB-1501452 Detailed specifications of hardware unit
Installation, connection, wiring, setup (startup/adjustment)
M800/M80/E80 Series
PLC Development Manual IB-1501270
Electrical design
I/O relation (assignment, setting, connection), field network
Development environment (PLC on-board, peripheral
development environment), etc.
M800/M80/E80 Series
PLC Programming Manual IB-1501271
Electrical design
Sequence programming
PLC support functions, etc.
M800/M80/E80/C80 Series
PLC Interface Manual IB-1501272 Electrical design
Interface signals between NC and PLC
M800/M80/E80 Series
Maintenance Manual IB-1501273 Cleaning and replacement for each unit
Other items related to maintenance
C80 Series
Maintenance Manual IB-1501454 Cleaning and replacement for each unit
Other items related to maintenance
Manual IB No. Contents
MDS-E/EH Series
Specifications Manual IB-1501226 Specifications for power supply regeneration type
MDS-E/EH Series
Instruction Manual IB-1501229 Instruction for power supply regeneration type
MDS-EJ/EJH Series
Specifications Manual IB-1501232 Specifications for regenerative resistor type
MDS-EJ/EJH Series
Instruction Manual IB-1501235 Instruction for regenerative resistor type
MDS-EM/EMH Series
Specifications Manual IB-1501238 Specifications for multi-hybrid, power supply regeneration
type
MDS-EM/EMH Series
Instruction Manual IB-1501241 Instruction for multi-hybrid, power supply regeneration type
DATA BOOK IB-1501252 Specifications of servo drive unit, spindle drive unit, motor, etc.
Manuals for MTBs (Others)
For M800/M80/E80 Series
Manual No. Purpose and Contents
GOT2000 Series Users Manual
(Hardware) SH-081194ENG Outline of hardware such as part names, external dimensions,
installation, wiring, maintenance, etc. of GOTs
GOT2000 Series Users Manual
(Utility) SH-081195ENG Outline of utilities such as screen display setting, operation
method, etc. of GOTs
GOT2000 Series Users Manual
(Monitor) SH-081196ENG Outline of each monitor function of GOTs
GOT2000 Series Connection
Manual (Mitsubishi Electric
Products)

SH-081197ENG Outline of connection types and connection method between
GOT and Mitsubishi Electric connection devices
GT Designer3 (GOT2000) Screen
Design Manual SH-081220ENG Outline of screen design method using screen creation
software GT Designer3
Manual No. Purpose and Contents
GOT2000 Series Connection
Manual (Non-Mitsubishi Electric
Products 1)
SH-081198ENG
 Explanation for connection types and connection method
GOT2000 Series Connection between GOT and other company's devices
Manual (Non-Mitsubishi Electric
Products 2)
SH-081199ENG
GOT2000 Series Connection
Manual (Microcomputers, MODBUS/
Fieldbus Products, Peripherals)
SH-081200ENG
 Explanation for connection types and connection method
between GOT and microcomputers, MODBUS/fieldbus
products, peripherals
GT SoftGOT2000 Version1
Operating Manual SH-081201ENG
 Explanation for system configuration, screen configuration
and operation method of monitoring software GT
SoftGOT2000
GOT2000/GOT1000 Series CC-Link
Communication Unit User's Manual IB-0800351 Explanation for handling CC-Link communication unit (for
GOT2000 series/GOT1000 series)
GX Developer Version 8 Operating
Manual (Startup) SH-080372E Explanation for system configuration, installation, etc. of PLC
development tool GX Developer
GX Developer Version 8 Operating
Manual SH-080373E Explanation for operations using PLC development tool GX
Developer
GX Converter Version 1 Operating
Manual IB-0800004 Explanation for operations using data conversion tool GX
Converter
GX Works2 Installation Instructions BCN-P5999-0944 Explanation for the operating environment and installation
method of GX Works2
GX Works2 Version 1 Operating
Manual (Common) SH-080779ENG
 Explanation for the system configuration of GX Works2 and
the functions common to Simple project and Structured project
such as parameter setting, operation method for the online
function
GX Works2 Version 1 Operating
Manual (Simple Project) SH-080780ENG Explanation for methods for such as creating and monitoring
programs in Simple project of GX Works2
GX Works2 Version 1 Operating
Manual (Simple Project, Function
Block)
SH-080984ENG
 Explanation for methods for such as creating function blocks,
pasting function blocks to sequence programs, and operating
FB library in Simple project of GX Works2
GX Works2 Version 1 Operating
Manual (Structured Project) SH-080781ENG Explanation for methods for such as creating and monitoring
programs in Structured project of GX Works2
GX Works3 Installation Instructions BCN-P5999-0391 Explanation for the operating environment and installation
method of GX Works3
MELSEC-Q CC-Link System Master/
Local Module Users Manual SH-080394E Explanation for system configuration, installation, wiring, etc.
of master/local modules for CC-Link system
 For C80 Series
Reference Manual for MTBs
Manual No. Purpose and Contents
MELSEC iQ-R Module Configuration
Manual SH-081262 Outline of system configuration, specifications, installation,
wiring, maintenance, etc.
MELSEC iQ-R CPU Module Users
Manual (Startup) SH-081263 Outline of specifications, procedures before operation,
troubleshooting, etc. for CPU module
MELSEC iQ-R CPU Module Users
Manual (Application) SH-081264 Outline of memory, functions, devices, parameters, etc. for
CPU module
MELSEC iQ-R CC-Link IE Field
Network User's Manual (Application) SH-081259 Explanation for functions, parameter settings, programming,
troubleshooting, etc. of the CC-Link IE Field Network function
QCPU Users Manual (Hardware
Design, Maintenance and
Inspection)
SH-080483
 Outline of specifications, necessary knowledge to configure
the system and maintenance-related descriptions for Q series
CPU module, etc.
GX Works3 Operating Manual SH-081215 Outline of functions, programming, etc.

Manual No. Purpose and Contents
M800/M80 Series Smart safety
observation Specification manual BNP-C3072-022
Explanation for smart safety observation function C80 Series Smart safety observation
Specification manual BNP-C3077-022
M800/M80 Series Interactive cycle
insertion (Customization)
Specification manual
BNP-C3072-121-
0003 Explanation for interactive cycle insertion
M800/M80 Series Synchronous
Control Specifications manual BNP-C3072-074 Explanation for synchronous control
M800/M80 Series Multiple-Axis
Synchronization Control
Specifications manual
BNP-C3072-339 Explanation for multiple-axis synchronization control
M800/M80 Series GOT Connection
Specifications manual BNP-C3072-314 Explanation for GOT connection
M800/M80 Series PROFIBUS-DP
Specification manual BNP-C3072-118 Explanation for PROFIBUS-DP communication function
M800/M80 Series EtherNet/IP
Specifications manual BNP-C3072-263 Explanation for EtherNet/IP
M800/M80 Series FL-net
Specifications manual BNP-C3072-368 Explanation for FL-net
M800/M80 Series CC-Link (Master/
Local) Specification manual BNP-C3072-089 Explanation for CC-Link
M800/M80 Series CC-Link IE Field
(Master/local) Specifications manual BNP-C3072-283 Explanation for CC-Link IE Field
M800/M80 Series CC-Link IE Field
Basic Specifications manual BNP-C3072-337 Explanation for CC-Link IE Field Basic
Precautions for Safety
Always read this manual, related manuals and attached documents before installation, operation, programming, maintenance or inspection to ensure correct use. Understand all the conditions described in this manual before using the unit. We rank the safety precautions into "DANGER", "WARNING" and "CAUTION" for the manuals issued by Mitsubishi, including this manual.
Note that even items ranked as " CAUTION", may lead to major results depending on the situation. In any case, important information that must always be observed is described.
The following signs indicate prohibition and compulsory.
The meaning of each pictorial sign is as follows.
DANGER
When there is a great risk that the user could be subject to fatalities or serious injuries if handling is mistaken.
WARNING
When the user could be subject to fatalities or serious injuries if handling is mistaken.
CAUTION
When the user could be subject to injuries or when physical damage could occur if handling is mistaken.
This sign indicates prohibited behavior (must not do).
For example, indicates "Keep fire away".
This sign indicated a thing that is pompously (must do).
For example, indicates "it must be grounded".
CAUTION CAUTION rotated
object CAUTION HOT Danger Electric shock
risk Danger explosive
Prohibited Disassembly is
prohibited KEEP FIRE AWAY General instruction Earth ground
Not applicable in this manual.
Not applicable in this manual.
1. Items related to product and manual
The items that are not described in this manual must be interpreted as "not possible".
This manual is written on the assumption that all the applicable functions are included. Some of them, however, may not be available for your NC system.
Refer to the specifications issued by the machine tool builder before use.
Some screens and functions may differ depending on the NC system (or its version), and some functions may not be possible. Please confirm the specifications before use.
To protect the availability, integrity and confidentiality of the NC system against cyber-attacks including unauthorized access, denial-of-service (DoS) (*1) attack, and computer virus from external sources via a network, take security measures such as firewall, VPN, and anti-virus software.
(*1) Denial-of-service (DoS): refers to a type of cyber-attack that disrupts services by overloading the system or by exploiting a vulnerability of the system.
Mitsubishi Electric assumes no responsibility for any problems caused to the NC system by any type of cyber-attacks including DoS attack, unauthorized access and computer virus.
2. Items related to start up and maintenance
Follow the power specifications (input voltage range, frequency range, momentary power failure time range) described in this manual.
Follow the environment conditions (ambient temperature, humidity, vibration, atmosphere) described in this manual.
Follow the remote type machine contact input/output interface described in this manual. (Connect a diode in parallel with the inductive load or connect a protective resistor in serial with the capacitive load, etc.)
If the parameter is used to set the temperature rise detection function to invalid, overheating may occur, thereby disabling control and possibly resulting in the axes running out of control, which in turn may result in machine damage and/or bodily injury or destruction of the unit. It is for this reason that the detection function is normally left "valid" for operation.The parameter for the temperature rise detection function will be validated forcibly when the NC unit is turned ON.
DANGER
WARNING
CAUTION
Treatment of waste
The following two laws will apply when disposing of this product. Considerations must be made to each law. The following

laws are in effect in Japan. Thus, when using this product overseas, the local laws will have a priority. If necessary, indicate or notify these laws to the final user of the product.
(1) Requirements for "Law for Promotion of Effective Utilization of Resources"
(a) Recycle as much of this product as possible when finished with use.
(b) When recycling, often parts are sorted into steel scraps and electric parts, etc., and sold to scrap contractors. Mitsubishi Electric recommends sorting the product and selling the members to appropriate contractors.
(2) Requirements for "Law for Treatment of Waste and Cleaning"
(a) Mitsubishi Electric recommends recycling and selling the product when no longer needed according to item (1) above. The user should make an effort to reduce waste in this manner.
(b) When disposing a product that cannot be resold, it shall be treated as a waste product.
(c) The treatment of industrial waste must be commissioned to a licensed industrial waste treatment contractor, and appropriate measures, including a manifest control, must be taken.
(d) Batteries correspond to "primary batteries", and must be disposed of according to local disposal laws.
Disposal
(Note) This symbol mark is for EU countries only.
This symbol mark is according to the directive 2006/66/EC Article 20 Information for end-users and Annex II.
Your MITSUBISHI ELECTRIC product is designed and manufactured with high quality materials and components which can be recycled and/or reused.
This symbol means that batteries and accumulators, at their end-of-life, should be disposed of separately from your household waste.
If a chemical symbol is printed beneath the symbol shown above, this chemical symbol means that the battery or accumulator contains a heavy metal at a certain concentration. This will be indicated as follows:
Hg: mercury (0.0005%), Cd: cadmium (0.002%), Pb: lead (0.004%)
In the European Union there are separate collection systems for used batteries and accumulators.
Please, dispose of batteries and accumulators correctly at your local community waste collection/recycling centre.
Please, help us to conserve the environment we live in!
Trademarks
MELDAS, MELSEC, EZSocket, EZMotion, iQ Platform, MELSEC iQ-R, MELSOFT, GOT, CC-Link, CC-Link/LT, CC-Link IE, CC-Link IE/field, EcoMonitorLight and SLMP are either trademarks or registered trademarks of Mitsubishi Electric Corporation in Japan and/or other countries.
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BiSS is a registered trademark of iC-Haus GmbH.
Other company and product names that appear in this manual are trademarks or registered trademarks of the respective companies.

(/Japanese)
(A)

Handling of our product
(English)
This is a class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

(/Korean)
(A)
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WARRANTY
Please confirm the following product warranty details before using Mitsubishi Electric CNC.
1. Warranty Period and Coverage
Should any fault or defect (hereafter called "failure") for which we are liable occur in this product during the warranty period, repair services shall be provided at no cost through the distributor from which the product was purchased or through a Mitsubishi Electric service provider. Note, however, that this does not apply if the customer was informed prior to purchasing the product that the product is not covered under warranty. Also note that we are not responsible for any on-site readjustment and/or trial run that may be required after a defective unit is replaced.
[Warranty Term]
The term of warranty for this product shall be twenty-four (24) months from the date of delivery of the product to the end user, provided the product purchased from Mitsubishi Electric or a distributor in Japan is installed in Japan (but in no event longer than thirty (30) months, including distribution time after shipment from Mitsubishi Electric or a distributor).
Note that, in the case where the product purchased from Mitsubishi Electric or a distributor in or outside Japan is exported and installed in any country other than where it was purchased, please refer to "2. Service in Overseas Countries" below.
[Limitations]
(1) The machine tool builder is requested to conduct an initial failure diagnosis, as a general rule. The diagnosis may also be carried out by Mitsubishi Electric or our service provider for a fee at the machine tool builder's request.
(2) This warranty applies only when the conditions, method, environment, etc., of use are in compliance with the terms, conditions and instructions that are set forth in the instruction manual, users manual, and the caution label affixed to the product, etc.
(3) Even during the term of warranty, repair costs will be charged to the customer in the following cases:
(a) a failure caused by improper storage or handling, carelessness or negligence, etc., or a failure caused by a problem with the customer's hardware or software
(b) a failure caused by any alteration, etc., to the product made by the customer without Mitsubishi Electrics approval
(c) a failure which may be regarded as avoidable, if the customers equipment in which this product is incorporated is equipped with a safety device required by applicable laws or has any function or structure considered to be indispensable in the light of common sense in the industry

(d) a failure which could have been avoided if consumable parts designated in the instruction manual, etc. had been duly maintained and replaced
(e) any replacement of consumable parts (including the battery, relay and fuse)
(f) a failure caused by external factors such as inevitable accidents, including without limitation fire and abnormal fluctuation of voltage, and acts of God, including without limitation earthquakes, lightning, and natural disasters
(g) a failure which could not have been foreseen under technologies available at the time of shipment of this product from Mitsubishi Electric
(h) any other failures which are not attributable to Mitsubishi Electric or which the customer acknowledges are not attributable to Mitsubishi Electric
2. Service in Overseas Countries
If the customer installs a product purchased from Mitsubishi Electric in a machine or equipment and exports it to any country other than where it was purchased, the customer may sign a paid warranty contract with our local FA center.
This applies in the case where the product purchased from us in or outside Japan is exported and installed in any country other than where it was purchased.
For details please contact the distributor from which the product was purchased.
3. Exclusion of Responsibility for Compensation against Loss of Opportunity, Secondary Loss, etc.
Regardless of the gratis warranty term, Mitsubishi Electric shall not be liable for compensation for:
(1) Damage arising from any cause found not to be the responsibility of Mitsubishi Electric.
(2) Lost opportunity or lost profit incurred by the user due to a failure of a Mitsubishi Electric product.
(3) Special damage or secondary damage, whether foreseeable or not, compensation for accidents, and compensation for damages to products other than Mitsubishi Electric products.
(4) Replacement by the user, maintenance of on-site equipment, start-up test run and other tasks.
4. Changes in Product Specifications
Specifications shown in our catalogs, manuals or technical documents are subject to change without notice.
5. Product Application
(1) For use of this product, applications should be those that will not result in a serious damage even if a failure or malfunction occurs in the product, and a backup or failsafe function should operate on an external system when any failure or malfunction occurs to the product.
(2) Mitsubishi Electric CNC is designed and manufactured solely for applications to machine tools for industrial purposes.
Do not use this product in applications other than those specified above, especially those which have substantial influence on public interest or which are expected to have significant influence on human lives or properties.
CONTENTS
Mitsubishi Electric CNC M800W/M800S/M80W Series Specifications List [L system]
: Standard: Option: Selection
M850W M830W M850S M830S M80W
1 Control Axes 1
1.1 Control Axes 2
1.1.1 Number of Basic Control Axes (NC Axes) 2 2 2 2 2 2
1.1.2 Max. Number of Axes
(NC Axes + Spindles + PLC Axes)
16
32
16
32
16
32
16
32 12 2
1.1.2.1 Max. Number of NC Axes
(In Total for All the Part Systems)
16
32
16
32
16
32
16
32 10 2
1.1.2.2 Max. Number of Spindles 8888 4+G/B
(*2) 2
1.1.2.3 Max. Number of PLC Axes 8 8 8 8 62
1.1.4 Max. Number of PLC Indexing Axes 8 8 8 8 43
1.1.5 Number of Simultaneous Contouring
Control Axes 8 4 8 4 43
1.1.6 Max. Number of NC Axes
in a Part System
8
12
8
12
8
12
8
12 8 3
1.1.7 Axis Name Extension 3
1.2 Control Part System 4
1.2.1 Standard Number of Part Systems 1 1 1 1 14
1.2.2 Max. Number of Part Systems
(Main + Sub)
4
8
4
8
4
8
4
8 4 4
1.2.2.1 Max. Number of Main Part Systems 4

8
4
8
4
8
4
8 2 4
1.2.2.2 Max. Number of Sub Part Systems 4
8
4
8
4
8
4
8 2 4
1.3 Control Axes and Operation Modes 5
1.3.1 Tape (RS-232C Input) Mode 5
1.3.2 Memory Mode 5
1.3.3 MDI Mode 5
1.3.4 High-Speed Program Server Mode 6
1.3.4.1 Control Unit-side High-speed
Program Server Mode 6
1.3.4.2 Display Unit-side High-speed
Program Server Mode / / / 6
1.3.4.3 FTP High-speed Program Server Mode 6
1.3.5 Front-side SD Card Mode 7
1.3.6 Front-side USB Memory Mode 7
2 Input Command 9
2.1 Data Increment 10
2.1.1 Least Command Increment 10
Least command increment 1m 10
Least command increment 0.1m 10
Least command increment 0.01m(10nm) 10
Least command increment 0.001m(1nm) 10
2.1.2 Least Control Increment 12
Least control increment0.01m(10nm) 12
Least control increment0.001m(1nm) 12
Class Page
Lathe system
: Standard: Option: Selection
M850W M830W M850S M830S M80W Class Page
Lathe system
2.1.3 Indexing Increment 12
2.2 Unit System 13
2.2.1 Inch/Metric Changeover 13
2.2.2 Input Command Increment Tenfold 13
2.3 Program Format 14
2.3.1 Program Format 14
2.3.1.1 Format 1 for Lathe
(G Code List 2, 3) 14
2.3.1.2 Format 2 for Lathe
(G Code List 4, 5) 14
2.3.1.3 Special Format for Lathe
(G Code List 6, 7) 14
2.3.1.4 Format 1 for Machining Center 14
2.3.1.5 Format 2 for Machining Center
(M2 Format) 14
2.3.1.6 MITSUBISHI CNC Special Format 14
2.3.2 Program Format Switch 15
2.4 Command Value 17
2.4.1 Decimal Point Input I, II 17
2.4.2 Absolute/Incremental Command 18
2.4.3 Diameter/Radius Designation 19
2.4.4 Diameter/Radius Designation Switch 20
3 Positioning/Interpolation 21
3.1 Positioning 22
3.1.1 Positioning 22
3.1.2 Unidirectional Positioning 23
3.2 Linear/Circular Interpolation 24
3.2.1 Linear Interpolation 24
3.2.2 Circular Interpolation
(Center/Radius Designation) 25
3.2.3 Helical Interpolation 27
3.2.4 Spiral/Conical Interpolation 30
3.2.5 Cylindrical Interpolation 32
3.2.6 Polar Coordinate Interpolation 33
3.2.7 Milling Interpolation 34
3.2.8 Hypothetical Axis Interpolation 35
3.3 Curve Interpolation 36
3.3.1 Involute Interpolation 36
3.3.2 Exponential Interpolation 38
3.3.3 Spline Interpolation (G05.1Q2/G61.2) 39
3.3.4 NURBS Interpolation 40
3.3.5 3-Dimensional Circular Interpolation 41
3.3.6 Spline Interpolation2 (G61.4) 42
4 Feed 45
4.1 Feedrate 46
4.1.1 Rapid Traverse Rate (m/min) 1000 1000 1000 1000 1000 46

4.1.2 Cutting Feedrate (m/min) 1000 1000 1000 1000 1000 47
4.1.3 Manual Feedrate (m/min) 1000 1000 1000 1000 1000 48
: Standard: Option: Selection
M850W M830W M850S M830S M80W Class Page
Lathe system
4.1.4 Rotary Axis Command Speed Tenfold 48
4.2 Feedrate Input Methods 49
4.2.1 Feed per Minute (Asynchronous Feed) 49
4.2.2 Feed per Revolution (Synchronous Feed) 51
4.2.3 Inverse Time Feed 53
4.2.4 F 1-digit Feed 54
4.2.5 Manual Speed Command 55
4.2.7 G00 Feedrate Designation (,F Command) 55
4.2.8 Selection of Axis (Axes) for
Feedrate Command 57
4.3 Override 58
4.3.1 Rapid Traverse Override 58
4.3.2 Cutting Feed Override 58
4.3.3 2nd Cutting Feed Override 58
4.3.4 Override Cancel 59
4.4 Acceleration/Deceleration 60
4.4.1 Automatic Acceleration/Deceleration
after Interpolation 60
4.4.2 Rapid Traverse Constant-gradient
Acceleration/Deceleration 62
4.4.3 Rapid Traverse Constant-gradient
Multi-step Acceleration/Deceleration 63
4.5 Thread Cutting 64
4.5.1 Thread Cutting
(Lead/Thread Number Designation) 64
4.5.2 Variable Lead Thread Cutting 67
4.5.3 Synchronous Tapping 68
4.5.3.1 Synchronous Tapping Cycle 68
4.5.3.2 Pecking Tapping Cycle 70
4.5.3.3 Deep-hole Tapping Cycle 72
4.5.3.4 Synchronous Tapping
with Multiple Spindles 74
4.5.3.5 Synchronous Tapping
with Analog I/F Spindle 74
4.5.4 Chamfering 74
4.5.6 Circular Thread Cutting 75
4.5.8 High-speed Synchronous Tapping (OMR-DD) 76
4.5.10 Thread Recutting 77
4.5.11 Thread Cutting Override 78
4.5.12 Variable Feed Thread Cutting 78
4.5.13 Thread Cutting Time Constant Switch 79
4.6 Manual Feed 80
4.6.1 Manual Rapid Traverse 80
4.6.2 Jog Feed 80
4.6.3 Incremental Feed 81
4.6.4 Handle Feed 81
4.6.5 Manual Feedrate B 82
4.6.6 Manual Feedrate B Surface Speed Control 83
4.6.8 Manual Speed Clamp 84
: Standard: Option: Selection
M850W M830W M850S M830S M80W Class Page
Lathe system
4.7 Dwell 85
4.7.1 Dwell (Time-based Designation) 85
4.7.2 Dwell (Revolution-based Designation) 86
5 Program Memory/Editing 87
5.1 Memory Capacity 88
5.1.1 Memory Capacity
(Number of Programs Stored) 88
230kB[600m] (400 programs) 88
500kB[1280m] (1000 programs) 88
1000kB[2560m] (1000 programs) 88
2000kB[5120m] (1000 programs) 88
5.2 Editing 89
5.2.1 Program Editing 89
5.2.2 Background Editing 90
5.2.3 Buffer Correction 91
5.2.5 Multi-part System Simultaneous
Program Editing 92
5.2.6 Special Program Editing Display for
Synchronization between Part Systems 92
5.2.7 Finish Shape View Programming 93
6 Operation and Display 95
6.1 Structure of Operation/Display Panel 96
6.1.1 Color Display (8.4-type LCD TFT) 96
6.1.2 Color Touchscreen Display
(10.4-type LCD TFT) 96
6.1.3 Color Touchscreen Display
(15-type LCD TFT) 96
6.1.4 Separated-type Color Display
(8.4-type LCD TFT) 96
6.1.5 Separated-type Color Touchscreen
Display (10.4-type LCD TFT) 96

6.1.6 Separated-type Color Touchscreen
Display (15-type LCD TFT) 96
6.1.7 Separated-type Color Touchscreen
Display (15-type LCD TFT/Windows8) 96
6.1.8 Separated-type Color Touchscreen
Display (19-type LCD TFT/Windows8) 97
6.1.9 Separated-type Color Touchscreen
Display
(19-type Horizontal LCD TFT/Windows8)
97
6.1.11 GOT (GOT2000 Series
GT27/GT25 12.1/10.4/8.4/5.7) 97
6.2 Operation Methods and Functions 98
6.2.1 Operation Input 98
6.2.2 Absolute/Incremental Setting 98
6.2.3 Multiple Display Connection 99
6.2.4 Common Display to Multiple NCs 99
6.2.5 Displayed Part System Switch 99
6.2.6 Menu List 100
6.2.7 Display Switch by Operation Mode 100
6.2.8 External Signal Display Switch 100
: Standard: Option: Selection
M850W M830W M850S M830S M80W Class Page
Lathe system
6.2.9 Screen Saver 100
6.2.10 Parameter Guidance 100
6.2.11 Alarm Guidance 101
6.2.12 Machining Program Input Mistake
Check Warning 101
6.2.14 Screenshot Capture / / / 101
6.2.15 User Selectable Menu Configuration 101
6.2.16 PC-NC Network Automatic Connection / / / 102
6.2.17 Device Open Parameter 102
6.2.18 SRAM Open Parameter 102
6.2.19 MTB Selectable Menu Configuration 102
6.2.20 Remote Desktop Connection / / / 103
6.2.21 VNC Server / / / 104
6.3 Display Methods and Contents 105
6.3.1 Status Display 105
6.3.2 Clock Display 105
6.3.3 Monitor Screen Display 106
6.3.4 Setup Screen Display 107
6.3.5 Edit Screen Display 107
6.3.6 Diagnosis Screen Display 107
6.3.7 Maintenance Screen Display 108
6.3.8 Home Application / / / 108
6.3.9 Home Screen 109
6.3.10 Additional Languages 110
6.3.10.1 Japanese 110
6.3.10.2 English 110
6.3.10.3 German 110
6.3.10.4 Italian 110
6.3.10.5 French 110
6.3.10.6 Spanish 110
6.3.10.7 Chinese 110
6.3.10.7.1 Chinese
(Traditional Chinese Characters) 110
6.3.10.7.2 Chinese
(Simplified Chinese Characters) 110
6.3.10.8 Korean 111
6.3.10.9 Portuguese 111
6.3.10.10 Hungarian 111
6.3.10.11 Dutch 111
6.3.10.12 Swedish 111
6.3.10.13 Turkish 111
6.3.10.14 Polish 111
6.3.10.15 Russian 111
6.3.10.16 Czech 111
6.3.10.17 Indonesian 112
6.3.10.18 Vietnamese 112
: Standard: Option: Selection
M850W M830W M850S M830S M80W Class Page
Lathe system
7 Input/Output Functions and Devices 113
7.1 Input/Output Data 114
7.1.1 Machining Program Input/Output 114
7.1.2 Tool Offset Data Input/Output 114
7.1.3 Common Variable Input/Output 114
7.1.4 Parameter Input/Output 114
7.1.5 History Data Output 114
7.1.7 System Configuration Data Output 114
7.2 Input/Output I/F 115
7.2.1 RS-232C I/F 115
7.2.2 SD Card I/F 115
7.2.2.1 Control Unit-side SD Card I/F
[Up to 32GB] 115
7.2.2.2 Front-side SD Card I/F [Up to 32GB] / / / 115
7.2.3 Ethernet I/F 115

7.2.4 Display Unit-side Data Server I/F 116
7.2.5 Front-side USB Memory I/F [Up to 32GB] 116
7.2.6 USB I/F (GOT Front-side USB I/F) 116
7.2.7 SD I/F (GOT Back-side SD Card I/F) 116
7.3 Computer Link 117
7.3.1 Computer Link B 117
7.4 Others 118
7.4.1 Handy Terminal Connection 118
7.4.3 IP Filter Setting 119
8 Spindle, Tool and Miscellaneous Functions 121
8.1 Spindle Functions (S) 122
8.1.1 Spindle Control Functions 122
8.1.1.1 Spindle Digital I/F 123
8.1.1.2 Spindle Analog I/F 123
8.1.1.3 Coil Switch 123
8.1.1.4 Automatic Coil Switch 123
8.1.1.5 Encoder Input I/F 124
8.1.1.6 Spindle-mode Servo Motor Control 125
8.1.1.7 Spindle-mode Rotary Axis Control 126
8.1.1.8 Turret Gear Change Control 127
8.1.1.9 Spindle Control with
Pulse Train Output 128
8.1.2 S Code Output 129
8.1.3 Constant Surface Speed Control 130
8.1.4 Spindle Override 132
8.1.5 Multiple-spindle Control 132
8.1.5.1 Multiple-spindle Control I 133
8.1.5.2 Multiple-spindle Control II 134
8.1.6 Spindle Orientation 135
: Standard: Option: Selection
M850W M830W M850S M830S M80W Class Page
Lathe system
8.1.7 Spindle Position Control
(Spindle/C Axis Control) 136
8.1.7.1 Spindle Position Control
(Spindle/C Axis Control) 136
8.1.7.2 C Axis Control during
Spindle Synchronization 137
8.1.8 Spindle Synchronization 138
8.1.8.1 Spindle Synchronization I 138
8.1.8.2 Spindle Synchronization II 139
8.1.8.3 Guide Bushing Spindle
Synchronization 139
8.1.9 Tool Spindle Synchronization I
(Polygon) 140
8.1.9.1 Tool Spindle Synchronization IA
(Spindle-Spindle, Polygon) 140
8.1.9.2 Tool Spindle Synchronization IB
(Spindle-Spindle, Polygon) 141
8.1.9.3 Tool Spindle Synchronization IC
(Spindle-NC Axis, Polygon) 142
8.1.10 Tool Spindle Synchronization II
(Hobbing) 143
8.1.11 Spindle Speed Clamp 144
8.1.13 Spindle Oscillation 144
8.1.14 Spindle Superimposition Control 145
8.1.15 Multiple Spindle Synchronization
Set Control 147
8.1.16 Spindle Speed Fluctuation Detection 150
8.1.17 Spindle Motor Temperature Output
to PLC 151
8.2 Tool Functions (T) 152
8.2.1 Tool Functions (T Command) 152
8.3 Miscellaneous Functions (M) 153
8.3.1 Miscellaneous Functions 153
8.3.2 Multiple M Codes in 1 Block 153
8.3.3 M Code Independent Output 154
8.3.4 Miscellaneous Function Finish 155
8.3.5 M Code Output during Axis Traveling 156
8.3.6 Miscellaneous Function Command
High-speed Output 157
8.4 2nd Miscellaneous Functions (B) 159
8.4.1 2nd Miscellaneous Functions 159
8.4.2 2nd Miscellaneous Function Name
Extension 159
9 Tool Compensation 161
9.1 Tool Length/Tool Position 162
9.1.1 Tool Length Offset 162
9.1.2 Tool Position Offset 165
9.1.3 Tool Compensation for Additional Axes 165
9.1.4 Tool Position Compensation (G43.7) 166
9.2 Tool Radius 167
9.2.1 Tool Radius Compensation 167
: Standard: Option: Selection
M850W M830W M850S M830S M80W Class Page
Lathe system
9.2.2 3-dimensional Tool Radius Compensation (*3) (*3) 169
9.2.3 Tool Nose Radius Compensation

(G40/41/42) 170
9.2.4 Automatic Decision of Nose Radius
Compensation Direction (G46/40) 171
9.2.5 Tool Radius Compensation Diameter
Designation 171
9.3 Tool Offset Amount 172
9.3.1 Number of Tool Offset Sets 172
99 sets 172
128 sets 172
200 sets 172
256 sets 172
400 sets 172
999 sets 172
9.3.2 Offset Memory 173
9.3.2.1 Tool Shape/Wear Offset Amount 173
9.3.2.2 Compensation Type Selection
by Parameter 176
9.3.3 Number of Tool Offset Sets Allocation
to Part Systems 177
10 Coordinate System 179
10.1 Coordinate System Type and Setting 180
10.1.1 Machine Coordinate System 181
10.1.2 Coordinate System Setting 182
10.1.3 Automatic Coordinate System Setting 183
10.1.4 Workpiece Coordinate System Selection 184
10.1.4.1 Workpiece Coordinate System
Selection (6 Sets) 184
10.1.4.2 Extended Workpiece Coordinate
System Selection (48 Sets)
G54.1P1 to P48
186
10.1.4.3 Extended Workpiece Coordinate
System Selection (96 Sets)
G54.1P1 to P96
186
10.1.4.4 Extended Workpiece Coordinate
System Selection (300 Sets)
G54.1P1 to P300
186
10.1.5 External Workpiece Coordinate Offset 187
10.1.6 Workpiece Coordinate System Preset
(G92.1) 188
10.1.7 Local Coordinate System 189
10.1.8 Coordinate System for Rotary Axis 190
10.1.9 Plane Selection 191
10.1.10 Origin Set/Origin Cancel 192
10.1.11 Counter Set 193
10.1.12 Workpiece Position Offset
for Rotary Axis 194
10.1.13 Workpiece Coordinate System Shift 196
10.2 Return 197
10.2.1 Manual Reference Position Return 197
: Standard: Option: Selection
M850W M830W M850S M830S M80W Class Page
Lathe system
10.2.2 Automatic 1st Reference Position
Return 198
10.2.3 2nd, 3rd, 4th Reference Position
Return 200
10.2.4 Reference Position Check 201
10.2.5 Absolute Position Detection 202
10.2.6 Tool Exchange Position Return 203
11 Operation Support Functions 205
11.1 Program Control 206
11.1.1 Optional Block Skip 206
11.1.2 Optional Block Skip Addition 206
11.1.3 Single Block 207
11.2 Program Test 208
11.2.1 Dry Run 208
11.2.2 Machine Lock 208
11.2.3 Miscellaneous Function Lock 208
11.2.4 Graphic Check 209
11.2.4.1 Graphic Check 209
11.2.4.2 3D Solid Program Check 209
11.2.4.3 Graphic Check Rotary Axis Drawing 210
11.2.5 Graphic Trace 211
11.2.5.1 Graphic Trace 211
11.2.5.2 Graphic Trace Rotary Axis Drawing 212
11.2.6 Machining Time Computation 212
11.2.7 Manual Arbitrary Reverse Run
(Program Check Operation) 213
11.2.8 High-speed Simple Program Check 214
11.3 Program Search/Start/Stop 215
11.3.1 Program Search 215
11.3.2 Sequence Number Search 215
11.3.3 Collation and Stop 216
11.3.4 Program Restart 217
11.3.5 Automatic Operation Start 218

11.3.6 NC Reset 218
11.3.7 Feed Hold 219
11.3.8 Search & Start 219
11.3.10 Auto-restart 219
11.4 Interrupt Operation 220
11.4.1 Manual Interruption 220
11.4.2 Automatic Operation Handle
Interruption 220
11.4.3 Manual Absolute Switch 221
11.4.4 Thread Cutting Cycle Retract 222
11.4.5 Tapping Retract 223
11.4.6 Manual Numerical Value Command 224
11.4.7 Arbitrary Reverse Run 225
11.4.8 MDI Interruption 226
: Standard: Option: Selection
M850W M830W M850S M830S M80W Class Page
Lathe system
11.4.9 Simultaneous Operation of Manual and
Automatic Modes 226
11.4.10 Simultaneous Operation of JOG and
Handle Modes 226
11.4.11 Reference Position Retract 227
11.4.12 Tool Retract and Return 228
11.4.13 Skip Retract 229
11.4.14 PLC Interruption 229
11.4.16 Machining Interruption 230
12 Program Support Functions 231
12.1 Machining Method Support Functions 232
12.1.1 Program 232
12.1.1.1 Subprogram Control [Layers] 10 10 10 10 10 232
12.1.1.2 Figure Rotation 235
12.1.1.3 Scaling 237
12.1.1.4 Axis Name Switch 238
12.1.2 Macro Program 239
12.1.2.1 User Macro [Layers] 4 4 4 4 4 239
12.1.2.2 Machine Tool Builder Macro 242
12.1.2.3 Macro Interruption 244
12.1.2.4 Variable Command 245
200 sets 245
600 sets 245
700 sets 245
8000 sets 245
(600+100number of part systems) sets 245
(7900+100number of part systems) sets 245
12.1.3 Fixed Cycle 247
12.1.3.1 Fixed Cycle for Drilling 248
12.1.3.2 Fixed Cycle for Drilling (Type II) 253
12.1.3.3 Special Fixed Cycle 254
12.1.3.4 Fixed Cycle for Turning Machining 257
12.1.3.5 Compound Type Fixed Cycle
for Turning Machining 262
12.1.3.6 Compound Type Fixed Cycle
for Turning Machining (Type II) 267
12.1.3.7 Small-diameter Deep-hole Drilling
Cycle 271
12.1.4 Mirror Image 271
12.1.4.1 Mirror Image by Parameter Setting 271
12.1.4.2 Mirror Image by External Input 271
12.1.4.3 Mirror Image by G Code 272
12.1.4.4 Mirror Image for Facing Tool Posts 273
12.1.4.5 T Code Mirror Image for Facing
Tool Posts 273
12.1.5 Coordinate System Operation 274
12.1.5.1 Coordinate Rotation by Program 274
12.1.5.2 Coordinate Rotation by Parameter 276
: Standard: Option: Selection
M850W M830W M850S M830S M80W Class Page
Lathe system
12.1.5.3 3-dimensional Coordinate Conversion 277
12.1.6 Dimension Input 279
12.1.6.1 Corner Chamfering/Corner R 279
12.1.6.2 Linear Angle Command 286
12.1.6.3 Geometric Command 287
12.1.6.4 Polar Coordinate Command 288
12.1.7 Axis Control 289
12.1.7.1 Chopping 289
12.1.7.1.1 Chopping 289
12.1.7.2 Normal Line Control 290
12.1.7.3 Circular Cutting 291
12.1.7.4 Vibration Cutting Control 292
12.1.8 Multi-part System Control 293
12.1.8.1 Timing Synchronization between
Part Systems 293
12.1.8.2 Start Point Designation Timing
Synchronization 294
12.1.8.3 Mixed Control 297
12.1.8.3.1 Mixed Control
(Cross Axis Control) 297

12.1.8.3.2 Arbitrary Axis Exchange
Control 298
12.1.8.4 Control Axis Superimposition 300
12.1.8.4.1 Control Axis Superimposition 300
12.1.8.4.2 Arbitrary Axis
Superimposition Control 301
12.1.8.5 Control Axis Synchronization
between Part Systems 302
12.1.8.6 Balance Cut 304
12.1.8.7 Common Memory for Part Systems 306
12.1.8.8 Multi-part System Simultaneous
Thread Cutting 306
12.1.8.8.1 Two-part System Simultaneous
Thread Cutting 307
12.1.8.8.2 Multi-part System
Simultaneous Thread Cutting 309
12.1.8.9 Multi-part System Program
Management 310
12.1.8.10 Synchronization between
Part Systems 311
12.1.8.10.1 Single Block between
Part Systems 311
12.1.8.10.2 Dwell/Miscellaneous Function
Time Override 312
12.1.8.10.3 Synchronization between
Part Systems OFF 313
12.1.8.11 Sub Part System Control I 314
12.1.8.12 Sub Part System Control II 316
12.1.8.13 Loader Control Part System 318
: Standard: Option: Selection
M850W M830W M850S M830S M80W Class Page
Lathe system
12.1.9 Data Input/Output by Program 319
12.1.9.1 Parameter Input by Program 319
12.1.9.2 Compensation Data Input by Program 320
12.1.9.3 Tool/Material Shape Input
by Program 324
12.1.9.5 API Section and Sub-section Nos.
Input/Output by Program 326
12.1.9.6 R-Navi Data Input by Program 326
12.1.10 Machining Modal 327
12.1.10.1 Tapping Mode 327
12.1.10.2 Cutting Mode 327
12.1.11 High-speed Parts Machining 328
12.1.11.1 Rapid Traverse Block Overlap 328
12.2 Machining Accuracy Support Functions 330
12.2.1 Automatic Corner Override 330
12.2.2 Deceleration Check 331
12.2.2.1 Exact Stop Check Mode 333
12.2.2.2 Exact Stop Check 333
12.2.2.3 Error Detection 333
12.2.2.4 Programmable In-position Check 334
12.2.2.5 Automatic Error Detection 334
12.3 High-speed and High-accuracy
Functions [kBPM: k Block per Minute] 335
12.3.1 High-speed Machining Mode 335
12.3.1.1 High-speed Machining Mode I
(G05P1) Maximum [kBPM] 33.7 33.7 33.7 33.7 33.7 335
12.3.1.2 High-speed Machining Mode II
(G05P2) Maximum [kBPM] 168 168 168 168 67.5 336
12.3.2 High-accuracy Control 337
12.3.2.1 High-accuracy Control (G61.1/G08) 337
12.3.2.2 Multi-part System Simultaneous
High-accuracy Control 341
12.3.2.3 SSS Control 342
12.3.2.4 Tolerance Control 343
12.3.2.5 Variable-acceleration
Pre-interpolation
Acceleration/Deceleration
344
12.3.2.6 High-accuracy
Acceleration/Deceleration Time
Constant Extension
344
12.3.2.7 Axis-specific Acceleration
Tolerance Control 345
12.3.3 High-speed High-accuracy Control 346
12.3.3.1 High-speed High-accuracy
Control I (G05.1Q1) Maximum [kBPM] 67.5 67.5 67.5 67.5 33.7 346
12.3.3.2 High-speed High-accuracy
Control II (G05P10000) Maximum [kBPM] 168 168 168 168 67.5 347
12.3.3.3 High-speed High-accuracy
Control III (G05P20000) Maximum [kBPM] 350
12.3.3.4 Smooth Fairing 351
12.3.4 Machining Condition Selection I 352
: Standard: Option: Selection
M850W M830W M850S M830S M80W Class Page
Lathe system

12.3.5 Direct Command Mode 352
12.4 Programming Support Functions 353
12.4.1 Playback 353
12.4.3 Interactive Cycle Insertion 354
12.4.4 Simple Programming (NAVI MILL/LATHE) 357
12.4.5 G code Guidance 357
12.4.7 DXF Data Input 358
13 Machine Accuracy Compensation 359
13.1 Static Accuracy Compensation 360
13.1.1 Backlash Compensation 360
13.1.2 Memory-type Pitch Error Compensation
[sets] 32 32 32 32 16 361
13.1.3 Memory-type Relative Position Error
Compensation 362
13.1.4 External Machine Coordinate System
Compensation 363
13.1.5 Circular Radius Error Compensation 363
13.1.6 Ball Screw Thermal Expansion
Compensation 364
13.1.7 Rotation Center Error Compensation 365
13.1.8 Position-dependent Gradually
Increasing-type Backlash Compensation 367
13.1.9 Bidirectional Pitch Error Compensation 368
13.1.10 Cyclic Error Compensation 368
13.1.11 Spatial Error Compensation 369
13.1.12 Backlash Compensation II 370
13.2 Dynamic Accuracy Compensation 371
13.2.1 Smooth High-gain (SHG) Control 371
13.2.2 Dual Feedback 372
13.2.3 Lost Motion Compensation 372
13.2.4 OMR II (Backlash with Filter) 373
13.2.6 OMR-FF 374
13.2.7 Distance-coded Reference Position
Detection 375
13.2.9 Variable Torsion Compensation 376
13.2.10 Cogging Torque Compensation 377
14 Automation Support Functions 379
14.1 Measurement 380
14.1.1 Skip 380
14.1.1.1 Skip 380
14.1.1.2 Multiple-step Skip 382
14.1.1.4 PLC Skip 383
14.1.1.5 Speed Change Skip 383
14.1.1.6 Torque Limitation Skip 384
14.1.2 Automatic Tool Length Measurement 385
14.1.3 Manual Tool Length Measurement 1 388
14.1.4 Manual Tool Length Measurement 2 391
14.1.5 Workpiece Coordinate Offset
Measurement 392
: Standard: Option: Selection
M850W M830W M850S M830S M80W Class Page
Lathe system
14.1.6 Workpiece Position Measurement 393
14.1.7 Rotation Measurement 395
14.1.8 Rotation Center Error Measurement 396
14.1.9 Workpiece Installation Error
Measurement 397
14.2 Tool Life Management 398
14.2.1 Tool Life Management 398
14.2.1.1 Tool Life Management I 398
14.2.1.2 Tool Life Management II 399
14.2.1.3 Tool Life Management III 399
14.2.2 Number of Tool Life Management Sets 400
99 sets 400
128 sets 400
200 sets 400
256 sets 400
400 sets 400
999 sets 400
14.2.3 Tool Life Management Set Allocation
to Part Systems 402
14.3 Others 404
14.3.1 Programmable Current Limitation 404
14.3.2 Auto Power OFF 404
14.3.4 Load Monitoring I 405
14.3.5 Power ON/OFF Sequence / / / 405
14.3.6 PLC Axis Current Limit 405
14.3.7 Direct Robot Control 406
15 Safety and Maintenance 407
15.1 Safety Switches 408
15.1.1 Emergency Stop 408
15.1.2 Data Protection Key 408
15.2 Display for Ensuring Safety 409
15.2.1 NC Warning 409
15.2.2 NC Alarm 409
15.2.3 Operation Stop Cause 410
15.2.4 Emergency Stop Cause 410
15.2.5 Thermal Detection 410

15.2.6 Battery Alarm/Warning 411
15.3 Protection 412
15.3.1 Stroke End (Over Travel) 412
15.3.2 Stored Stroke Limit 412
15.3.2.1 Stored Stroke Limit I/II 413
15.3.2.2 Stored Stroke Limit IB 415
15.3.2.3 Stored Stroke Limit IIB 415
15.3.2.4 Stored Stroke Limit IC 416
15.3.3 Stroke Check before Travel 417
15.3.4 Chuck/Tailstock Barrier Check 419
: Standard: Option: Selection
M850W M830W M850S M830S M80W Class Page
Lathe system
15.3.5 Interlock 420
15.3.6 External Deceleration 420
15.3.7 Interference Check III 421
15.3.8 3D Machine Interference Check 423
15.3.9 Door Interlock 424
15.3.9.1 Door Interlock I 424
15.3.9.2 Door Interlock II 426
15.3.10 Parameter Lock 428
15.3.11 Program Protection (Edit Lock B, C) 428
15.3.12 Program Display Lock 428
15.3.13 Data Protection by User's Level 428
15.3.15 Vertical Axis Pull-up 429
15.3.16 Machine Group-based Alarm Stop 429
15.3.17 Interference Check Between
Part Systems 431
15.3.18 Spindle Protection 432
15.4 Maintenance and Troubleshooting 433
15.4.1 Operation History 433
15.4.2 Data Sampling 434
15.4.3 NC Data Backup 434
15.4.4 Servo Tuning Support 435
15.4.4.1 NC Analyzer2 435
15.4.5 Automatic Backup 437
15.4.8 Application Error Detection / / / 437
15.4.9 Email Notification to Operator 438
15.4.10 NC Configurator2 439
15.4.11 Diagnosis Data Output 439
15.4.12 Backup/Restore 439
15.4.14 Field Network Diagnostics 440
15.4.15 Remote service iQ Care Remote4U 441
15.4.15.1 Connection with RGU 441
15.4.16 Brake Wear Diagnostics 442
15.5 Functional Safety 443
15.5.1 Safety Observation 443
15.5.2 Smart Safety Observation 444
15.5.2.1 Safety-related I/O Observation 444
15.5.2.2 Emergency Stop Observation 444
15.5.2.3 Drive Safety Function 445
15.5.2.3.1 SLS (Safely-Limited Speed) 445
15.5.2.3.2 SLP (Safely-Limited Position) 445
15.5.2.3.3 SOS (Safe Operating Stop) 445
15.5.2.3.4 SSM (Safe Speed Monitor) 445
15.5.2.3.5 SBC/SBT
(Safe Brake Control/Safe Brake Test) 446
: Standard: Option: Selection
M850W M830W M850S M830S M80W Class Page
Lathe system
15.5.2.3.6 SCA (Safe Cam) 446
15.5.2.3.7 SS1/SS2 (Safe Stop) 446
15.5.2.3.8 STO (Safe Torque Off) 446
15.5.2.3.9 SCN
(Safety Communication Network) 447
16 Drive System 449
16.1 Servo/Spindle 450
Feed axis -
MDS-E-Vx -
MDS-EH-Vx -
MDS-EJ-Vx -
MDS-EJH-Vx -
MDS-EM-SPVx -
MDS-EMH-SPVx -
Spindle -
MDS-E-SPx -
MDS-EH-SPx -
MDS-EJ-SPx -
MDS-EM-SPVx -
MDS-EMH-SPVx -
Power supply -
MDS-E-CV -
MDS-EH-CV -
MDS-EX-CVP -
17 Machine Support Functions 451
17.1 PLC 452
17.1.1 Built-in PLC Processing Mode 452
17.1.2 PLC Functions 452

17.1.2.1 Built-in PLC Basic Function 452
17.1.2.1.1 Index Modification 455
17.1.2.1.2 Multi-program
[Number of Programs] 120 120 120 120 60 455
17.1.2.1.3 Multi-project
[Number of Projects Stored] 456
Number of PLC projects: 2 456
Number of PLC projects: 3 456
Number of PLC projects: 6 456
17.1.2.1.4 Function Block (FB) 456
17.1.2.1.5 Label Programming 456
17.1.2.2 PLC Exclusive Instruction 457
17.1.2.3 Enhanced PLC Security Mode 459
17.1.3 PLC Support Functions 460
17.1.3.1 Alarm Message Display 460
: Standard: Option: Selection
M850W M830W M850S M830S M80W Class Page
Lathe system
17.1.3.2 Operator Message Display 460
17.1.3.3 Memory Switch (PLC Switch) 461
17.1.3.3.1 Memory Switch (PLC Switch)
32 Points 461
17.1.3.3.2 Memory Switch (PLC Switch)
64 Points 461
17.1.3.3.3 Memory Switch (PLC Switch)
96 points 461
17.1.3.4 Load Meter Display 462
17.1.3.5 User PLC Version Display 462
17.1.3.6 Ladder Program Writing during RUN 462
17.1.3.7 PLC Program Protection 462
17.1.4 Built-in PLC Capacity 463
17.1.4.1 Standard PLC Capacity
[Number of Steps] 128K 128K 128K 128K 64K 463
17.1.4.2 Large PLC Capacity: 256 Ksteps 463
17.1.4.3 Large PLC Capacity: 512 Ksteps 463
17.1.5 Machine Contact Input/Output I/F 463
17.1.6 Ladder Monitor 464
17.1.7 PLC Development 465
17.1.7.1 On-board Development 465
17.1.7.2 MELSEC Development Tool
(GX Developer) 465
17.1.7.3 MELSEC Development Tool
(GX Works2) 465
17.1.7.4 MELSEC Development Tool
(GX Works3) 466
17.1.8 PLC Parameter 466
17.1.8.1 PLC Constant (150 Points) 466
17.1.8.2 PLC Constant Extension
(Up to 750 Points) 466
17.1.9 GOT Connection 467
17.1.9.1 Ethernet Connection 467
17.1.9.2 CC-Link Connection 467
17.1.9.3 CC-Link IE Field Connection 467
17.1.10 Pallet Program Registration 468
17.2 Machine Construction 469
17.2.1 Servo OFF 469
17.2.2 Axis Detachment 470
17.2.3 Synchronous Control 471
17.2.4 Inclined Axis Control 475
17.2.5 Position Switch 24 24 24 24 24 476
17.2.7 Index Table Indexing 477
17.2.8 Tool Length Compensation along
the Tool Axis (*3) (*3) (*3) (*3) 479
17.2.9 Tool Handle Feed & Interruption 480
: Standard: Option: Selection
M850W M830W M850S M830S M80W Class Page
Lathe system
17.2.10 Tool Center Coordinate Display 480
17.2.11 Tool Center Point Control 481
17.2.11.1 Tool Center Point Control
(G43.4/G43.5) 481
17.2.12 Inclined Surface Machining Command 484
17.2.13 Simple Inclined Surface Machining
Command 486
17.2.14 3-dimensional Tool Radius
Compensation (Tool's
Vertical-direction Compensation)
(*3) (*3) (*3) (*3) 488
17.2.15 Workpiece Installation Error
Compensation (*3) (*3) 489
17.2.16 3-dimensional Manual Feed 490
17.2.17 R-Navi 491
17.2.18 Simple Synchronous Control 493
17.2.20 Real-time Tuning 494
17.2.20.1 Real-time Tuning 1 (Speed Gain) 494
17.2.20.2 Real-time Tuning 2 (Rapid
Traverse Time Constant) 495
17.2.21 Constant Torque Control 496

17.2.22 External Encoder Position Output I/F 497
17.2.23 Multiple-axis Synchronization Control 498
17.2.24 Hypothetical Linear Axis Control 499
17.2.25 BiSS Encoder I/F 500
17.2.26 Tool Head Hot Swapping 501
17.3 PLC Operation 502
17.3.1 Arbitrary Feed in Manual Mode 502
17.3.2 Circular Feed in Manual Mode 503
17.3.3 PLC Axis Control 505
17.3.5 PLC Axis Indexing 506
17.3.6 NC Axis/PLC Axis Switchover 508
17.4 PLC Interface 509
17.4.1 CNC Control Signal 509
17.4.2 CNC Status Signal 510
17.4.3 PLC Window 512
17.4.4 External Search 513
17.4.5 Direct Screen Selection 513
17.4.6 Buzzer Sound Control 514
17.5 Machine Contact I/O 515
17.5.1 Operation Panel I/O 515
17.5.1.1 DI:64/DO:64 / / / 515
17.5.1.2 DI:64/DO:64 + SDI:8 / / / 515
17.5.1.3 DI:96/DO:64 / / / 515
17.5.1.5 DI:64/DO:48/AO:1 / / / 515
17.5.2 Remote I/O 516
17.5.2.1 DI:32/DO:32 516
17.5.2.2 DI:64/DO:48 516
17.5.2.3 DI:64/DO:48 + AO:1 516
: Standard: Option: Selection
M850W M830W M850S M830S M80W Class Page
Lathe system
17.5.2.5 DI:16/DO:8 516
17.5.2.6 DI:32/DO:32 + SDI:8/SDO:4 516
17.5.2.7 SDI:8/SDO:4 516
17.6 External PLC Link 517
17.6.1 CC-Link (Master/Local) 517
17.6.2 PROFIBUS-DP (Master) 523
17.6.3 CC-Link IE Field (Master/Local) 524
17.6.4 PROFINET 525
17.6.5 EtherNet/IP 526
17.6.8 FL-net 527
17.6.9 DeviceNet (Master) 527
17.6.10 CC-Link IE Field Basic 528
17.7 Installing S/W for Machine Tools 530
17.7.1 Customization (NC Designer2) 530
17.7.1.1 Customization Data Storage
Capacity [MB] 6 6 532
17.7.1.2 Customization Working Memory Size
[MB] 6 6 6 6 3 532
17.7.2 User-defined Key 532
17.7.3 EZSocket I/F 532
17.7.4 APLC Release 533
17.7.5 Custom API Library 534
17.7.6 MES Interface Library 534
17.7.7 SLMP Server 535
17.7.8 Numerical Control (CNC) Communication
Software FCSB1224W000 536
17.7.10 GOT2000 Screen Design Tool GT Works3 536
17.8 Others 537
17.8.1 System Lock 537
17.8.2 CNC Remote Operation Tool 537
17.8.2.1 NC Monitor2 537
17.8.2.2 NC Explorer 537
17.8.3 Automatic Operation Lock 537
17.8.4 Power Consumption Computation 538
17.8.5 EcoMonitorLight Connection 538
17.8.6 GOT Window 539
17.8.7 Log Viewer 540
(*2)G/B: Guide Bush
(*3)This function is available
during program format switch
CONTENTS
Mitsubishi Electric CNC M800W/M800S/M80W Series Specifications List [M system]
: Standard: Option: Selection
M850W M830W M850S M830S M80W
1 Control Axes 1
1.1 Control Axes 2
1.1.1 Number of Basic Control Axes (NC Axes) 3 3 3 3 3 2
1.1.2 Max. Number of Axes
(NC Axes + Spindles + PLC Axes)
16
32
16
32
16
32
16
32 11 2

1.1.2.1 Max. Number of NC Axes
(In Total for All the Part Systems) 16 16 16 16 8 2
1.1.2.2 Max. Number of Spindles 4 4 4 4 22
1.1.2.3 Max. Number of PLC Axes 8 8 8 8 62
1.1.4 Max. Number of PLC Indexing Axes 8 8 8 8 43
1.1.5 Number of Simultaneous Contouring
Control Axes 8 4 8 4 43
1.1.6 Max. Number of NC Axes
in a Part System
8
12
8
12
8
12
8
12 8 3
1.1.7 Axis Name Extension 3
1.2 Control Part System 4
1.2.1 Standard Number of Part Systems 1 1 1 1 14
1.2.2 Max. Number of Part Systems
(Main + Sub)
2
3(*9)
2
3(*9)
2
3(*9)
2
3(*9) 2 4
1.2.2.1 Max. Number of Main Part Systems 2 2 2 2 2 4
1.2.2.2 Max. Number of Sub Part Systems 2 2 2 2 4
1.3 Control Axes and Operation Modes 5
1.3.1 Tape (RS-232C Input) Mode 5
1.3.2 Memory Mode 5
1.3.3 MDI Mode 5
1.3.4 High-Speed Program Server Mode 6
1.3.4.1 Control Unit-side High-speed
Program Server Mode 6
1.3.4.2 Display Unit-side High-speed
Program Server Mode / / / 6
1.3.4.3 FTP High-speed Program Server Mode 6
1.3.5 Front-side SD Card Mode 7
1.3.6 Front-side USB Memory Mode 7
2 Input Command 9
2.1 Data Increment 10
2.1.1 Least Command Increment 10
Least command increment 1m 10
Least command increment 0.1m 10
Least command increment 0.01m(10nm) 10
Least command increment 0.001m(1nm) 10
2.1.2 Least Control Increment 12
Least control increment0.01m(10nm) 12
Least control increment0.001m(1nm) 12
Class Page
Machining center system
: Standard: Option: Selection
M850W M830W M850S M830S M80W Class Page
Machining center system
2.1.3 Indexing Increment 12
2.2 Unit System 13
2.2.1 Inch/Metric Changeover 13
2.2.2 Input Command Increment Tenfold 13
2.3 Program Format 14
2.3.1 Program Format 14
2.3.1.1 Format 1 for Lathe
(G Code List 2, 3) 14
2.3.1.2 Format 2 for Lathe
(G Code List 4, 5) 14
2.3.1.3 Special Format for Lathe
(G Code List 6, 7) 14
2.3.1.4 Format 1 for Machining Center 14
2.3.1.5 Format 2 for Machining Center
(M2 Format) 14
2.3.1.6 MITSUBISHI CNC Special Format 14
2.3.2 Program Format Switch 15
2.4 Command Value 17
2.4.1 Decimal Point Input I, II 17
2.4.2 Absolute/Incremental Command 18
2.4.3 Diameter/Radius Designation 19
2.4.4 Diameter/Radius Designation Switch 20
3 Positioning/Interpolation 21
3.1 Positioning 22
3.1.1 Positioning 22
3.1.2 Unidirectional Positioning 23
3.2 Linear/Circular Interpolation 24
3.2.1 Linear Interpolation 24
3.2.2 Circular Interpolation

(Center/Radius Designation) 25
3.2.3 Helical Interpolation 27
3.2.4 Spiral/Conical Interpolation 30
3.2.5 Cylindrical Interpolation 32
3.2.6 Polar Coordinate Interpolation 33
3.2.7 Milling Interpolation 34
3.2.8 Hypothetical Axis Interpolation 35
3.3 Curve Interpolation 36
3.3.1 Involute Interpolation 36
3.3.2 Exponential Interpolation 38
3.3.3 Spline Interpolation (G05.1Q2/G61.2) 39
3.3.4 NURBS Interpolation 40
3.3.5 3-Dimensional Circular Interpolation 41
3.3.6 Spline Interpolation2 (G61.4) 42
4 Feed 45
4.1 Feedrate 46
4.1.1 Rapid Traverse Rate (m/min) 1000 1000 1000 1000 1000 46
4.1.2 Cutting Feedrate (m/min) 1000 1000 1000 1000 1000 47
4.1.3 Manual Feedrate (m/min) 1000 1000 1000 1000 1000 48
: Standard: Option: Selection
M850W M830W M850S M830S M80W Class Page
Machining center system
4.1.4 Rotary Axis Command Speed Tenfold 48
4.2 Feedrate Input Methods 49
4.2.1 Feed per Minute (Asynchronous Feed) 49
4.2.2 Feed per Revolution (Synchronous Feed) 51
4.2.3 Inverse Time Feed 53
4.2.4 F 1-digit Feed 54
4.2.5 Manual Speed Command 55
4.2.7 G00 Feedrate Designation (,F Command) 55
4.2.8 Selection of Axis (Axes) for
Feedrate Command 57
4.3 Override 58
4.3.1 Rapid Traverse Override 58
4.3.2 Cutting Feed Override 58
4.3.3 2nd Cutting Feed Override 58
4.3.4 Override Cancel 59
4.4 Acceleration/Deceleration 60
4.4.1 Automatic Acceleration/Deceleration
after Interpolation 60
4.4.2 Rapid Traverse Constant-gradient
Acceleration/Deceleration 62
4.4.3 Rapid Traverse Constant-gradient
Multi-step Acceleration/Deceleration 63
4.5 Thread Cutting 64
4.5.1 Thread Cutting
(Lead/Thread Number Designation) 64
4.5.2 Variable Lead Thread Cutting 67
4.5.3 Synchronous Tapping 68
4.5.3.1 Synchronous Tapping Cycle 68
4.5.3.2 Pecking Tapping Cycle 70
4.5.3.3 Deep-hole Tapping Cycle 72
4.5.3.4 Synchronous Tapping
with Multiple Spindles 74
4.5.3.5 Synchronous Tapping
with Analog I/F Spindle 74
4.5.4 Chamfering 74
4.5.6 Circular Thread Cutting 75
4.5.8 High-speed Synchronous Tapping (OMR-DD) 76
4.5.10 Thread Recutting 77
4.5.11 Thread Cutting Override 78
4.5.12 Variable Feed Thread Cutting 78
4.5.13 Thread Cutting Time Constant Switch 79
4.6 Manual Feed 80
4.6.1 Manual Rapid Traverse 80
4.6.2 Jog Feed 80
4.6.3 Incremental Feed 81
4.6.4 Handle Feed 81
4.6.5 Manual Feedrate B 82
4.6.6 Manual Feedrate B Surface Speed Control 83
4.6.8 Manual Speed Clamp 84
: Standard: Option: Selection
M850W M830W M850S M830S M80W Class Page
Machining center system
4.7 Dwell 85
4.7.1 Dwell (Time-based Designation) 85
4.7.2 Dwell (Revolution-based Designation) 86
5 Program Memory/Editing 87
5.1 Memory Capacity 88
5.1.1 Memory Capacity
(Number of Programs Stored) 88
230kB[600m] (400 programs) 88
500kB[1280m] (1000 programs) 88
1000kB[2560m] (1000 programs) 88
2000kB[5120m] (1000 programs) 88
5.2 Editing 89
5.2.1 Program Editing 89
5.2.2 Background Editing 90

5.2.3 Buffer Correction 91
5.2.5 Multi-part System Simultaneous
Program Editing 92
5.2.6 Special Program Editing Display for
Synchronization between Part Systems 92
5.2.7 Finish Shape View Programming 93
6 Operation and Display 95
6.1 Structure of Operation/Display Panel 96
6.1.1 Color Display (8.4-type LCD TFT) 96
6.1.2 Color Touchscreen Display
(10.4-type LCD TFT) 96
6.1.3 Color Touchscreen Display
(15-type LCD TFT) 96
6.1.4 Separated-type Color Display
(8.4-type LCD TFT) 96
6.1.5 Separated-type Color Touchscreen
Display (10.4-type LCD TFT) 96
6.1.6 Separated-type Color Touchscreen
Display (15-type LCD TFT) 96
6.1.7 Separated-type Color Touchscreen
Display (15-type LCD TFT/Windows8) 96
6.1.8 Separated-type Color Touchscreen
Display (19-type LCD TFT/Windows8) 97
6.1.9 Separated-type Color Touchscreen
Display
(19-type Horizontal LCD TFT/Windows8)
97
6.1.11 GOT (GOT2000 Series
GT27/GT25 12.1/10.4/8.4/5.7) 97
6.2 Operation Methods and Functions 98
6.2.1 Operation Input 98
6.2.2 Absolute/Incremental Setting 98
6.2.3 Multiple Display Connection 99
6.2.4 Common Display to Multiple NCs 99
6.2.5 Displayed Part System Switch 99
6.2.6 Menu List 100
6.2.7 Display Switch by Operation Mode 100
6.2.8 External Signal Display Switch 100
: Standard: Option: Selection
M850W M830W M850S M830S M80W Class Page
Machining center system
6.2.9 Screen Saver 100
6.2.10 Parameter Guidance 100
6.2.11 Alarm Guidance 101
6.2.12 Machining Program Input Mistake
Check Warning 101
6.2.14 Screenshot Capture / / / 101
6.2.15 User Selectable Menu Configuration 101
6.2.16 PC-NC Network Automatic Connection / / / 102
6.2.17 Device Open Parameter 102
6.2.18 SRAM Open Parameter 102
6.2.19 MTB Selectable Menu Configuration 102
6.2.20 Remote Desktop Connection / / / 103
6.2.21 VNC Server / / / 104
6.3 Display Methods and Contents 105
6.3.1 Status Display 105
6.3.2 Clock Display 105
6.3.3 Monitor Screen Display 106
6.3.4 Setup Screen Display 107
6.3.5 Edit Screen Display 107
6.3.6 Diagnosis Screen Display 107
6.3.7 Maintenance Screen Display 108
6.3.8 Home Application / / / 108
6.3.9 Home Screen 109
6.3.10 Additional Languages 110
6.3.10.1 Japanese 110
6.3.10.2 English 110
6.3.10.3 German 110
6.3.10.4 Italian 110
6.3.10.5 French 110
6.3.10.6 Spanish 110
6.3.10.7 Chinese 110
6.3.10.7.1 Chinese
(Traditional Chinese Characters) 110
6.3.10.7.2 Chinese
(Simplified Chinese Characters) 110
6.3.10.8 Korean 111
6.3.10.9 Portuguese 111
6.3.10.10 Hungarian 111
6.3.10.11 Dutch 111
6.3.10.12 Swedish 111
6.3.10.13 Turkish 111
6.3.10.14 Polish 111
6.3.10.15 Russian 111
6.3.10.16 Czech 111
6.3.10.17 Indonesian 112
6.3.10.18 Vietnamese 112
: Standard: Option: Selection

7 Input/Output Functions and Devices 113
7.1 Input/Output Data 114
7.1.1 Machining Program Input/Output 114
7.1.2 Tool Offset Data Input/Output 114
7.1.3 Common Variable Input/Output 114
7.1.4 Parameter Input/Output 114
7.1.5 History Data Output 114
7.1.7 System Configuration Data Output 114
7.2 Input/Output I/F 115
7.2.1 RS-232C I/F 115
7.2.2 SD Card I/F 115
7.2.2.1 Control Unit-side SD Card I/F
[Up to 32GB] 115
7.2.2.2 Front-side SD Card I/F [Up to 32GB] / / / 115
7.2.3 Ethernet I/F 115
7.2.4 Display Unit-side Data Server I/F 116
7.2.5 Front-side USB Memory I/F [Up to 32GB] 116
7.2.6 USB I/F (GOT Front-side USB I/F) 116
7.2.7 SD I/F (GOT Back-side SD Card I/F) 116
7.3 Computer Link 117
7.3.1 Computer Link B 117
7.4 Others 118
7.4.1 Handy Terminal Connection 118
7.4.3 IP Filter Setting 119
8 Spindle, Tool and Miscellaneous Functions 121
8.1 Spindle Functions (S) 122
8.1.1 Spindle Control Functions 122
8.1.1.1 Spindle Digital I/F 123
8.1.1.2 Spindle Analog I/F 123
8.1.1.3 Coil Switch 123
8.1.1.4 Automatic Coil Switch 123
8.1.1.5 Encoder Input I/F 124
8.1.1.6 Spindle-mode Servo Motor Control 125
8.1.1.7 Spindle-mode Rotary Axis Control 126
8.1.1.8 Turret Gear Change Control 127
8.1.1.9 Spindle Control with
Pulse Train Output 128
8.1.2 S Code Output 129
8.1.3 Constant Surface Speed Control 130
8.1.4 Spindle Override 132
8.1.5 Multiple-spindle Control 132
8.1.5.1 Multiple-spindle Control I 133
8.1.5.2 Multiple-spindle Control II 134
8.1.6 Spindle Orientation 135
: Standard: Option: Selection

8.1.7 Spindle Position Control
(Spindle/C Axis Control) 136
8.1.7.1 Spindle Position Control
(Spindle/C Axis Control) 136
8.1.7.2 C Axis Control during
Spindle Synchronization 137
8.1.8 Spindle Synchronization 138
8.1.8.1 Spindle Synchronization I 138
8.1.8.2 Spindle Synchronization II 139
8.1.8.3 Guide Bushing Spindle
Synchronization 139
8.1.9 Tool Spindle Synchronization I
(Polygon) 140
8.1.9.1 Tool Spindle Synchronization IA
(Spindle-Spindle, Polygon) 140
8.1.9.2 Tool Spindle Synchronization IB
(Spindle-Spindle, Polygon) 141
8.1.9.3 Tool Spindle Synchronization IC
(Spindle-NC Axis, Polygon) 142
8.1.10 Tool Spindle Synchronization II
(Hobbing) 143
8.1.11 Spindle Speed Clamp 144
8.1.13 Spindle Oscillation 144
8.1.14 Spindle Superimposition Control 145
8.1.15 Multiple Spindle Synchronization
Set Control 147
8.1.16 Spindle Speed Fluctuation Detection 150
8.1.17 Spindle Motor Temperature Output
to PLC 151
8.2 Tool Functions (T) 152
8.2.1 Tool Functions (T Command) 152
8.3 Miscellaneous Functions (M) 153
8.3.1 Miscellaneous Functions 153
8.3.2 Multiple M Codes in 1 Block 153
8.3.3 M Code Independent Output 154
8.3.4 Miscellaneous Function Finish 155
8.3.5 M Code Output during Axis Traveling 156
8.3.6 Miscellaneous Function Command
High-speed Output 157

8.4 2nd Miscellaneous Functions (B) 159
8.4.1 2nd Miscellaneous Functions 159
8.4.2 2nd Miscellaneous Function Name
Extension 159
9 Tool Compensation 161
9.1 Tool Length/Tool Position 162
9.1.1 Tool Length Offset 162
9.1.2 Tool Position Offset 165
9.1.3 Tool Compensation for Additional Axes 165
9.1.4 Tool Position Compensation (G43.7) 166
9.2 Tool Radius 167
9.2.1 Tool Radius Compensation 167
: Standard: Option: Selection
M850W M830W M850S M830S M80W Class Page
Machining center system
9.2.2 3-dimensional Tool Radius Compensation 169
9.2.3 Tool Nose Radius Compensation
(G40/41/42) 170
9.2.4 Automatic Decision of Nose Radius
Compensation Direction (G46/40) 171
9.2.5 Tool Radius Compensation Diameter
Designation 171
9.3 Tool Offset Amount 172
9.3.1 Number of Tool Offset Sets 172
99 sets 172
128 sets 172
200 sets 172
256 sets 172
400 sets 172
999 sets 172
9.3.2 Offset Memory 173
9.3.2.1 Tool Shape/Wear Offset Amount 173
9.3.2.2 Compensation Type Selection
by Parameter 176
9.3.3 Number of Tool Offset Sets Allocation
to Part Systems 177
10 Coordinate System 179
10.1 Coordinate System Type and Setting 180
10.1.1 Machine Coordinate System 181
10.1.2 Coordinate System Setting 182
10.1.3 Automatic Coordinate System Setting 183
10.1.4 Workpiece Coordinate System Selection 184
10.1.4.1 Workpiece Coordinate System
Selection (6 Sets) 184
10.1.4.2 Extended Workpiece Coordinate
System Selection (48 Sets)
G54.1P1 to P48
186
10.1.4.3 Extended Workpiece Coordinate
System Selection (96 Sets)
G54.1P1 to P96
186
10.1.4.4 Extended Workpiece Coordinate
System Selection (300 Sets)
G54.1P1 to P300
186
10.1.5 External Workpiece Coordinate Offset 187
10.1.6 Workpiece Coordinate System Preset
(G92.1) 188
10.1.7 Local Coordinate System 189
10.1.8 Coordinate System for Rotary Axis 190
10.1.9 Plane Selection 191
10.1.10 Origin Set/Origin Cancel 192
10.1.11 Counter Set 193
10.1.12 Workpiece Position Offset
for Rotary Axis 194
10.1.13 Workpiece Coordinate System Shift 196
10.2 Return 197
10.2.1 Manual Reference Position Return 197
: Standard: Option: Selection
M850W M830W M850S M830S M80W Class Page
Machining center system
10.2.2 Automatic 1st Reference Position
Return 198
10.2.3 2nd, 3rd, 4th Reference Position
Return 200
10.2.4 Reference Position Check 201
10.2.5 Absolute Position Detection 202
10.2.6 Tool Exchange Position Return 203
11 Operation Support Functions 205
11.1 Program Control 206
11.1.1 Optional Block Skip 206
11.1.2 Optional Block Skip Addition 206
11.1.3 Single Block 207
11.2 Program Test 208
11.2.1 Dry Run 208
11.2.2 Machine Lock 208
11.2.3 Miscellaneous Function Lock 208

11.2.4 Graphic Check 209
11.2.4.1 Graphic Check 209
11.2.4.2 3D Solid Program Check 209
11.2.4.3 Graphic Check Rotary Axis Drawing 210
11.2.5 Graphic Trace 211
11.2.5.1 Graphic Trace 211
11.2.5.2 Graphic Trace Rotary Axis Drawing 212
11.2.6 Machining Time Computation 212
11.2.7 Manual Arbitrary Reverse Run
(Program Check Operation) 213
11.2.8 High-speed Simple Program Check 214
11.3 Program Search/Start/Stop 215
11.3.1 Program Search 215
11.3.2 Sequence Number Search 215
11.3.3 Collation and Stop 216
11.3.4 Program Restart 217
11.3.5 Automatic Operation Start 218
11.3.6 NC Reset 218
11.3.7 Feed Hold 219
11.3.8 Search & Start 219
11.3.10 Auto-restart 219
11.4 Interrupt Operation 220
11.4.1 Manual Interruption 220
11.4.2 Automatic Operation Handle
Interruption 220
11.4.3 Manual Absolute Switch 221
11.4.4 Thread Cutting Cycle Retract 222
11.4.5 Tapping Retract 223
11.4.6 Manual Numerical Value Command 224
11.4.7 Arbitrary Reverse Run 225
11.4.8 MDI Interruption 226
: Standard: Option: Selection
M850W M830W M850S M830S M80W Class Page
Machining center system
11.4.9 Simultaneous Operation of Manual and
Automatic Modes 226
11.4.10 Simultaneous Operation of JOG and
Handle Modes 226
11.4.11 Reference Position Retract 227
11.4.12 Tool Retract and Return 228
11.4.13 Skip Retract 229
11.4.14 PLC Interruption 229
11.4.16 Machining Interruption 230
12 Program Support Functions 231
12.1 Machining Method Support Functions 232
12.1.1 Program 232
12.1.1.1 Subprogram Control [Layers] 10 10 10 10 10 232
12.1.1.2 Figure Rotation 235
12.1.1.3 Scaling 237
12.1.1.4 Axis Name Switch 238
12.1.2 Macro Program 239
12.1.2.1 User Macro [Layers] 4 4 4 4 4 239
12.1.2.2 Machine Tool Builder Macro 242
12.1.2.3 Macro Interruption 244
12.1.2.4 Variable Command 245
200 sets 245
600 sets 245
700 sets 245
8000 sets 245
(600+100number of part systems) sets 245
(7900+100number of part systems) sets 245
12.1.3 Fixed Cycle 247
12.1.3.1 Fixed Cycle for Drilling 248
12.1.3.2 Fixed Cycle for Drilling (Type II) 253
12.1.3.3 Special Fixed Cycle 254
12.1.3.4 Fixed Cycle for Turning Machining 257
12.1.3.5 Compound Type Fixed Cycle
for Turning Machining 262
12.1.3.6 Compound Type Fixed Cycle
for Turning Machining (Type II) 267
12.1.3.7 Small-diameter Deep-hole Drilling
Cycle 271
12.1.4 Mirror Image 271
12.1.4.1 Mirror Image by Parameter Setting 271
12.1.4.2 Mirror Image by External Input 271
12.1.4.3 Mirror Image by G Code 272
12.1.4.4 Mirror Image for Facing Tool Posts 273
12.1.4.5 T Code Mirror Image for Facing
Tool Posts 273
12.1.5 Coordinate System Operation 274
12.1.5.1 Coordinate Rotation by Program 274
12.1.5.2 Coordinate Rotation by Parameter 276
: Standard: Option: Selection
M850W M830W M850S M830S M80W Class Page
Machining center system
12.1.5.3 3-dimensional Coordinate Conversion 277
12.1.6 Dimension Input 279
12.1.6.1 Corner Chamfering/Corner R 279

12.1.6.2 Linear Angle Command 286
12.1.6.3 Geometric Command 287
12.1.6.4 Polar Coordinate Command 288
12.1.7 Axis Control 289
12.1.7.1 Chopping 289
12.1.7.1.1 Chopping 289
12.1.7.2 Normal Line Control 290
12.1.7.3 Circular Cutting 291
12.1.7.4 Vibration Cutting Control 292
12.1.8 Multi-part System Control 293
12.1.8.1 Timing Synchronization between
Part Systems 293
12.1.8.2 Start Point Designation Timing
Synchronization 294
12.1.8.3 Mixed Control 297
12.1.8.3.1 Mixed Control
(Cross Axis Control) 297
12.1.8.3.2 Arbitrary Axis Exchange
Control 298
12.1.8.4 Control Axis Superimposition 300
12.1.8.4.1 Control Axis Superimposition 300
12.1.8.4.2 Arbitrary Axis
Superimposition Control 301
12.1.8.5 Control Axis Synchronization
between Part Systems 302
12.1.8.6 Balance Cut 304
12.1.8.7 Common Memory for Part Systems 306
12.1.8.8 Multi-part System Simultaneous
Thread Cutting 306
12.1.8.8.1 Two-part System Simultaneous
Thread Cutting 307
12.1.8.8.2 Multi-part System
Simultaneous Thread Cutting 309
12.1.8.9 Multi-part System Program
Management 310
12.1.8.10 Synchronization between
Part Systems 311
12.1.8.10.1 Single Block between
Part Systems 311
12.1.8.10.2 Dwell/Miscellaneous Function
Time Override 312
12.1.8.10.3 Synchronization between
Part Systems OFF 313
12.1.8.11 Sub Part System Control I 314
12.1.8.12 Sub Part System Control II 316
12.1.8.13 Loader Control Part System 318
: Standard: Option: Selection
M850W M830W M850S M830S M80W Class Page
Machining center system
12.1.9 Data Input/Output by Program 319
12.1.9.1 Parameter Input by Program 319
12.1.9.2 Compensation Data Input by Program 320
12.1.9.3 Tool/Material Shape Input
by Program 324
12.1.9.5 API Section and Sub-section Nos.
Input/Output by Program 326
12.1.9.6 R-Navi Data Input by Program 326
12.1.10 Machining Modal 327
12.1.10.1 Tapping Mode 327
12.1.10.2 Cutting Mode 327
12.1.11 High-speed Parts Machining 328
12.1.11.1 Rapid Traverse Block Overlap 328
12.2 Machining Accuracy Support Functions 330
12.2.1 Automatic Corner Override 330
12.2.2 Deceleration Check 331
12.2.2.1 Exact Stop Check Mode 333
12.2.2.2 Exact Stop Check 333
12.2.2.3 Error Detection 333
12.2.2.4 Programmable In-position Check 334
12.2.2.5 Automatic Error Detection 334
12.3 High-speed and High-accuracy
Functions [kBPM: k Block per Minute] 335
12.3.1 High-speed Machining Mode 335
12.3.1.1 High-speed Machining Mode I
(G05P1) Maximum [kBPM] 33.7 33.7 33.7 33.7 33.7 335
12.3.1.2 High-speed Machining Mode II
(G05P2) Maximum [kBPM] 168 168 168 168 67.5 336
12.3.2 High-accuracy Control 337
12.3.2.1 High-accuracy Control (G61.1/G08) 337
12.3.2.2 Multi-part System Simultaneous
High-accuracy Control 341
12.3.2.3 SSS Control 342
12.3.2.4 Tolerance Control 343
12.3.2.5 Variable-acceleration
Pre-interpolation
Acceleration/Deceleration
344
12.3.2.6 High-accuracy

Acceleration/Deceleration Time
Constant Extension
344
12.3.2.7 Axis-specific Acceleration
Tolerance Control 345
12.3.3 High-speed High-accuracy Control 346
12.3.3.1 High-speed High-accuracy
Control I (G05.1Q1) Maximum [kBPM] 67.5 67.5 67.5 67.5 33.7 346
12.3.3.2 High-speed High-accuracy
Control II (G05P10000) Maximum [kBPM] 168 168 168 168 67.5 347
12.3.3.3 High-speed High-accuracy
Control III (G05P20000) Maximum [kBPM] 270 270 270 270 135 350
12.3.3.4 Smooth Fairing 351
12.3.4 Machining Condition Selection I 352
: Standard: Option: Selection
M850W M830W M850S M830S M80W Class Page
Machining center system
12.3.5 Direct Command Mode 352
12.4 Programming Support Functions 353
12.4.1 Playback 353
12.4.3 Interactive Cycle Insertion 354
12.4.4 Simple Programming (NAVI MILL/LATHE) 357
12.4.5 G code Guidance 357
12.4.7 DXF Data Input 358
13 Machine Accuracy Compensation 359
13.1 Static Accuracy Compensation 360
13.1.1 Backlash Compensation 360
13.1.2 Memory-type Pitch Error Compensation
[sets] 32 32 32 32 16 361
13.1.3 Memory-type Relative Position Error
Compensation 362
13.1.4 External Machine Coordinate System
Compensation 363
13.1.5 Circular Radius Error Compensation 363
13.1.6 Ball Screw Thermal Expansion
Compensation 364
13.1.7 Rotation Center Error Compensation 365
13.1.8 Position-dependent Gradually
Increasing-type Backlash Compensation 367
13.1.9 Bidirectional Pitch Error Compensation 368
13.1.10 Cyclic Error Compensation 368
13.1.11 Spatial Error Compensation 369
13.1.12 Backlash Compensation II 370
13.2 Dynamic Accuracy Compensation 371
13.2.1 Smooth High-gain (SHG) Control 371
13.2.2 Dual Feedback 372
13.2.3 Lost Motion Compensation 372
13.2.4 OMR II (Backlash with Filter) 373
13.2.6 OMR-FF 374
13.2.7 Distance-coded Reference Position
Detection 375
13.2.9 Variable Torsion Compensation 376
13.2.10 Cogging Torque Compensation 377
14 Automation Support Functions 379
14.1 Measurement 380
14.1.1 Skip 380
14.1.1.1 Skip 380
14.1.1.2 Multiple-step Skip 382
14.1.1.4 PLC Skip 383
14.1.1.5 Speed Change Skip 383
14.1.1.6 Torque Limitation Skip 384
14.1.2 Automatic Tool Length Measurement 385
14.1.3 Manual Tool Length Measurement 1 388
14.1.4 Manual Tool Length Measurement 2 391
14.1.5 Workpiece Coordinate Offset
Measurement 392
: Standard: Option: Selection
M850W M830W M850S M830S M80W Class Page
Machining center system
14.1.6 Workpiece Position Measurement 393
14.1.7 Rotation Measurement 395
14.1.8 Rotation Center Error Measurement 396
14.1.9 Workpiece Installation Error
Measurement 397
14.2 Tool Life Management 398
14.2.1 Tool Life Management 398
14.2.1.1 Tool Life Management I 398
14.2.1.2 Tool Life Management II 399
14.2.1.3 Tool Life Management III 399
14.2.2 Number of Tool Life Management Sets 400
99 sets 400
128 sets 400
200 sets 400
256 sets 400
400 sets 400
999 sets 400
14.2.3 Tool Life Management Set Allocation
to Part Systems 402

14.3 Others 404
14.3.1 Programmable Current Limitation 404
14.3.2 Auto Power OFF 404
14.3.4 Load Monitoring I 405
14.3.5 Power ON/OFF Sequence / / / 405
14.3.6 PLC Axis Current Limit 405
14.3.7 Direct Robot Control 406
15 Safety and Maintenance 407
15.1 Safety Switches 408
15.1.1 Emergency Stop 408
15.1.2 Data Protection Key 408
15.2 Display for Ensuring Safety 409
15.2.1 NC Warning 409
15.2.2 NC Alarm 409
15.2.3 Operation Stop Cause 410
15.2.4 Emergency Stop Cause 410
15.2.5 Thermal Detection 410
15.2.6 Battery Alarm/Warning 411
15.3 Protection 412
15.3.1 Stroke End (Over Travel) 412
15.3.2 Stored Stroke Limit 412
15.3.2.1 Stored Stroke Limit I/II 413
15.3.2.2 Stored Stroke Limit IB 415
15.3.2.3 Stored Stroke Limit IIB 415
15.3.2.4 Stored Stroke Limit IC 416
15.3.3 Stroke Check before Travel 417
15.3.4 Chuck/Tailstock Barrier Check 419
: Standard: Option: Selection
M850W M830W M850S M830S M80W Class Page
Machining center system
15.3.5 Interlock 420
15.3.6 External Deceleration 420
15.3.7 Interference Check III 421
15.3.8 3D Machine Interference Check 423
15.3.9 Door Interlock 424
15.3.9.1 Door Interlock I 424
15.3.9.2 Door Interlock II 426
15.3.10 Parameter Lock 428
15.3.11 Program Protection (Edit Lock B, C) 428
15.3.12 Program Display Lock 428
15.3.13 Data Protection by User's Level 428
15.3.15 Vertical Axis Pull-up 429
15.3.16 Machine Group-based Alarm Stop 429
15.3.17 Interference Check Between
Part Systems 431
15.3.18 Spindle Protection 432
15.4 Maintenance and Troubleshooting 433
15.4.1 Operation History 433
15.4.2 Data Sampling 434
15.4.3 NC Data Backup 434
15.4.4 Servo Tuning Support 435
15.4.4.1 NC Analyzer2 435
15.4.5 Automatic Backup 437
15.4.8 Application Error Detection / / / 437
15.4.9 Email Notification to Operator 438
15.4.10 NC Configurator2 439
15.4.11 Diagnosis Data Output 439
15.4.12 Backup/Restore 439
15.4.14 Field Network Diagnostics 440
15.4.15 Remote service iQ Care Remote4U 441
15.4.15.1 Connection with RGU 441
15.4.16 Brake Wear Diagnostics 442
15.5 Functional Safety 443
15.5.1 Safety Observation 443
15.5.2 Smart Safety Observation 444
15.5.2.1 Safety-related I/O Observation 444
15.5.2.2 Emergency Stop Observation 444
15.5.2.3 Drive Safety Function 445
15.5.2.3.1 SLS (Safely-Limited Speed) 445
15.5.2.3.2 SLP (Safely-Limited Position) 445
15.5.2.3.3 SOS (Safe Operating Stop) 445
15.5.2.3.4 SSM (Safe Speed Monitor) 445
15.5.2.3.5 SBC/SBT
(Safe Brake Control/Safe Brake Test) 446
: Standard: Option: Selection
M850W M830W M850S M830S M80W Class Page
Machining center system
15.5.2.3.6 SCA (Safe Cam) 446
15.5.2.3.7 SS1/SS2 (Safe Stop) 446
15.5.2.3.8 STO (Safe Torque Off) 446
15.5.2.3.9 SCN
(Safety Communication Network) 447
16 Drive System 449
16.1 Servo/Spindle 450
Feed axis -
MDS-E-Vx -
MDS-EH-Vx -
MDS-EJ-Vx -

MDS-EJH-Vx -
MDS-EM-SPVx -
MDS-EMH-SPVx -
Spindle -
MDS-E-SPx -
MDS-EH-SPx -
MDS-EJ-SPx -
MDS-EM-SPVx -
MDS-EMH-SPVx -
Power supply -
MDS-E-CV -
MDS-EH-CV -
MDS-EX-CVP -
17 Machine Support Functions 451
17.1 PLC 452
17.1.1 Built-in PLC Processing Mode 452
17.1.2 PLC Functions 452
17.1.2.1 Built-in PLC Basic Function 452
17.1.2.1.1 Index Modification 455
17.1.2.1.2 Multi-program
[Number of Programs] 120 120 120 120 60 455
17.1.2.1.3 Multi-project
[Number of Projects Stored] 456
Number of PLC projects: 2 456
Number of PLC projects: 3 456
Number of PLC projects: 6 456
17.1.2.1.4 Function Block (FB) 456
17.1.2.1.5 Label Programming 456
17.1.2.2 PLC Exclusive Instruction 457
17.1.2.3 Enhanced PLC Security Mode 459
17.1.3 PLC Support Functions 460
17.1.3.1 Alarm Message Display 460
: Standard: Option: Selection
M850W M830W M850S M830S M80W Class Page
Machining center system
17.1.3.2 Operator Message Display 460
17.1.3.3 Memory Switch (PLC Switch) 461
17.1.3.3.1 Memory Switch (PLC Switch)
32 Points 461
17.1.3.3.2 Memory Switch (PLC Switch)
64 Points 461
17.1.3.3.3 Memory Switch (PLC Switch)
96 points 461
17.1.3.4 Load Meter Display 462
17.1.3.5 User PLC Version Display 462
17.1.3.6 Ladder Program Writing during RUN 462
17.1.3.7 PLC Program Protection 462
17.1.4 Built-in PLC Capacity 463
17.1.4.1 Standard PLC Capacity
[Number of Steps] 128K 128K 128K 128K 64K 463
17.1.4.2 Large PLC Capacity: 256 Ksteps 463
17.1.4.3 Large PLC Capacity: 512 Ksteps 463
17.1.5 Machine Contact Input/Output I/F 463
17.1.6 Ladder Monitor 464
17.1.7 PLC Development 465
17.1.7.1 On-board Development 465
17.1.7.2 MELSEC Development Tool
(GX Developer) 465
17.1.7.3 MELSEC Development Tool
(GX Works2) 465
17.1.7.4 MELSEC Development Tool
(GX Works3) 466
17.1.8 PLC Parameter 466
17.1.8.1 PLC Constant (150 Points) 466
17.1.8.2 PLC Constant Extension
(Up to 750 Points) 466
17.1.9 GOT Connection 467
17.1.9.1 Ethernet Connection 467
17.1.9.2 CC-Link Connection 467
17.1.9.3 CC-Link IE Field Connection 467
17.1.10 Pallet Program Registration 468
17.2 Machine Construction 469
17.2.1 Servo OFF 469
17.2.2 Axis Detachment 470
17.2.3 Synchronous Control 471
17.2.4 Inclined Axis Control 475
17.2.5 Position Switch 24 24 24 24 24 476
17.2.7 Index Table Indexing 477
17.2.8 Tool Length Compensation along
the Tool Axis 479
17.2.9 Tool Handle Feed & Interruption 480
: Standard: Option: Selection
M850W M830W M850S M830S M80W Class Page
Machining center system
17.2.10 Tool Center Coordinate Display 480
17.2.11 Tool Center Point Control 481
17.2.11.1 Tool Center Point Control
(G43.4/G43.5) (*7) (*7) (*7) 481

17.2.12 Inclined Surface Machining Command 484
17.2.13 Simple Inclined Surface Machining
Command 486
17.2.14 3-dimensional Tool Radius
Compensation (Tool's
Vertical-direction Compensation)
488
17.2.15 Workpiece Installation Error
Compensation 489
17.2.16 3-dimensional Manual Feed 490
17.2.17 R-Navi 491
17.2.18 Simple Synchronous Control 493
17.2.20 Real-time Tuning 494
17.2.20.1 Real-time Tuning 1 (Speed Gain) 494
17.2.20.2 Real-time Tuning 2 (Rapid
Traverse Time Constant) 495
17.2.21 Constant Torque Control 496
17.2.22 External Encoder Position Output I/F 497
17.2.23 Multiple-axis Synchronization Control 498
17.2.24 Hypothetical Linear Axis Control 499
17.2.25 BiSS Encoder I/F 500
17.2.26 Tool Head Hot Swapping 501
17.3 PLC Operation 502
17.3.1 Arbitrary Feed in Manual Mode 502
17.3.2 Circular Feed in Manual Mode 503
17.3.3 PLC Axis Control 505
17.3.5 PLC Axis Indexing 506
17.3.6 NC Axis/PLC Axis Switchover 508
17.4 PLC Interface 509
17.4.1 CNC Control Signal 509
17.4.2 CNC Status Signal 510
17.4.3 PLC Window 512
17.4.4 External Search 513
17.4.5 Direct Screen Selection 513
17.4.6 Buzzer Sound Control 514
17.5 Machine Contact I/O 515
17.5.1 Operation Panel I/O 515
17.5.1.1 DI:64/DO:64 / / / 515
17.5.1.2 DI:64/DO:64 + SDI:8 / / / 515
17.5.1.3 DI:96/DO:64 / / / 515
17.5.1.5 DI:64/DO:48/AO:1 / / / 515
17.5.2 Remote I/O 516
17.5.2.1 DI:32/DO:32 516
17.5.2.2 DI:64/DO:48 516
17.5.2.3 DI:64/DO:48 + AO:1 516
: Standard: Option: Selection
M850W M830W M850S M830S M80W Class Page
Machining center system
17.5.2.5 DI:16/DO:8 516
17.5.2.6 DI:32/DO:32 + SDI:8/SDO:4 516
17.5.2.7 SDI:8/SDO:4 516
17.6 External PLC Link 517
17.6.1 CC-Link (Master/Local) 517
17.6.2 PROFIBUS-DP (Master) 523
17.6.3 CC-Link IE Field (Master/Local) 524
17.6.4 PROFINET 525
17.6.5 EtherNet/IP 526
17.6.8 FL-net 527
17.6.9 DeviceNet (Master) 527
17.6.10 CC-Link IE Field Basic 528
17.7 Installing S/W for Machine Tools 530
17.7.1 Customization (NC Designer2) 530
17.7.1.1 Customization Data Storage
Capacity [MB] 6 6 532
17.7.1.2 Customization Working Memory Size
[MB] 6 6 6 6 3 532
17.7.2 User-defined Key 532
17.7.3 EZSocket I/F 532
17.7.4 APLC Release 533
17.7.5 Custom API Library 534
17.7.6 MES Interface Library 534
17.7.7 SLMP Server 535
17.7.8 Numerical Control (CNC) Communication
Software FCSB1224W000 536
17.7.10 GOT2000 Screen Design Tool GT Works3 536
17.8 Others 537
17.8.1 System Lock 537
17.8.2 CNC Remote Operation Tool 537
17.8.2.1 NC Monitor2 537
17.8.2.2 NC Explorer 537
17.8.3 Automatic Operation Lock 537
17.8.4 Power Consumption Computation 538
17.8.5 EcoMonitorLight Connection 538
17.8.6 GOT Window 539
17.8.7 Log Viewer 540
(*7)Restrained to 4-axis
simultaneous contouring
(*9)The third part system is for

loader part system only.

CONTENTS

Mitsubishi Electric CNC M80/E80/C80 Series Specifications List [L system]

: Standard: Option: Selection
M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
1 Control Axes 1
1.1 Control Axes 2
1.1.1 Number of Basic Control Axes (NC Axes) 2 2 2 2 2 2
1.1.2 Max. Number of Axes
(NC Axes + Spindles + PLC Axes) 12 9 8 6 16 2
1.1.2.1 Max. Number of NC Axes
(In Total for All the Part Systems) 10 7 5 4 16 2
1.1.2.2 Max. Number of Spindles 5 4 3 3 72
1.1.2.3 Max. Number of PLC Axes 6 6 3 3 82
1.1.4 Max. Number of PLC Indexing Axes 4 4 1 1 83
1.1.5 Number of Simultaneous Contouring
Control Axes 4 4 4 4 43
1.1.6 Max. Number of NC Axes
in a Part System 8 5 5 4 83
1.1.7 Axis Name Extension 3
1.2 Control Part System 4
1.2.1 Standard Number of Part Systems 1 1 1 1 14
1.2.2 Max. Number of Part Systems
(Main + Sub) 4 2 1 1 7 4
1.2.2.1 Max. Number of Main Part Systems 2 2 1 1 7 4
1.2.2.2 Max. Number of Sub Part Systems 2 1 2 4
1.3 Control Axes and Operation Modes 5
1.3.1 Tape (RS-232C Input) Mode 5
1.3.2 Memory Mode 5
1.3.3 MDI Mode 5
1.3.4 High-Speed Program Server Mode 6
1.3.4.1 Control Unit-side High-speed
Program Server Mode 6
1.3.4.2 Display Unit-side High-speed
Program Server Mode 6
1.3.4.3 FTP High-speed Program Server Mode 6
1.3.5 Front-side SD Card Mode 7
1.3.6 Front-side USB Memory Mode 7
2 Input Command 9
2.1 Data Increment 10
2.1.1 Least Command Increment 10
Least command increment 1m 10
Least command increment 0.1m 10
Least command increment 0.01m(10nm) 10
Least command increment 0.001m(1nm) 10
2.1.2 Least Control Increment 12
Least control increment0.01m(10nm) 12
Least control increment0.001m(1nm) 12
Class Page
Lathe system
: Standard: Option: Selection
M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80 Class Page
Lathe system
2.1.3 Indexing Increment 12
2.2 Unit System 13
2.2.1 Inch/Metric Changeover 13
2.2.2 Input Command Increment Tenfold 13
2.3 Program Format 14
2.3.1 Program Format 14
2.3.1.1 Format 1 for Lathe
(G Code List 2, 3) 14
2.3.1.2 Format 2 for Lathe
(G Code List 4, 5) 14
2.3.1.3 Special Format for Lathe
(G Code List 6, 7) 14
2.3.1.4 Format 1 for Machining Center 14
2.3.1.5 Format 2 for Machining Center
(M2 Format) 14
2.3.1.6 MITSUBISHI CNC Special Format 14
2.3.2 Program Format Switch 15
2.4 Command Value 17
2.4.1 Decimal Point Input I, II 17
2.4.2 Absolute/Incremental Command 18
2.4.3 Diameter/Radius Designation 19

2.4.4 Diameter/Radius Designation Switch 20
3 Positioning/Interpolation 21
3.1 Positioning 22
3.1.1 Positioning 22
3.1.2 Unidirectional Positioning 23
3.2 Linear/Circular Interpolation 24
3.2.1 Linear Interpolation 24
3.2.2 Circular Interpolation
(Center/Radius Designation) 25
3.2.3 Helical Interpolation 27
3.2.4 Spiral/Conical Interpolation 30
3.2.5 Cylindrical Interpolation 32
3.2.6 Polar Coordinate Interpolation 33
3.2.7 Milling Interpolation 34
3.2.8 Hypothetical Axis Interpolation 35
3.3 Curve Interpolation 36
3.3.1 Involute Interpolation 36
3.3.2 Exponential Interpolation 38
3.3.3 Spline Interpolation (G05.1Q2/G61.2) 39
3.3.4 NURBS Interpolation 40
3.3.5 3-Dimensional Circular Interpolation 41
3.3.6 Spline Interpolation2 (G61.4) 42
4 Feed 45
4.1 Feedrate 46
4.1.1 Rapid Traverse Rate (m/min) 1000 1000 1000 1000 1000 46
4.1.2 Cutting Feedrate (m/min) 1000 1000 1000 1000 1000 47
4.1.3 Manual Feedrate (m/min) 1000 1000 1000 1000 1000 48
: Standard: Option: Selection
M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80 Class Page
Lathe system
4.1.4 Rotary Axis Command Speed Tenfold 48
4.2 Feedrate Input Methods 49
4.2.1 Feed per Minute (Asynchronous Feed) 49
4.2.2 Feed per Revolution (Synchronous Feed) 51
4.2.3 Inverse Time Feed 53
4.2.4 F 1-digit Feed 54
4.2.5 Manual Speed Command 55
4.2.7 G00 Feedrate Designation (,F Command) 55
4.2.8 Selection of Axis (Axes) for
Feedrate Command 57
4.3 Override 58
4.3.1 Rapid Traverse Override 58
4.3.2 Cutting Feed Override 58
4.3.3 2nd Cutting Feed Override 58
4.3.4 Override Cancel 59
4.4 Acceleration/Deceleration 60
4.4.1 Automatic Acceleration/Deceleration
after Interpolation 60
4.4.2 Rapid Traverse Constant-gradient
Acceleration/Deceleration 62
4.4.3 Rapid Traverse Constant-gradient
Multi-step Acceleration/Deceleration 63
4.5 Thread Cutting 64
4.5.1 Thread Cutting
(Lead/Thread Number Designation) 64
4.5.2 Variable Lead Thread Cutting 67
4.5.3 Synchronous Tapping 68
4.5.3.1 Synchronous Tapping Cycle 68
4.5.3.2 Pecking Tapping Cycle 70
4.5.3.3 Deep-hole Tapping Cycle 72
4.5.3.4 Synchronous Tapping
with Multiple Spindles 74
4.5.3.5 Synchronous Tapping
with Analog I/F Spindle 74
4.5.4 Chamfering 74
4.5.6 Circular Thread Cutting 75
4.5.8 High-speed Synchronous Tapping (OMR-DD) 76
4.5.10 Thread Recutting 77
4.5.11 Thread Cutting Override 78
4.5.12 Variable Feed Thread Cutting 78
4.5.13 Thread Cutting Time Constant Switch 79
4.6 Manual Feed 80
4.6.1 Manual Rapid Traverse 80
4.6.2 Jog Feed 80
4.6.3 Incremental Feed 81
4.6.4 Handle Feed 81
4.6.5 Manual Feedrate B 82
4.6.6 Manual Feedrate B Surface Speed Control 83
4.6.8 Manual Speed Clamp 84
: Standard: Option: Selection
M80

TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80 Class Page
Lathe system
4.7 Dwell 85
4.7.1 Dwell (Time-based Designation) 85
4.7.2 Dwell (Revolution-based Designation) 86
5 Program Memory/Editing 87
5.1 Memory Capacity 88
5.1.1 Memory Capacity
(Number of Programs Stored) 88
230kB[600m] (400 programs) 88
500kB[1280m] (1000 programs) 88
1000kB[2560m] (1000 programs) (*8) 88
2000kB[5120m] (1000 programs) (*8) 88
5.2 Editing 89
5.2.1 Program Editing 89
5.2.2 Background Editing 90
5.2.3 Buffer Correction 91
5.2.5 Multi-part System Simultaneous
Program Editing 92
5.2.6 Special Program Editing Display for
Synchronization between Part Systems 92
5.2.7 Finish Shape View Programming 93
6 Operation and Display 95
6.1 Structure of Operation/Display Panel 96
6.1.1 Color Display (8.4-type LCD TFT) 96
6.1.2 Color Touchscreen Display
(10.4-type LCD TFT) 96
6.1.3 Color Touchscreen Display
(15-type LCD TFT) 96
6.1.4 Separated-type Color Display
(8.4-type LCD TFT) 96
6.1.5 Separated-type Color Touchscreen
Display (10.4-type LCD TFT) 96
6.1.6 Separated-type Color Touchscreen
Display (15-type LCD TFT) 96
6.1.7 Separated-type Color Touchscreen
Display (15-type LCD TFT/Windows8) 96
6.1.8 Separated-type Color Touchscreen
Display (19-type LCD TFT/Windows8) 97
6.1.9 Separated-type Color Touchscreen
Display
(19-type Horizontal LCD TFT/Windows8)
97
6.1.11 GOT (GOT2000 Series
GT27/GT25 12.1/10.4/8.4/5.7) 97
6.2 Operation Methods and Functions 98
6.2.1 Operation Input 98
6.2.2 Absolute/Incremental Setting 98
6.2.3 Multiple Display Connection (GOT) 99
6.2.4 Common Display to Multiple NCs (GOT) 99
6.2.5 Displayed Part System Switch 99
6.2.6 Menu List 100
6.2.7 Display Switch by Operation Mode 100
6.2.8 External Signal Display Switch 100
: Standard: Option: Selection
M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80 Class Page
Lathe system
6.2.9 Screen Saver (GOT) 100
6.2.10 Parameter Guidance 100
6.2.11 Alarm Guidance 101
6.2.12 Machining Program Input Mistake
Check Warning 101
6.2.14 Screenshot Capture (GOT) 101
6.2.15 User Selectable Menu Configuration 101
6.2.16 PC-NC Network Automatic Connection 102
6.2.17 Device Open Parameter 102
6.2.18 SRAM Open Parameter 102
6.2.19 MTB Selectable Menu Configuration 102
6.2.20 Remote Desktop Connection 103
6.2.21 VNC Server 104
6.3 Display Methods and Contents 105
6.3.1 Status Display 105
6.3.2 Clock Display 105
6.3.3 Monitor Screen Display 106
6.3.4 Setup Screen Display 107

6.3.5 Edit Screen Display 107
6.3.6 Diagnosis Screen Display 107
6.3.7 Maintenance Screen Display 108
6.3.8 Home Application 108
6.3.9 Home Screen 109
6.3.10 Additional Languages 110
6.3.10.1 Japanese 110
6.3.10.2 English 110
6.3.10.3 German 110
6.3.10.4 Italian 110
6.3.10.5 French 110
6.3.10.6 Spanish 110
6.3.10.7 Chinese 110
6.3.10.7.1 Chinese
(Traditional Chinese Characters) 110
6.3.10.7.2 Chinese
(Simplified Chinese Characters) 110
6.3.10.8 Korean 111
6.3.10.9 Portuguese 111
6.3.10.10 Hungarian 111
6.3.10.11 Dutch 111
6.3.10.12 Swedish 111
6.3.10.13 Turkish 111
6.3.10.14 Polish 111
6.3.10.15 Russian 111
6.3.10.16 Czech 111
6.3.10.17 Indonesian 112
6.3.10.18 Vietnamese 112
: Standard: Option: Selection
M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80 Class Page
Lathe system
7 Input/Output Functions and Devices 113
7.1 Input/Output Data 114
7.1.1 Machining Program Input/Output 114
7.1.2 Tool Offset Data Input/Output 114
7.1.3 Common Variable Input/Output 114
7.1.4 Parameter Input/Output 114
7.1.5 History Data Output 114
7.1.7 System Configuration Data Output 114
7.2 Input/Output I/F 115
7.2.1 RS-232C I/F 115
7.2.2 SD Card I/F 115
7.2.2.1 Control Unit-side SD Card I/F
[Up to 32GB] 115
7.2.2.2 Front-side SD Card I/F [Up to 32GB] 115
7.2.3 Ethernet I/F (GOT) 115
7.2.4 Display Unit-side Data Server I/F 116
7.2.5 Front-side USB Memory I/F [Up to 32GB] 116
7.2.6 USB I/F (GOT Front-side USB I/F) 116
7.2.7 SD I/F (GOT Back-side SD Card I/F) 116
7.3 Computer Link 117
7.3.1 Computer Link B 117
7.4 Others 118
7.4.1 Handy Terminal Connection 118
7.4.3 IP Filter Setting 119
8 Spindle, Tool and Miscellaneous Functions 121
8.1 Spindle Functions (S) 122
8.1.1 Spindle Control Functions 122
8.1.1.1 Spindle Digital I/F 123
8.1.1.2 Spindle Analog I/F
(MELSEC) 123
8.1.1.3 Coil Switch 123
8.1.1.4 Automatic Coil Switch 123
8.1.1.5 Encoder Input I/F 124
8.1.1.6 Spindle-mode Servo Motor Control 125
8.1.1.7 Spindle-mode Rotary Axis Control 126
8.1.1.8 Turret Gear Change Control 127
8.1.1.9 Spindle Control with
Pulse Train Output 128
8.1.2 S Code Output 129
8.1.3 Constant Surface Speed Control 130
8.1.4 Spindle Override 132
8.1.5 Multiple-spindle Control 132
8.1.5.1 Multiple-spindle Control I 133
8.1.5.2 Multiple-spindle Control II 134
8.1.6 Spindle Orientation 135
: Standard: Option: Selection
M80
TypeA
M80
TypeB

E80
TypeA
E80
TypeB C80 Class Page
Lathe system
8.1.7 Spindle Position Control
(Spindle/C Axis Control) 136
8.1.7.1 Spindle Position Control
(Spindle/C Axis Control) 136
8.1.7.2 C Axis Control during
Spindle Synchronization 137
8.1.8 Spindle Synchronization 138
8.1.8.1 Spindle Synchronization I 138
8.1.8.2 Spindle Synchronization II 139
8.1.8.3 Guide Bushing Spindle
Synchronization 139
8.1.9 Tool Spindle Synchronization I
(Polygon) 140
8.1.9.1 Tool Spindle Synchronization IA
(Spindle-Spindle, Polygon) 140
8.1.9.2 Tool Spindle Synchronization IB
(Spindle-Spindle, Polygon) 141
8.1.9.3 Tool Spindle Synchronization IC
(Spindle-NC Axis, Polygon) 142
8.1.10 Tool Spindle Synchronization II
(Hobbing) 143
8.1.11 Spindle Speed Clamp 144
8.1.13 Spindle Oscillation 144
8.1.14 Spindle Superimposition Control 145
8.1.15 Multiple Spindle Synchronization
Set Control 147
8.1.16 Spindle Speed Fluctuation Detection 150
8.1.17 Spindle Motor Temperature Output
to PLC 151
8.2 Tool Functions (T) 152
8.2.1 Tool Functions (T Command) 152
8.3 Miscellaneous Functions (M) 153
8.3.1 Miscellaneous Functions 153
8.3.2 Multiple M Codes in 1 Block 153
8.3.3 M Code Independent Output 154
8.3.4 Miscellaneous Function Finish 155
8.3.5 M Code Output during Axis Traveling 156
8.3.6 Miscellaneous Function Command
High-speed Output 157
8.4 2nd Miscellaneous Functions (B) 159
8.4.1 2nd Miscellaneous Functions 159
8.4.2 2nd Miscellaneous Function Name
Extension 159
9 Tool Compensation 161
9.1 Tool Length/Tool Position 162
9.1.1 Tool Length Offset 162
9.1.2 Tool Position Offset 165
9.1.3 Tool Compensation for Additional Axes 165
9.1.4 Tool Position Compensation (G43.7) 166
9.2 Tool Radius 167
9.2.1 Tool Radius Compensation 167
: Standard: Option: Selection
M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80 Class Page
Lathe system
9.2.2 3-dimensional Tool Radius Compensation 169
9.2.3 Tool Nose Radius Compensation
(G40/41/42) 170
9.2.4 Automatic Decision of Nose Radius
Compensation Direction (G46/40) 171
9.2.5 Tool Radius Compensation Diameter
Designation 171
9.3 Tool Offset Amount 172
9.3.1 Number of Tool Offset Sets 172
99 sets 172
128 sets 172
200 sets 172
256 sets 172
400 sets 172
999 sets 172
9.3.2 Offset Memory 173
9.3.2.1 Tool Shape/Wear Offset Amount 173
9.3.2.2 Compensation Type Selection
by Parameter 176
9.3.3 Number of Tool Offset Sets Allocation
to Part Systems 177
10 Coordinate System 179

10.1 Coordinate System Type and Setting 180
10.1.1 Machine Coordinate System 181
10.1.2 Coordinate System Setting 182
10.1.3 Automatic Coordinate System Setting 183
10.1.4 Workpiece Coordinate System Selection 184
10.1.4.1 Workpiece Coordinate System
Selection (6 Sets) 184
10.1.4.2 Extended Workpiece Coordinate
System Selection (48 Sets)
G54.1P1 to P48
186
10.1.4.3 Extended Workpiece Coordinate
System Selection (96 Sets)
G54.1P1 to P96
186
10.1.4.4 Extended Workpiece Coordinate
System Selection (300 Sets)
G54.1P1 to P300
186
10.1.5 External Workpiece Coordinate Offset 187
10.1.6 Workpiece Coordinate System Preset
(G92.1) 188
10.1.7 Local Coordinate System 189
10.1.8 Coordinate System for Rotary Axis 190
10.1.9 Plane Selection 191
10.1.10 Origin Set/Origin Cancel 192
10.1.11 Counter Set 193
10.1.12 Workpiece Position Offset
for Rotary Axis 194
10.1.13 Workpiece Coordinate System Shift 196
10.2 Return 197
10.2.1 Manual Reference Position Return 197
: Standard: Option: Selection
M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80 Class Page
Lathe system
10.2.2 Automatic 1st Reference Position
Return 198
10.2.3 2nd, 3rd, 4th Reference Position
Return 200
10.2.4 Reference Position Check 201
10.2.5 Absolute Position Detection 202
10.2.6 Tool Exchange Position Return 203
11 Operation Support Functions 205
11.1 Program Control 206
11.1.1 Optional Block Skip 206
11.1.2 Optional Block Skip Addition 206
11.1.3 Single Block 207
11.2 Program Test 208
11.2.1 Dry Run 208
11.2.2 Machine Lock 208
11.2.3 Miscellaneous Function Lock 208
11.2.4 Graphic Check 209
11.2.4.1 Graphic Check 209
11.2.4.2 3D Solid Program Check 209
11.2.4.3 Graphic Check Rotary Axis Drawing 210
11.2.5 Graphic Trace 211
11.2.5.1 Graphic Trace 211
11.2.5.2 Graphic Trace Rotary Axis Drawing 212
11.2.6 Machining Time Computation 212
11.2.7 Manual Arbitrary Reverse Run
(Program Check Operation) 213
11.2.8 High-speed Simple Program Check 214
11.3 Program Search/Start/Stop 215
11.3.1 Program Search 215
11.3.2 Sequence Number Search 215
11.3.3 Collation and Stop 216
11.3.4 Program Restart 217
11.3.5 Automatic Operation Start 218
11.3.6 NC Reset 218
11.3.7 Feed Hold 219
11.3.8 Search & Start 219
11.3.10 Auto-restart 219
11.4 Interrupt Operation 220
11.4.1 Manual Interruption 220
11.4.2 Automatic Operation Handle
Interruption 220
11.4.3 Manual Absolute Switch 221
11.4.4 Thread Cutting Cycle Retract 222
11.4.5 Tapping Retract 223
11.4.6 Manual Numerical Value Command 224
11.4.7 Arbitrary Reverse Run 225

11.4.8 MDI Interruption 226
: Standard: Option: Selection
M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80 Class Page
Lathe system
11.4.9 Simultaneous Operation of Manual and
Automatic Modes 226
11.4.10 Simultaneous Operation of JOG and
Handle Modes 226
11.4.11 Reference Position Retract 227
11.4.12 Tool Retract and Return 228
11.4.13 Skip Retract 229
11.4.14 PLC Interruption 229
11.4.16 Machining Interruption 230
12 Program Support Functions 231
12.1 Machining Method Support Functions 232
12.1.1 Program 232
12.1.1.1 Subprogram Control [Layers] 10 10 10 10 10 232
12.1.1.2 Figure Rotation 235
12.1.1.3 Scaling 237
12.1.1.4 Axis Name Switch 238
12.1.2 Macro Program 239
12.1.2.1 User Macro [Layers] 4 4 4 4 4 239
12.1.2.2 Machine Tool Builder Macro 242
12.1.2.3 Macro Interruption 244
12.1.2.4 Variable Command 245
200 sets 245
600 sets 245
700 sets 245
8000 sets 245
(600+100number of part systems) sets 245
(7900+100number of part systems) sets 245
12.1.3 Fixed Cycle 247
12.1.3.1 Fixed Cycle for Drilling 248
12.1.3.2 Fixed Cycle for Drilling (Type II) 253
12.1.3.3 Special Fixed Cycle 254
12.1.3.4 Fixed Cycle for Turning Machining 257
12.1.3.5 Compound Type Fixed Cycle
for Turning Machining 262
12.1.3.6 Compound Type Fixed Cycle
for Turning Machining (Type II) 267
12.1.3.7 Small-diameter Deep-hole Drilling
Cycle 271
12.1.4 Mirror Image 271
12.1.4.1 Mirror Image by Parameter Setting 271
12.1.4.2 Mirror Image by External Input 271
12.1.4.3 Mirror Image by G Code 272
12.1.4.4 Mirror Image for Facing Tool Posts 273
12.1.4.5 T Code Mirror Image for Facing
Tool Posts 273
12.1.5 Coordinate System Operation 274
12.1.5.1 Coordinate Rotation by Program 274
12.1.5.2 Coordinate Rotation by Parameter 276
: Standard: Option: Selection
M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80 Class Page
Lathe system
12.1.5.3 3-dimensional Coordinate Conversion 277
12.1.6 Dimension Input 279
12.1.6.1 Corner Chamfering/Corner R 279
12.1.6.2 Linear Angle Command 286
12.1.6.3 Geometric Command 287
12.1.6.4 Polar Coordinate Command 288
12.1.7 Axis Control 289
12.1.7.1 Chopping 289
12.1.7.1.1 Chopping 289
12.1.7.2 Normal Line Control 290
12.1.7.3 Circular Cutting 291
12.1.7.4 Vibration Cutting Control 292
12.1.8 Multi-part System Control 293
12.1.8.1 Timing Synchronization between
Part Systems 293
12.1.8.2 Start Point Designation Timing
Synchronization 294
12.1.8.3 Mixed Control 297
12.1.8.3.1 Mixed Control

(Cross Axis Control) 297
12.1.8.3.2 Arbitrary Axis Exchange
Control 298
12.1.8.4 Control Axis Superimposition 300
12.1.8.4.1 Control Axis Superimposition 300
12.1.8.4.2 Arbitrary Axis
Superimposition Control 301
12.1.8.5 Control Axis Synchronization
between Part Systems 302
12.1.8.6 Balance Cut 304
12.1.8.7 Common Memory for Part Systems 306
12.1.8.8 Multi-part System Simultaneous
Thread Cutting 306
12.1.8.8.1 Two-part System Simultaneous
Thread Cutting 307
12.1.8.8.2 Multi-part System
Simultaneous Thread Cutting 309
12.1.8.9 Multi-part System Program
Management 310
12.1.8.10 Synchronization between
Part Systems 311
12.1.8.10.1 Single Block between
Part Systems 311
12.1.8.10.2 Dwell/Miscellaneous Function
Time Override 312
12.1.8.10.3 Synchronization between
Part Systems OFF 313
12.1.8.11 Sub Part System Control I 314
12.1.8.12 Sub Part System Control II 316
12.1.8.13 Loader Control Part System 318
: Standard: Option: Selection
M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80 Class Page
Lathe system
12.1.9 Data Input/Output by Program 319
12.1.9.1 Parameter Input by Program 319
12.1.9.2 Compensation Data Input by Program 320
12.1.9.3 Tool/Material Shape Input
by Program 324
12.1.9.5 API Section and Sub-section Nos.
Input/Output by Program 326
12.1.9.6 R-Navi Data Input by Program 326
12.1.10 Machining Modal 327
12.1.10.1 Tapping Mode 327
12.1.10.2 Cutting Mode 327
12.1.11 High-speed Parts Machining 328
12.1.11.1 Rapid Traverse Block Overlap 328
12.2 Machining Accuracy Support Functions 330
12.2.1 Automatic Corner Override 330
12.2.2 Deceleration Check 331
12.2.2.1 Exact Stop Check Mode 333
12.2.2.2 Exact Stop Check 333
12.2.2.3 Error Detection 333
12.2.2.4 Programmable In-position Check 334
12.2.2.5 Automatic Error Detection 334
12.3 High-speed and High-accuracy
Functions [kBPM: k Block per Minute] 335
12.3.1 High-speed Machining Mode 335
12.3.1.1 High-speed Machining Mode I
(G05P1) Maximum [kBPM] 33.7 33.7 335
12.3.1.2 High-speed Machining Mode II
(G05P2) Maximum [kBPM] 67.5 67.5 336
12.3.2 High-accuracy Control 337
12.3.2.1 High-accuracy Control (G61.1/G08) 337
12.3.2.2 Multi-part System Simultaneous
High-accuracy Control 341
12.3.2.3 SSS Control (*4) (*4) 342
12.3.2.4 Tolerance Control 343
12.3.2.5 Variable-acceleration
Pre-interpolation
Acceleration/Deceleration
344
12.3.2.6 High-accuracy
Acceleration/Deceleration Time
Constant Extension
344
12.3.2.7 Axis-specific Acceleration
Tolerance Control 345
12.3.3 High-speed High-accuracy Control 346
12.3.3.1 High-speed High-accuracy
Control I (G05.1Q1) Maximum [kBPM] 33.7 33.7 346
12.3.3.2 High-speed High-accuracy

Control II (G05P10000) Maximum [kBPM] 67.5 67.5 347
12.3.3.3 High-speed High-accuracy
Control III (G05P20000) Maximum [kBPM] 350
12.3.3.4 Smooth Fairing 351
12.3.4 Machining Condition Selection I 352
: Standard: Option: Selection
M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80 Class Page
Lathe system
12.3.5 Direct Command Mode 352
12.4 Programming Support Functions 353
12.4.1 Playback 353
12.4.3 Interactive Cycle Insertion 354
12.4.4 Simple Programming (NAVI MILL/LATHE) 357
12.4.5 G code Guidance 357
12.4.7 DXF Data Input 358
13 Machine Accuracy Compensation 359
13.1 Static Accuracy Compensation 360
13.1.1 Backlash Compensation 360
13.1.2 Memory-type Pitch Error Compensation
[sets] 16 16 16 16 10 361
13.1.3 Memory-type Relative Position Error
Compensation 362
13.1.4 External Machine Coordinate System
Compensation 363
13.1.5 Circular Radius Error Compensation 363
13.1.6 Ball Screw Thermal Expansion
Compensation 364
13.1.7 Rotation Center Error Compensation 365
13.1.8 Position-dependent Gradually
Increasing-type Backlash Compensation 367
13.1.9 Bidirectional Pitch Error Compensation 368
13.1.10 Cyclic Error Compensation 368
13.1.11 Spatial Error Compensation 369
13.1.12 Backlash Compensation II 370
13.2 Dynamic Accuracy Compensation 371
13.2.1 Smooth High-gain (SHG) Control 371
13.2.2 Dual Feedback 372
13.2.3 Lost Motion Compensation 372
13.2.4 OMR II (Backlash with Filter) 373
13.2.6 OMR-FF 374
13.2.7 Distance-coded Reference Position
Detection 375
13.2.9 Variable Torsion Compensation 376
13.2.10 Cogging Torque Compensation 377
14 Automation Support Functions 379
14.1 Measurement 380
14.1.1 Skip 380
14.1.1.1 Skip 380
14.1.1.2 Multiple-step Skip 382
14.1.1.4 PLC Skip 383
14.1.1.5 Speed Change Skip 383
14.1.1.6 Torque Limitation Skip 384
14.1.2 Automatic Tool Length Measurement 385
14.1.3 Manual Tool Length Measurement 1 388
14.1.4 Manual Tool Length Measurement 2 391
14.1.5 Workpiece Coordinate Offset
Measurement 392
: Standard: Option: Selection
M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80 Class Page
Lathe system
14.1.6 Workpiece Position Measurement 393
14.1.7 Rotation Measurement 395
14.1.8 Rotation Center Error Measurement 396
14.1.9 Workpiece Installation Error
Measurement 397
14.2 Tool Life Management 398
14.2.1 Tool Life Management 398
14.2.1.1 Tool Life Management I 398
14.2.1.2 Tool Life Management II 399
14.2.1.3 Tool Life Management III 399
14.2.2 Number of Tool Life Management Sets 400
99 sets 400
128 sets 400
200 sets 400

256 sets 400
400 sets 400
999 sets 400
14.2.3 Tool Life Management Set Allocation
to Part Systems 402
14.3 Others 404
14.3.1 Programmable Current Limitation 404
14.3.2 Auto Power OFF 404
14.3.4 Load Monitoring I 405
14.3.5 Power ON/OFF Sequence 405
14.3.6 PLC Axis Current Limit 405
14.3.7 Direct Robot Control 406
15 Safety and Maintenance 407
15.1 Safety Switches 408
15.1.1 Emergency Stop 408
15.1.2 Data Protection Key 408
15.2 Display for Ensuring Safety 409
15.2.1 NC Warning 409
15.2.2 NC Alarm 409
15.2.3 Operation Stop Cause 410
15.2.4 Emergency Stop Cause 410
15.2.5 Thermal Detection 410
15.2.6 Battery Alarm/Warning 411
15.3 Protection 412
15.3.1 Stroke End (Over Travel) 412
15.3.2 Stored Stroke Limit 412
15.3.2.1 Stored Stroke Limit I/II 413
15.3.2.2 Stored Stroke Limit IB 415
15.3.2.3 Stored Stroke Limit IIB 415
15.3.2.4 Stored Stroke Limit IC 416
15.3.3 Stroke Check before Travel 417
15.3.4 Chuck/Tailstock Barrier Check 419
: Standard: Option: Selection
M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80 Class Page
Lathe system
15.3.5 Interlock 420
15.3.6 External Deceleration 420
15.3.7 Interference Check III 421
15.3.8 3D Machine Interference Check 423
15.3.9 Door Interlock 424
15.3.9.1 Door Interlock I 424
15.3.9.2 Door Interlock II 426
15.3.10 Parameter Lock 428
15.3.11 Program Protection (Edit Lock B, C) 428
15.3.12 Program Display Lock 428
15.3.13 Data Protection by User's Level 428
15.3.15 Vertical Axis Pull-up 429
15.3.16 Machine Group-based Alarm Stop 429
15.3.17 Interference Check Between
Part Systems 431
15.3.18 Spindle Protection 432
15.4 Maintenance and Troubleshooting 433
15.4.1 Operation History 433
15.4.2 Data Sampling 434
15.4.3 NC Data Backup 434
15.4.4 Servo Tuning Support 435
15.4.4.1 NC Analyzer2 435
15.4.5 Automatic Backup (GOT) 437
15.4.8 Application Error Detection 437
15.4.9 Email Notification to Operator 438
15.4.10 NC Configurator2 439
15.4.11 Diagnosis Data Output 439
15.4.12 Backup/Restore 439
15.4.14 Field Network Diagnostics 440
15.4.15 Remote service iQ Care Remote4U 441
15.4.15.1 Connection with RGU 441
15.4.16 Brake Wear Diagnostics 442
15.5 Functional Safety 443
15.5.1 Safety Observation 443
15.5.2 Smart Safety Observation 444
15.5.2.1 Safety-related I/O Observation 444
15.5.2.2 Emergency Stop Observation 444
15.5.2.3 Drive Safety Function 445
15.5.2.3.1 SLS (Safely-Limited Speed) 445
15.5.2.3.2 SLP (Safely-Limited Position) 445
15.5.2.3.3 SOS (Safe Operating Stop) 445
15.5.2.3.4 SSM (Safe Speed Monitor) 445
15.5.2.3.5 SBC/SBT
(Safe Brake Control/Safe Brake Test) 446
: Standard: Option: Selection
M80

TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80 Class Page
Lathe system
15.5.2.3.6 SCA (Safe Cam) 446
15.5.2.3.7 SS1/SS2 (Safe Stop) 446
15.5.2.3.8 STO (Safe Torque Off) 446
15.5.2.3.9 SCN
(Safety Communication Network) 447
16 Drive System 449
16.1 Servo/Spindle 450
Feed axis -
MDS-E-Vx -
MDS-EH-Vx -
MDS-EJ-Vx -
MDS-EJH-Vx -
MDS-EM-SPVx -
MDS-EMH-SPVx -
Spindle -
MDS-E-SPx -
MDS-EH-SPx -
MDS-EJ-SPx -
MDS-EM-SPVx -
MDS-EMH-SPVx -
Power supply -
MDS-E-CV -
MDS-EH-CV -
MDS-EX-CVP -
17 Machine Support Functions 451
17.1 PLC 452
17.1.1 Built-in PLC Processing Mode 452
17.1.2 PLC Functions 452
17.1.2.1 Built-in PLC Basic Function
(MELSEC) 452
17.1.2.1.1 Index Modification
(MELSEC) 455
17.1.2.1.2 Multi-program
[Number of Programs] 60 60 60 60
(MELSEC) 455
17.1.2.1.3 Multi-project
[Number of Projects Stored] 456
Number of PLC projects: 2 456
Number of PLC projects: 3 456
Number of PLC projects: 6 456
17.1.2.1.4 Function Block (FB)
(MELSEC) 456
17.1.2.1.5 Label Programming
(MELSEC) 456
17.1.2.2 PLC Exclusive Instruction
(MELSEC) 457
17.1.2.3 Enhanced PLC Security Mode 459
17.1.3 PLC Support Functions 460
17.1.3.1 Alarm Message Display 460
: Standard: Option: Selection
M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80 Class Page
Lathe system
17.1.3.2 Operator Message Display (*5) 460
17.1.3.3 Memory Switch (PLC Switch) 461
17.1.3.3.1 Memory Switch (PLC Switch)
32 Points 461
17.1.3.3.2 Memory Switch (PLC Switch)
64 Points 461
17.1.3.3.3 Memory Switch (PLC Switch)
96 points 461
17.1.3.4 Load Meter Display 462
17.1.3.5 User PLC Version Display 462
17.1.3.6 Ladder Program Writing during RUN
(MELSEC) 462
17.1.3.7 PLC Program Protection
(MELSEC) 462
17.1.4 Built-in PLC Capacity 463
17.1.4.1 Standard PLC Capacity
[Number of Steps] 64K 32K 20K 20K
(MELSEC) 463
17.1.4.2 Large PLC Capacity: 256 Ksteps 463
17.1.4.3 Large PLC Capacity: 512 Ksteps 463
17.1.5 Machine Contact Input/Output I/F

(MELSEC) 463
17.1.6 Ladder Monitor (GOT) 464
17.1.7 PLC Development 465
17.1.7.1 On-board Development (GOT) 465
17.1.7.2 MELSEC Development Tool
(GX Developer) 465
17.1.7.3 MELSEC Development Tool
(GX Works2) 465
17.1.7.4 MELSEC Development Tool
(GX Works3) 466
17.1.8 PLC Parameter 466
17.1.8.1 PLC Constant (150 Points) 466
17.1.8.2 PLC Constant Extension
(Up to 750 Points) 466
17.1.9 GOT Connection 467
17.1.9.1 Ethernet Connection 467
17.1.9.2 CC-Link Connection
(MELSEC) 467
17.1.9.3 CC-Link IE Field Connection
(MELSEC) 467
17.1.10 Pallet Program Registration 468
17.2 Machine Construction 469
17.2.1 Servo OFF 469
17.2.2 Axis Detachment 470
17.2.3 Synchronous Control 471
17.2.4 Inclined Axis Control 475
17.2.5 Position Switch 24 24 24 24 (*6) 476
17.2.7 Index Table Indexing 477
17.2.8 Tool Length Compensation along
the Tool Axis 479
17.2.9 Tool Handle Feed & Interruption 480
: Standard: Option: Selection
M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80 Class Page
Lathe system
17.2.10 Tool Center Coordinate Display 480
17.2.11 Tool Center Point Control 481
17.2.11.1 Tool Center Point Control
(G43.4/G43.5) 481
17.2.12 Inclined Surface Machining Command 484
17.2.13 Simple Inclined Surface Machining
Command 486
17.2.14 3-dimensional Tool Radius
Compensation (Tool's
Vertical-direction Compensation)
488
17.2.15 Workpiece Installation Error
Compensation 489
17.2.16 3-dimensional Manual Feed 490
17.2.17 R-Navi 491
17.2.18 Simple Synchronous Control 493
17.2.20 Real-time Tuning 494
17.2.20.1 Real-time Tuning 1 (Speed Gain) 494
17.2.20.2 Real-time Tuning 2 (Rapid
Traverse Time Constant) 495
17.2.21 Constant Torque Control 496
17.2.22 External Encoder Position Output I/F 497
17.2.23 Multiple-axis Synchronization Control 498
17.2.24 Hypothetical Linear Axis Control 499
17.2.25 BiSS Encoder I/F 500
17.2.26 Tool Head Hot Swapping 501
17.3 PLC Operation 502
17.3.1 Arbitrary Feed in Manual Mode 502
17.3.2 Circular Feed in Manual Mode 503
17.3.3 PLC Axis Control 505
17.3.5 PLC Axis Indexing 506
17.3.6 NC Axis/PLC Axis Switchover 508
17.4 PLC Interface 509
17.4.1 CNC Control Signal 509
17.4.2 CNC Status Signal 510
17.4.3 PLC Window 512
17.4.4 External Search 513
17.4.5 Direct Screen Selection 513
17.4.6 Buzzer Sound Control 514
17.5 Machine Contact I/O 515
17.5.1 Operation Panel I/O 515
17.5.1.1 DI:64/DO:64 515
17.5.1.2 DI:64/DO:64 + SDI:8 515
17.5.1.3 DI:96/DO:64 515
17.5.1.5 DI:64/DO:48/AO:1 515
17.5.2 Remote I/O 516
17.5.2.1 DI:32/DO:32 516

17.5.2.2 DI:64/DO:48 516
17.5.2.3 DI:64/DO:48 + AO:1 516
: Standard: Option: Selection
M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80 Class Page
Lathe system
17.5.2.5 DI:16/DO:8 516
17.5.2.6 DI:32/DO:32 + SDI:8/SDO:4 516
17.5.2.7 SDI:8/SDO:4 516
17.6 External PLC Link 517
17.6.1 CC-Link (Master/Local)
(MELSEC) 517
17.6.2 PROFIBUS-DP (Master)
(MELSEC) 523
17.6.3 CC-Link IE Field (Master/Local)
(MELSEC) 524
17.6.4 PROFINET
(MELSEC) 525
17.6.5 EtherNet/IP
(MELSEC) 526
17.6.8 FL-net
(MELSEC) 527
17.6.9 DeviceNet (Master)
(MELSEC) 527
17.6.10 CC-Link IE Field Basic 528
17.7 Installing S/W for Machine Tools 530
17.7.1 Customization (NC Designer2) 530
17.7.1.1 Customization Data Storage
Capacity [MB] 6 6 1 1 532
17.7.1.2 Customization Working Memory Size
[MB] 3 3 1 1 532
17.7.2 User-defined Key 532
17.7.3 EZSocket I/F 532
17.7.4 APLC Release 533
17.7.5 Custom API Library 534
17.7.6 MES Interface Library 534
17.7.7 SLMP Server 535
17.7.8 Numerical Control (CNC) Communication
Software FCSB1224W000 536
17.7.10 GOT2000 Screen Design Tool GT Works3 536
17.8 Others 537
17.8.1 System Lock 537
17.8.2 CNC Remote Operation Tool 537
17.8.2.1 NC Monitor2 537
17.8.2.2 NC Explorer 537
17.8.3 Automatic Operation Lock 537
17.8.4 Power Consumption Computation 538
17.8.5 EcoMonitorLight Connection 538
17.8.6 GOT Window 539
17.8.7 Log Viewer 540
(*2)G/B: Guide Bush
(*4)eSSS
(*5)Only the macro alarm message
can be displayed.
(*6)24 points for each part system and
32 points for the whole PLC axes.
(*8)Up to 2000 programs for C80
CONTENTS
Mitsubishi Electric CNC M80/E80/C80 Series Specifications List [M system]
: Standard: Option: Selection
M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
1 Control Axes 1
1.1 Control Axes 2
1.1.1 Number of Basic Control Axes (NC Axes) 3 3 3 3 3 2
1.1.2 Max. Number of Axes
(NC Axes + Spindles + PLC Axes) 11 9 6 4 16 2
1.1.2.1 Max. Number of NC Axes
(In Total for All the Part Systems) 8 5 5(*1) 3 16 2
1.1.2.2 Max. Number of Spindles 2 2 1 1 72
1.1.2.3 Max. Number of PLC Axes 6 6 2 0 82
1.1.4 Max. Number of PLC Indexing Axes 4 4 1 0 83
1.1.5 Number of Simultaneous Contouring
Control Axes 4 4 4 3 43
1.1.6 Max. Number of NC Axes
in a Part System 8 5 5(*1) 3 8 3

1.1.7 Axis Name Extension 3
1.2 Control Part System 4
1.2.1 Standard Number of Part Systems 1 1 1 1 14
1.2.2 Max. Number of Part Systems
(Main + Sub) 2 1 1 1 7 4
1.2.2.1 Max. Number of Main Part Systems 2 1 1 1 7 4
1.2.2.2 Max. Number of Sub Part Systems 4
1.3 Control Axes and Operation Modes 5
1.3.1 Tape (RS-232C Input) Mode 5
1.3.2 Memory Mode 5
1.3.3 MDI Mode 5
1.3.4 High-Speed Program Server Mode 6
1.3.4.1 Control Unit-side High-speed
Program Server Mode 6
1.3.4.2 Display Unit-side High-speed
Program Server Mode 6
1.3.4.3 FTP High-speed Program Server Mode 6
1.3.5 Front-side SD Card Mode 7
1.3.6 Front-side USB Memory Mode 7
2 Input Command 9
2.1 Data Increment 10
2.1.1 Least Command Increment 10
Least command increment 1m 10
Least command increment 0.1m 10
Least command increment 0.01m(10nm) 10
Least command increment 0.001m(1nm) 10
2.1.2 Least Control Increment 12
Least control increment0.01m(10nm) 12
Least control increment0.001m(1nm) 12
Class Page
Machining center system
: Standard: Option: Selection
M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80 Class Page
Machining center system
2.1.3 Indexing Increment 12
2.2 Unit System 13
2.2.1 Inch/Metric Changeover 13
2.2.2 Input Command Increment Tenfold 13
2.3 Program Format 14
2.3.1 Program Format 14
2.3.1.1 Format 1 for Lathe
(G Code List 2, 3) 14
2.3.1.2 Format 2 for Lathe
(G Code List 4, 5) 14
2.3.1.3 Special Format for Lathe
(G Code List 6, 7) 14
2.3.1.4 Format 1 for Machining Center 14
2.3.1.5 Format 2 for Machining Center
(M2 Format) 14
2.3.1.6 MITSUBISHI CNC Special Format 14
2.3.2 Program Format Switch 15
2.4 Command Value 17
2.4.1 Decimal Point Input I, II 17
2.4.2 Absolute/Incremental Command 18
2.4.3 Diameter/Radius Designation 19
2.4.4 Diameter/Radius Designation Switch 20
3 Positioning/Interpolation 21
3.1 Positioning 22
3.1.1 Positioning 22
3.1.2 Unidirectional Positioning 23
3.2 Linear/Circular Interpolation 24
3.2.1 Linear Interpolation 24
3.2.2 Circular Interpolation
(Center/Radius Designation) 25
3.2.3 Helical Interpolation 27
3.2.4 Spiral/Conical Interpolation 30
3.2.5 Cylindrical Interpolation 32
3.2.6 Polar Coordinate Interpolation 33
3.2.7 Milling Interpolation 34
3.2.8 Hypothetical Axis Interpolation 35
3.3 Curve Interpolation 36
3.3.1 Involute Interpolation 36
3.3.2 Exponential Interpolation 38
3.3.3 Spline Interpolation (G05.1Q2/G61.2) 39
3.3.4 NURBS Interpolation 40
3.3.5 3-Dimensional Circular Interpolation 41
3.3.6 Spline Interpolation2 (G61.4) 42
4 Feed 45
4.1 Feedrate 46
4.1.1 Rapid Traverse Rate (m/min) 1000 1000 1000 1000 1000 46
4.1.2 Cutting Feedrate (m/min) 1000 1000 1000 1000 1000 47

4.1.3 Manual Feedrate (m/min) 1000 1000 1000 1000 1000 48
: Standard: Option: Selection
M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80 Class Page
Machining center system
4.1.4 Rotary Axis Command Speed Tenfold 48
4.2 Feedrate Input Methods 49
4.2.1 Feed per Minute (Asynchronous Feed) 49
4.2.2 Feed per Revolution (Synchronous Feed) 51
4.2.3 Inverse Time Feed 53
4.2.4 F 1-digit Feed 54
4.2.5 Manual Speed Command 55
4.2.7 G00 Feedrate Designation (,F Command) 55
4.2.8 Selection of Axis (Axes) for
Feedrate Command 57
4.3 Override 58
4.3.1 Rapid Traverse Override 58
4.3.2 Cutting Feed Override 58
4.3.3 2nd Cutting Feed Override 58
4.3.4 Override Cancel 59
4.4 Acceleration/Deceleration 60
4.4.1 Automatic Acceleration/Deceleration
after Interpolation 60
4.4.2 Rapid Traverse Constant-gradient
Acceleration/Deceleration 62
4.4.3 Rapid Traverse Constant-gradient
Multi-step Acceleration/Deceleration 63
4.5 Thread Cutting 64
4.5.1 Thread Cutting
(Lead/Thread Number Designation) 64
4.5.2 Variable Lead Thread Cutting 67
4.5.3 Synchronous Tapping 68
4.5.3.1 Synchronous Tapping Cycle 68
4.5.3.2 Pecking Tapping Cycle 70
4.5.3.3 Deep-hole Tapping Cycle 72
4.5.3.4 Synchronous Tapping
with Multiple Spindles 74
4.5.3.5 Synchronous Tapping
with Analog I/F Spindle 74
4.5.4 Chamfering 74
4.5.6 Circular Thread Cutting 75
4.5.8 High-speed Synchronous Tapping (OMR-DD) 76
4.5.10 Thread Recutting 77
4.5.11 Thread Cutting Override 78
4.5.12 Variable Feed Thread Cutting 78
4.5.13 Thread Cutting Time Constant Switch 79
4.6 Manual Feed 80
4.6.1 Manual Rapid Traverse 80
4.6.2 Jog Feed 80
4.6.3 Incremental Feed 81
4.6.4 Handle Feed 81
4.6.5 Manual Feedrate B 82
4.6.6 Manual Feedrate B Surface Speed Control 83
4.6.8 Manual Speed Clamp 84
: Standard: Option: Selection
M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80 Class Page
Machining center system
4.7 Dwell 85
4.7.1 Dwell (Time-based Designation) 85
4.7.2 Dwell (Revolution-based Designation) 86
5 Program Memory/Editing 87
5.1 Memory Capacity 88
5.1.1 Memory Capacity
(Number of Programs Stored) 88
230kB[600m] (400 programs) 88
500kB[1280m] (1000 programs) 88
1000kB[2560m] (1000 programs) (*8) 88
2000kB[5120m] (1000 programs) (*8) 88
5.2 Editing 89
5.2.1 Program Editing 89
5.2.2 Background Editing 90
5.2.3 Buffer Correction 91
5.2.5 Multi-part System Simultaneous
Program Editing 92
5.2.6 Special Program Editing Display for

Synchronization between Part Systems 92
5.2.7 Finish Shape View Programming 93
6 Operation and Display 95
6.1 Structure of Operation/Display Panel 96
6.1.1 Color Display (8.4-type LCD TFT) 96
6.1.2 Color Touchscreen Display
(10.4-type LCD TFT) 96
6.1.3 Color Touchscreen Display
(15-type LCD TFT) 96
6.1.4 Separated-type Color Display
(8.4-type LCD TFT) 96
6.1.5 Separated-type Color Touchscreen
Display (10.4-type LCD TFT) 96
6.1.6 Separated-type Color Touchscreen
Display (15-type LCD TFT) 96
6.1.7 Separated-type Color Touchscreen
Display (15-type LCD TFT/Windows8) 96
6.1.8 Separated-type Color Touchscreen
Display (19-type LCD TFT/Windows8) 97
6.1.9 Separated-type Color Touchscreen
Display
(19-type Horizontal LCD TFT/Windows8)
97
6.1.11 GOT (GOT2000 Series
GT27/GT25 12.1/10.4/8.4/5.7) 97
6.2 Operation Methods and Functions 98
6.2.1 Operation Input 98
6.2.2 Absolute/Incremental Setting 98
6.2.3 Multiple Display Connection (GOT) 99
6.2.4 Common Display to Multiple NCs (GOT) 99
6.2.5 Displayed Part System Switch 99
6.2.6 Menu List 100
6.2.7 Display Switch by Operation Mode 100
6.2.8 External Signal Display Switch 100
: Standard: Option: Selection
M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80 Class Page
Machining center system
6.2.9 Screen Saver (GOT) 100
6.2.10 Parameter Guidance 100
6.2.11 Alarm Guidance 101
6.2.12 Machining Program Input Mistake
Check Warning 101
6.2.14 Screenshot Capture (GOT) 101
6.2.15 User Selectable Menu Configuration 101
6.2.16 PC-NC Network Automatic Connection 102
6.2.17 Device Open Parameter 102
6.2.18 SRAM Open Parameter 102
6.2.19 MTB Selectable Menu Configuration 102
6.2.20 Remote Desktop Connection 103
6.2.21 VNC Server 104
6.3 Display Methods and Contents 105
6.3.1 Status Display 105
6.3.2 Clock Display 105
6.3.3 Monitor Screen Display 106
6.3.4 Setup Screen Display 107
6.3.5 Edit Screen Display 107
6.3.6 Diagnosis Screen Display 107
6.3.7 Maintenance Screen Display 108
6.3.8 Home Application 108
6.3.9 Home Screen 109
6.3.10 Additional Languages 110
6.3.10.1 Japanese 110
6.3.10.2 English 110
6.3.10.3 German 110
6.3.10.4 Italian 110
6.3.10.5 French 110
6.3.10.6 Spanish 110
6.3.10.7 Chinese 110
6.3.10.7.1 Chinese
(Traditional Chinese Characters) 110
6.3.10.7.2 Chinese
(Simplified Chinese Characters) 110
6.3.10.8 Korean 111
6.3.10.9 Portuguese 111
6.3.10.10 Hungarian 111
6.3.10.11 Dutch 111
6.3.10.12 Swedish 111
6.3.10.13 Turkish 111
6.3.10.14 Polish 111
6.3.10.15 Russian 111
6.3.10.16 Czech 111

6.3.10.17 Indonesian 112
6.3.10.18 Vietnamese 112
: Standard: Option: Selection
M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80 Class Page
Machining center system
7 Input/Output Functions and Devices 113
7.1 Input/Output Data 114
7.1.1 Machining Program Input/Output 114
7.1.2 Tool Offset Data Input/Output 114
7.1.3 Common Variable Input/Output 114
7.1.4 Parameter Input/Output 114
7.1.5 History Data Output 114
7.1.7 System Configuration Data Output 114
7.2 Input/Output I/F 115
7.2.1 RS-232C I/F 115
7.2.2 SD Card I/F 115
7.2.2.1 Control Unit-side SD Card I/F
[Up to 32GB] 115
7.2.2.2 Front-side SD Card I/F [Up to 32GB] 115
7.2.3 Ethernet I/F (GOT) 115
7.2.4 Display Unit-side Data Server I/F 116
7.2.5 Front-side USB Memory I/F [Up to 32GB] 116
7.2.6 USB I/F (GOT Front-side USB I/F) 116
7.2.7 SD I/F (GOT Back-side SD Card I/F) 116
7.3 Computer Link 117
7.3.1 Computer Link B 117
7.4 Others 118
7.4.1 Handy Terminal Connection 118
7.4.3 IP Filter Setting 119
8 Spindle, Tool and Miscellaneous Functions 121
8.1 Spindle Functions (S) 122
8.1.1 Spindle Control Functions 122
8.1.1.1 Spindle Digital I/F 123
8.1.1.2 Spindle Analog I/F
(MELSEC) 123
8.1.1.3 Coil Switch 123
8.1.1.4 Automatic Coil Switch 123
8.1.1.5 Encoder Input I/F 124
8.1.1.6 Spindle-mode Servo Motor Control 125
8.1.1.7 Spindle-mode Rotary Axis Control 126
8.1.1.8 Turret Gear Change Control 127
8.1.1.9 Spindle Control with
Pulse Train Output 128
8.1.2 S Code Output 129
8.1.3 Constant Surface Speed Control 130
8.1.4 Spindle Override 132
8.1.5 Multiple-spindle Control 132
8.1.5.1 Multiple-spindle Control I 133
8.1.5.2 Multiple-spindle Control II 134
8.1.6 Spindle Orientation 135
: Standard: Option: Selection
M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80 Class Page
Machining center system
8.1.7 Spindle Position Control
(Spindle/C Axis Control) 136
8.1.7.1 Spindle Position Control
(Spindle/C Axis Control) 136
8.1.7.2 C Axis Control during
Spindle Synchronization 137
8.1.8 Spindle Synchronization 138
8.1.8.1 Spindle Synchronization I 138
8.1.8.2 Spindle Synchronization II 139
8.1.8.3 Guide Bushing Spindle
Synchronization 139
8.1.9 Tool Spindle Synchronization I
(Polygon) 140
8.1.9.1 Tool Spindle Synchronization IA
(Spindle-Spindle, Polygon) 140
8.1.9.2 Tool Spindle Synchronization IB
(Spindle-Spindle, Polygon) 141
8.1.9.3 Tool Spindle Synchronization IC
(Spindle-NC Axis, Polygon) 142
8.1.10 Tool Spindle Synchronization II
(Hobbing) 143

8.1.11 Spindle Speed Clamp 144
8.1.13 Spindle Oscillation 144
8.1.14 Spindle Superimposition Control 145
8.1.15 Multiple Spindle Synchronization
Set Control 147
8.1.16 Spindle Speed Fluctuation Detection 150
8.1.17 Spindle Motor Temperature Output
to PLC 151
8.2 Tool Functions (T) 152
8.2.1 Tool Functions (T Command) 152
8.3 Miscellaneous Functions (M) 153
8.3.1 Miscellaneous Functions 153
8.3.2 Multiple M Codes in 1 Block 153
8.3.3 M Code Independent Output 154
8.3.4 Miscellaneous Function Finish 155
8.3.5 M Code Output during Axis Traveling 156
8.3.6 Miscellaneous Function Command
High-speed Output 157
8.4 2nd Miscellaneous Functions (B) 159
8.4.1 2nd Miscellaneous Functions 159
8.4.2 2nd Miscellaneous Function Name
Extension 159
9 Tool Compensation 161
9.1 Tool Length/Tool Position 162
9.1.1 Tool Length Offset 162
9.1.2 Tool Position Offset 165
9.1.3 Tool Compensation for Additional Axes 165
9.1.4 Tool Position Compensation (G43.7) 166
9.2 Tool Radius 167
9.2.1 Tool Radius Compensation 167
: Standard: Option: Selection
M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80 Class Page
Machining center system
9.2.2 3-dimensional Tool Radius Compensation 169
9.2.3 Tool Nose Radius Compensation
(G40/41/42) 170
9.2.4 Automatic Decision of Nose Radius
Compensation Direction (G46/40) 171
9.2.5 Tool Radius Compensation Diameter
Designation 171
9.3 Tool Offset Amount 172
9.3.1 Number of Tool Offset Sets 172
99 sets 172
128 sets 172
200 sets 172
256 sets 172
400 sets 172
999 sets 172
9.3.2 Offset Memory 173
9.3.2.1 Tool Shape/Wear Offset Amount 173
9.3.2.2 Compensation Type Selection
by Parameter 176
9.3.3 Number of Tool Offset Sets Allocation
to Part Systems 177
10 Coordinate System 179
10.1 Coordinate System Type and Setting 180
10.1.1 Machine Coordinate System 181
10.1.2 Coordinate System Setting 182
10.1.3 Automatic Coordinate System Setting 183
10.1.4 Workpiece Coordinate System Selection 184
10.1.4.1 Workpiece Coordinate System
Selection (6 Sets) 184
10.1.4.2 Extended Workpiece Coordinate
System Selection (48 Sets)
G54.1P1 to P48
186
10.1.4.3 Extended Workpiece Coordinate
System Selection (96 Sets)
G54.1P1 to P96
186
10.1.4.4 Extended Workpiece Coordinate
System Selection (300 Sets)
G54.1P1 to P300
186
10.1.5 External Workpiece Coordinate Offset 187
10.1.6 Workpiece Coordinate System Preset
(G92.1) 188
10.1.7 Local Coordinate System 189
10.1.8 Coordinate System for Rotary Axis 190
10.1.9 Plane Selection 191
10.1.10 Origin Set/Origin Cancel 192

10.1.11 Counter Set 193
10.1.12 Workpiece Position Offset
for Rotary Axis 194
10.1.13 Workpiece Coordinate System Shift 196
10.2 Return 197
10.2.1 Manual Reference Position Return 197
: Standard: Option: Selection
M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80 Class Page
Machining center system
10.2.2 Automatic 1st Reference Position
Return 198
10.2.3 2nd, 3rd, 4th Reference Position
Return 200
10.2.4 Reference Position Check 201
10.2.5 Absolute Position Detection 202
10.2.6 Tool Exchange Position Return 203
11 Operation Support Functions 205
11.1 Program Control 206
11.1.1 Optional Block Skip 206
11.1.2 Optional Block Skip Addition 206
11.1.3 Single Block 207
11.2 Program Test 208
11.2.1 Dry Run 208
11.2.2 Machine Lock 208
11.2.3 Miscellaneous Function Lock 208
11.2.4 Graphic Check 209
11.2.4.1 Graphic Check 209
11.2.4.2 3D Solid Program Check 209
11.2.4.3 Graphic Check Rotary Axis Drawing 210
11.2.5 Graphic Trace 211
11.2.5.1 Graphic Trace 211
11.2.5.2 Graphic Trace Rotary Axis Drawing 212
11.2.6 Machining Time Computation 212
11.2.7 Manual Arbitrary Reverse Run
(Program Check Operation) 213
11.2.8 High-speed Simple Program Check 214
11.3 Program Search/Start/Stop 215
11.3.1 Program Search 215
11.3.2 Sequence Number Search 215
11.3.3 Collation and Stop 216
11.3.4 Program Restart 217
11.3.5 Automatic Operation Start 218
11.3.6 NC Reset 218
11.3.7 Feed Hold 219
11.3.8 Search & Start 219
11.3.10 Auto-restart 219
11.4 Interrupt Operation 220
11.4.1 Manual Interruption 220
11.4.2 Automatic Operation Handle
Interruption 220
11.4.3 Manual Absolute Switch 221
11.4.4 Thread Cutting Cycle Retract 222
11.4.5 Tapping Retract 223
11.4.6 Manual Numerical Value Command 224
11.4.7 Arbitrary Reverse Run 225
11.4.8 MDI Interruption 226
: Standard: Option: Selection
M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80 Class Page
Machining center system
11.4.9 Simultaneous Operation of Manual and
Automatic Modes 226
11.4.10 Simultaneous Operation of JOG and
Handle Modes 226
11.4.11 Reference Position Retract 227
11.4.12 Tool Retract and Return 228
11.4.13 Skip Retract 229
11.4.14 PLC Interruption 229
11.4.16 Machining Interruption 230
12 Program Support Functions 231
12.1 Machining Method Support Functions 232
12.1.1 Program 232
12.1.1.1 Subprogram Control [Layers] 10 10 10 10 10 232
12.1.1.2 Figure Rotation 235
12.1.1.3 Scaling 237

12.1.1.4 Axis Name Switch 238
12.1.2 Macro Program 239
12.1.2.1 User Macro [Layers] 4 4 4 4 4 239
12.1.2.2 Machine Tool Builder Macro 242
12.1.2.3 Macro Interruption 244
12.1.2.4 Variable Command 245
200 sets 245
600 sets 245
700 sets 245
8000 sets 245
(600+100number of part systems) sets 245
(7900+100number of part systems) sets 245
12.1.3 Fixed Cycle 247
12.1.3.1 Fixed Cycle for Drilling 248
12.1.3.2 Fixed Cycle for Drilling (Type II) 253
12.1.3.3 Special Fixed Cycle 254
12.1.3.4 Fixed Cycle for Turning Machining 257
12.1.3.5 Compound Type Fixed Cycle
for Turning Machining 262
12.1.3.6 Compound Type Fixed Cycle
for Turning Machining (Type II) 267
12.1.3.7 Small-diameter Deep-hole Drilling
Cycle 271
12.1.4 Mirror Image 271
12.1.4.1 Mirror Image by Parameter Setting 271
12.1.4.2 Mirror Image by External Input 271
12.1.4.3 Mirror Image by G Code 272
12.1.4.4 Mirror Image for Facing Tool Posts 273
12.1.4.5 T Code Mirror Image for Facing
Tool Posts 273
12.1.5 Coordinate System Operation 274
12.1.5.1 Coordinate Rotation by Program 274
12.1.5.2 Coordinate Rotation by Parameter 276
: Standard: Option: Selection
M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80 Class Page
Machining center system
12.1.5.3 3-dimensional Coordinate Conversion 277
12.1.6 Dimension Input 279
12.1.6.1 Corner Chamfering/Corner R 279
12.1.6.2 Linear Angle Command 286
12.1.6.3 Geometric Command 287
12.1.6.4 Polar Coordinate Command 288
12.1.7 Axis Control 289
12.1.7.1 Chopping 289
12.1.7.1.1 Chopping 289
12.1.7.2 Normal Line Control 290
12.1.7.3 Circular Cutting 291
12.1.7.4 Vibration Cutting Control 292
12.1.8 Multi-part System Control 293
12.1.8.1 Timing Synchronization between
Part Systems 293
12.1.8.2 Start Point Designation Timing
Synchronization 294
12.1.8.3 Mixed Control 297
12.1.8.3.1 Mixed Control
(Cross Axis Control) 297
12.1.8.3.2 Arbitrary Axis Exchange
Control 298
12.1.8.4 Control Axis Superimposition 300
12.1.8.4.1 Control Axis Superimposition 300
12.1.8.4.2 Arbitrary Axis
Superimposition Control 301
12.1.8.5 Control Axis Synchronization
between Part Systems 302
12.1.8.6 Balance Cut 304
12.1.8.7 Common Memory for Part Systems 306
12.1.8.8 Multi-part System Simultaneous
Thread Cutting 306
12.1.8.8.1 Two-part System Simultaneous
Thread Cutting 307
12.1.8.8.2 Multi-part System
Simultaneous Thread Cutting 309
12.1.8.9 Multi-part System Program
Management 310
12.1.8.10 Synchronization between
Part Systems 311
12.1.8.10.1 Single Block between
Part Systems 311
12.1.8.10.2 Dwell/Miscellaneous Function
Time Override 312
12.1.8.10.3 Synchronization between

Part Systems OFF 313
12.1.8.11 Sub Part System Control I 314
12.1.8.12 Sub Part System Control II 316
12.1.8.13 Loader Control Part System 318
: Standard: Option: Selection
M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80 Class Page
Machining center system
12.1.9 Data Input/Output by Program 319
12.1.9.1 Parameter Input by Program 319
12.1.9.2 Compensation Data Input by Program 320
12.1.9.3 Tool/Material Shape Input
by Program 324
12.1.9.5 API Section and Sub-section Nos.
Input/Output by Program 326
12.1.9.6 R-Navi Data Input by Program 326
12.1.10 Machining Modal 327
12.1.10.1 Tapping Mode 327
12.1.10.2 Cutting Mode 327
12.1.11 High-speed Parts Machining 328
12.1.11.1 Rapid Traverse Block Overlap 328
12.2 Machining Accuracy Support Functions 330
12.2.1 Automatic Corner Override 330
12.2.2 Deceleration Check 331
12.2.2.1 Exact Stop Check Mode 333
12.2.2.2 Exact Stop Check 333
12.2.2.3 Error Detection 333
12.2.2.4 Programmable In-position Check 334
12.2.2.5 Automatic Error Detection 334
12.3 High-speed and High-accuracy
Functions [kBPM: k Block per Minute] 335
12.3.1 High-speed Machining Mode 335
12.3.1.1 High-speed Machining Mode I
(G05P1) Maximum [kBPM] 33.7 16.8 33.7 335
12.3.1.2 High-speed Machining Mode II
(G05P2) Maximum [kBPM] 67.5 67.5 67.5 336
12.3.2 High-accuracy Control 337
12.3.2.1 High-accuracy Control (G61.1/G08) 337
12.3.2.2 Multi-part System Simultaneous
High-accuracy Control 341
12.3.2.3 SSS Control (*4) 342
12.3.2.4 Tolerance Control 343
12.3.2.5 Variable-acceleration
Pre-interpolation
Acceleration/Deceleration
344
12.3.2.6 High-accuracy
Acceleration/Deceleration Time
Constant Extension
344
12.3.2.7 Axis-specific Acceleration
Tolerance Control 345
12.3.3 High-speed High-accuracy Control 346
12.3.3.1 High-speed High-accuracy
Control I (G05.1Q1) Maximum [kBPM] 33.7 33.7 33.7 346
12.3.3.2 High-speed High-accuracy
Control II (G05P10000) Maximum [kBPM] 67.5 67.5 67.5 347
12.3.3.3 High-speed High-accuracy
Control III (G05P20000) Maximum [kBPM] 135 135 350
12.3.3.4 Smooth Fairing 351
12.3.4 Machining Condition Selection I 352
: Standard: Option: Selection
M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80 Class Page
Machining center system
12.3.5 Direct Command Mode 352
12.4 Programming Support Functions 353
12.4.1 Playback 353
12.4.3 Interactive Cycle Insertion 354
12.4.4 Simple Programming (NAVI MILL/LATHE) 357
12.4.5 G code Guidance 357
12.4.7 DXF Data Input 358
13 Machine Accuracy Compensation 359
13.1 Static Accuracy Compensation 360
13.1.1 Backlash Compensation 360
13.1.2 Memory-type Pitch Error Compensation

[sets] 16 16 16 16 10 361
13.1.3 Memory-type Relative Position Error
Compensation 362
13.1.4 External Machine Coordinate System
Compensation 363
13.1.5 Circular Radius Error Compensation 363
13.1.6 Ball Screw Thermal Expansion
Compensation 364
13.1.7 Rotation Center Error Compensation 365
13.1.8 Position-dependent Gradually
Increasing-type Backlash Compensation 367
13.1.9 Bidirectional Pitch Error Compensation 368
13.1.10 Cyclic Error Compensation 368
13.1.11 Spatial Error Compensation 369
13.1.12 Backlash Compensation II 370
13.2 Dynamic Accuracy Compensation 371
13.2.1 Smooth High-gain (SHG) Control 371
13.2.2 Dual Feedback 372
13.2.3 Lost Motion Compensation 372
13.2.4 OMR II (Backlash with Filter) 373
13.2.6 OMR-FF 374
13.2.7 Distance-coded Reference Position
Detection 375
13.2.9 Variable Torsion Compensation 376
13.2.10 Cogging Torque Compensation 377
14 Automation Support Functions 379
14.1 Measurement 380
14.1.1 Skip 380
14.1.1.1 Skip 380
14.1.1.2 Multiple-step Skip 382
14.1.1.4 PLC Skip 383
14.1.1.5 Speed Change Skip 383
14.1.1.6 Torque Limitation Skip 384
14.1.2 Automatic Tool Length Measurement 385
14.1.3 Manual Tool Length Measurement 1 388
14.1.4 Manual Tool Length Measurement 2 391
14.1.5 Workpiece Coordinate Offset
Measurement 392
: Standard: Option: Selection
M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80 Class Page
Machining center system
14.1.6 Workpiece Position Measurement 393
14.1.7 Rotation Measurement 395
14.1.8 Rotation Center Error Measurement 396
14.1.9 Workpiece Installation Error
Measurement 397
14.2 Tool Life Management 398
14.2.1 Tool Life Management 398
14.2.1.1 Tool Life Management I 398
14.2.1.2 Tool Life Management II 399
14.2.1.3 Tool Life Management III 399
14.2.2 Number of Tool Life Management Sets 400
99 sets 400
128 sets 400
200 sets 400
256 sets 400
400 sets 400
999 sets 400
14.2.3 Tool Life Management Set Allocation
to Part Systems 402
14.3 Others 404
14.3.1 Programmable Current Limitation 404
14.3.2 Auto Power OFF 404
14.3.4 Load Monitoring I 405
14.3.5 Power ON/OFF Sequence 405
14.3.6 PLC Axis Current Limit 405
14.3.7 Direct Robot Control 406
15 Safety and Maintenance 407
15.1 Safety Switches 408
15.1.1 Emergency Stop 408
15.1.2 Data Protection Key 408
15.2 Display for Ensuring Safety 409
15.2.1 NC Warning 409
15.2.2 NC Alarm 409
15.2.3 Operation Stop Cause 410
15.2.4 Emergency Stop Cause 410
15.2.5 Thermal Detection 410
15.2.6 Battery Alarm/Warning 411
15.3 Protection 412
15.3.1 Stroke End (Over Travel) 412
15.3.2 Stored Stroke Limit 412

15.3.2.1 Stored Stroke Limit I/II 413
15.3.2.2 Stored Stroke Limit IB 415
15.3.2.3 Stored Stroke Limit IIB 415
15.3.2.4 Stored Stroke Limit IC 416
15.3.3 Stroke Check before Travel 417
15.3.4 Chuck/Tailstock Barrier Check 419
: Standard: Option: Selection
M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80 Class Page
Machining center system
15.3.5 Interlock 420
15.3.6 External Deceleration 420
15.3.7 Interference Check III 421
15.3.8 3D Machine Interference Check 423
15.3.9 Door Interlock 424
15.3.9.1 Door Interlock I 424
15.3.9.2 Door Interlock II 426
15.3.10 Parameter Lock 428
15.3.11 Program Protection (Edit Lock B, C) 428
15.3.12 Program Display Lock 428
15.3.13 Data Protection by User's Level 428
15.3.15 Vertical Axis Pull-up 429
15.3.16 Machine Group-based Alarm Stop 429
15.3.17 Interference Check Between
Part Systems 431
15.3.18 Spindle Protection 432
15.4 Maintenance and Troubleshooting 433
15.4.1 Operation History 433
15.4.2 Data Sampling 434
15.4.3 NC Data Backup 434
15.4.4 Servo Tuning Support 435
15.4.4.1 NC Analyzer2 435
15.4.5 Automatic Backup (GOT) 437
15.4.8 Application Error Detection 437
15.4.9 Email Notification to Operator 438
15.4.10 NC Configurator2 439
15.4.11 Diagnosis Data Output 439
15.4.12 Backup/Restore 439
15.4.14 Field Network Diagnostics 440
15.4.15 Remote service iQ Care Remote4U 441
15.4.15.1 Connection with RGU 441
15.4.16 Brake Wear Diagnostics 442
15.5 Functional Safety 443
15.5.1 Safety Observation 443
15.5.2 Smart Safety Observation 444
15.5.2.1 Safety-related I/O Observation 444
15.5.2.2 Emergency Stop Observation 444
15.5.2.3 Drive Safety Function 445
15.5.2.3.1 SLS (Safely-Limited Speed) 445
15.5.2.3.2 SLP (Safely-Limited Position) 445
15.5.2.3.3 SOS (Safe Operating Stop) 445
15.5.2.3.4 SSM (Safe Speed Monitor) 445
15.5.2.3.5 SBC/SBT
(Safe Brake Control/Safe Brake Test) 446
: Standard: Option: Selection
M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80 Class Page
Machining center system
15.5.2.3.6 SCA (Safe Cam) 446
15.5.2.3.7 SS1/SS2 (Safe Stop) 446
15.5.2.3.8 STO (Safe Torque Off) 446
15.5.2.3.9 SCN
(Safety Communication Network) 447
16 Drive System 449
16.1 Servo/Spindle 450
Feed axis -
MDS-E-Vx -
MDS-EH-Vx -
MDS-EJ-Vx -
MDS-EJH-Vx -
MDS-EM-SPVx -
MDS-EMH-SPVx -
Spindle -
MDS-E-SPx -
MDS-EH-SPx -
MDS-EJ-SPx -

MDS-EM-SPVx -
MDS-EMH-SPVx -
Power supply -
MDS-E-CV -
MDS-EH-CV -
MDS-EX-CVP -
17 Machine Support Functions 451
17.1 PLC 452
17.1.1 Built-in PLC Processing Mode 452
17.1.2 PLC Functions 452
17.1.2.1 Built-in PLC Basic Function
(MELSEC) 452
17.1.2.1.1 Index Modification
(MELSEC) 455
17.1.2.1.2 Multi-program
[Number of Programs] 60 60 60 60
(MELSEC) 455
17.1.2.1.3 Multi-project
[Number of Projects Stored] 456
Number of PLC projects: 2 456
Number of PLC projects: 3 456
Number of PLC projects: 6 456
17.1.2.1.4 Function Block (FB)
(MELSEC) 456
17.1.2.1.5 Label Programming
(MELSEC) 456
17.1.2.2 PLC Exclusive Instruction
(MELSEC) 457
17.1.2.3 Enhanced PLC Security Mode 459
17.1.3 PLC Support Functions 460
17.1.3.1 Alarm Message Display 460
: Standard: Option: Selection
M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80 Class Page
Machining center system
17.1.3.2 Operator Message Display (*5) 460
17.1.3.3 Memory Switch (PLC Switch) 461
17.1.3.3.1 Memory Switch (PLC Switch)
32 Points 461
17.1.3.3.2 Memory Switch (PLC Switch)
64 Points 461
17.1.3.3.3 Memory Switch (PLC Switch)
96 points 461
17.1.3.4 Load Meter Display 462
17.1.3.5 User PLC Version Display 462
17.1.3.6 Ladder Program Writing during RUN
(MELSEC) 462
17.1.3.7 PLC Program Protection
(MELSEC) 462
17.1.4 Built-in PLC Capacity 463
17.1.4.1 Standard PLC Capacity
[Number of Steps] 64K 32K 20K 20K
(MELSEC) 463
17.1.4.2 Large PLC Capacity: 256 Ksteps 463
17.1.4.3 Large PLC Capacity: 512 Ksteps 463
17.1.5 Machine Contact Input/Output I/F
(MELSEC) 463
17.1.6 Ladder Monitor (GOT) 464
17.1.7 PLC Development 465
17.1.7.1 On-board Development (GOT) 465
17.1.7.2 MELSEC Development Tool
(GX Developer) 465
17.1.7.3 MELSEC Development Tool
(GX Works2) 465
17.1.7.4 MELSEC Development Tool
(GX Works3) 466
17.1.8 PLC Parameter 466
17.1.8.1 PLC Constant (150 Points) 466
17.1.8.2 PLC Constant Extension
(Up to 750 Points) 466
17.1.9 GOT Connection 467
17.1.9.1 Ethernet Connection 467
17.1.9.2 CC-Link Connection
(MELSEC) 467
17.1.9.3 CC-Link IE Field Connection
(MELSEC) 467
17.1.10 Pallet Program Registration 468
17.2 Machine Construction 469
17.2.1 Servo OFF 469
17.2.2 Axis Detachment 470
17.2.3 Synchronous Control 471
17.2.4 Inclined Axis Control 475

17.2.5 Position Switch 24 24 24 24 (*6) 476
17.2.7 Index Table Indexing 477
17.2.8 Tool Length Compensation along
the Tool Axis 479
17.2.9 Tool Handle Feed & Interruption 480
: Standard: Option: Selection
M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80 Class Page
Machining center system
17.2.10 Tool Center Coordinate Display 480
17.2.11 Tool Center Point Control 481
17.2.11.1 Tool Center Point Control
(G43.4/G43.5) (*7) 481
17.2.12 Inclined Surface Machining Command 484
17.2.13 Simple Inclined Surface Machining
Command 486
17.2.14 3-dimensional Tool Radius
Compensation (Tool's
Vertical-direction Compensation)
488
17.2.15 Workpiece Installation Error
Compensation 489
17.2.16 3-dimensional Manual Feed 490
17.2.17 R-Navi 491
17.2.18 Simple Synchronous Control 493
17.2.20 Real-time Tuning 494
17.2.20.1 Real-time Tuning 1 (Speed Gain) 494
17.2.20.2 Real-time Tuning 2 (Rapid
Traverse Time Constant) 495
17.2.21 Constant Torque Control 496
17.2.22 External Encoder Position Output I/F 497
17.2.23 Multiple-axis Synchronization Control 498
17.2.24 Hypothetical Linear Axis Control 499
17.2.25 BiSS Encoder I/F 500
17.2.26 Tool Head Hot Swapping 501
17.3 PLC Operation 502
17.3.1 Arbitrary Feed in Manual Mode 502
17.3.2 Circular Feed in Manual Mode 503
17.3.3 PLC Axis Control 505
17.3.5 PLC Axis Indexing 506
17.3.6 NC Axis/PLC Axis Switchover 508
17.4 PLC Interface 509
17.4.1 CNC Control Signal 509
17.4.2 CNC Status Signal 510
17.4.3 PLC Window 512
17.4.4 External Search 513
17.4.5 Direct Screen Selection 513
17.4.6 Buzzer Sound Control 514
17.5 Machine Contact I/O 515
17.5.1 Operation Panel I/O 515
17.5.1.1 DI:64/DO:64 515
17.5.1.2 DI:64/DO:64 + SDI:8 515
17.5.1.3 DI:96/DO:64 515
17.5.1.5 DI:64/DO:48/AO:1 515
17.5.2 Remote I/O 516
17.5.2.1 DI:32/DO:32 516
17.5.2.2 DI:64/DO:48 516
17.5.2.3 DI:64/DO:48 + AO:1 516
: Standard: Option: Selection
M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80 Class Page
Machining center system
17.5.2.5 DI:16/DO:8 516
17.5.2.6 DI:32/DO:32 + SDI:8/SDO:4 516
17.5.2.7 SDI:8/SDO:4 516
17.6 External PLC Link 517
17.6.1 CC-Link (Master/Local)
(MELSEC) 517
17.6.2 PROFIBUS-DP (Master)
(MELSEC) 523
17.6.3 CC-Link IE Field (Master/Local)
(MELSEC) 524
17.6.4 PROFINET
(MELSEC) 525
17.6.5 EtherNet/IP
(MELSEC) 526

17.6.8 FL-net
(MELSEC) 527
17.6.9 DeviceNet (Master)
(MELSEC) 527
17.6.10 CC-Link IE Field Basic 528
17.7 Installing S/W for Machine Tools 530
17.7.1 Customization (NC Designer2) 530
17.7.1.1 Customization Data Storage
Capacity [MB] 6 6 1 1 532
17.7.1.2 Customization Working Memory Size
[MB] 3 3 1 1 532
17.7.2 User-defined Key 532
17.7.3 EZSocket I/F 532
17.7.4 APLC Release 533
17.7.5 Custom API Library 534
17.7.6 MES Interface Library 534
17.7.7 SLMP Server 535
17.7.8 Numerical Control (CNC) Communication
Software FCSB1224W000 536
17.7.10 GOT2000 Screen Design Tool GT Works3 536
17.8 Others 537
17.8.1 System Lock 537
17.8.2 CNC Remote Operation Tool 537
17.8.2.1 NC Monitor2 537
17.8.2.2 NC Explorer 537
17.8.3 Automatic Operation Lock 537
17.8.4 Power Consumption Computation 538
17.8.5 EcoMonitorLight Connection 538
17.8.6 GOT Window 539
17.8.7 Log Viewer 540
(*1)Up to one rotary axis.
(*4)eSSS
(*5)Only the macro alarm message
can be displayed.
(*6)24 points for each part system and
32 points for the whole PLC axes.
(*7)Restrained to 4-axis simultaneous contouring
(*8)Up to 2000 programs for C80

1 Control Axes

1.1 Control Axes
The NC axis, spindle, PLC axis and auxiliary axis are generically called the control axis.
The NC axis is an axis that can be manually operated, or automatically operated with the machining program. X, Y, Z, U, V, W, A, B and C axis can be used.
The PLC axis is an axis that can be controlled from the PLC ladder.
1.1.1 Number of Basic Control Axes (NC Axes)
1.1.2 Max. Number of Axes (NC Axes + Spindles + PLC Axes)
A number of axes that are within the maximum number of axes, and that does not exceed the maximum number given for the NC axis, spindle and PLC axis can be used.
Connection specifications of NC axis, PLC axis and spindle:
NC axes, PLC axes and spindles (except for analog spindles) are connected to the high-speed optical servo communication (OPTH).
Refer to the Connection and Setup Manual for details.
1.1.2.1 Max. Number of NC Axes (In Total for All the Part Systems)
(*1) Up to one rotary axis.
1.1.2.2 Max. Number of Spindles
(*1) G/B : Guide Bush
Includes analog spindles.
1.1.2.3 Max. Number of PLC Axes
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M 3 3 3 3 3 3 3 3 3 3
L 2 2 2 2 2 2 2 2 2 2
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M 16
32
16
32
16
32
16

32
11 11 9 6 4 16
L 16
32
16
32
16
32
16
32
12 12 9 8 6 16
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M 16 16 16 16 8 8 65 (*1)3 16
L 16
32
16
32
16
32
16
32
10 10 7 5 4 16
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M 4444222117
L 8 8 8 84+G/B (*1)5 4 3 3 7
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M 8888666208
L 8888666338
M800/M80/E80/C80 Series Specifications Manual (Function)
1 Control Axes
3 IB-1501505-N
1.1.4 Max. Number of PLC Indexing Axes
PLC axis indexing function: This function is used to move the PLC axis to the positioning destination or an arbitrary coordinate position.
1.1.5 Number of Simultaneous Contouring Control Axes
Simultaneous control of all axes is possible as a principle in the same part system.
However, for actual use, the machine tool builder specification will apply.
1.1.6 Max. Number of NC Axes in a Part System
(*1) Up to one rotary axis.
Listed are the maximum number of axes which can be controlled in a part system. Follow the specifications by each machine tool builder for actual use.
1.1.7 Axis Name Extension
The axis name (command axis name) to perform the absolute/incremental command to NC control axis can be expanded to two letters. Because the command axis name while this function is invalid is set with one letter from A, B, C, U, V, W, X, Y or Z, when the incremental command axis name is used (two letters of the alphabet are used per one axis), the number of axes is limited. The incremental command axis name can be used to all axes by this function. The name extension axis cannot be designated to the parameter which sets the command axis name such as axes configuring plane I, J or K. Thus, apply this function to miscellaneous axis which is not used for machining (cutting).
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M 8 8 8 8 4 4 4 1 0 8
L 8 8 8 8 4 4 4 1 1 8
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M 8 4 8 4 4 4 4 4 3 4

L 8 4 8 4 4 4 4 4 4 4
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M 8
 12
 8
 12
 8
 12
 8
 12 8 8 5 5 (*1) 3 8
L 8
 12
 8
 12
 8
 12
 8
 12
885548
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
M800/M80/E80/C80 Series Specifications Manual (Function)
1 Control Axes
IB-1501505-N 4
1.2 Control Part System
1.2.1 Standard Number of Part Systems
1.2.2 Max. Number of Part Systems (Main + Sub)
(*1) The 3rd part system is only for the loader part system.
For actual use, the machine tool builder specification will apply.
1.2.2.1 Max. Number of Main Part Systems
1.2.2.2 Max. Number of Sub Part Systems
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M 1 1 1 1 1 1 1 1 1 1
L 1 1 1 1 1 1 1 1 1 1
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M 2
 3 (*1)
 2
 3 (*1)
 2
 3 (*1)
 2
 3 (*1) 2 2 1 1 1 7
L 4
 8
 4
 8
 4
 8
 4
 8 4 4 2 1 1 7
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80

M 2 2 2 2 2 2 1 1 1 7
L 4
8
4
8
4
8
4
8 2 2 2 1 1 7
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M 2 2 2 2
L 4
8
4
8
4
8
4
8 2 2 1 2
M800/M80/E80/C80 Series Specifications Manual (Function)
1 Control Axes
5 IB-1501505-N
1.3 Control Axes and Operation Modes
1.3.1 Tape (RS-232C Input) Mode
In this mode, operation is performed using the machining program data from the RS-232C interface built in the CNC unit.
A paper tape reader must be provided if machining programs on paper tape are to be run.
1.3.2 Memory Mode
The machining programs stored in the memory of the CNC unit are run.
1.3.3 MDI Mode
The MDI data stored in the memory of the CNC unit is executed. Once executed, the MDI data is set to the "setting incomplete" status, and the data will not be executed unless the "setting completed" status is established by screen operations.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
M800/M80/E80/C80 Series Specifications Manual (Function)
1 Control Axes
IB-1501505-N 6
1.3.4 High-Speed Program Server Mode
1.3.4.1 Control Unit-side High-speed Program Server Mode
The machining program stored in SD card can be operated by installing a SD card in the control unit SD card interface.
From this, mass capacity and multi-process machining can be done.
Machining programs can be copied to SD card with the front SD card or Ethernet on the input/output screen.
When a machining program stored in SD card is searched while "DS" (Data server) is selected for device during operation search, the machining program in SD card can be operated as a main program. ("Memory mode" is used as the operation mode.)
Also, when "M198 Pp;" is commanded in the main program, the machining program in SD card can be called and operated as a sub program.
Macros such as WHILE, IF and GOTO can be used. Also, calling the sub program and macro program stored in memory or SD card is possible.
1.3.4.2 Display Unit-side High-speed Program Server Mode
* Specifications of separated-type display are classified with "Windows-based" and "non-Windows-based"
The machining program stored in the built-in disk of the display unit can be operated.
The built-in disk of the display unit is mounted in the personal computer for M800W/M80W.

For M800S/M80/E80, the SD card inserted into SD card I/F on the back of the display unit is equivalent to the built-in disk of the display unit.
When a machining program stored in the built-in disk of the display unit is searched while "HD" (M800W/M80W) or "DS" (M800S/M80/E80) is selected for device during operation search, the machining program in the built-in disk of the display unit can be operated as a main program. ("Memory mode" is used as the operation mode.)
Also, when "M98 Pp ,Dd;" ("d" for designating a unit) is commanded in the main program, the machining program in the built-in disk of the display unit can be called and operated as a sub program.
Macros such as WHILE, IF and GOTO can be used. Also, calling the sub program and macro program stored in memory or the built-in disk of the display unit is possible.
1.3.4.3 FTP High-speed Program Server Mode
This function allows high-speed transfer of machining programs from the FTP server to the large-capacity buffer memory in CNC CPU via Ethernet to execute the program.
The buffer memory has 20 MB of data capacity; however, the memory does not retain machining programs when the power is turned OFF.
If the FTP server function of GOT is used, programs stored in such as a USB memory of GOT can be transferred and operated. ("Tape mode" is used as the operation mode.)
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M / / /
L / / /
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
M800/M80/E80/C80 Series Specifications Manual (Function)
1 Control Axes
7 IB-1501505-N
1.3.5 Front-side SD Card Mode
The machining program stored in a SD card can be operated. This SD card is installed to the front-side SD card I/F.
When a machining program stored in SD card is searched while "Memory Card" is selected for device during operation search, the machining program in SD card can be operated as a main program. ("Memory mode" is used as the operation mode.)
Also, when "M98 Pp, Dd;" ("d" for designating a unit) is commanded in the main program, the machining program in SD card can be called and operated as a sub program.
Macros such as WHILE, IF and GOTO can be used. Also, calling the sub program and macro program stored in memory or SD card is possible.
1.3.6 Front-side USB Memory Mode
The control is able to run a machining program stored in a USB memory when it is inserted into the front USB port of the display unit.
USB memory may be pulled off due to the machine vibration depending on the environment. Use this function at your own risk.
USB memory mode enables you to handle the same programs as for memory mode. In addition you can handle the greater number of large-capacity programs.
When a machining program stored in the USB memory is searched while USB is selected for device during operation search, the machining program in the USB memory can be operated as a main program. ("Memory mode" is used as the operation mode.)
Also, when "M98 Pp ,Dd;" ("d" for designating a unit) is commanded in the main program, the machining program in the USB memory can be called and operated as a sub program.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80

M
L
Display unit
Front USB port of the display unit

2.1 Data Increment
2.1.1 Least Command Increment
[M system]
[L system]
The data increment handled in the controller includes the input setting increment, PLC increment and machine error compensation increment. Each type is set with parameters.
(1) Input setting increment
The input setting increment applies to the data entered from or displayed in the Monitor or other screens, the travel distance per pulse of manual pulse generator, machining programs, and maintenance data. (Excluding PLC increment and machine error compensation increment mentioned below.) This increment is applied per part system (1st to the maximum part system within the specification, PLC axis).
(Note) The inch and metric systems cannot be used together.
Least command increment
(input setting increment) M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
1m (1m)
0.1m (0.1m)
0.01m (10nm)
0.001m (1nm)
Least command increment
(input setting increment) M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
1m (1m)
0.1m (0.1m)
0.01m (10nm)
0.001m (1nm)
Input setting
increment
(parameter)
Metric unit system Inch unit system
Linear axis Rotary axis Linear axis Rotary axis
(Unit = mm) (Unit =) (Unit = inch) (Unit =)
1m (B) 0.001 0.001 0.0001 0.001
0.1m (C) 0.0001 0.0001 0.00001 0.0001
10nm (D) 0.00001 0.00001 0.000001 0.00001
1nm (E) 0.000001 0.000001 0.0000001 0.000001

(2) PLC increment
PLC increment is used for setting and display of PLC interface. Input-output to ladder is handled with this increment. (excluding machine error compensation increment) This increment is applied per part system.
(Example)
When writing to 90 degree for A axis and 180 degree for C axis on the A-C axis configuration with using a rotary axis angle designation (*).
- When PLC increment is 1m(B).
- When PLC increment is 1nm(E).
(*) Rotary axis angle designation
R2628-2629: part system1, 1st rotary axis of the mechanical axis angle 0 to 720000(1/1000) (When PLC increment is 1m(B))
R2630-2631: part system1, 2nd rotary axis of the mechanical axis angle 0 to 720000(1/1000) (When PLC increment is 1m(B))
(3) Machine error compensation increment
Machine error compensation increment is used for setting and display of machine error compensation amount. This increment is applied per part system.
This increment is applied for following parameters and PLC interface.
(a) Backlash compensation (parameter)
This function compensates for the error (backlash) produced when the direction is reversed.
(b) Pitch error compensation (parameter)
This function compensates for the errors in pitch intervals of ball screws.
(c) Machine rotation center error compensation (parameter)
This function compensates for the errors difference between the center of the actual rotary axis and the center of programmed rotary axis.

(d) External machine coordinate system compensation (PLC interface)
This function shifts the coordinate system by PLC.
(e) Ball screw thermal displacement compensation (PLC interface)
This function compensates for axis feed error caused by the ball screw thermal expansion, etc.
90 1000 = 90000 [DMOV K90000 R2628]
180 1000 = 180000 [DMOV K180000 R2630]
1/1000
<A axis>
Angle System unit
<C axis>
90 1000000 = 90000000 [DMOV K90000000 R2628]
180 1000000 = 180000000 [DMOV K180000000 R2630]
1/1000000
<A axis>
Angle System unit
<C axis>

2.1.2 Least Control Increment
[M system]
[L system]
The least control increment determines the CNC's internal operation accuracy.
The control increment (the unit of the NC internal position data) and output increment (the unit of the data communicated to the drive unit) can be set individually.
2.1.3 Indexing Increment
This function limits the command value for the rotary axis.
This can be used for indexing the rotary table, etc. It is possible to cause a program error with a program command other than an indexing increment (parameter setting value).
(Example)When the indexing increment setting value is 2 degrees, only command with the 2-degree increment are possible.
G90 G01 C102.000 ; Moves to the 102 degree angle.
G90 G01 C101.000 ; Program error
G90 G01 C102 ; Moves to the 102 degree angle. (Decimal point type II)
Least control increment M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
0.01m (10nm)
0.001m (1nm)
Least control increment M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
0.01m (10nm)
0.001m (1nm)
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L

2.2 Unit System
2.2.1 Inch/Metric Changeover
The unit systems of the data handled in the controller include the metric unit system and inch unit system. The unit (inch/mm) for the setting and display, as well as for the handle/incremental feed can be switched with either the parameters or machining program (G20/G21 command).
An additional specification is required when the unit is switched with the machining program command.
(Note) For the angle data, 1.0 means 1 degree () regardless of the unit system.
(Note 1) The parameter changeover is valid after the power is turned ON again.
(Note 2) The unit system for the PLC axis can be switched with a parameter different from the one used with the NC axis.
The PLC axis unit system cannot be switched with the machining program (G20/G21 command).
(Note 3) When the power is turned ON or resetting is performed, the command increment depends on the parameter setting.
2.2.2 Input Command Increment Tenfold
The program's command increment can be multiplied by an arbitrary scale with the parameter designation.
This function is valid when a decimal point is not used for the command increment.
For example, this function allows a CNC unit, for which the command increment is set to 1m, to run a machining program, which has been created with a 10m input command increment, as same as before.
The scale is set with the parameters.
(Note 1) This function cannot be used for the dwell function G04_X_(P_);.
(Note 2) This function cannot be used for the compensation amount of the tool offset input.

(Note 3) This function can be used when decimal point type I is valid, but cannot be used when decimal point type II is valid.
(Note 4) This function cannot be used for a tool shape setting command (in G10L100 format).
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
Unit system Length data Meaning
Metric unit system 1.0 1.0mm
Inch unit system 1.0 1.0inch
Parameter
Data
Machining program
Screen data (Compensation amount, user
parameter, counter, etc.) /
Feedrate of handle, etc.
Machine parameter /
PLC interface machine position, etc.
A
0 G20 Inch unit system Metric unit system
Not affected G21 Metric unit system
1 G20 Inch unit system Inch unit system G21 Metric unit system
B
0
Not affected Not affected Metric unit system
1 Inch unit system
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
M800/M80/E80/C80 Series Specifications Manual (Function)
2 Input Command
IB-1501505-N 14
2.3 Program Format
2.3.1 Program Format
This is G code (program) format.
The G-code of lathe system is selected by parameter.
This manual explains the G function with G-code list 3 as standard.
2.3.1.1 Format 1 for Lathe (G Code List 2, 3)
2.3.1.2 Format 2 for Lathe (G Code List 4, 5)
2.3.1.3 Special Format for Lathe (G Code List 6, 7)
2.3.1.4 Format 1 for Machining Center
2.3.1.5 Format 2 for Machining Center (M2 Format)
2.3.1.6 MITSUBISHI CNC Special Format
The formats of the turning fixed cycles (G77 to G79), compound type fixed cycle for turning machining (G71 to G76) and the fixed cycle for drilling (G80 to G89) can be switched to the MITSUBISHI CNC special formats.
(Note) There is a specification (zigzag thread cutting) for specific machine tool builder.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M

L
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
M800/M80/E80/C80 Series Specifications Manual (Function)
2 Input Command
15 IB-1501505-N
2.3.2 Program Format Switch
Program format switch is a function designed to switch the program format (G code list) using G codes or PLC signal. While the switch is active, the control runs a program based on the switched G code list. When you run a lathe-based multi-tasking machine, and if you change to the G code list of Machining center system, you can use a free-curved surface machining program made with CAM without modifying the program.
[Switchover using G codes (G code method)]
Command format
Program format switch ON
When G188 is given, the control switches the L-system program format to M-system (G code list 1 (Command type II)). The control runs the next and subsequent program blocks based on the M-system G code list.
Program format switch cancel
When G189 is given, the control switches the M-system program format back to L-system (a system selected by command type parameter). The control runs the next and subsequent program blocks based on the L-system G code list.
Program example
[For G code list 2]
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
G188 ; Change to M-system G code list (G code list 1 (Command type II))
G189 ; Change back to L-system G code list (G code list determined by command type parameter)
O1
:
L-system
(G code list 2 (Command type III)
G188; Enable "Program format switch"
G90 G00 X20. Z200.;
G91 G01 X30. Z180. F100;
:
M-system
(G code list 1 (Command type II))
G189; Disable "Program format switch"
: L-system
(G code list 2 (Command type III)
M800/M80/E80/C80 Series Specifications Manual (Function)
2 Input Command
IB-1501505-N 16
[Switchover using PLC signal (PLC I/F method)]
(Note) A switchover using the PLC I/F method is unavailable during automatic operation.
G code method and PLC I/F method are distinguished in the following points:
PFCHR ON; Change to M-system G code list (G code list 1 (Command type II))
PFCHR OFF; Change back to L-system G code list (G code list determined by command type parameter)
G code method This switches by G188/G189 commands in cycle operation.
(e.g. to switch the format dynamically for some machining processes)
PLC I/F method This switches by PLC signal not in cycle operation.
(e.g. to enable the switched state at the time of power up)
Program format switch

request (PFCHR)
Program format being
switched (PFCHS)
In automatic operation
(OP)
Run a program based on the M-system G code list

2.4 Command Value
2.4.1 Decimal Point Input I, II
There are two types of the decimal point input commands and they can be selected by parameter.
(1) Decimal point input type I
When axis coordinates and other data are issued in machining program commands, the assignment of the program data can be simplified by using a decimal point. The minimum digit of a command not using a decimal point is the same as the least command increment.
The decimal point can be applied not only to axis coordinate position but also to speed commands and dwell commands.
The decimal point position serves as the millimeter unit in the metric mode, as the inch unit in the inch mode and as the second unit in a time designation of dwell command.
(2) Decimal point input type II
As opposed to type I, the minimum digit of a command without a decimal point serves as the millimeter unit in the metric mode, as the inch unit in the inch mode and as the second unit in the time designation.
The "." (point) must be added when commands below the decimal point are required.
(*1) The F unit is mm/min for either type (inch system : inch/min).
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
Unit interpretation (for metric system)
Type I Type II
G00 X100. Y-200.5 X100mm, Y-200.5mm <-
G1 X100 F20. X100m, F20mm/min X100mm, F20mm/min
G1 Y200 F100 (*1) Y200m, F100mm/min Y200mm, F100mm/min
G4 X1.5 Dwell 1.5s <-
G4 X2 Dwell 2ms Dwell 2s

2.4.2 Absolute/Incremental Command
(1) M system
When axis coordinate data is issued in a machining program command, either the incremental command method (G91) that commands a relative distance from the current position or the absolute command method (G90) that moves to a designated position in a predetermined coordinate system can be selected.
The absolute and incremental commands can be both used in one block, and are switched with G90 or G91.
However, the arc radius designation (R) and arc center designation (I, J, K) always use incremental designations.
The absolute and incremental commands are switched with G190 and G191 depending on G code list.
G90, G190 ... Absolute command
G91, G191 ... Incremental command
These G codes can be commanded multiple times in one block.
(2) L system
When axis coordinate data is issued in a machining program command, either the incremental command method that commands a relative distance from the current position or the absolute command method that moves to a designated position in a predetermined coordinate system can be selected.
When issuing an incremental command, register the axis address to be commanded as the incremental axis name in the parameter. However, the arc radius designation (R) and arc center designation (I, J, K) always use incremental designations.
Absolute command ... X, Z
Incremental command ... U, W
(Note) Absolute command and incremental command can be switched by the parameter. In addition to the command method using the axis addresses as indicated above, a command method using G code (G90/G91 or G190/G191) may be selected.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L

2.4.3 Diameter/Radius Designation
For axis command value, the radius designation or diameter designation can be changed over with parameters.
When the diameter designation is selected, the scale of the length of the selected axis is doubled.
(Only the half (1/2) of the commanded amount moves.)
This function is used when programming the workpiece dimensions on a lathe as diameters.
Changing over from the diameter designation to the radius designation or vice versa can be set separately for each axis.
When the tool is to be moved from point P1 to point P2

SP Spindle
Radius and diameter commands
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
X command U command Remarks
Radius Diameter Radius Diameter Even when a diameter command has been selected, only
the U command can be made a radius command by
parameter. X = r1 X = 2r1 U = r2 U = 2r2
r1
r2
P1
P2
SP
X
Z

2.4.4 Diameter/Radius Designation Switch
The method of commanding a travel distance (command with a diameter dimension/command with a radius dimension (as-is distance)) in a program is defined individually for each axis using the parameter. Diameter/Radius designation switch function; however, enables you to switch the diameter/radius designation of each axis using a G code at your desired timing. When you use the function to switch diameter/radius designation, it helps you create a program more flexibly, from turning to milling, according to each machining situation.
Command format
Diameter/Radius designation switch
Diameter/Radius designation switch enables you to select any desired NC axis, excluding rotary axes, and switch the diameter/radius designation of the axis.
If you select no axis address, the diameter/radius designation statuses of all the axes of the part system are returned to the initial power-on state.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
G10.9 Axis address 1__Axis address 2__ ... Axis address n__ ;
Axis address n : Axis address for which diameter/radius designation is switched
Select radius or diameter designation with a value that follows the axis address.
0: Radius designation
1: Diameter designation
X X
Z Z
Radius
designation
Diameter
designation
Diameter/Radius designation for
X axis is switched with G code

3.1 Positioning
3.1.1 Positioning
This function carries out high-speed positioning following the movement command given in a program.
The above command positions the tool with rapid traverse rate. The tool path takes the shortest distance to the end point in the form of a straight line.
For details on the rapid traverse feed rate of the NC, refer to the section entitled "Rapid Traverse Rate".
Since the actual rapid traverse feed rate depends on the machine, refer to the specifications of the machine concerned.
(1) The rapid traverse feed rate can be set for each axis with parameters.
(2) The number of axes which can be commanded simultaneously depends on the specifications (number of simultaneously controlled axes). The axes can be used in any combination within this range.
(3) The feed rate is controlled within the range that it does not exceed the rapid traverse rate of each axis and so that the shortest time is taken. (Linear type)
Parameter setting enables movement at the rapid traverse rates of the respective axes independently for each axis.
In this case, the tool path does not take the form of a straight line to the end point. (Non-Linear type)
(4) The tool is always accelerated at the start of the program command block and decelerated at the end of the block.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA

E80
TypeB C80
M
L
G00 Xx1 Yy1 Zz1 ;(Also possible for additional axes A, B, C, U, V, W simultaneously)
Xx1, Yy1, Zz1 :Position data

3.1.2 Unidirectional Positioning
The G60 command always moves the tool to the final position in a direction determined with parameters.
The tool can be positioned without backlash.
The parameter setting enables G60 to switch between G code group 0 (unmodal) and G code group 01 (modal).
With the above command, the tool is first moved to a position distanced from the end point by an amount equivalent to the creep distance (parameter setting) with rapid traverse and then moved to its final position.
For details on the rapid traverse feed rate of the NC, refer to the section entitled "Rapid Traverse Rate".
Since the actual rapid traverse feed rate depends on the machine, refer to the specifications of the machine concerned.
Positioning to the final point is shown below (when this positioning is in the "+" direction.)
(Note 1) The processing of the above pattern will be followed even for the machine lock and Z-axis command cancel.
(Note 2) On the creep distance, the tool is moved with rapid traverse.
(Note 3) G60 is valid even for positioning in drilling in the fixed cycle.
(Note 4) When the mirror image function is on, the tool will be moved in the reverse direction by mirror image as far as the interim position, but operation over the creep distance with the final advance will not be affected by the mirror image.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
G60 X__ Y__ Z__ ;(Also possible for additional axes A/B/C/U/V/W simultaneously)
X/Y/Z :Position data
+ -

3.2 Linear/Circular Interpolation
3.2.1 Linear Interpolation
Linear interpolation is a function that moves a tool linearly by the movement command value supplied in the program at the cutting feed rate designated by the F code.
Linear interpolation is executed by the above command at the f1 feed rate. The tool path takes the shortest distance to the end point in the form of a straight line.
For details on the f1 command values for NC, refer to the section entitled "Cutting Feedrate".
Since the actual cutting feed rate depends on the machine, refer to the specifications of the machine concerned.
(1) The number of axes which can be commanded simultaneously depends on the specifications (number of simultaneously controlled axes). The axes can be used in any combination within this range.
(2) The feed rate is controlled so that it does not exceed the cutting feed rate clamp of each axis.
(3) When a rotary axis has been commanded in the same block, it is treated as a linear axis in degree() units (1 = 1mm), and linear interpolation is performed.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
G01 Xx1 Yy1 Zz1 Ff1 ; (Also possible for additional axes A, B, C, U, V, W simultaneously)
Xx1,Yy1,z1 :Position data
Ff1 :Feed rate data

3.2.2 Circular Interpolation (Center/Radius Designation)
(1) Circular interpolation with I, J, K commands
This function moves a tool along a circular arc on the plane selected by the plane selection G code with movement command supplied in the program.
The above commands move the tool along the circular arc at the f1 feed rate. The tool moves along a circular path, whose center is the position from the start point designated by distance "i1" in the X-axis direction and distance "j1" in the Y-axis direction, toward the end point.
(a) The axes that can be commanded simultaneously are the two axes for the selected plane.
(b) The feed rate is controlled so that the tool always moves at a speed along the circumference of the circle.
(c) Circular interpolation can be commanded within a range extending from 0 to 360 .
(d) The max. value of the radius can be set up to six digits above the decimal point.
(Note 1) The arc plane is always based on the G17, G18 or G19 command. If a command is issued with two addresses which do not match the plane, an alarm will occur.
(Note 2) The axes configuring a plane can be designated by parameters. Refer to the section entitled "Plane Selection".
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB

E80
TypeA
E80
TypeB C80
M
L
G02(G03) Xx1 Yy1 Ii1 Jj1 Ff1 ; (Also possible for additional axes A, B, C, U, V, W)
G02,G03
Xx1,Yy1
Ii1,Jj1
Ff1
: Arc rotation direction
: End point coordinate
: Arc center
: Feed rate
The direction of the arc rotation is specified by G02 or
G03.
G02: Clockwise (CW)
G03: Counterclockwise (CCW)
The plane is selected by G17, G18 or G19.
G17: XY plane
G18: ZX plane
G19: YZ plane
(Example) See below for examples of circular
commands.
G17 G18 Y X
Y
Z
X Z
G19
G02 G02
G02
G03 G03
G03
F
Y
X
I,J
Start
point
Center
End
point

(2) R-specified circular interpolation
Besides the designation of the arc center coordinates using the above-mentioned I, J and K commands, arc
commands can also be issued by designating the arc radius directly.
G02 or G03 is used to designate the direction of the arc rotation.
The arc plane is designated by G17, G18 or G19.
The arc center is on the bisector which orthogonally intersects the segment connecting the start and end points, and
the point of intersection with the circle, whose radius has been designated with the start point serving as the center,
is the center coordinate of the arc command.
When the sign of the value of R in the command program is positive, the command will be for an arc of 180 or less;
when it is negative, it will be for an arc exceeding 180 .
(Note 1) The arc plane is always based on the G17, G18 or G19 command. If a command is issued with two
addresses which do not match the plane, an alarm will occur.
G02(G03) Xx1 Yy1 Rr1 Ff1 ; (Also possible for additional axes A, B, C, U, V, W)
G02,G03
Xx1,Yy1
Rr1
Ff1
: Arc rotation direction
: End point coordinate
: Arc radius
: Feed rate

3.2.3 Helical Interpolation
With this function, any two of three axes intersecting orthogonally are made to perform circular interpolation while the
third axis performs linear interpolation in synchronization with the arc rotation. This simultaneous 3-axis control can move
helically to machine and be exercised to machine large-diameter screws or 3-dimensional cams.
This is commanded by combining a height axis to the circular interpolation command.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
Program command path XY plane projection path
(S) Start point
(E) End point

Program command path
Circular interpolation components
Linear interpolation components
Z
(S) Y
(E)
X
Y
X
(E)
(S)

Command format
[M system]
The arc center coordinate values and arc radius are commanded by the input increment. Pay attention to the case of the helical interpolation command of the axis which has a different input command increment.
To prevent confusion, command with a decimal point.
Absolute and incremental commands can be used for the arc end point coordinates and the end point coordinates of the linear axis, but incremental commands must be used for the arc center coordinates.
When executing the pitch command with ",P" address, the program error occurs.
[L system]
(Note 1) Indicates as I axis: X, J axis: Y, and K axis: Z.
(Note 2) When commanding "P" and ",P" for the number of pitches together, the command value ",P" is prioritized.
(1) The arc plane is designated by G17, G18 or G19.
(2) G02 or G03 is used to designate the direction of the arc rotation.
(3) Absolute and incremental commands can be used for the arc end point coordinates and the end point coordinates of the linear axis, but incremental commands must be used for the arc center coordinates.
(4) The linear interpolation axis is the other axis which is not included in the plane selection.
(5) Command the speed in the component direction that represents all the axes combined for the feed rate.
Pitch L is obtained by the formula below.
Where xs, ys are the start point coordinates (0<2)
xe, ye are the end point coordinates
The combination of the axes which can be commanded simultaneously depends on the specifications. The axes can be used in any combination under the specifications.
The feed rate is controlled so that the tool always moves at a speed along the circumference of the circle.
G17 G02/G03 X__ Y__ Z__ I__ J__ P__ F__ ; Helical interpolation command (Specify arc center)
G17 G02/G03 X__ Y__ Z__ R__ F__ ; Helical interpolation command (Specify arc radius "R")
G17/G18/G19 : Arc plane (G17: XY plane, G18: ZX plane, G19: YZ plane)
G02/G03 : Arc rotation direction (G02: clockwise, G03: counterclockwise)
X,Y : End point coordinate values for arc
Z : End point coordinate values of linear axis
I,J : Arc center coordinate values
R : Arc radius
P : Number of pitches
F : Feed rate
G17 G02/G03 X/U__ Y/V__ Z/W__ I__ J__ P/,P__ F__ ;
G17 G02/G03 X/U__ Y/V__ Z/W__ R__ F__ ;
G17/G18/G19 : Arc plane (G17: XY plane, G18: ZX plane, G19: YZ plane)
G02/G03 : Arc rotation direction (G02: clockwise, G03: counterclockwise)
X/U, Y/V : End point coordinate values for arc
Z/W : End point coordinate values of linear axis
I,J : Arc center coordinate values
R : Arc radius
P/,P : Number of pitches
F : Feed rate
L =
= e - s = tan- 1 - tan-1 ( ) 0 < 2
ye ys
xe xs
(2 P +)/2
Z

(Note 1) Helical shapes are machined by assigning linear commands for one axis which is not a circular interpolation axis using an orthogonal coordinate system. It is also possible to assign these commands to two or more axes which are not circular interpolation axes.
When a simultaneous 4-axis command is used with the V axis as the axis parallel to the Y axis, helical interpolation will be carried out for a cylinder which is inclined as illustrated below. In other words, linear interpolation of the Z and V axes is carried out in synchronization with the circular interpolation on the XY plane.
V
Z
Y
X
End point
Start point

3.2.4 Spiral/Conical Interpolation
This function interpolates arcs where the start point and end point are not on the circumference of the same circle into spiral shapes.
Conical interpolation is performed by commanding end point in height direction.
There are two types of command formats which can be changed with the parameters.
(1) For command format type 1

(a) Spiral interpolation

The circular interpolation operation is performed at the feed rate f1 by the commands listed above. The tool draws a spiral arc path whose center is at the position from the start point which is designated by distance i1 for the X-axis direction and distance j1 for the Y-axis direction as the tool moves toward the end point.

The arc plane is designated by G17, G18 or G19.

G17XY plane

G18ZX plane

G19YZ plane

The direction of the arc rotation is designated by G02.1 or G03.1.

G02.1Clockwise (CW)

G03.1Counterclockwise (CCW)

The number of pitches (number of rotations) is designated by p1.

By assigning zero to p1, the pitch designation can be omitted in this case, the interpolation is obtained as a spiral rotation of less than one full turn. Assigning 1 to p1 yields a spiral rotation of more than one full turn but less than two full turns.

(b) Conical interpolation

M850W M830W M850S M830S M80W M80

TypeA

M80

TypeB

E80

TypeA

E80

TypeB C80

M

L

G02.1(G03.1) Xx1 Yy1 Ii1 Jj1 Pp1 Ff1 ;

G02.1,G03.1 : Arc rotation direction

Xx1,Yy1 : End point coordinate

Ii1,Jj1 : Arc center

Pp1 : Number of pitches

Ff1 : Feed rate

When an axis other than the ones for the spiral interpolation plane has been designated at the same time, the other axis will also be interpolated in synchronization with the spiral interpolation.

G17 G91 G02.1 X100. Z150. I150

P3 F500;

In the example given above, truncated cone interpolation is performed.

W

Z

Y

X

X

W

Z

X

XY plane

XZ plane

(2) For command format type 2

(a) Spiral interpolation

- The number of spiral rotations when the increment/decrement amount of radius is specified can be calculated with the following expression.

Number of rotations =

| (arc end point radius - arc start point radius) | / | increment or decrement amount of radius |

- Q takes precedence if both Q and L have been designated at the same time.

(b) Conical interpolation

- The number of rotations when the height increment or decrement amount is specified can be calculated with the following expression.

Number of rotations = | Height | / | Amount by which height is incremented or decremented (I,J,K) |

- Q takes precedence over K which in turn takes precedence over L if Q, K and L have been designated at the same time.

- The tolerable error range (absolute position) for when the commanded end point position is deviated from the end point position obtained from the number of pitches and increment/decrement amount is set with the parameters.

(3) Common cautions for type 1 and 2

- This function cannot be used in combination with a tool radius compensation command (G41, G42).

- The arc plane is always based on the G17, G18 or G19 command. Arc control is performed on a plane by the G17, G18 or G19 command even when two addresses which are not on the selected plane are designated.

G02(G03) Xx1 Yy1 Ii1 Jj1 Qq1/Ll1 Ff1 ;

G02,G03 : Arc rotation direction

Xx1,Yy1 : End point coordinate

Ii1,Jj1 : Arc center

Qq1 : Incremental/decremental amount of radius per spiral rotation

Ll1 : Number of pitches

Ff1 : Feed rate

G02(G03) Xx1 Yy1 Zz1 Ii1 Jj1 Kk1 /Qq /Ll1 Ff1 ;

G02,G03 : Arc rotation direction

Zz1 : End point coordinate in height direction

Ii1,Jj1 : Arc center

Kk1 : Amount by which height is incremented or decremented per spiral rotation

Qq1 : Amount by which radius is incremented or decremented per spiral rotation

Ll1 : Number of pitches
Ff1 : Feed rate

3.2.5 Cylindrical Interpolation
This function transfers the shape that is on the cylinder's side surface (shape yielded by the cylindrical coordinate system) onto a plane, and when the transferred shape is designated in the program in the form of plane coordinates, the shape is converted into a movement along the linear and rotary axes of the original cylinder coordinates, and the contours are controlled by means of the CNC unit during machining.
Since the programming can be performed for the shapes produced by transferring the side surfaces of the cylinders, this function is useful when it comes to machining cylindrical cams and other such parts.
The command is programmed with the rotary axis and its orthogonal axis, which are different between the lathe and the machining center systems, to machine grooves and other shapes on the side of the cylinder.
Command format
Cylindrical interpolation mode start
Cylindrical interpolation mode cancel
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
G07.1 Name of rotary axis Cylinder radius;
or G107 Name of rotary axis Cylinder radius;
Name of rotary axis : Axis name set to the rotary axis
Cylinder radius : Radius value 0: Cylindrical interpolation mode start
Command a value other than "0".
G07.1 Name of rotary axis 0 ;
or G107 Name of rotary axis 0;
Hypothetical
axis C
X
Z
Z
Y
X
r
r C
B
Lathe
Machining
center

3.2.6 Polar Coordinate Interpolation
This function converts the commands programmed by the orthogonal coordinate axes into linear axis movements (tool movements) and rotary axis movements (workpiece rotation) to control the contours. It is useful for cutting linear cutouts on the outside diameter of the workpiece, grinding cam shafts, etc.
This function can be used only with the G code list 6 or 7.
(1) Polar coordinate interpolation mode
(G12.1)
The polar coordinate interpolation mode is established by designating the G12.1 command.
Polar coordinate interpolation plane consists of a linear axis and a hypothetical axis, which are at right angles to each other.
Polar coordinate interpolation is performed on this plane.
(a) Linear interpolation and circular interpolation can be designated in the polar coordinate interpolation mode.
(b) Either absolute command or incremental command can be issued.
(c) Tool radius compensation can be applied to the program commands. Polar coordinate interpolation is performed for the path after tool radius compensation.
(d) For the feed rate, designate a tangential rate on the polar coordinate interpolation plane (orthogonal coordinate system) using the F command.
The F rate is in either mm/min or inch/mm units.
(2) Polar coordinate interpolation cancel mode
(G13.1)
The polar coordinate interpolation cancel mode is established by designating the G13.1 command.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
Z
C
X
Hypothetical axis
Polar coordinate interpolation
plane (G17 plane)

3.2.7 Milling Interpolation
When a lathe with linear axes (X, Z axes) and rotary axis (C axis) serving as the control axes is to perform milling at a workpiece end face or in the longitudinal direction of the workpiece, this function uses the hypothetical axis Y which is at right angles to both the X and Z axes to enables the milling shape to be programmed as the X, Y and Z orthogonal coordinate system commands.
With this function, the workpiece can be treated as a cylinder with radius X, and commands can be designated on the plane formed by transferring the cylinder side surface instead.
With milling interpolation, the commands programmed by the orthogonal coordinate system are converted into linear axis and rotary axis movements (workpiece rotation) to control the contours.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
G12.1 ; Milling mode ON
G13.1 ; Milling mode OFF (Turning mode)
G16(Y-Z cylindrical plane) G17(X-Y plane) G19(Y-Z plane)
Plane on which radius X cylinder is
developed.
Select this to machine the cylindrical plane
of a workpiece.
X-Y plane in XYZ orthogonal coordinate
system.
Select this to machine the workpiece end
face.
Y-Z plane in XYZ orthogonal coordinate system.
Select this to machine a plane of a cylinder cut in
the longitudinal direction.
C
X
Y
Z
(Hypothetical axis)
X
Z
Y
X
Z
Y
Z
X
Y

3.2.8 Hypothetical Axis Interpolation
Take one of the axes of the helical interpolation or spiral interpolation, including a linear axis, as a hypothetical axis (axis with no actual movement) and perform pulse distribution. With this procedure, an interpolation equivalent to the helical interpolation or spiral interpolation looked from the side (hypothetical axis), or SIN or COS interpolation, will be possible.
The setting of this hypothetical axis is commanded with G07.
(1) Interpolation functions that are used for hypothetical interpolation are helical interpolation and spiral interpolation.
(2) During G070; to G071;, axis will be the hypothetical axis. Thus, when axis is commanded independently
during this time, dwell mode will be held until finishing the pulse distribution to the hypothetical axis.
(Note) In order to perform hypothetical axis interpolation, helical interpolation must be added.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
G07 Y0 ; (X axis command cancel ON)
G07 Y1 ; (X axis command cancel OFF)
G07
Y
:Hypothetical axis interpolation command
:Designate the axis for which hypothetical axis interpolation is performed
Designation of the axis for which axis command cancellation is performed applies for all the NC axes.
(0: Cancel (normal), 1: Handle as hypothetical axis)

3.3 Curve Interpolation
3.3.1 Involute Interpolation
Involute interpolation moves a tool along an involute curve. This function can also move a tool helically (spirally) while moving the tool along the involute curve. This can be used for scroll machining of involute gears or compressors. The interpolation can eliminate a path step that is generated at a micro segment command, as well as acceleration/

deceleration that is caused due to differences of segment length, leading to smooth accurate machining.
Using the automatic speed control function, including "involute interpolation override" and "acceleration clamping during involute interpolation", further improves the machining accuracy.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
Involute interpolation Helical involute interpolation
(S) Start point
(E) End point
Program command path
Projected trajectory of XY plane of command program
Involute curve is obtained with the following expression:
X() = R{cos(+ 0) + x sin(+ 0)} + X0
Y() = R{sin(+ 0) - x cos(+ 0)} + Y0
Circle in the right figure is the base circle.
Y
X
I
J
(S)
(E)
R
Z
X
Y
(S)
(E)
(X,Y)
Y0
R

0
X
X0
Y

Command format
Involute interpolation
The range of command value follows the input range of coordinate position data.
Helical involute interpolation
The range of command value follows the input range of coordinate position data.
G02.2 (G03.2) X__ Y__ I__ J__ R__ F__ ; G17 plane
G02.2 (G03.2) Z__ X__ K__ I__ R__ F__ ; G18 plane
G02.2 (G03.2) Y__ Z__ J__ K__ R__ F__ ; G19 plane
G02.2 (G03.2) : Involute curve rotation direction (G02.2: clockwise; G03.2: counterclockwise)
X : End point of involute interpolation (X axis)
Y : End point of involute interpolation (Y axis)
Z : End point of involute interpolation (Z axis)
I : Incremental value from the start point to the center of base circle (X axis)
J : Incremental value from the start point to the center of base circle (Y axis)
K : Incremental value from the start point to the center of base circle (Z axis)
R : Base circle radius
F : Feedrate (in involute curve tangent direction)
G02.2 (G03.2) X__ Y__ __ I__ J__ R__ F__ ; G17 plane
G02.2 (G03.2) Z__ X__ __ K__ I__ R__ F__ ; G18 plane
G02.2 (G03.2) Y__ Z__ __ J__ K__ R__ F__ ; G19 plane
G02.2 (G03.2) : Involute curve rotation direction (G02.2: clockwise; G03.2: counterclockwise)
X : End point of involute interpolation (X axis)
Y : End point of involute interpolation (Y axis)
Z : End point of involute interpolation (Z axis)
 : End point of linear axis (: the name of the linear axis)
When a rotary axis is designated, a program error occurs.
Multiple linear axes can be designated.
I : Incremental value from the start point to the center of base circle (X axis)
J : Incremental value from the start point to the center of base circle (Yaxis)
K : Incremental value from the start point to the center of base circle (Z axis)
R : Base circle radius
F : Feedrate (in involute curve tangent direction)

3.3.2 Exponential Interpolation
With this function, the rotary axis movement is changed into exponential functions vis-a-vis the linear axis movements.
When exponential function interpolation is performed, linear interpolation is performed between the other axes and the linear axis. This makes it possible to machine tapered grooves (regular helix machining of tapered shapes) whose helix angle is always constant.
The function can be used for slotting and grinding end mills and other tools.
[Regular helix machining of tapered shapes]
[Relationship between linear and rotary axes]

M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
A
Z
X
J1 J2 J3
(G02.3/G03.3)
(G00)
(G01)
(G01)
Helix angle : J1=J2=J3
(rotary axis)
(linear axis)
A
X X=B (eCA - 1)
(rotary axis)
(linear axis) {B, C = constants}

3.3.3 Spline Interpolation (G05.1Q2/G61.2)
This function automatically generates spline curves that smoothly pass through rows of dots designated by a fine segment machining program, and performs interpolation for the paths along the curves. This enables high-speed and high-accuracy machining to be achieved.
There are two types of the spline interpolation command format: G61.2 and G05.1Q2.
The high-speed high-accuracy control II/III is required for G05.1Q2 command. Command G05.1Q2 for the high-speed and smooth machining in the high-speed high-accuracy control II/III mode.
(Note) While the spline interpolation is valid, the high-speed high-accuracy control III operates as high-speed high accuracy control II.
Command format
G61.2 command
G05.1Q2 command
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
G61.2 X__ Y__ Z__ F__ ; Spline interpolation mode ON
or
G61.2 ;
G64 ; Spline interpolation mode OFF
G05.1 Q2 X0 Y0 Z0 ; Spline interpolation mode ON
G05.1 Q0 ; Spline interpolation mode OFF
G64/G61.1
G61.2 / G05.1Q2

3.3.4 NURBS Interpolation
This function realizes NURBS curve machining by commanding NURBS curve parameters (number of stages, weight, knot, control point). The path does not need to be replaced with fine segments.
This function operates only in the high-speed high-accuracy control II/III mode, so the high-speed high-accuracy control II/III function is required.
During NURBS interpolation, interpolation takes place at the commanded speed. However, if the curvature is large, the speed is clamped so that the machine's tolerable acceleration rate is not exceeded.
NURBS interpolation cannot be used during graphic check (continuous/step check).
Linear interpolation that connects the control points is used during graphic check.
The multi-part system simultaneous high-accuracy function is required when the NURBS interpolation is commanded to 2nd part system or higher.
(Note) While the NURBS interpolation is valid, the high-speed high-accuracy control III operates as high-speed high accuracy control II.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
(x1, y1, z1)
(x2, y2, z2)
(x3, y3, z3) (x4, y4, z4)
(xn,yn,zn)
Program path passing through
control point
NURBS interpolation curve

3.3.5 3-Dimensional Circular Interpolation

To issue a circular command over a three-dimensional space, an arbitrary point (intermediate point) must be designated on the arc in addition to the start point (current position) and end point. Using the 3-dimensional circular interpolation command, an arc shape determined by the three points (start point, intermediate point, end point) designated on the three-dimensional space can be machined.

The speed command during 3-dimensional circular interpolation is the tangential velocity on the arc.

The command format is shown below.

- The operation is the same for G02.4 and G03.4. (The rotation direction cannot be designated.)
- The axes used as the reference in 3-dimensional circular interpolation are the three basic axes set with the parameters.
- The X, Y, Z address in the block may be omitted. The intermediate point coordinates omitted in the 1st block become the start point coordinates, and the end point coordinates omitted in the 2nd block become the intermediate point coordinates.
- When using the 3-dimensional circular interpolation command, an arbitrary axis can be commanded in addition to the orthogonal coordinate system (X, Y, Z) used as the reference. The arbitrary axis designated in the intermediate point designating block (1st block) will interpolate to the command point when moving from the start point to intermediate point movement. The arbitrary axis designated in the end point command block (2nd block) will interpolate to the command point when moving from the intermediate point to the end point. The number of arbitrary axes that can be commanded differs according to the number of simultaneous contour control axes. The total of the basic three axes used as the reference of the 3-dimensional circular interpolation and the arbitrary axes commanded simultaneously must be less than the number of simultaneous contour control axes.
- To command 3-dimensional circular interpolation when the incremental command is enabled, specify as follows.

Intermediate point coordinates: The position of the intermediate point relative to the start point

End point coordinates: The position of the end point relative to the intermediate point

M850W M830W M850S M830S M80W M80

TypeA

M80

TypeB

E80

TypeA

E80

TypeB C80

M

L

G02.4(G03.4) Xx1 Yy1 Zz1 1 ... ; Intermediate point designation (1st block)

Xx2 Yy2 Zz2 2 ... ; End point designation (2nd block)

G02.4(G03.4)

Xx1, Yy1, Zz1

Xx2, Yy2, Zz2

1

: 3-dimensional circular interpolation command

: Intermediate point coordinates

: End point coordinates

: Arbitrary axis other than axis used as the reference in 3-dimensional circular interpolation (May be omitted)

Z

X

Y

End point

Intermediate point

Start point

(current position)

3.3.6 Spline Interpolation2 (G61.4)

This function automatically generates a curve that smoothly passes through within the tolerable error range. The tool is able to move along the curve, providing smooth machining.

This function allows the machine to operate with the optimum tool path and speed, simply by specifying the tolerance size, so an operator can easily attain high quality machining.

This function is enabled under the tolerance control, so the specification of the tolerance control is required, too.

The tolerance size is the allowable error value between the path commanded by machining program and the path output with NC.

When spline interpolation 2 is used in combination with tool center point (TCP) control, spline interpolation 2 is performed with 5 axes. It generates a curve that passes through the TCP points smoothly within the tolerance, with the rotary axis angle also within the tolerance. The tool moves along the curve.

M850W M830W M850S M830S M80W M80

TypeA

M80

TypeB

E80

TypeA

E80

TypeB C80

M

L

Command

position

Tolerance

Tool path

Tolerance of rotary axis

Program command

position

Tolerance of linear axis

Tool path

Command format
Spline interpolation 2 mode with command G61.4 will be cancelled by designating any one of G code group 13.
- G61 (Exact stop check mode)
- G61.1 (High-accuracy control mode)
- G61.2 (Spline interpolation command)
- G62 (Automatic corner override)
- G63 (Tapping mode)
- G64 (Cutting mode)
- G08P1 (High-accuracy control mode start)
- G08P0 (High-accuracy control mode end)
G61.4 (,K__) (,R__) ; Spline interpolation 2 mode ON
,K : Tolerance size (mm) linear axis
,R : Tolerance size (deg) rotary axis

4
Feed

4.1 Feedrate
4.1.1 Rapid Traverse Rate (m/min)
The rapid traverse rate is set in the parameters for each axis.
During high-accuracy control mode, the dedicated rapid traverse rate (parameter) is applied.
Override can be applied to the rapid traverse rate using the external signal supplied.
The rapid traverse rate is effective for the following commands.
M system: G00, G27, G28, G29, G30, G60
L system: G00, G27, G28, G29, G30
The high-accuracy control mode rapid traverse rate is effective for the following commands.
M system: High-accuracy control, high-speed high-accuracy control I/II/III, SSS control, high-accuracy spline control
L system: High-accuracy control, high-speed high-accuracy control I/II, SSS control
Rapid traverse rate and high-accuracy control mode rapid traverse rate setting
Least command increment B : 0.001mm (0.0001inch)
Least command increment C : 0.0001mm (0.00001inch)
Least command increment D : 0.00001mm (0.000001inch)
Least command increment E : 0.000001mm (0.0000001inch)
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M 1000 1000 1000 1000 1000 1000 1000 1000 1000 1000
L 1000 1000 1000 1000 1000 1000 1000 1000 1000 1000
Least command increment BC D E
Metric input (mm/min, /min) 1 to 1000000 1 to 1000000 1 to 1000000 1 to 1000000
Inch input (inch/min) 1 to 100000 1 to 100000 1 to 100000 1 to 100000

4.1.2 Cutting Feedrate (m/min)
[M system]
This function specifies the feedrate of the cutting commands, and a feed amount per spindle rotation or feed amount per minute is commanded.
Once commanded, it is stored in the memory as a modal value. The feedrate modal value is cleared to zero only when the power is turned ON.
The maximum cutting feedrate is clamped by the cutting feedrate clamp parameter (whose setting range is the same as that for the cutting feedrate).
If the high-accuracy control mode's cutting clamp speed is set, the cutting feedrate will be clamped at that speed during high-accuracy control, high-speed high-accuracy control, high-accuracy spline control or SSS control.
- If the value set for high-accuracy control mode cutting clamp speed is 0, the axis will be clamped at the cutting feed clamp speed.
- High-accuracy control mode cutting clamp speed is set with the parameters.
Cutting feedrate setting range
Least command increment B : 0.001mm (0.0001inch)
Least command increment C : 0.0001mm (0.00001inch)
Least command increment D : 0.00001mm (0.000001inch)
Least command increment E : 0.000001mm (0.0000001inch)
- G code command for which the cutting feedrate is effective
For others such as G01,G02,G03,G02.1,G03.1,G33, etc., refer to the interpolation specifications.
[L system]
This function specifies the feedrate of the cutting commands, and a feed amount per spindle rotation or feed amount per minute is commanded.
Once commanded, it is stored in the memory as a modal value. The feedrate modal is cleared to zero only when the power is turned ON.
The maximum cutting feedrate is clamped by the cutting feedrate clamp parameter (whose setting range is the same as that for the cutting feedrate).
Cutting feedrate setting range
Least command increment B : 0.001mm (0.0001inch)
Least command increment C : 0.0001mm (0.00001inch)
Least command increment D : 0.00001mm (0.000001inch)

Least command increment E : 0.000001mm (0.0000001inch)
- G code command for which the cutting feedrate is effective
For others such as G01,G02,G03,G02.1,G03.1,G33, etc., refer to the interpolation specifications.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M 1000 1000 1000 1000 1000 1000 1000 1000 1000 1000
L 1000 1000 1000 1000 1000 1000 1000 1000 1000 1000
Least command increment BC D E
Metric input (mm/min, /min) 0.001 to 1000000 0.0001 to 1000000 0.00001 to 1000000 0.000001 to 1000000
Inch input (inch/min) 0.0001 to 100000 0.00001 to 100000 0.000001 to 100000 0.0000001 to 100000
Least command increment BC D E
Metric input (mm/min, /min) 0.001 to 1000000 0.0001 to 1000000 0.00001 to 1000000 0.000001 to 1000000
Inch input (inch/min) 0.0001 to 100000 0.00001 to 100000 0.000001 to 100000 0.0000001 to 100000

4.1.3 Manual Feedrate (m/min)
The manual feedrate are designated as the feedrate in the jog mode or incremental feed mode for manual operation and the feedrate during dry run ON for automatic operation. The manual feedrate are set with external signals.
The manual feedrate signals from the PLC include two methods, the code method and value setting method.
Which method to be applied is determined with a signal common to the entire system. The signals used by these methods are common to all axes.
- Setting range under the code method
 Metric input 0.00 to 14000.00 mm/min (31 steps)
 Inch input 0.000 to 551.000 inch/min (31 steps)
- Setting range under the value setting method
 Metric input 0 to 1000000.00 mm/min in 0.01 mm/min increments
 Inch input 0 to 39370 inch/min in 0.001 inch/min increments
 Multiplication factor PCF1 and PCF2 are available with the value setting method.
4.1.4 Rotary Axis Command Speed Tenfold
This function multiplies the rotary axis' command speed by 10 during initial inching.
The commanded speeds are as follow.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M 1000 1000 1000 1000 1000 1000 1000 1000 1000 1000
L 1000 1000 1000 1000 1000 1000 1000 1000 1000 1000
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
Automatic
operation Cutting feedrate
For the inch system, the rotary axis command speed is multiplied by 10.
For example, if the B axis is the rotary axis in the inch system and the following type of machining program is executed, the rotary axis command speed will be multiplied by 10, and the rotary axis will move at 1000 deg./min.
 N1 G1 B100. F100.;
Rapid traverse rate The rapid traverse rate is not multiplied by 10, and is the speed set in the parameters.
Manual operation The command speeds related to manual operation, such as JOG feed, are not multiplied by 10. The display speed unit also remains as "deg./min".

4.2 Feedrate Input Methods
4.2.1 Feed per Minute (Asynchronous Feed)
[M system]
By issuing the G94 command, the commands from that block are issued directly by the numerical value following F as the feedrate per minute (mm/min, inch/min).
Metric input
Inch input
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M

L
Input
Setting unit B(0.001mm) C(0.0001mm) D(0.00001mm) E(0.000001mm)
Command
Mode Feed per minute Feed per minute Feed per minute Feed per minute
Command
Address F(mm/min) F(mm/min) F(mm/min) F(mm/min)
Minimum
command
unit
1 (= 1.000)
(1. = 1.000)
1 (= 1.0000)
(1. = 1.0000)
1 (= 1.00000)
(1. = 1.00000)
1 (= 1.000000)
(1. = 1.000000)
Command
range
0.001 - 1000000.000 0.0001 - 1000000.0000 0.00001 -
1000000.00000
0.000001 -
1000000.000000
Input
setting unit B(0.0001inch) C(0.00001inch) D(0.000001inch) E(0.0000001inch)
Command
Mode Feed per minute Feed per minute Feed per minute Feed per minute
Command
Address F(inch/min) F(inch/min) F(inch/min) F(inch/min)
Minimum
command
unit
1 (= 1.0000)
(1. = 1.0000)
1 (= 1.00000)
(1. = 1.00000)
1 (= 1.000000)
(1. = 1.000000)
1 (= 1.0000000)
(1. = 1.0000000)
Command
range
0.0001 - 100000.0000 0.00001 - 100000.00000 0.000001 -
100000.000000
0.0000001 -
100000.0000000
M800/M80/E80/C80 Series Specifications Manual (Function)
4 Feed
IB-1501505-N 50
[L system]
By issuing the G94 command, the commands from that block are issued directly by the numerical value following F
as the feedrate per minute (mm/min, inch/min).
Metric input
Inch input
Input
Setting unit B(0.001mm) C(0.0001mm) D(0.00001mm) E(0.000001mm)
Command
Mode Feed per minute Feed per minute Feed per minute Feed per minute
Command
Address F(mm/min) F(mm/min) F(mm/min) F(mm/min)
Minimum
command
unit
1(=1.000)
(1.=1.000)
1(=1.0000)
(1.=1.0000)
1(=1.00000)
(1.=1.00000)
1(=1.000000)
(1.=1.000000)
Command
range
0.001 -
1000000.000
0.0001 -
1000000.0000
0.00001 -
1000000.00000
0.000001 -
1000000.000000
Input
setting unit B(0.0001inch) C(0.00001inch) D(0.000001inch) E(0.0000001inch)
Command
Mode Feed per minute Feed per minute Feed per minute Feed per minute
Command
Address F(inch/min) F(inch/min) F(inch/min) F(inch/min)

Minimum
command
unit
1(=0.0100)
(1.=1.0000)
1(=0.01000)
(1.=1.00000)
1(=0.010000)
(1.=1.000000)
1(=0.0100000)
(1.=1.0000000)
Command
range
0.0001 -
100000.0000
0.00001 -
100000.00000
0.000001 -
100000.000000
0.0000001 -
100000.0000000

4.2.2 Feed per Revolution (Synchronous Feed)
By issuing the G95 command, the commands from that block are issued directly by the numerical value following F as the feedrate per spindle revolution (mm/revolution or inch/revolution).
The least command increment and command range of the feedrate designation F are as follows.
[M system]
Metric input
Inch input
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
Input
Setting unit B(0.001mm) C(0.0001mm) D(0.00001mm) E(0.000001mm)
Command
Mode Feed per revolution Feed per revolution Feed per revolution Feed per revolution
Command
Address F(mm/rev) F(mm/rev) F(mm/rev) F(mm/rev)
Minimum
command
unit
1 (= 0.001)
(1. = 1.000)
1 (= 0.0001)
(1. = 1.0000)
1 (= 0.00001)
(1. = 1.00000)
1 (= 0.000001)
(1. = 1.000000)
Command
range
0.001 -
999.999
0.0001 -
999.9999
0.00001 -
999.99999
0.000001 -
999.999999
Input
setting unit B(0.0001inch) C(0.00001inch) D(0.000001inch) E(0.0000001inch)
Command
Mode Feed per revolution Feed per revolution Feed per revolution Feed per revolution
Command
Address F(inch/rev) F(inch/rev) F(inch/rev) F(inch/rev)
Minimum
command
unit
1 (= 0.0001)
(1. = 1.0000)
1 (= 0.00001)
(1. = 1.00000)
1 (= 0.000001)
(1. = 1.000000)
1 (= 0.0000001)
(1. = 1.0000000)
Command
range
0.0001 - 999.9999 0.00001 - 999.99999 0.000001 - 999.999999 0.0000001 -

999.9999999

[L system]
Metric input
Inch input
Input
Setting unit B(0.001mm) C(0.0001mm) D(0.00001mm) E(0.000001mm)
Command
Mode Feed per revolution Feed per revolution Feed per revolution Feed per revolution
Command
Address F(mm/rev) F(mm/rev) F(mm/rev) F(mm/rev)
Minimum
command
unit
1(=0.0001)
(1.=1.00)
1(=0.00001)
(1.=1.00)
1(=0.000001)
(1.=1.00)
1(=0.0000001)
(1.=1.00)
Command
range
0.0001 -
999.9999
0.00001 -
999.99999
0.000001 -
999.999999
0.0000001 -
999.9999999
Input
setting unit B(0.0001inch) C(0.00001inch) D(0.000001inch) E(0.0000001inch)
Command
Mode Feed per revolution Feed per revolution Feed per revolution Feed per revolution
Command
Address F(inch/rev) F(inch/rev) F(inch/rev) F(inch/rev)
Minimum
command
unit
1(=0.000001)
(1.=1.000)
1(=0.0000001)
(1.=1.000)
1(=0.00000001)
(1.=1.000)
1(=0.000000001)
(1.=1.000)
Command
range
0.00001 - 99.99999 0.000001 - 99.999999 0.0000001 - 99.9999999 0.00000001 -
99.99999999

4.2.3 Inverse Time Feed
During inside cutting when machining curved shapes with tool radius compensation applied, the machining speed on the cutting surface becomes faster than the tool center feedrate. Therefore, problems such as reduced accuracy on the cutting surface may occur.
This reduced accuracy can be prevented with inverse time feed. This function can, in place of normal feed commands, issue one block of machining time (inverse) in F commands. The machining speed on the cutting surface is constantly controlled, even if radius compensation is applied to the machining program that expresses the free curve surface with fine segment lines.
Note that when the calculated machining time exceeds the cutting feed clamp speed, the F command value in the inverse time feed follows the cutting feed clamp speed.
Command format is as shown below.
Inverse time feed (G93) is a modal command and is valid until feed per minute (G94) or feed per revolution (G95) is commanded.
In movement blocks, since processing time is commanded to a line segment, command the feedrate "F" each time.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
Regular F command Inverse time feed
G93 ; Inverse time feed
G00 Xx1 Yy1 ;
G93 ; Inverse time feed mode ON
G01 Xx2 Yy2 Ff2 ; In inverse time feed mode
G02 Xx3 Yy3 Ii3 Jj3 Ff3 ; :

G94(G95) ; Inverse time feed mode OFF
Actual machining speed
Large Small
F command
Same
F command

4.2.4 F 1-digit Feed
The feedrate registered by parameter can be assigned by designating a single digit following address F.
There are six F codes: F0 and F1 to F5. The rapid traverse rate is applied when F0 is issued which is the same as the G00 command.
When one of the codes F1 to F5 is issued, the cutting feedrate set to support the code serves as the valid rate command.
If F6 or larger value is command, the value is regarded as the cutting feedrate which has been directly commanded with numerical values.
When an F 1-digit command has been issued, the external output signal is output.
When the programmed feedrate has been issued as an F 1-digit command, the feedrate can be increased or reduced by turning the manual handle.
The feedrate cannot be changed by the 2nd and 3rd handles.
(1) Amount by which speed is varied by manual handle
Speed variation amount F is expressed by the equation below:
P : Handle pulses ()
FM : F1 to F5 upper limit (parameter setting)
K :Speed variation constant (parameter setting)
(Example) When the feedrate is to be increased or reduced by 10 mm/min per manual handle scale increment
If FM is 3600 mm/min, then:
 Therefore, K = 360.
(2) Conditions under which F1-digit feed is valid
(a) Cycle start must be underway.
(b) Cutting feed must be underway, and the F 1-digit feedrate must be designated.
(c) The F 1-digit valid parameter must be ON
(d) The F 1-digit feedrate change valid signal must be ON.
(e) The handle mode must not be selected.
(f) A dry run must not be in progress.
(g) Machine lock must not be activated.
(h) The parameter settings (the F 1-digit feedrate upper limit and F 1-digit feedrate change constant) must not be "0".
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
K
FM = PF
K
F 3600 10 == 1

4.2.5 Manual Speed Command
In the memory or MDI mode, validate the manual speed command and select either handle feed or jog (manual) feed so that the automatic operation is carried out at the feedrate.
With a command in the (-) direction, the program path can be reversed. Note that, however, program path can be reversed only within the currently executing block and not beyond the block.
Whether or not to execute reverse run with a command in the (-) direction is set with the PLC interface.
Furthermore, by setting the parameter, handle, jog and manual feed speed can be executed at the feed speed according to the ratio of program command speed of running block when issuing the manual speed command in multiple systems.
4.2.7 G00 Feedrate Designation (,F Command)
Feedrates can be specified for G00 (positioning command).
The speed of tool exchange, axis movement of gantry, etc. can be specified with the machining program so that the mechanical vibration can be suppressed.
Operations other than the feedrate follows the G00 specification.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L

Gantry
Spindle
G00 Z_ ,F2000
G00 X_ ,F1500
G00 X_ ,F500

Command format
The feedrates of the movement in the G00,G00 mode and the movement during the fixed cycle for drilling are commanded with ",F".
Feedrate designation in G00 block
Feedrate designation for movement command in G00 mode
(Note) ", F" command is ignored in the G01 mode.
Feedrate designation for movement command during drilling cycle
L system G83/G87: Deep-hole drilling, G84/G88: Tapping, G85/G89: Boring
M system G81: Drilling/Spot drilling, G82: Drilling/Counter boring, G83: Deep-hole drilling, G84: Tapping, G85/G86: Boring, G87: Back boring, G88/G89: Boring, G73: Step, G74: Reverse tapping, G75: Circular cutting, G76: Fine boring
",F" command range
- The range is equal to the range of the feed per minute F command (mm/min, inch/min) in the G01 mode.
- Commands that exceed the command range cause the error "P67: F value is exceeding the limit".
- Switching inch/mm is invalid for rotary axes.
G00 X__ Z__ ,F1000 ;
G00 ;
X__ Z__ ,F1000 ;
G8 (G7) X/Z__ ..... ,F1000;
X/Z__ ..... ,F500;
:
:
G80
:

4.2.8 Selection of Axis (Axes) for Feedrate Command
This function enables designation of the feedrate of a specific axis (with the command F).
When the feedrate of a specific axis fluctuates wildly, desired surface finish may fail to be attained. The fluctuation can be suppressed with this function, resulting in improved surface quality.
Command format
Selection of axis (axes) for feedrate command
Selection of axis (axes) for feedrate command cancel
(1) G130 is a non-modal command of group 0.
(2) G130 must be commanded alone in a block. A program error occurs when another G code is commanded in the same block.
(3) Designate the axis name "n" using an axis address set in the parameter. If the designated axis does not exist, a program error occurs.
(4) When an axis address enabled with the axis name extension function is specified for the axis name "n", a program error occurs.
(5) The selection of axis (axes) for feedrate command is canceled with reset 1, reset 2, Reset & rewind, or emergency stop.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
G130 Axis name 1 Axis name 2 ... Axis name n ;
Axis name n : Axis (axes) for feedrate command as axis address
G130 ;
Speed
Resultant speed of all axes when the function is valid
(with X axis being selected)
Time
Resultant speed of all axes when the function is invalid
Speed
Time
Speed Speed
Time Time
Feedrate of each axis when the function is valid
(with X axis being selected)
Feedrate of each axis when the function is invalid
X axis
Y axis
Z axis
X axis
Y axis
Z axis
Speed differs in
each block.
Speed is kept
constant.

4.3 Override
4.3.1 Rapid Traverse Override
(1) Type 1 (code method)
Four levels of override (1%, 25%, 50% and 100%) can be applied to manual or automatic rapid traverse using the external input signal supplied.
(2) Type 2 (value setting method)
Override can be applied in 1% steps from 0% to 100% to manual or automatic rapid traverse using the external input signal supplied.
(Note 1) Type 1 and type 2 can be selected by PLC processing.
(Note 2) This function requires a built-in PLC for type 2.
4.3.2 Cutting Feed Override
(1) Type 1 (code method)
Override can be applied in 10% steps from 0% to 300% to the feed rate command designated in the machining program using the external input signal supplied.
(2) Type 2 (value setting method)
Override can be applied in 1% steps from 0% to 327% to the feed rate command designated in the machining program using the external input signal supplied.
(Note 1) This function requires a built-in PLC for type 2.
4.3.3 2nd Cutting Feed Override
Override can be further applied in 0.01% steps from 0% to 327.67% as a second stage override to the feed rate after the cutting feed override has been applied.
(Note 1) This function requires a built-in PLC.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
M800/M80/E80/C80 Series Specifications Manual (Function)
4 Feed

4.3.4 Override Cancel
By turning on the override cancel external signal, the override is automatically set to 100% for the cutting feed during an automatic operation mode (tape, memory and MDI).
(Note 1) The override cancel signal is not valid for manual operation.
(Note 2) When the cutting feed override or second cutting feed override is 0%, the 0% override takes precedence and the override is not canceled.
(Note 3) The override cancel signal is not valid for rapid traverse.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
M800/M80/E80/C80 Series Specifications Manual (Function)
4 Feed

4.4 Acceleration/Deceleration
4.4.1 Automatic Acceleration/Deceleration after Interpolation
Acceleration/deceleration is applied to all commands automatically. The acceleration/deceleration patterns are linear acceleration/deceleration, soft acceleration/deceleration, exponent function acceleration/ deceleration, exponent function acceleration/linear deceleration and any of which can be selected by using a parameter.
For rapid traverse feed or manual feed, acceleration/deceleration is always made for each block, and the time constant can be set for each axis separately.
G0tL:G0 time constant(linear)
G0t1:G0 time constant(primary delay)/The 2nd step time constant of the soft acceleration/deceleration
G1tL:G1 time constant(linear)
G1t1:G1 time constant(primary delay)/The 2nd step time constant of the soft acceleration/deceleration
M850W M830W M850S M830S M80W M80

TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
Rapid traverse Cutting feed
<Linear acceleration/deceleration> <Linear acceleration/deceleration>
<Primary delay> <Primary delay>
<Exponential acceleration-Linear deceleration> <Exponential acceleration-Linear deceleration>
<Soft acceleration/deceleration> <Soft acceleration/deceleration>
F
t
G0tL G0tL
F
t
G1tL G1tL
F
t
G0t1 G0t1
F
t
G1t1 G1t1
F
t
G0t1 2G0t1
F
t
G1t1 2G1t1
F
t
G0t1
G0t1 G0t1
G0t1
G0tL G0tL
F
t
G1t1
G1t1 G1t1
G1t1
G1tL G1tL
M800/M80/E80/C80 Series Specifications Manual (Function)
4 Feed
61 IB-1501505-N
(Note 1) The rapid traverse feed acceleration/deceleration patterns are effective for the following:
G00, G27, G28, G29, G30, rapid traverse feed in manual run, JOG feed, incremental feed, return to reference position.
It is invalid to G31 and handle feed.
(Note 2) Acceleration/deceleration in handle feed mode is usually performed according to the acceleration/deceleration pattern for cutting feed. However, a parameter can be specified to select a pattern with no acceleration/deceleration (step).
(Note 3) Acceleration/deceleration time of soft acceleration/deceleration can be changed by parameter as follows.
A rapid traverse time constant can be switched by rapid traverse time constant changeover request signal.
Total accelerating time:G0tL+G0t1
S-pattern part time:G0t1
Linear part time:G0tL-G0t1
F
t
G0tL+G0t1
G0tL
G0t1 G0t1
Y1
#2004 G0tL
#2005 G0t1
#2598 G0tL_2
#2599 G0t1_2
#2004 G0tL
#2005 G0t1
#2598 G0tL_2
#2599 G0t1_2
#2004 G0tL
#2005 G0t1
#2598 G0tL_2
#2599 G0t1_2
X1 Z1
Set the rapid traverse time
constant by axis
Basic rapid
traverse time
constant
Rapid traverse time
constant to use
Rapid traverse
acceleration/deceleration
Rapid traverse

acceleration/deceleration
Rapid traverse
acceleration/deceleration
Rapid traverse time
constant to use
Rapid traverse time
constant to use
Rapid traverse
time constant
for switching
Basic rapid
traverse time
constant
Rapid traverse
time constant
for switching
Basic rapid
traverse time
constant
Rapid traverse
time constant
for switching
Switch between basic rapid
traverse time constant and
rapid traverse time constant for
switching using the rapid
traverse time constant changeover
request signal

4.4.2 Rapid Traverse Constant-gradient Acceleration/Deceleration
This function performs acceleration and deceleration at a constant-gradient during linear acceleration/deceleration by
the rapid traverse command or the linear interpolation command. Compared to the method of acceleration/deceleration
after interpolation, the constant-gradient acceleration/deceleration method makes for improved cycle time.
This function is valid for the rapid traverse (G00) command and the linear interpolation (G01) command only when the
acceleration/deceleration mode is set to linear acceleration/deceleration or soft acceleration/deceleration.
(Example) When the interpolation distance is so short that the rapid traverse rate is not achieved
For acceleration/deceleration with fixed time constant, the gradient is determined by the rapid traverse rate;
however, the cycle time is determined by the time constant, and the reaching speed is slower than constant gradient acceleration/deceleration.
For constant-gradient acceleration/deceleration, the gradient is determined by the rapid traverse rate and the time
constant. The reaching time is determined by interpolation distance; therefore, the cycle time is shorter than
acceleration/deceleration with fixed time constant.
rapid: Rapid traverse rate
Ts1: Acceleration/deceleration time
Ts2: Acceleration/deceleration time to reach the maximum speed
Td: Command deceleration check time
: Acceleration/deceleration gradient
T1: Interpolation time (Acceleration/deceleration with fixed time constant)
T2: Interpolation time (Constant-gradient acceleration/deceleration)
L: Interpolation distance
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
L
Ts1 Ts2
Td
T1

L
Ts1
Ts2 Td
T2
rapid
rapid T1 = Ts1 + Ts2
T2 = 2 Ts1 L
rapid
Td = Ts2 + (0 to 14 ms)
= tan1 ( ) rapid
Ts1
In case of acceleration/deceleration with fixed time constant:
In case of constant-gradient acceleration/deceleration:
Speed
Speed
Next block
Time
Next block
Time

4.4.3 Rapid Traverse Constant-gradient Multi-step Acceleration/Deceleration

This function carries out the acceleration/deceleration according to the torque characteristic of the motor in the rapid traverse mode during automatic operation. (This function is not available in manual operation.) The rapid traverse constant-gradient multi-step acceleration/deceleration method makes for improved cycle time because the positioning time is shortened by using the motor ability to its maximum.

In general, the servomotor has the characteristic that the torque falls in the high-speed rotation range.

(Note) This characteristic is data at input voltage 380VAC.

In the rapid traverse constant-gradient acceleration/deceleration method, the acceleration has been treated constantly because this torque characteristic is not considered. So, it is necessary to use a minimum acceleration within the used speed range. Therefore, the margin of acceleration must be had in a low-speed range. Or if the acceleration is used to its maximum, the upper limit of the rotation speed must be slowed.

Then, to use the servomotor ability to its maximum, acceleration/deceleration to which the torque characteristic is considered is carried out by the rapid traverse constant-gradient multi-step acceleration/deceleration method.

The acceleration/deceleration patterns in the case where rapid traverse constant-gradient multi-step acceleration/deceleration are performed are as follows.

M850W M830W M850S M830S M80W M80

TypeA

M80

TypeB

E80

TypeA

E80

TypeB C80

M

L

0

0

1000 2000 3000 3500

25

50

75

100

125

Rotation speed [r/min]

Torque [N*m]

t b t a

(b) Rapid traverse constant-gradient

acceleration/deceleration

(a) Rapid traverse constant-gradient

multi-step acceleration/deceleration

Number of steps is

automatically adjusted

by parameter setting.

It was necessary to slow down the

acceleration for high speed rotation.

Time

Acceler ation

Acceler ation

Speed Speed

Time

Time

Time

4.5 Thread Cutting

4.5.1 Thread Cutting (Lead/Thread Number Designation)

Thread cutting with designated lead can be performed. Designate the number of threads per inch with the E address to cut inch threads.

(1) Lead designation

The thread cutting with designated lead is performed based on the synchronization signals from the spindle encoder.

The thread cutting with designated lead can be performed. Inch threads are cut by designating the number of threads per inch with the E address.

(2) Thread number designation

Inch threads are cut by designating the number of threads per inch with the E address.

Whether the E command is a thread number designation or lead designation is selected with the parameters.

[M system]

Thread cutting metric input

M850W M830W M850S M830S M80W M80

TypeA

M80

TypeB

E80

TypeA

E80

TypeB C80

M

L

G33 Zz1/Ww1 Xx1/Uu1 Qq1 Ff1/Ee1 ;

G33

Zz1/Ww1,Xx1/Uu1

Qq1

Ff1

Ee1

: Thread cutting command

: Thread end point coordinates

: Shift angle at start of thread cutting (0.000 to 360.000)

: Thread lead (normal lead threads)
: Thread lead (precise lead threads)
G33 Zz1/Ww1 Xx1/Uu1 Qq1 Ee1 ;
G33
Zz1/Ww1,Xx1/Uu1
Qq1
Ee1
: Thread cutting command
: Thread end point coordinates
: Shift angle at start of thread cutting (0.000 to 360.000)
: Thread number per inch
Input
setting unit B (0.001mm) C (0.0001mm)
Command
address F (mm/rev) E (mm/rev) E (ridges/inch) F (mm/rev) E (mm/rev) E (ridges/inch)
Least
Command
Increments
1(=0.001)
(1.=1.000)
1(=0.0001)
(1.=1.0000)
1(=1.00)
(1.=1.00)
1(=0.0001)
(1.=1.0000)
1(=0.00001)
(1.=1.00000)
1(=1.000)
(1.=1.000)
Command
range
0.001 -
999.999
0.0001 -
999.9999
0.03 -
999.99
0.0001 -
999.9999
0.00001 -
999.99999
0.026 -
222807.017
Input
setting unit D (0.00001mm) E (0.000001mm)
Command
address F (mm/rev) E (mm/rev) E (ridges/inch) F (mm/rev) E (mm/rev) E (ridges/inch)
Least
Command
Increments
1(=0.00001)
(1.=1.00000)
1(=0.000001)
(1.=1.000000)
1(=1.0000)
(1.=1.0000)
1(=0.000001)
(1.=1.000000)
1(=0.0000001)
(1.=1.0000000)
1(=1.00000)
(1.=1.00000)
Command
range
0.00001 -
999.99999
0.000001 -
999.999999
0.0255 -
224580.0000
0.000001 -
999.999999
0.0000001 -
999.9999999
0.02541 -
224719.00000

Thread cutting inch input
(Note 1) It is not possible to assign a lead that causes the feedrate converted into the feed per minute value
to exceed the maximum cutting feedrate.
[L system]
Thread cutting metric input
Input
setting unit B (0.0001inch) C (0.00001inch)
Command

address F (inch/rev) E (inch/rev) E (ridges/inch) F (inch/rev) E (inch/rev) E (ridges/inch)
Least
Command
 Increments
1(=0.0001)
(1.=1.0000)
1(=0.00001)
(1.=1.00000)
1(=1.000)
(1.=1.000)
1(=0.00001)
(1.=1.00000)
1(=0.000001)
(1.=1.000000)
1(=1.0000)
(1.=1.0000)
Command
range
0.0001 -
39.3700
0.00001 -
39.37007
0.025 -
9999.999
0.00001 -
39.37007
0.000001 -
39.370078
0.0255 -
9999.9999
Input
setting unit D (0.000001inch) E (0.0000001inch)
Command
address F (inch/rev) E (inch/rev) E (ridges/inch) F (inch/rev) E (inch/rev) E (ridges/inch)
Least
Command
 Increments
1(=0.000001)
(1.=1.000000)
1(=0.0000001)
(1.=1.0000000)
1(=1.00000)
(1.=1.00000)
1(=0.0000001)
(1.=1.0000000)
1(=0.00000001)
(1.=1.00000000)
1(=1.000000)
(1.=1.000000)
Command
range
0.000001 -
39.370078
0.0000001 -
39.3700787
0.02541 -
9999.99999
0.0000001 -
39.3700787
0.00000001 -
39.37007873
0.025401 -
9999.999999
Input
setting unit B (0.001mm) C (0.0001mm)
Command
address F (mm/rev) E (mm/rev) E (ridges/inch) F (mm/rev) E (mm/rev) E (ridges/inch)
Least
Command
 Increments
1(=0.0001)
(1.=1.0000)
1(=0.00001)
(1.=1.00000)
1(=1.00)
(1.=1.00)
1(=0.00001)
(1.=1.00000)
1(=0.000001)
(1.=1.000000)
1(=1.000)
(1.=1.000)
Command
range
0.0001 -
999.9999
0.00001 -
999.99999

0.03 -
999.99
0.00001 -
999.99999
0.000001 -
999.999999
0.026 -
222807.017
Input
setting unit D (0.00001mm) E (0.000001mm)
Command
address F (mm/rev) E (mm/rev) E (ridges/inch) F (mm/rev) E (mm/rev) E (ridges/inch)
Least
Command
Increments
1(=0.000001)
(1.=1.000000)
1(=0.0000001)
(1.=1.0000000)
1(=1.0000)
(1.=1.0000)
1(=0.0000001)
(1.=1.0000000)
1(=0.00000001)
(1.=1.00000000)
1(=1.00000)
(1.=1.00000)
Command
range
0.000001 -
999.999999
0.0000001 -
999.9999999
0.0255 -
224580.0000
0.0000001 -
999.9999999
0.00000001 -
999.99999999
0.02540 -
224719.00000
M800/M80/E80/C80 Series Specifications Manual (Function)
4 Feed
IB-1501505-N 66
Thread cutting inch input
(Note 1) It is not possible to assign a lead that causes the feedrate converted into the feed per minute value
to exceed the maximum cutting feedrate.
Input
setting unit B (0.0001inch) C (0.00001inch)
Command
address F (inch/rev) E (inch/rev) E (ridges/inch) F (inch/rev) E (inch/rev) E (ridges/inch)
Least
Command
Increments
1(=0.00001)
(1.=1.00000)
1(=0.000001)
(1.=1.000000)
1(=1.000)
(1.=1.000)
1(=0.000001)
(1.=1.000000)
1(=0.0000001)
(1.=1.0000000)
1(=1.0000)
(1.=1.0000)
Command
range
0.00001 -
39.37007
0.000001 -
39.370078
0.025 -
9999.999
0.000001 -
39.370078
0.0000001 -
39.3700787
0.0254 -
9999.9999
Input
setting unit D (0.000001inch) E (0.0000001inch)
Command
address F (inch/rev) E (inch/rev) E (ridges/inch) F (inch/rev) E (inch/rev) E (ridges/inch)
Least
Command
Increments
1(=0.0000001)

(1.=1.0000000)
1(=0.00000001)
(1.=1.00000000)
1(=1.00000)
(1.=1.00000)
1(=0.00000001)
(1.=1.00000000)
1(=0.000000001)
(1.=1.000000000)
1(=1.000000)
(1.=1.000000)
Command
range
0.0000001 -
39.3700787
0.00000001 -
39.37007873
0.02540 -
9999.99999
0.00000001 -
39.37007873
0.000000001 -
39.370078736
0.025400 -
9999.999999
M800/M80/E80/C80 Series Specifications Manual (Function)
4 Feed
67 IB-1501505-N
4.5.2 Variable Lead Thread Cutting
By commanding the lead increment/decrement amount per thread rotation, variable lead thread cutting can be done.
The machining program is commanded in the following manner.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
G34 Xx1/Uu1 Zz1/Ww1 Ff1/Ee1 Kk1 ;
G34
Xx1/Uu1
Zz1/Ww1
Ff1/Ee1
Kk1
: Variable lead thread cutting command
: Thread end point X coordinate
: Thread end point Z coordinate
: Thread's basic lead
: Lead increment/decrement amount per thread rotation
F+3.5K F+2.5K F+1.5K F+0.5K
F+4K
F+3K F+2K F+K F
Non-lead axis
Lead axis
Lead speed
M800/M80/E80/C80 Series Specifications Manual (Function)
4 Feed
IB-1501505-N 68
4.5.3 Synchronous Tapping
(Note) With digital I/F spindle
4.5.3.1 Synchronous Tapping Cycle
This function performs tapping through the synchronized control of the digital spindle and servo axis. This eliminates the need for floating taps and enables tapping to be conducted at a highly precise tap depth.
(1) Tapping pitch assignment
(2) Tapping thread number assignment
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
G84(G74) Xx1 Yy1 Zz1 Rr1 Dd1 Pp1 Ff1 Kk1 Ss1 ,Ss2 ,Rr2 ,Ii1 ,Jj1 Mm1 ;
G84
G74
Xx1,Yy1
Zz1
Rr1
Dd1
Pp1
Ff1
Kk1

Ss1
,Ss2
,Rr2
,Ii1/,Jj1
Mm1
: Mode, forward tapping
: Mode, reverse tapping
: Hole position data, hole drilling position
: Hole machining data, hole bottom position
: Hole machining data, point R position
: Tool spindle number (d is 1 to number of spindles)
Depending on the parameter setting, command as "-d1" to carry out reverse tapping.
: Hole machining data, dwell time at hole bottom
: Z-axis feed amount (tapping pitch) per spindle rotation
: Number of repetitions
: Spindle speed
: Rotation speed of spindle during retract
: Synchronization method selection (r2=1 Synchronous, r2=0 Asynchronous)
: In-position width of positioning axis/hole drilling axis
: M function designation
G84(G74) Xx1 Yy1 Zz1 Rr1 Dd1 Pp1 Ee1 Kk1 Ss1 ,Ss2 ,Rr2 ,Ii1 ,Jj1 Mm1 ;
G84
G74
Xx1,Yy1
Zz1
Rr1
Dd1
Pp1
Ee1
Kk1
Ss1
,Ss2
,Rr2
,Ii1/,Jj1
Mm1
: Mode, forward tapping
: Mode, reverse tapping
: Hole position data, hole drilling position
: Hole machining data, hole bottom position
: Hole machining data, point R position
: Tool spindle number (d is 1 to number of spindles)
Depending on the parameter setting, command as "-d1" to carry out reverse tapping.
: Hole machining data, dwell time at hole bottom
: Tap thread number per 1-inch feed of Z axis
: Number of repetitions
: Spindle speed
: Rotation speed of spindle during retract
: Synchronization method selection (r2=1 synchronous, r2=0 asynchronous)
: In-position width of positioning axis/hole drilling axis
: M function designation

(Note) The synchronous tapping cycle can be used for axes other than the Z axis with the plane selection.
Furthermore, in-position checks can be performed at the hole bottom or point R, etc. using the parameters.
The figure below shows the correlation between the in-position width and the movement of the tapping axis of
the synchronous tapping in-position check.
(1) Section where in-position check is performed using servo in-position width
(2) Section where in-position check is performed using in-position width for tapping
(3) Section where in-position check is performed using in-position width for cutting feed (G1, G2, G3)
(4) Section where in-position check is performed using in-position width for rapid traverse (G0)
FIN
(4) (2) (3) (1)

Feed
rate
Hole bottom
Time T
Point R
In-position finish
for G0 feed from
point R
G1
deceleration
start during
tapping cutting
G1
deceleration
start during
tapping retract
G0 feed
start to
point R

4.5.3.2 Pecking Tapping Cycle
The load applied to the tool can be reduced by designating the depth of cut per pass and cutting the workpiece to the

hole bottom for a multiple number of passes.
The amount retracted from the hole bottom is set to the parameters.
Select either the pecking tapping cycle or the deep-hole tapping cycle by parameter.
When the pecking tapping cycle is executed in the synchronous tapping mode, the synchronous tapping cycle function and pecking tapping cycle function are required.
When "depth of cut per pass Q" is designated in the block containing the G84 or G74 command in the state where the pecking tapping cycle is selected by parameter, the pecking tapping cycle is executed.
In the following cases, the normal tapping cycle is established.
When Q is not designated
When the command value of Q is zero
When there is no Pecking tapping cycle function
(1) M system
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
G84(G74) Xx1 Yy1 Zz1 Rr1 Qq1 Ff1(Ee1) Pp1 Ss1 ,Ss2 ,Ii1 ,Jj1 ,Rr2 Ll1 ;
G84 : G84 forward tapping cycle
G74 : G74 reverse tapping cycle
Xx1,Yy1 : Hole drilling position
Zz1 : Hole bottom position
Rr1 : Point R position
Qq1 : Depth of cut per pass (designated as an incremental position)
Ff1 : During synchronous tapping: Designation of drilling axis feed amount (tapping pitch) per spindle revolution (modal)
During asynchronous tapping: Designation of the feedrate for cutting feed (modal)
Ee1 : Tap thread number per 1-inch feed of Z axis
Pp1 : Dwell time at hole bottom position
Ss1 : Rotation speed of spindle
,Ss2 : Rotation speed of spindle during retract
,Ii2 : In-position width of positioning axis
,Jj2 : In-position width of hole drilling axis
,Rr2 : Synchronization method selection (r2=1 synchronous, r2=0 asynchronous)
Ll1 : Number of repetitions
M800/M80/E80/C80 Series Specifications Manual (Function)
4 Feed
71 IB-1501505-N
(2) L system
d : Retract amount (parameter)
(Note) This program is for the G84 command. The spindle forward rotation (M3) and reverse rotation (M4) are reversed with the G74 command.
G84(G88, G84.1, G88.1) Xx1 Cc1 Zz1 Rr1 Qq1 Ff1(Ee1) Pp1 Ss1 ,Ss2 ,Ii ,Jj ,Rr2 Dd1 Ll1 Mm1 ;
G84 : G84 Face forward tapping cycle
G88 : G88 Side forward tapping cycle
G84.1 : G84.1 Face reverse tapping cycle (It can be commanded by setting of parameter)
G88.1 : G88.1 Side reverse tapping cycle (It can be commanded by setting of parameter)
Xx1,Cc1,Zz1 : Hole position data and : hole bottom position
Rr1 : Point R position
Qq1 : Depth of cut per pass (designated as an incremental position)
Ff1 : During synchronous tapping: Designation of drilling axis feed amount (tapping pitch) per spindle revolution (modal)
During asynchronous tapping: Designation of the feedrate for cutting feed (modal)
Ee1 : Tap thread number per 1-inch feed of Z axis
Pp1 : Dwell time at hole bottom position
Ss1 : Rotation speed of spindle
,Ss2 : Rotation speed of spindle
,Ii2 : In-position width of positioning axis
,Jj2 : In-position width of hole drilling axis
,Rr2 : Synchronization method selection (r2=1:synchronousr2=0:asynchronous)
Dd1 : Tapping spindle number assignment
(By minus command, reverse tapping can be commanded by setting of parameter.
It can be commanded when it is multiple-spindle control .
Program error occurs when multiple-spindle control is commanded by D command.)
Ll1 : Number of repetitions
Mm1 : C axis clamp M code
(1): G00 Xx1 Cc1 ,Ii1
(2): G00 Zr1
(3): G01 Zq1 Ff1
(4): M4 (Spindle reverse rotation)
(5): G01 Z-d Ff1
(6): M3 (Spindle forward rotation)
(7): G01 Z(q1+d) Ff1
:
(n1): G01 Z(z1-q1*n) Ff1
(n2): G04 Pp1
(n3): M4
(n4): G01 Z-z1 Ff1
(n5): G04 Pp1
(n6): M3
(n7): G00 Xx1 Cc1 ,Ii1 G98 mode
No movement G99 mode
G98

G99
q1q1q1
d
d
r1
d
(1)
(2) (3)
(4)
(5)
(6)
(7)
(n1)
(n6) (n7)
(n5) (n4) (n3)
(n2)
x1,c1
z1

4.5.3.3 Deep-hole Tapping Cycle
In the deep-hole tapping, the load applied to the tool can be reduced by designating the depth of cut per pass and cutting the workpiece to the hole bottom for a multiple number of passes.
Adding this function, the pecking tapping cycle function is also added.
Under the deep-hole tapping cycle, the tool is retracted to the R-point every time.
Select either the pecking tapping cycle or the deep-hole tapping cycle by parameter.
When the deep-hole tapping cycle is executed in the synchronous tapping mode, the synchronous tapping cycle function and deep-hole tapping cycle function are required.
When "depth of cut per pass Q" is designated in the block containing the G84 or G74 command in the state where the deep-hole tapping cycle is selected by parameter, the deep-hole tapping cycle is executed.
In the following cases, the normal tapping cycle is established.
When Q is not designated
When the command value of Q is zero
When there is no deep tapping cycle function
(1) M system
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
G84(G74) Xx1 Yy1 Zz1 Rr1 Qq1 Ff1(Ee1) Pp1 Ss1 ,Ss2 ,Ii ,Jj ,Rr2 Ll1 (Kk1) ;
G84 : G84 forward tapping cycle
G74 : G74 reverse tapping cycle
Xx1,Yy1 : Hole drilling position
Zz1 : Hole bottom position
Rr1 : Point R position
Qq1 : Depth of cut per pass (designated as an incremental position)
Ff1 : During synchronous tapping: Designation of drilling axis feed amount (tapping pitch) per spindle revolution (modal)
During asynchronous tapping: Designation of the feedrate for cutting feed (modal)
Ee1 : Tap thread number per 1-inch feed of Z axis
Pp1 : Dwell time at hole bottom and point R return
Ss1 : Rotation speed of spindle
,Ss2 : Rotation speed of spindle during retract
,Ii2 : In-position width of positioning axis
,Jj2 : In-position width of hole drilling axis
,Rr2 : Synchronization method selection (r2=1 synchronous, r2=0 asynchronous)
Ll1 : Number of repetitions
Kk1 : Number of repetitions (It commanded by parameter)

(2) L system
(Note) This program is for the G84 command. The spindle forward rotation (M3) and reverse rotation (M4) are reversed with the G74 command.
G84(G88, G84.1, G88.1) Xx1 Cc1 Zz1 Rr1 Qq1 Ff1(Ee1) Pp1 Ss1 ,Ss2 ,Ii ,Jj ,Rr2 Dd1 Ll1 Mm1 ;
G84 : G84 Face forward tapping cycle
G88 : G88 Side forward tapping cycle
G84.1 : G84.1 Face reverse tapping cycle (It can be commanded by setting of parameter)
G88.1 : G88.1 Side reverse tapping cycle (It can be commanded by setting of parameter)
Xx1,Cc1,Zz1 : Hole position data and : hole bottom position
Rr1 : Point R position
Qq1 : Depth of cut per pass (designated as an incremental position)
Ff1 : During synchronous tapping: Designation of drilling axis feed amount (tapping pitch) per spindle revolution (modal)
During asynchronous tapping: Designation of the feedrate for cutting feed (modal)
Ee1 : Tap thread number per 1-inch feed of Z axis
Pp1 : Dwell time at hole bottom position
Ss1 : Rotation speed of spindle
,Ss2 : Rotation speed of spindle
,Ii2 : In-position width of positioning axis
,Jj2 : In-position width of hole drilling axis

,Rr2 : Synchronization method selection (r2=1:synchronousr2=0:asynchronous)
Dd1 : Tapping spindle number assignment
(By minus command, reverse tapping can be commanded by setting of parameter.
It can be commanded when it is multiple-spindle control .
Program error occurs when multiple-spindle control is commanded by D command.)
Ll1 : Number of repetitions
Mm1 : C axis clamp M code
(1): G00 Xx1 Cc1
(2): G00 Zr1
(3): G01 Zq1 Ff1
(4): M4 (Spindle reverse rotation)
(5): G01 Z-q1 Ff1
(6): G04 Pp1
(7): M3 (Spindle forward rotation)
(8): G01 Z(2*q1)Ff1
(9):
:
(n1): G01 Zz1 Ff1
(n2): G4 Pp1
(n3): M4
(n4): G01 Z-z1 Ff1
(n5): G04 Pp1
(n6): M3
(n7): G00Z-r1 G98 mode
No movement G99 mode
G98
G99
qqq
r1
(1)
(2) (3)
(4)
(5) (6)
(7)
(n1)
(n6) (n7)
(n5)
(n4)
(n3)
(n2)
x1,c1
z1
(8)
(9)

4.5.3.4 Synchronous Tapping with Multiple Spindles
This can perform synchronous tapping with multiple spindles simultaneously, and can improve efficiency of the tapping.
You can designate all spindles to constitute.
The command format is the same as the command for normal synchronous tapping.
The multiple spindles to execute the synchronous tapping are designated from the sequence I/F.
4.5.3.5 Synchronous Tapping with Analog I/F Spindle
This function performs tapping using the analog-connected spindle. The functions in the table below can be used using the spindle analog-connected by inverter, etc. The operation of synchronous tapping cycle other than this function follows the specification in the table below.
When this function is used, the analog spindle with the function to control the spindle position needs to be connected.
Also, the parameter needs to be turned ON.
The voltage value to be output to the analog spindle is between -10V and 10V, which is determined by the ratio of the spindle rotation speed corresponding to the command to analog spindle and the setting value of the parameter.
4.5.4 Chamfering
Chamfering can be validated during the thread cutting cycle by using external signals.
The chamfer amount and angle are designated with parameters.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
Function name G code
M system Tapping cycle G84
Reverse tapping cycle G74
L system
Face tapping cycle G84

Face reverse tapping cycle G84.1
Longitudinal tapping cycle G88
Longitudinal reverse tapping cycle G88.1
Synchronous tapping cycle G84.2
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
Thread cutting cycle
Chamfer angle
Chamfer amount

4.5.6 Circular Thread Cutting
Circular thread in which the lead is in longitudinal direction can be cut.
This function can be used with the G code list 6 or 7.
Command format
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
G35(G36) Xx/Uu Zz/Ww
Ii Kk
Ff/Ee Qq ; Rr
G35 : Clockwise (CW)
(G36) : Counterclockwise (CCW)
Xx/Uu : X-axis arc end point coordinate
Zz/Ww : Z-axis arc end point coordinate
Ii : X-axis arc center (incremental value from start point to arc center)
Kk : Z-axis arc center (incremental value from start point to arc center)
Rr : Arc radius
Ff/Ee : Longitudinal axis (axis with most travel) direction lead
(Ff: normal lead thread cutting, Ee: precise lead threads or inch threads)
Qq : Thread cutting start shift angle (0.000 to 360.000)
X
Z
R
Z W
I
K
X
U/2
Center
End point
Start point

4.5.8 High-speed Synchronous Tapping (OMR-DD)
The servo axis directly detects and compensates of the spindle's delay in tracking by using the communication between drive unit over the high-speed optical servo network. By minimizing the synchronization error, the accuracy of the synchronous tapping is increased.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
without OMR-DD control
Implement to
increase the
accuracy of
the synchronous
tapping
with DMR-DD control
(sec)
4000
3000
0 0.5 1 1.5 2 2.5 3 3.5
2000
1000

1000
2000
3000
4000
0
Spindle rotation speed
Synchronization
error
4000
3000
0 0.5 1 1.5 2 2.5 3 3.5
2000
1000
1000
2000
3000
4000
0
(sec)
Spindle rotation speed
Synchronization
error

4.5.10 Thread Recutting
The function stores a thread groove position and compensates a start position of spindle thread cutting automatically so
that the tool can pass along the memorized position of the thread groove at the thread cutting execution. Thread
machined workpieces which have problems such as the thread number shortage, striped groove, etc., can be re chucked and thread recut.
Thread recutting correspondence table
: Machinable : Machinable with conditions : Impossible
Machinable with conditions ()
(Note 1) Continuous thread: Conduct a memorizing of thread recutting position at the groove on the first block of
continuous thread.
(Note 2) Variable lead thread: thread recutting is disable during an automatic operation with thread recutting
enabled when the first thread cutting command is the variable lead thread cutting.
(Note 3) Compound type fixed cycle: Thread re-cutting can be performed only for the workpiece which has been
cut its finishing allowance.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
(1) Re-chucking of thread machined workpiece (2) Memorizing thread groove position (memorizing lead
axis and spindle position)
(3) Moving to start position after tool retract (4) Thread recutting ON and program operation start
The start position of spindle thread cutting is automatically
compensated with the memorized position of the lead axis
and spindle.
Thread cutting command
Z direction feed thread X direction feed thread
Right-handed/Left-handed thread Scroll thread
Thread cutting
Continuous thread (Note 1) (Note 1)
Variable lead thread (Note 2) (Note 2)
Fixed cycle for turning machining
Compound type fixed cycle for turning
machining (Note 3) (Note 3)

4.5.11 Thread Cutting Override
The thread cutting feedrate can be changed by changing the spindle override depending on rough cutting, finish
machining, etc.
The spindle speed during thread cutting is determined with the spindle override at the start of thread cutting.
4.5.12 Variable Feed Thread Cutting
This function changes the cutting feedrate by the spindle override at the time of the thread cutting. The machining
condition during thread cutting can be changed.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80

TypeA
E80
TypeB C80
M
L
M800/M80/E80/C80 Series Specifications Manual (Function)
4 Feed
79 IB-1501505-N
4.5.13 Thread Cutting Time Constant Switch
"Thread cutting time constant" can be applied to the acceleration/deceleration time constant of the NC control axis during the thread cutting. Usually, incorrect lead parts occur at the start and the end of thread cutting due to the acceleration/deceleration of the NC control axis. However, the acceleration/deceleration time, which causes incorrect lead parts, can be reduced by applying the thread cutting time constant to the NC control axis during the thread cutting so that the incorrect thread parts can be reduced. Additionally, the machining time can be reduced as much as the acceleration/deceleration time reduction of thread cutting.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
Approach distance can be shorter by applying thread
cutting time constant.
Approach position with G01 time constant
Approach position with thread cutting time constant
Ttop: G01 time constant
Tthr: Thread cutting time constant
Cutting feedrate (max.)
Thread cutting rate (max.)
Acceleration time can be reduced
G01 acceleration curve with G01 time constant
G33 acceleration curve with thread cutting time constant
G33 acceleration curve with G01 time constant
Axis speed
F
ime t 0 Tthr Ttop
G33
G00 G00
G00
M800/M80/E80/C80 Series Specifications Manual (Function)
4 Feed
IB-1501505-N 80
4.6 Manual Feed
4.6.1 Manual Rapid Traverse
When the manual rapid traverse mode is selected, the tool can be moved at the rapid traverse rate for each axis separately. Override can also be applied to the rapid traverse rate by means of the rapid traverse override function.
Rapid traverse override can be set for each part system respectively.
4.6.2 Jog Feed
When the jog feed mode is selected, the tool can be moved in the axis direction (+ or -) in which the machine is to be moved at the per-minute feed.
The jog feedrate can be set for each axis with the parameters.
If the jog feedrate is not set with the parameters, the jog feedrate is set with the PLC signal.
There are two methods for PLC signal which sets the jog feed rate: the code method and the value setting method.
The method to be used is selected by PLC signal for each part system. The signals of code and value setting methods are set for each part system.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
CNC
PLC
1 100
25 50
X
- +
Y
- +
Z

- +
Rapid traverse override
Axis
movement
control
Machine tool
Tool
Rapid traverse
Rapid traverse
CNC
PLC
0 3000 0 200
X
- +
Y
- +
Z
- +
Jog Feed rate Override
Axis
movement
control
Machine tool
Tool
Manual cutting feed
M800/M80/E80/C80 Series Specifications Manual (Function)
4 Feed
81 IB-1501505-N
4.6.3 Incremental Feed
When the incremental feed mode is selected, the tool can be operated by an amount equivalent to the designated amount (incremental amount) in the axis direction each time the jog switch is pressed. The incremental feed amount is the amount obtained by multiplying the least command increment that was set with the parameter by the incremental feed magnification rate.
The incremental feed amount parameter and its magnification rate can be set for each part system respectively.
4.6.4 Handle Feed
In the handle feed mode, the machine can be moved in very small amounts by rotating the manual pulse generator. The scale can be selected from x1, x10, x100, x1000 or arbitrary value.
If the least command increment is 10nm or 1nm, the scale can be selected from x5000, x10000, x50000 or x100000, as well.
Individual axes can be moved in very small amounts separately by rotating the manual pulse generators installed on each of the axes.
(Note 1) The actual movement amount and scale may not match if the manual pulse generator is rotated quickly.
Up to three handles (manual pulse generators) can be used with the MITSUBISHI CNC.
The handles can be connected to the control unit and remote I/O unit. If the operation panel I/O unit is connected, the handle can also be connected to the operation panel I/O unit.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
PLC
1000 CNC
X
- +
Y
- +
Z
- +
Incremental Scale factor
Axis
movement
control
Machine tool
Tool
Step feed
M800/M80/E80/C80 Series Specifications Manual (Function)
4 Feed
IB-1501505-N 82
4.6.5 Manual Feedrate B
"Manual feedrate B" is a function that sets an arbitrary axis feedrate from the user PLC separately from the "manual feedrate". The "manual feedrate B" feedrate setting can be selected from the feedrate common for all axes and the feedrate independent of reach axis.
By combining the "manual feedrate B" function with the manual/automatic simultaneous function, an arbitrary axis can be

moved at the "manual feedrate B" independently of the machining program operation even during automatic operation.
Similarly, if the jog mode and other manual operation mode are set simultaneously, an arbitrary axis can be moved at a speed independent from the "manual feedrate" even during the manual operation mode.
The "manual feedrate B" function can move an axis at a speed different from the "manual feedrate". This is not affected by dry run, or by manual or cutting override, so an arbitrary axis can be moved independently even in operations during automatic operation or override during manual axis movement.
The relation of the "manual feedrate B" and "manual feedrate" is shown below.
(Note) For the axis to which manual feedrate B is applied, the feedrate is not displayed on the screen.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
Manual override validity
Each axis manual feedrate B speed
1st axis
Manual feedrate
Dry run speed
Cutting override
Each axis manual feedrate B speed
2nd axis
Each axis manual feedrate B speed
3rd axis
Each axis manual feedrate B speed
4th axis
Manual feedrate B speed
Dry run validity
X axis speed
Y axis speed
Z axis speed
B axis speed
Each axis manual
feedrate B valid Validity
Manual feedrate B valid
n-th axis Validity

4.6.6 Manual Feedrate B Surface Speed Control
When using the manual feedrate B function and machining by moving the orthogonal axis while rotating the rotary table, the tool nose and workpiece's relative speed will drop as the tool nears the rotation center if the table rotation speed remains under the set conditions. This function controls the table rotation speed according to the distance from the rotation center.
As shown below, the distance (radius) from the rotation center at two points and the rotary axis speed at each point is set in the parameters. When the "manual feedrate B constant surface speed control valid" signal is turned ON, the rotary axis speed will be automatically calculated according to the current radius R.
(1) If RR1, then V1 will be applied.
(2) If R1<R<R2, the speed V is calculated with the following expression.
(3) If R2R, then V2 will be applied.
Override can be applied in the range of 0 to 200% in respect to the rotary axis's speed for which the manual feedrate B surface speed control is valid.
This function can be used with a rotary axis for which the manual feedrate B function is valid.
The manual feedrate B speed and each axis' manual feedrate B speed which are issued from the user PLC is ignored for an axis for which this function is valid.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
(1) (2) (3)
R1 R2
V1
V2
Rotary axis speed
Radius
V= (V2 - V1)
(R2 - R1) *(R - R1)+V1

4.6.8 Manual Speed Clamp
The maximum speed for manual feed can be switched to the rapid traverse rate or the manual feed clamp speed.
This function is usable, for instance, when the axis speed needs to be clamped at an arbitrary rate for performing a manual feed with a cutting cover opened.
The clamp speed is switched with the parameter or PLC signal.
The manual feed clamp speed can be set to an arbitrary speed with the parameter.
The manual feedrate can be applied for operation modes as follows:
- Jog mode

- Handle mode
- Incremental mode
- Manual reference position return (high-speed) mode
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
Rapid traverse rate (rapid)
Manual feed clamp speed (m_clamp)
Manual speed clamp ON
Manual speed clamp OFF

4.7 Dwell
With this function, the program command temporarily stops the machine movement and puts the machine into standby status so that the starting time of the next block can be delayed.
4.7.1 Dwell (Time-based Designation)
When G04 is commanded in the asynchronous feed mode (G94), the machine waits for the specified amount of time before executing the next block.
Command format
(1) G94 is not necessary in the asynchronous feed mode (G94).
(2) The decimal point command is valid for dwell time designated with the address "X" or "U".
(3) The decimal point command is valid for dwell time designated with the address "P", depending on the parameter setting. When the decimal point command is set to be invalid by the parameter, the number below the decimal point of the P command value is ignored.
(4) When the decimal point command is valid or invalid, the dwell time command range for each status is as follows.
(5) When the dwell is commanded with no decimal point, the setting unit for dwell time can be changed by setting the parameter. (M8 Series)
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
G94 G04 X/U__ ; or G94 G04 P__ ;
X/P/U : Dwell time
Command range when the decimal point command
is valid
Command range when the decimal point command
is invalid
0 to 99999.999 (s) 0 to 99999999 (ms)

4.7.2 Dwell (Revolution-based Designation)
When G04 is commanded in the synchronous feed mode (G95), the machine waits for the spindle to rotate for the number of the revolutions designated.
Command format
(1) G95 is not necessary when the D command is assigned in the same block as G04.
(2) G95 is not necessary in the synchronous feed mode (G95).
(3) The decimal point command is valid for the number of revolutions for dwell designated with the address "X" or "U".
(4) The decimal point command is valid for the number of revolutions for dwell designated with the address "P", depending on the parameter setting. When the decimal point command is set to be invalid by the parameter, the number below the decimal point of the P command value is ignored.
(5) When the decimal point command is valid or invalid, the command range of number of revolution for dwell is as follows for each status.
(6) When the dwell is commanded with no decimal point, the setting unit for the number of revolution can be changed by setting the parameter. (M8 Series)
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
G95 G04 X/U__ D__ ; or G95 G04 P__ D__ ;
X/P/U : Number of revolutions for dwell
D : Dwell target spindle (For command using the spindle number, the spindle number should be within the number of spindles for specifications. For command using the spindle name, the number from 1 to 9 is valid for the spindle name.)
Command range when the decimal point command
is valid
Command range when the decimal point command
is invalid

0 to 99999.999 (rev) 0 to 99999999 (0.001rev)

5.1 Memory Capacity
Machining programs are stored in the NC memory, DS, and external memory device (front SD card, built-in disk of display unit, etc.).
When using devices such as the built-in disk (HD) of the display unit, DS and memory card, mass-editing, which is carried out on those devices, is possible.
The data size that can be handled in the mass-editing differs depending on the devices.
5.1.1 Memory Capacity (Number of Programs Stored)
[M system]
[L system]
(*1) Up to 2000 programs for C80
(Note) The tape length for the multi-part system specifications is the total for all part systems.
Memory capacity
(number of programs stored) M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
230 KB [600m] (400 programs)
500 KB [1280m] (1000
programs)
1000 KB [2560m] (1000
programs) (*1)
2000 KB [5120m] (1000
programs) (*1)
Memory capacity
(number of programs stored) M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
230 KB [600m] (400 programs)
500 KB [1280m] (1000
programs)
1000 KB [2560m] (1000
programs) (*1)
2000 KB [5120m] (1000
programs) (*1)

5.2 Editing
5.2.1 Program Editing
The following editing functions are possible.
(1) Program erasing
(a) Machining programs can be erased individually or totally.
(2) Program filing
(a) This function displays a list of the machining programs stored (registered) in the controller memory.
(b) The programs are displayed in ascending order.
(c) Comments can be added to corresponding program numbers.
(3) Program copying
(a) Machining programs stored in the controller memory can be copied, condensed or merged.
(b) The program No. of the machining programs in the memory can be changed.
(4) Program editing
(a) Overwriting, inserting and erasing can be done per character.
(5) Mass editing (M8 series)
There are regular editing and mass-editing for program editing. The specification and restrictions are different between the regular editing and mass-editing.
Refer to the table below for conditions to be mass-editing and its maximum editing size.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
Series Conditions to be mass-editing Maximum editing size
M800 Series
M80W Series
- The storage destination for the machining program to be opened is either the built-in disk (HD) of the display unit, USB memory, memory card or DS.
- A file size is 1.0 MB or larger. (The size could be 2.0 MB or larger,

depending on the parameter settings.) 1 GB
M80 Series
E80 Series
- The storage destination for the machining program to be opened is
either memory card, USB memory or DS.
- A file size is 0.5 MB or larger.

5.2.2 Background Editing
This function enables one machining program to be created or editing while another program is being run.
(1) The data of the machining programs being used in memory operation can be displayed and scrolled on the setting and display unit, but data cannot be added, revised or deleted.
(2) The editing functions mentioned in the preceding section can be used at any time for machining programs which are not being used for memory operation.
This makes it possible to prepare and edit the next program for machining, and so the machining preparations can be made more efficiently.
(3) The machining program will not be searched as the operation target even when searched in the edit screen.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
O1000
O2000
O3000
O4000
Prohibited Program
registered
in memory
Editing Memory
operation
Program editing Machining with memory operation
Display unit

5.2.3 Buffer Correction
During automatic operation (including memory, SD card, USB memory or DS operation) or MDI operation, this function initiates single block stop and enables the next command to be corrected or changed.
Only memory or DS operation allows the changes with buffer corrections to be updated in the machining program.
When a program error has occurred, the function enables the block in which the error occurred to be corrected and operation to be resumed without having to perform NC resetting.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
MDI
Memory mode Pre-read
block
Execution
block NC
operation
Machine
control
MDI mode
Display unit
Buffer correction
Memory,
The built-in disk of the
display unit (HD),
SD card,
DS,
USB memory

5.2.5 Multi-part System Simultaneous Program Editing
When an operation to open a machining program in the NC memory is performed on the edit screen, machining programs are opened in the right and left areas at the same time; the specified machining program of the displayed part system in the edit area being selected and the machining program of another part system with the same name in the unselected edit area.
5.2.6 Special Program Editing Display for Synchronization between Part Systems
Pressing the [Synchro view] menu enables synchronized display of the left- and right-side programs aligned using the timing synchronization symbols, when all the following conditions are met:
- Multi-part system program management is ON
- Multi-program display type is selected

- The left and right edit areas are displaying the same named programs of different part systems stored on the NC memory

M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L

5.2.7 Finish Shape View Programming

This function shows the machining shape according to the command at the time the machining program is input, and is intended to eliminate mistakes in programming.

Therefore, the machining shape can be confirmed easily without performing the automatic operation or the graphic check.

(Example) For a new program file, confirm the finish shape by inputting the machining program.

M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
The input machining program will be reflected in the shape.

* In this example, as the cutting is not performed with G54, the shape will not be changed.

Input the machining program.

When inputting the machining program continuously ...

The input machining program will be reflected in the shape.

6 Operation and Display

6.1 Structure of Operation/Display Panel

Setting display unit consists of the display and keyboard unit.

Refer to "Specifications Manual (Hardware)" for details.

(Note) For Separated-type color touchscreen display (19-type LCD TFT/Windows8), only software keyboard is available and there is no hardware keyboard.

6.1.1 Color Display (8.4-type LCD TFT)
6.1.2 Color Touchscreen Display (10.4-type LCD TFT)
6.1.3 Color Touchscreen Display (15-type LCD TFT)
6.1.4 Separated-type Color Display (8.4-type LCD TFT)
6.1.5 Separated-type Color Touchscreen Display (10.4-type LCD TFT)
6.1.6 Separated-type Color Touchscreen Display (15-type LCD TFT)
6.1.7 Separated-type Color Touchscreen Display (15-type LCD TFT/Windows8)

M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80

TypeB C80
M
L
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
M800/M80/E80/C80 Series Specifications Manual (Function)
6 Operation and Display
97 IB-1501505-N
6.1.8 Separated-type Color Touchscreen Display (19-type LCD TFT/Windows8)
6.1.9 Separated-type Color Touchscreen Display (19-type Horizontal LCD TFT/Windows8)
6.1.11 GOT (GOT2000 Series GT27/GT25 12.1/10.4/8.4/5.7)
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M

L
M800/M80/E80/C80 Series Specifications Manual (Function)
6 Operation and Display
IB-1501505-N 98
6.2 Operation Methods and Functions
6.2.1 Operation Input
In addition to the method of directly inputting numeric data, a method to input the operation results using four rules operators and function symbols can be used for specific data settings.
Numeric values, function symbols, operators and parentheses ( ) are combined and set in the data setting area.
The operation results appear when the INPUTkey is pressed. If the INPUT key is pressed again, the data is processed and displayed on the screen. The contents in the data setting area are erased.
6.2.2 Absolute/Incremental Setting
When setting the data, the absolute/incremental setting can be selected from the menu.
The absolute/incremental settings can be selected on the following screens.
- Common variable screen
- Tool compensation amount screen
- Coordinate system offset screen
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
Examples of operator settings and results Function symbols, setting examples and results
Operation Setting example Operation
results Function Function
symbol Setting example Operation
results
Addition = 100+50 150.000 Absolute
value ABS = ABS(50-60) 10
Subtraction = 100-50 50.000 Square
root SQRT = SQRT(3) 1.732
Multiplication = 12.3*4 49.200 Sine SIN = SIN(30) 0.5
Division = 100/3 33.333 Cosine COS = COS(15) 0.966
Function = 1.2*(2.5+SQRT(4)) 5.4 Tangent TAN = TAN(45) 1
Arc tangent ATAN = ATAN(1.3) 52.431
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
M800/M80/E80/C80 Series Specifications Manual (Function)
6 Operation and Display
99 IB-1501505-N
6.2.3 Multiple Display Connection
By attaching an Ethernet hub, one CNC can be switched to display up to 8 setting display units (CNC monitor2 for GOT or NC Monitor2) at a time. (However, depending on the specification of machine operation panel, there might be the limitation of the maximum number of the connectable units.)
6.2.4 Common Display to Multiple NCs
By attaching an Ethernet hub, one setting display unit can be switched to display up to 64 CNCs. (However, depending on the specification of machine operation panel, there might be the limitation of the maximum number of the connectable units.)
6.2.5 Displayed Part System Switch
The part system displayed on the screen can be changed with the [$<->$] keys.
The number of displayed part systems is counted by one each time the [$<->$] keys are pressed. The screen corresponding to that part system opens.
If the number of displayed part systems exceeds the valid number of part systems, the number of displayed part systems will return to 1.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M (GOT)
L (GOT)
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M (GOT)
L (GOT)
M850W M830W M850S M830S M80W M80

TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
M800/M80/E80/C80 Series Specifications Manual (Function)
6 Operation and Display
IB-1501505-N 100
6.2.6 Menu List
The menu list function displays the menu configuration of each screen as a list making it possible to directly select the menu for other screens.
When the cursor is moved to the menu, the outline of that menu's functions will also appear. The menu can be selected while checking the details of the menu.
6.2.7 Display Switch by Operation Mode
The screen display changes when the screen mode selection switch is changed.
The details corresponding to the operation mode are displayed.
6.2.8 External Signal Display Switch
The screen display changes with the signal from PLC.
6.2.9 Screen Saver
The screen saver function protects the screen display unit by turning the backlight OFF after the time set in the parameters has elapsed. The backlight is turned OFF after a certain period of time (automatic change function) or after the key operations (manual change function).
The screen is displayed again by pressing any key, or by touching anywhere on the screen if the display unit carries a touch-sensitive screen.
6.2.10 Parameter Guidance
The parameter guidance function displays the details of the parameters according to the state of the screen currently being displayed.
If the ? key is pressed on any screen, the parameter guidance window will open. If a pop-up window other than the parameter guidance window is opened, the parameter guidance window will open over the currently opened pop-up window.
For the display unit with a touch-sensitive screen, if you hold down the parameter data area (tap the target and keep your finger down for a while), the guidance of that parameter is displayed.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M (GOT)
L (GOT)
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
M800/M80/E80/C80 Series Specifications Manual (Function)
6 Operation and Display

6.2.11 Alarm Guidance
The alarm guidance displays the alarm message, details and remedy for the alarm currently issued.
By utilizing the guidance information, identify the cause from possible factors and determine the countermeasures.
When a multiple number of alarms are issued at the same time, guidance will be displayed for all the alarm issued.
6.2.12 Machining Program Input Mistake Check Warning
If an illegal input is found in the decimal point after the current cursor position, the cursor will move to that position, and a warning message will appear.
If this function is ON when editing the program, the decimal point will be checked for the block each time an edit key (alphabet, number, symbol, Delete, etc.) is pressed. The block is not checked when the cursor keys or page feed keys are pressed.
The warning for illegal machining program can also be issued while editing an MDI program.
The comment block is also subject to the warning for illegal machining program.
A warning does not appear in the following cases.
(1) When the data in the address subject to the illegal decimal point input is "0", a warning will not be issued regardless of whether there is a decimal point or not. (Example: A warning is not issued for "X0".)
(2) When the data in the address subject to the illegal decimal point input is omitted, a warning will not be issued. (Example: A warning is not issued for "G28XYZ".)
(3) Blocks containing "[" or "]" are not subject to the warning for illegal machining program.
6.2.14 Screenshot Capture
* Specifications of separated-type display are classified with "Windows-based" and "non-Windows-based"
This function allows to output a bitmap file of a screen displayed on the setting and display unit to USB memory or SD card.
6.2.15 User Selectable Menu Configuration
This function allows to change the display order of operations, procedure and edit screen, and to change display/non display selection.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M / / / (GOT)
L / / / (GOT)
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L

6.2.16 PC-NC Network Automatic Connection
* Specifications of separated-type display are classified with "Windows-based" and "non-Windows-based"
This function supports to restore the connection when the network connection cannot be created between the display unit and the control unit.
When the connection is not established even after the time out has expired, the connectable control unit IP address list appears. From the IP address list, the network connection can be re-established and restored when the IP address, which is to be connected with the control unit, is selected.
6.2.17 Device Open Parameter
This function can set or change the user backed up area of the PLC device from the NC screen.
The following settings are available from the NC screen.
- Divide the device area accordance with the specifications of the machine maker and set and display for each divided area.
- Switch the display format or data type for each divided area.
6.2.18 SRAM Open Parameter
This function can set or change the SRAM open area for the machine maker from the NC screen.
The following settings are available from the NC screen.
- Divide the SRAM area accordance with the specifications of the machine maker and set and display for each divided area.
- Switch the display format or data type for each divided area.
6.2.19 MTB Selectable Menu Configuration

Menu items on the "Monitor", "Setup", and "Edit" screens (of MITSUBISHI standard format) can be moved within a screen or hidden as desired. The custom screen menu items added by machine tool builders, to the contrary, cannot be moved or hidden.

	M850W	M830W	M850S	M830S	M80W	M80	TypeA	M80	TypeB	E80	TypeA	E80	TypeB	C80
M	/	/	/											
L	/	/	/											

	M850W	M830W	M850S	M830S	M80W	M80	TypeA	M80	TypeB	E80	TypeA	E80	TypeB	C80
M														
L														

	M850W	M830W	M850S	M830S	M80W	M80	TypeA	M80	TypeB	E80	TypeA	E80	TypeB	C80
M														
L														

6.2.20 Remote Desktop Connection

* Specifications of separated-type display are classified with "Windows-based" and "non-Windows-based"

Remote desktop connection enables you to operate an external personal computer through the NC screen when UltraVNC server is installed in the PC.

	M850W	M830W	M850S	M830S	M80W	M80	TypeA	M80	TypeB	E80	TypeA	E80	TypeB	C80
M	/	/	/											
L	/	/	/											

In-house Network

Server PC that can deal with TCP/IP

Application

UltraVNC Server

Control unit [M80]

Control unit [M800S]

Connect to LAN1

Connect to LAN2

6.2.21 VNC Server

* Specifications of separated-type display are classified with "Windows-based" and "non-Windows-based"

This function enables status confirmation and remote operation by displaying the NC screen display on the external computer or tablet PC.

This function can be valid by setting the parameter.

	M850W	M830W	M850S	M830S	M80W	M80	TypeA	M80	TypeB	E80	TypeA	E80	TypeB	C80
M	/	/	/											
L	/	/	/											

Tablet

Application

VNC client
Wireless connection
Wireless LAN
router
Wired connection
Application
VNC client
Computer
Connect to LAN 1
Connect to LAN 1
Control unit [M80]
Connect to LAN 1
Control unit [M800S]
non-Windows-based display unit
[M800W/M80W]
Factory network

6.3 Display Methods and Contents
6.3.1 Status Display
The status of the program now being executed is indicated.
(1) Display of G, S, T, M commands and 2nd miscellaneous command modal values
(2) Feed rate display
(3) Tool compensation No. and compensation amount display
(4) Real speed display (*)
(*) The feed rate of each axis is converted from the final speed output to the drive unit, and is displayed.
However, during follow up, the speed is converted and displayed with the signals from the detector
installed on the servomotor.
6.3.2 Clock Display
The clock is built-in, and the date (year, month, date) and time (hour, minute, second) are displayed.
Once the time is set, it can be seen as a clock on the screen.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L

6.3.3 Monitor Screen Display
A variety of information related to operation, such as the axis counter, speed display and MSTB command is displayed.
The display can be switched according to the machining application (prototype or mass production).
The following operations regarding operation can be executed:
- Operation search
- Restart search
- Editing of searched machining program
- Trace (Display of machine movement path)
- Check (Display of NC program's tool movement path)
- Correction of running program's buffer
- Counter set
- Manual numeric command, etc.
(1) Simple monitor screen
The information displayed on the simple monitor screen is limited. Therefore, the size of the text is larger and it is
readable from a distance.
(2) Selective display
A part of monitor screen can be customized to suit user's need (to display data which a user always needs to refer
to). The following can be displayed on the selective display area by selecting with the parameter:
- Tool offset
- Common variable
- Workpiece offset, etc.
(Note) The display is not selective on the simple monitor screen.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L

6.3.4 Setup Screen Display
Tool/workpiece related settings, user parameter settings, MDI editing, counter setting, manual numeric command issuing, etc., can be carried out.
When the data of the selected workpiece offset has been changed, the timing when the change is reflected in each counter can be selected by the parameter. (M8 Series)
6.3.5 Edit Screen Display
Machining program editing (addition, deletion, change), program check, simple programming, playback and file input/output can be carried out.
The specified character string can be searched even during the mass-editing.
6.3.6 Diagnosis Screen Display
The data related CNC diagnosis can be set and displayed as follows:
- Display of hardware and software configuration
- Display of CNC options
- Diagnosis of PLC interface
- Display of drive unit information
- Display of CNC internal data
- Display of alarm message / alarm history list etc.
- Display of H/W and Operation stop status
- Setting of sampling parameter and sampling of NC internal data
- Diagnosis for functional safety
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L

6.3.7 Maintenance Screen Display
Parameter setting and display, NC data input/output, NC memory format, etc., can be carried out on the Maintenance screen.
Important operations are protected with a password.
6.3.8 Home Application
* Specifications of separated-type display are classified with "Windows-based" and "non-Windows-based"
19-type vertical display unit has the expansion applications that display the machine status, software keyboard, etc. in the lower half of the screen in no linkage with the upper half.
The following expansion applications are provided as standard MITSUBISHI CNC specifications:
- Home screen (machine state display)
- Software keyboard
- Software operation panel
- Manual
- Notepad
MTB unique applications can also be added.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80

M / / /
L / / /
<Home screen>
<Operation panel screen> <Software keyboard screen>
Touch the application button.
Touch the shortcut button.
Touch the shortcut button. Touch the home button.

6.3.9 Home Screen
Home screen is able to display the machine status (including spindle loads and positions of linear and rotary axes) which can be monitored by an operator. Also, each application can be called by pressing the application button on the home screen. Registered applications differ depending on MTB.
It can be selected by the parameter as to whether to hide, display (display at power ON) or display (not display at power ON) the home screen.
* The screen can also be changed between [Home screen] and [Standard screen] by pressing the window display key ( ).
(Example) When calling the manual display application with the application button
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
When the manual to be displayed is touched on the manual selection screen, the selected manual is displayed. The manuals which can be displayed differ depending on MTB.
Touch the standard screen changeover button
Touch the home screen changeover button
[Home screen] [Standard screen]
Touch the application (manual display) button.
Touch the home button.

6.3.10 Additional Languages
A language of choice can be selected by parameter setting.
6.3.10.1 Japanese
6.3.10.2 English
6.3.10.3 German
6.3.10.4 Italian
6.3.10.5 French
6.3.10.6 Spanish
6.3.10.7 Chinese
6.3.10.7.1 Chinese (Traditional Chinese Characters)
6.3.10.7.2 Chinese (Simplified Chinese Characters)
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
M850W M830W M850S M830S M80W M80
TypeA
M80

TypeB
E80
TypeA
E80
TypeB C80
M
L
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
M800/M80/E80/C80 Series Specifications Manual (Function)
6 Operation and Display
111 IB-1501505-N
6.3.10.8 Korean
6.3.10.9 Portuguese
6.3.10.10 Hungarian
6.3.10.11 Dutch
6.3.10.12 Swedish
6.3.10.13 Turkish
6.3.10.14 Polish
6.3.10.15 Russian
6.3.10.16 Czech
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M

L
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L

6.3.10.17 Indonesian
6.3.10.18 Vietnamese
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L

7.1 Input/Output Data
Certain kinds of data handled by the NC system can be input and output between the NC system's memory and external devices.
7.1.1 Machining Program Input/Output
User Macros and Fixed Cycle Macros are included.
7.1.2 Tool Offset Data Input/Output
7.1.3 Common Variable Input/Output
7.1.4 Parameter Input/Output
7.1.5 History Data Output
7.1.7 System Configuration Data Output
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L

7.2 Input/Output I/F
7.2.1 RS-232C I/F
Two ports (port 1 and port 2) can be used for control unit and graphic control unit of the RS-232C interface.
(*) Only for non-Windows-based display unit
RS-232C devices can be used by connecting to each of the ports.
7.2.2 SD Card I/F
7.2.2.1 Control Unit-side SD Card I/F [Up to 32GB]
An SD card can be inserted into the slot inside the control unit and used.
7.2.2.2 Front-side SD Card I/F [Up to 32GB]
* Specifications of separated-type display are classified with "Windows-based" and "non-Windows-based"
An SD card can be inserted into the slot in front of the display unit and used.

7.2.3 Ethernet I/F
The NC unit can be connected to Ethernet and used.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
Control unit Graphic control unit (*)
Port Port 1, Port 2 Port 1, Port 2
Baudrate Up to 19.2kbps
Handshake method DC code method, RTS/CTS method possible
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M / / /
L / / /
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M (GOT)
L (GOT)
M800/M80/E80/C80 Series Specifications Manual (Function)
7 Input/Output Functions and Devices
IB-1501505-N 116
7.2.4 Display Unit-side Data Server I/F
A built-in disk (HD) of display unit can be used.
7.2.5 Front-side USB Memory I/F [Up to 32GB]
A USB memory can be mounted.
7.2.6 USB I/F (GOT Front-side USB I/F)
A USB memory can be mounted.
7.2.7 SD I/F (GOT Back-side SD Card I/F)
An SD card can be mounted on the back side of GOT.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
M850W M830W M850S M830S M80W M80

TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L

7.3 Computer Link
7.3.1 Computer Link B
Computer link B is a function that passes the data between host computer (hereafter abbreviated to "HOST") and CNC.
This function sends [DC1] to the HOST at the CNC cycle start, and it enables operation to be performed while the machining programs are received from the HOST.
The computer link has a reception buffer so that operation will be less susceptible to the effects of the data transfer status at the HOST end.
The high-speed machining mode function is required for high-speed fine-segment machining.
This function cannot be operated in the 2nd and following part systems.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
CNC HOST
CNC RS - 232C
Operation
Command
Machining program

7.4 Others
7.4.1 Handy Terminal Connection
This function controls the serial communication (RS232C) of CNC and handy terminal.
Handy terminal is a downsized machine operation panel which enables you to operate the machine including setup at hand. Consequently, machine interference can be detected at hand and the usability and safety can be improved.
CNC receives data from the handy terminal and outputs them to PLC interface. CNC also sends the transmission data which PLC set in PLC interface to the handy terminal.
Each MTB needs to create PLC program corresponding to the handy terminal.
The handy terminal needs to be customized such as the configuration of the display area, key input and communication conditions with CNC.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L

7.4.3 IP Filter Setting
This function prevents unauthorized access from external devices by filtering the IP address of the access source when the NC is being connected to Ethernet. By setting the IP addresses to be passed or rejected, access from external devices can be restricted.
Access to the NC is limited with one of the following two methods. The method is specified by the parameter.
(1) Pass
When the range of IP addresses from which access to the NC should be allowed is set, access from an IP address within the range is permitted. Access from the other IP addresses is restricted.
(2) Reject
When the range of IP addresses to block is set, access from an IP address within the range is blocked. Access from the other IP addresses is permitted.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
NC
LAN 1
Internet
PC
Ethernet

PC
Pass the access
Reject the access
Reject the access
Router

121 IB-1501505-N
8
Spindle, Tool and Miscellaneous Functions

8.1 Spindle Functions (S)
8.1.1 Spindle Control Functions
The spindle rotation speed is determined in consideration of the override and gear ratio for the S command commanded in automatic operation or with manual numerical commands, and the spindle is rotated. The following diagram shows an outline of the spindle control.
When an 8-digit number following address S (S0 to S99999999) is commanded, a signed 32-bit binary data and start signal, or a non-signed 32-bit binary data and start signal will be output to the PLC.
Up to 1 set of S commands can be commanded in one block.
Processing and complete sequences must be incorporated on the PLC side for all S commands.
(1) The override can be designated as 50% to 120% in 10% increments or 0% to 200% in 1% increments (with built-in PLC specifications).
The override is not changed while the spindle stop input is ON, during the tapping mode, or during the thread cutting mode.
(2) The number of gear steps can be commanded up to four steps.
(3) The max. spindle rotation speed can be set for each gear.
(Note) The spindle functions can work on serially connected spindles.
Check the specifications of your machine.
PLC NC
BIN
S
command
Machining program,
manual numerical
command
S command
analysis
S command value
Start signal
Spindle rotation
command
Spindle rotation
command
Spindle drive
unit MDS-E
series, etc.
Changeover
(Parameter)
Remote I/O unit
D/A converter
Analog spindle (Parameter)
Spindle output
command
creation
Gear ratio
Max. rotation
8-digit
8-digit BIN
Gear selection
Override
8-digit

8.1.1.1 Spindle Digital I/F
This interface is used to connect the digital spindle (AC spindle motor and spindle driver).
8.1.1.2 Spindle Analog I/F
(*1) MELSEC
Spindle control can be executed using an analog spindle instead of the digital spindle.
8.1.1.3 Coil Switch
Constant output characteristics can be achieved across a broad spectrum down to the low-speed range by switching the spindle motor connections.
This is a system under which commands are assigned from the PLC.
8.1.1.4 Automatic Coil Switch
Constant output characteristics can be achieved across a broad spectrum down to the low-speed range by switching the spindle motor connections.
This is a system under which the NC unit switches the coils automatically in accordance with the motor speed.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80

M
L
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M (*1)
L (*1)
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L

8.1.1.5 Encoder Input I/F
* Encoder I/F expansion unit is required for M800W/M80W
Arbitrary pulse can be input by parameters set in R register.
The maximum number of input pulse is 76800. Synchronous feed function can be activated with the arbitrary pulse if the number of pulse to be used is set in R register and the external signal is turned ON.
When the arbitrary pulse is invalid, the input pulse is fixed to 1024 pulses.
Encoder arbitrary pulse input
Two kinds of encoders can be switched over and connected. Encoder switch-over is possible, using PLC device.
Encoder changeover pulse input
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
NC
NC
ENC interface
Encoder
Fixed to 1024 pulses
ENC interface
High resolution Encoder
R register Input pulse Maximum 76800 pulse
NC
Input pulse
Input pulse
R register
R register
ENC interface
Encoder1
(High resolution)
Encoder2
(Low resolution)
Switch with ladder
Switch internally

8.1.1.6 Spindle-mode Servo Motor Control
This function controls a spindle using the combination of servo motor and servo drive unit (MDS-E Series) which controls NC axis.
The maximum rotation speed of servo motor is low compared with a spindle motor. However, if the rated output is the same, the machine components can be downsized by using a servo motor to drive tool spindle, etc., because the servo motor is smaller than the spindle motor.
Note that some spindle functions can not be used under the spindle-mode servo motor control.
The figure below is the example of the application.
Normally, the components "spindle drive unit + spindle motor" are needed when cutting, drilling or milling is performed on a lathe with turret type tool selection mechanism, which means two pairs of "spindle drive unit + spindle motor" are needed; one for a main spindle and one for a turret.

However, downsizing of the turret, space-saving of the lathe and cost reduction can be achieved by replacing the turret side spindle drive with a servo motor and using spindle-mode servo motor control.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
X
S1/C
S2
Z Turret
Spindle
Spindle motor
Drive unit
Servo motor
Rotary tool
Gear switching mechanism
- Turret rotation
- Tool spindle rotation

8.1.1.7 Spindle-mode Rotary Axis Control
This function enables a rotary axis driven by a servo motor to be controlled as a spindle. When the spindle-mode rotary axis control command signal is turned ON, the rotary axis is controlled as a spindle. This enables lathe-turning machining, including synchronous feed and thread cutting, to be performed in synchronization with the feedback speed of the rotary axis (spindle-mode rotary axis mode). When the signal is turned OFF, positioning and interpolation commands can be given to the rotary axis (servo axis mode).
The following is the example of the application.
Add S2 as B axis spindle. B axis can be controlled as S2 spindle by setting "2" to B axis parameter "#1020 sp_ax" and setting the same value as the B axis (servo axis) drive unit I/F number to S2 axis parameter "#3031 smcp_no". B axis can be controlled as S2 spindle by turning the spindle-mode rotary axis control command signal ON after being used as B axis for indexing the machining surface. This enables turning machining, including thread cutting.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
B(S2) S2(B)
S1
X
Y
Z Z
Y
Milling machining
(Spindle-mode rotary axis control command signal OFF)
Turning machining
(Spindle-mode rotary axis control command signal ON)
Spindle
B axis (rotary axis) is used for
indexing the machining surface, etc.
Servo motor
Thread cutting
B axis (rotary axis) is controlled as a
spindle (S2). This enables turning
machining.

8.1.1.8 Turret Gear Change Control
This function enables axes in the semi-closed system to select four types of gear ratios which are set to the spindle specification parameters according to the control input from the PLC.
There are differences from normal gear change as follows:
(1) Positioning can be made at the predefined motor side position regardless of the selected gear step during spindle orientation or change to spindle position control (C axis control).
(2) Gears can be changed during the rotation.
Example of application
(1) Gear change between turret swiveling and tool spindle rotation in turret type tool post
For gear change on a turret where the turret swiveling and tool rotation are switched by physical gear using one servo or spindle motor as illustrated below, the positioning to motor side Z-phase position (orientation) can be made regardless of the selected gear steps by using this function. Consequently, the gears for the physical gear change are engaged and the physical gears can be changed.
(2) Gear change during rotation
For example, the tool for polygon has a tool system in which the reduction gear is for starting torque (cutter + tool folder). If this tool is installed in a tool post that has mechanism which rotates multiple tools by one motor, the gear change is needed when selecting the polygon tool. However, the gear change can be performed during the tool rotation without temporary stop so that the tool change time can be reduced.
(3) Gear change during spindle-mode servo motor control

This function is used when gear change is needed in the spindle-mode servo motor control which controls a servo motor as spindle using the combination of servo drive unit and servo motor.

M850W M830W M850S M830S M80W M80

TypeA

M80

TypeB

E80

TypeA

E80

TypeB C80

M

L

Turret

Rotary tool

Gear change mechanism

Turret swiveling

Tool spindle rotation

Servo motor

or

Spindle motor

8.1.1.9 Spindle Control with Pulse Train Output

This function controls a spindle using pulse trains output from the NC. You can control a spindle which is connected mainly to an inverter by outputting pulse trains.

Using this function requires an inverter which is capable of controlling spindle operation through pulse train input.

When this function is used, RIO port 1 and 2 are exclusively used for outputting pulse trains.

M850W M830W M850S M830S M80W M80

TypeA

M80

TypeB

E80

TypeA

E80

TypeB C80

M

L

60

=

NC

RIO1

RIO2 Spindle operation

Inverter

Pulse output

A phase

B phase

Waveform of pulse train output (A/B phase 1-fold output)

Frequency of output pulse train (Hz) Programmed rotation speed (r/min) x Number of pulses per motor revolution

Spindle

8.1.2 S Code Output

When an 8-digit number following address S (S0 to S99999999) is commanded, a signed 32-bit binary data and start signal, or a non-signed 32-bit binary data and start signal will be output to the PLC.

One set of S commands can be issued in one block.

Processing and complete sequences must be incorporated on the PLC side for all S commands.

S function can be designated with any other kind of commands. In the case where a movement command is in the same block, two different command sequences are available. Depending on user PLC specifications, either one of the following two will be applied.

(1) S function is executed after the movement is completed.

(2) S function is executed at the same time as when the movement command is issued.

M850W M830W M850S M830S M80W M80

TypeA

M80

TypeB

E80

TypeA

E80

TypeB C80

M

L

8.1.3 Constant Surface Speed Control

This function enables the spindle rotation speed to be adjusted (constant surface speed control) in accordance with the movement of tool nose point so that the cutting point always remains at the constant speed (constant surface speed).

Using this function for processes such as a cutting-off process is effective for a machining time and tool life, etc.

Note that when the tool nose point is moving to the workpiece zero point, the rotation may be at the maximum rotation speed of the machine specification and this is dangerous.

Command format

Constant surface speed ON

Constant surface speed cancel

The surface speed is commanded with an S code. For the metric designation, the speed is commanded with an m/min unit, and for the inch designation, the speed is commanded with a feet/min unit.

In the constant surface speed cancel mode, the S code is a spindle rotation speed command.

The axis for which constant surface speed is controlled is generally the X axis. However, this can be changed with the parameter settings or with address P in the G96 block.
Select with the parameter whether to enable the spindle rotation command from other part systems to the spindle which is in the constant surface speed control.
(Note 1) Under the constant surface speed control (during G96 modal), if the axis targeted for the constant surface speed control moves toward the spindle center, the spindle rotation speed will increase and may exceed the allowable speed of the workpiece or chuck, etc. In this case, the workpiece, etc. may jump out during machining, which may result in breakage of tools or machine or may cause damage to the operators. Thus make sure to use this control while the "spindle speed clamp" is enabled. When the constant surface speed control is commanded, keep enough distance from the program zero point.
(Note 2) If there is only one spindle, the spindle will not operate normally if the constant surface speed control command, S command or spindle related M command is commanded randomly from each part system. These commands must be commanded from only one certain part system, or commanded simultaneously with timing synchronization function.
The controller will execute the following control for the constant surface speed control and S commands. The part system from which an S command was issued last will have the spindle control rights. That part system will judge whether the constant surface speed command mode is valid or canceled, and will execute spindle control.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
G96S__ P__ ;
S : Surface speed designation (-99999999 to 99999999 (m/min), (feet/min))
P : Constant surface speed control axis designation (0 to the maximum number of the controllable axes in G96 part system.)
G97S__ ;
S : Spindle rotation speed (-99999999 to 99999999 (r/min))

$1: Part system 1
$2: Part system 2
1000r/min S200m/min S2000r/min S100m/min
G97 S1000 S2000 G96 S200
G96 S100
$1 $2 $1
Spindle control rights
Spindle speed
Part system 2 program
Part system 1 program

8.1.4 Spindle Override
This function applies override to the rotation speed of a spindle or mill spindle assigned by the machining program command during automatic operation or by manual operation. There are two types of override.
(1) Type 1 (code method)
Using an external signal, override can be applied to the commanded rotation speed of a spindle or mill spindle in 10% increments from 50% to 120%.
(2) Type 2 (value setting method)
Using an external signal, override can be applied to the commanded rotation speed of a spindle or mill spindle in 1% increments from 0% to 200%.
(Note 1) Selection between type 1 and type 2 can be designated by user PLC processing.
8.1.5 Multiple-spindle Control
Multiple-spindle control is a function that controls second and following spindles in addition to the first spindle in a machine tool equipped with multiple spindles.
Multiple-spindle control I can be switched to multiple-spindle control II or vice versa using a parameter and, by so doing, the spindle control method changes.
The figure below shows an example of the configuration for a machine which is equipped with second and third spindles.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
Multiple-spindle control I
(L system only)
Control based on a spindle selection command (such as G43.1) and spindle control command ([S*****;] or [SO=*****;]), etc.
Multiple-spindle control II Control based on a PLC signal (spindle command selection signal, spindle selection signal) and spindle control command ([S*****;] only), etc.
Spindle selection command and control command of [SO=*****;] cannot be used.
First spindle Second spindle
Tool post 1
Tool spindle
(third spindle)

8.1.5.1 Multiple-spindle Control I
(1) Spindle selection command
In a machine with two or more spindles, this function makes it possible to select the spindle to apply the S commands or feed per revolution.
Spindle selection command (G43.1/G44.1/G44.1 D_) makes it possible to select the spindle.
Using the 1st spindle control command (G43.1) and the 2nd spindle control command (G44.1), the commands can be given to the spindle designated with the parameter.
Using the arbitrary spindle control command (G44.1 D_), an arbitrary spindle can be selected with address D.
Using all spindles simultaneous control command (G47.1), all spindles are selected.
Use this function when cutting the back of workpiece by shifting it to the second spindle from the first spindle, cutting multiple workpieces with the respective spindles or on the respective tool posts, etc.
When selecting G43.1 = 1st spindle, G44.1 = 2nd spindle
Command format
(2) Spindle control command (Using extended word address (S =***))
In addition to using the "S*****" S commands, it is also possible to assign commands which differentiate each spindle by using the S =*****.
Command format
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
G43.1 ; First spindle control mode ON (The spindle to be used is set using the parameter.)
G44.1 ; Second spindle control mode ON (The spindle to be used is set using the parameter.)
G44.1 D__; Arbitrary spindle control mode ON (The spindle to be used is set using address D.)
G47.1 ; All spindles simultaneous control mode ON (Encoder of the 1st spindle is used)
D : Designate the spindle. (For a spindle number command, the range is from 1 to the number of available spindles, or from 1 to 9 for a spindle name command.)
S =***** ;
: Number assigned as the spindle number (1: first spindle; 2:second spindle; ...; n: "n"th spindle (n = maximum number of spindles for the specification)); variables can be designated.
***** : Rotational speed or surface speed value assigned by command; variables can be designated.
G43.1 G44.1
G44.1
G44.1 Dn
G43.1
1st spindle
(main spindle)
1st tool post
2nd tool post
"n"th spindle
(sub spindle)
2nd spindle
(sub spindle)

8.1.5.2 Multiple-spindle Control II
This function selects which spindle to perform spindle function (S) command or feed per revolution (synchronous feed) on a machine equipped with 2 or more spindles.
Command to spindles is issued with one spindle function (S) command, and you can select the target spindle with a PLC signal (spindle selection or spindle command selection).
A parameter is used to switch the control to multiple-spindle control I.
There are two types of spindle rotation speed control: common to part systems (which validates the S function command issued last to each spindle), and separated by each part system (which validates the S function command issued last in the part system to which the selected spindle belongs).
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L

8.1.6 Spindle Orientation
This function stops the spindle at a specified position.
The spindle zero position is determined to be the Z-phase position at the encoder method spindle orientation (PLG and external encoder). At the proximity switch method spindle orientation, the spindle zero position is determined to be the position of the proximity switch attached at the spindle end.
On a lathe, this function can be used for the workpiece positioning to align the attaching/removing direction and the turret turn positioning for the tool exchanges.
When Z-phase has not yet been passed, pass Z-phase twice (excluding reciprocations within one rotation), and then position to the orientation position.
When Z-phase has been passed already, immediately position to the orientation position.
The rotation direction of the spindle orientation is determined by the spindle zero point return specification parameter.
The spindle does not rotate if Z-phase has been passed and the orientation position is already established when

orientation command is issued.
When the spindle has been rotating in the direction opposite from that of orientation rotation when the orientation command is issued, orientation operation will be executed after decelerating to stop. By using the parameter, the orientation operation can be executed with the spindle revolution direction as it is, without having to decelerate and stop.
(a) Orientation
This function stops the spindle rotation at a certain position when using the digital spindle.
When the orientation command is used, the spindle will rotate several times and then stop at the orientation point.
The orientation position differs depending on the detector.
- When the orientation (PLG and external encoder) is used:
At the Z-phase position
- When the proximity switch method orientation is used:
At the proximity switch installation position
(b) Multi-point orientation
This function performs orientation to a position other than the Z-phase position by inputting a shift amount with the parameter or PLC. The shift amount is -35999 to 35999. (Unit: 360/36000=0.01)
(Note 1) Multi-point orientation cannot be executed when using the proximity switch.
(Note 2) Orientation is possible only when the gear ratio is 1:1 for the PLG orientation.
(The orientation is completed at the PLG encoder's Z-phase, so when using reduction gears, the orientation points will be generated at several points during one spindle rotation.)
(c) Orientation in-position advance output
This function turns the spindle in-position signal ON as soon as the spindle reaches within the second in-position width. Then, the spindle 2nd in-position signal is turned ON as soon as the spindle reaches within the in-position width.
Since orientation completion can be predicted using this function, it is possible to eliminate the sequence delay time, etc. for tool changes and other such operations, thereby achieving a faster takt time.
(d) Proximity switch method orientation
Proximity switch method orientation enables the spindle positioning by providing the proximity switch position installed on the spindle side as the spindle position zero point.
When the spindle motor and the spindle are connected with V-belt, the spindle position zero point calculated from the spindle motor position varies due to belt slipping, etc. Thus, the spindle position zero point must be detected from the proximity switch signal every time orientation or zero point return is carried out.
In the conventional spindle position zero point detection method, the spindle position zero point is calculated from the spindle drive unit and transmitted to NC when the position detector detects the one-time rotation signal (Z phase) for the first time after the system has been turned ON, and the zero point will not be changed thereafter.
In the case of proximity switch signal orientation, NC updates the spindle position zero point every time orientation or zero point return is carried out.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L

8.1.7 Spindle Position Control (Spindle/C Axis Control)
8.1.7.1 Spindle Position Control (Spindle/C Axis Control)
A spindle can be controlled as the rotary axis. After switching the spindle to the rotary axis, the positioning and the interpolation between the spindle and other NC axes can be operated in the same way as the NC axis by executing the position command (the movement command).
The NC axis for controlling the spindle as the rotary axis or the machinery for switching the spindle and NC axis (such as a gear switching machinery) had been necessary for controlling a spindle readily as the rotary axis, but they are not necessary with this function.
There are two method for switching a spindle and a rotary axis: PLC signal method and program command method. The method can be selected with the parameter.
(1) PLC signal method
The spindle mode and the C axis mode can be switched with the servo OFF signal (*SVFn) ON/OF with PLC ladder.
The interpolation operation is enabled by executing the movement command to the C axis in the C axis mode same as NC axis.
(a) Switching spindle mode to C axis mode
Change the servo OFF signal (*SVFn) OFF to ON.
(b) Switching C axis mode to spindle mode
Change the servo OFF signal (*SVFn) ON to OFF.
(2) Program command method
In the machining program, the program switches to the C axis mode with G00 command, and to the spindle mode with S command. The C axis servo OFF signal (*SVFn) must be kept ON while the program command method is selected.
(a) Switching spindle mode to C axis mode
Command [G00 C__] in the NC program during the spindle mode. The axis is positioned directly to the specified position.
The non-interpolation positioning for each axes is performed by specifying [G00 X__ Z__ C__] regardless of the parameter setting, and C axis is switched to the C axis mode.
(b) Switching C axis mode to spindle mode
- The switching is performed with the spindle forward run signal (SRN) ON or the spindle reverse run signal (SRI) ON and the S command.
- The switching is performed with the rising edge of the spindle forward run signal (SRN) or the spindle reverse run signal (SRI).
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80

TypeB C80
M
L
Servo ON
Spindle mode C axis mode Spindle mode
Servo OFF signal
(*SVFn)
Servo ready
signal(RDYn)
Servo OFF
Ready ON
Ready OFF

8.1.7.2 C Axis Control during Spindle Synchronization
This control enables C axis positioning while a long workpiece is controlled by front and rear spindles that are in synchronization with each other. Under this control, the machine can perform milling at the center of workpiece.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L

8.1.8 Spindle Synchronization
In a machine with two or more spindles, this function controls the rotation speed and phase of one selected spindle (synchronized spindle) in synchronization with the rotation of the other selected spindle (reference spindle). This function can be assigned by G code or by PLC.
It is used in cases where, for instance, workpiece clamped to the reference spindle is to be clamped to the synchronized spindle instead or where the spindle rotation speed is to be changed while one workpiece remains clamped to both spindles.
8.1.8.1 Spindle Synchronization I
The synchronized spindle is designated and the start/end of the synchronization are commanded with the G command in the machining program.
This function cannot be combined with the following spindle synchronization functions while it is active. An operation error occurs.
- Spindle synchronization I
- Spindle synchronization II
- Tool spindle synchronization IA
- Tool spindle synchronization IB (IC)
- Tool Spindle Synchronization II
- Spindle superimposition control
However, if multiple spindle synchronization set control is enabled, multiple spindle synchronization functions can be commanded. For details on the multiple spindle synchronization set control, refer to "8.1.15 Multiple Spindle Synchronization Set Control".
Command format
Spindle synchronization control ON (G114.1)
This command is used to designate the reference spindle and the spindle to be synchronized with the reference spindle, and it places the two designated spindles in the synchronized state.
By designating the synchronized spindle phase shift amount, the phases of the reference spindle and synchronized spindle can be aligned.
Spindle synchronization control cancel (G113 or G113.1)
This command releases the state of synchronization between two spindles whose rotation has been synchronized by the spindle synchronization command.
[Only for C80 Series]
This command can change the phase shift amount of the synchronized spindle of two spindles which have already synchronized by spindle synchronization command.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
G114.1 H__ D__ R__ A__ ;
H : Designate the reference spindle.
D : Designate the spindle to be synchronized with the reference spindle.
R : Designates the synchronized spindle phase shift amount.
A : Designates the spindle synchronization acceleration/deceleration time constant.
G113 ; (Lathe system)
G113.1 ; (Lathe system/Machining center system)

8.1.8.2 Spindle Synchronization II
The selection of the spindles to be synchronized, the start of the synchronization and other settings are all designated from the PLC.
The spindle synchronization control mode is established by inputting the spindle synchronization control signal. While

this mode is established, the synchronized spindle is controlled in synchronization with the rotation speed assigned for the reference spindle.
This function cannot be combined with the following spindle synchronization functions while it is active. An operation error occurs.
- Spindle synchronization I
- Spindle synchronization II
- Tool spindle synchronization IA
- Tool spindle synchronization IB (IC)
- Tool Spindle Synchronization II
- Spindle superimposition control
[Only for C80 Series]
If multiple spindle synchronization set control is enabled, multiple spindle synchronization functions can be commanded. For details on the multiple spindle synchronization set control, refer to "8.1.15 Multiple Spindle Synchronization Set Control".
8.1.8.3 Guide Bushing Spindle Synchronization
This function is for a machine with a spindle motor to rotate a guide bushing: This function allows the guide bushing spindle motor (G/B spindle) to synchronize with a reference spindle motor (Reference spindle).
The position error compensation function reduces the spindles vibration due to the workpieces torsion, and the motors overload.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
Collet Chuck (Reference spindle) Guide bushing
(G/B spindle)
Bar feeder
Bar feeder

8.1.9 Tool Spindle Synchronization I (Polygon)
8.1.9.1 Tool Spindle Synchronization IA (Spindle-Spindle, Polygon)
In a machine containing a rotary tool axis and that has a spindle controlled as the workpiece axis, spindle-spindle polygon machining can be carried out by controlling the workpiece axis rotation in synchronization with the rotation of the rotary tool axis.
This function can be used with the G code list 1 to 5.
This function cannot be combined with the following spindle synchronization functions while it is active. An operation error occurs.
- Spindle synchronization I
- Spindle synchronization II
- Tool spindle synchronization IA
- Tool spindle synchronization IB (IC)
- Tool Spindle Synchronization II
- Spindle superimposition control
However, if multiple spindle synchronization set control is enabled, multiple spindle synchronization functions can be commanded.
Command format
Tool spindle synchronization IA mode command (G114.2)
This command establishes the spindle-spindle polygon machining mode (IA) in which two spindles are rotated in synchronization at two different speeds. It is required to designate the rotary tool spindle, workpiece spindle and the rotational ratios (number of rotary tool teeth and number of work angles) of the two designated spindles.
Tool spindle synchronization IA mode cancel command (G113/G113.1)
This command releases the state of synchronization between two spindles whose rotation has been synchronized by the spindle synchronization command.
(Note) An axis that involves any travel cannot be put in the same block as Tool spindle synchronization IA mode cancel command. If the axis address is included in the block, a program error occurs upon the cancel command, causing the automatic operation to stop.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
G114.2 H__ D__ E__ L__ R__ ;
H : Selects the rotary tool spindle.
D : Selects the workpiece spindle.
E : Designates the rotary tool spindle rotational ratio.
L : Designates the workpiece spindle rotational ratio.

R : Synchronized spindle phase shift amount
G113 ; (L system)
G113.1 ; (L system/M system)

8.1.9.2 Tool Spindle Synchronization IB (Spindle-Spindle, Polygon)
In a machine containing a workpiece axis and that has a spindle controlled as the rotary tool axis, spindle-spindle polygon machining can be carried out by controlling the rotary tool axis rotation in synchronization with the rotation of the workpiece axis.
A parameter is used to switch from Tool spindle synchronization IB to Tool spindle synchronization IC or vice versa.
This function can be used with the G code list 1,6 and 7.
This function cannot be combined with the following spindle synchronization functions while it is active. An operation error occurs.
- Spindle synchronization I
- Spindle synchronization II
- Tool spindle synchronization IA
- Tool spindle synchronization IB (IC)
- Tool Spindle Synchronization II
- Spindle superimposition control
However, if multiple spindle synchronization set control is enabled, multiple spindle synchronization functions can be commanded.
Command format
Tool spindle synchronization IB mode ON (G51.2 or G251)
This command establishes the spindle-spindle polygon machining mode in which two spindles are rotated in synchronization at two different speeds. It is required to designate the rotary tool spindle, workpiece spindle and the rotational ratios (number of work angles and number of rotary tool teeth) of the two designated spindles.
Tool spindle synchronization IB mode cancel command (G50.2 or G250)
(Note) An axis that involves any travel cannot be put in the same block as Tool spindle synchronization IB mode cancel command. If the axis address is included in the block, a program error occurs upon the cancel command, causing the automatic operation to stop.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
G51.2 H__ D__ P__ Q__ R__ ;
H : Selects the workpiece spindle (spindle).
D : Selects the rotary tool spindle (spindle).
P : Designates the workpiece spindle rotational ratio.
Q : Designates the rotary tool spindle rotational ratio.
R : Synchronized spindle phase shift amount
G50.2 ;

8.1.9.3 Tool Spindle Synchronization IC (Spindle-NC Axis, Polygon)
This function controls so that the workpiece (spindle) and tool (NC axis) synchronously rotate at the commanded ratio and allows polygon machining. By changing the rotational ratio of workpieces and tools and the number of tool blades mounted, polygons such as rectangles and hexagons can be machined.
Tool spindle synchronization IB and Tool spindle synchronization IC can be switched by the parameter.
This function can be used with the G code list 1,6 and 7.
Command format
Tool spindle synchronization IC mode ON (G51.2 or G251)
Tool spindle synchronization IC mode OFF (G50.2 or G250)
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
G51.2 P__ Q__ ; Spindle synchronization start (Tool spindle synchronization IC mode start)
P
Q
: Spindle rotational ratio
: Rotary tool axis rotational ratio
Rotation direction is specified with a sign.
+: Forward run / -: Reverse run
G50.2 ;

8.1.10 Tool Spindle Synchronization II (Hobbing)
This function is to cut the gear with hob (hob cutter).
A spur gear can be machined by synchronizing and rotating the hob axis and the workpiece axis in a constant ratio.
A helical gear can be machined by compensating the workpiece axis according to the gear torsion angle for the Z axis movement.
Different command format is used for G code list 1 to 5 and G code list 6 or 7.
Spur gears Helical gears

By synchronizing and rotating the hob axis and the workpiece axis in a constant rotation ratio, a gear is machined so that the cutter is engaged with gear.
Hob axis : Rotary tool axis on which a hob is mounted.
Workpiece axis : Rotary axis on which a workpiece is mounted.
This function cannot be combined with the following spindle synchronization functions while it is active. An operation error occurs.
- Spindle synchronization I
- Spindle synchronization II
- Tool spindle synchronization IA
- Tool spindle synchronization IB (IC)
- Tool Spindle Synchronization II
- Spindle superimposition control
However, if multiple spindle synchronization set control is enabled, multiple spindle synchronization functions can be commanded.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
Hob
Gear

8.1.11 Spindle Speed Clamp
This function is to limit the spindle rotation speed to the ranges between the maximum rotation speed and the minimum rotation speed.
This function can be set by a parameter or a program.
An alarm will occur if the constant surface speed control is conducted without issuing the spindle clamp speed command (G92).
8.1.13 Spindle Oscillation
This function reciprocates (oscillates) the spindles with designated amplitude and frequency.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
G92 S__ Q__ ; Spindle clamp speed setting
S : Maximum clamp rotation speed
Q : Minimum clamp rotation speed
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L

8.1.14 Spindle Superimposition Control
Spindles are controlled by superimposing the rotation speed of one spindle on the rotary speed of other spindle.
Use this function when the tool spindle needs to be rotated with the superimposed speed on the spindle rotation speed.
If this function is used when tapping is performed to the center of a workpiece clamped to a spindle during its rotation, for instance, the tapping to the center of the workpiece (shown in Figure (b) below) can be performed during the turning machining (shown in Figure (a) below) so that the cycle time can be reduced.
This function cannot be combined with the following spindle synchronization functions while it is active. An operation error occurs.
- Spindle synchronization I
- Spindle synchronization II
- Tool spindle synchronization IA
- Tool spindle synchronization IB (IC)
- Tool Spindle Synchronization II
- Spindle superimposition control
However, if multiple spindle synchronization set control is enabled, multiple spindle synchronization functions can be commanded.
(1) Conventional method
(2) Using the spindle superimposition control
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80

TypeB C80
M
L
Synchronous tapping
Forward:
+500 (r/min)
Backward:
-500 (r/min)
Normal turning machining The rotation of the front workpiece is stopped, and then the tapping is
started at the front center.
Synchronous tapping
Forward:
+1500 (r/min)
Backward:
+500 (r/min)
Turning (a) and tapping at the front center (b) are performed simultaneously.
S1=1000(r/min)
(a)
S1 = 0 (r/min)
(b)
S1=1000(r/min)
(a)
(b)

Command format
Spindle superimposition control valid command
G164 command specifies the reference spindle and superimposed spindle and makes the two spindles to be
superimposed.
Command with the spindle name if all spindle names are set to the spindle name parameter. For others, command
with the spindle number.
Spindle superimposition control cancel command
G113 command cancels the superimposition of two spindles which are rotating by the differential velocity
rotation tool command.
The superimposition can be cancelled also with "Spindle synchronization cancel" signal ON.
For G code list 6 and 7, only G113.1 is available for the cancel command.
(Note) An axis that involves any travel cannot be put in the same block as the spindle superimposition control
cancel command. If the axis address is included in the block, a program error occurs upon the cancel
command, causing the automatic operation to stop.
G164 H__ D__ ;
H : Select the reference spindle (For command using the spindle number, the spindle number should be within the
number of spindles for specifications. For command using the spindle name, the name is valid from 1 to 9.)
D : Select the superimposed spindle (For command using the spindle number, the spindle number should be within
the number of spindles for specifications. For command using the spindle name, the number from 1 to 9 or from
-1 to -9 is valid for the spindle name.)
G113 ;
G113.1 ;

8.1.15 Multiple Spindle Synchronization Set Control
This function enables users to combine the following spindle control functions and control them simultaneously.
(*1) The same function can be combined.
When a certain pair of spindles has been designated for one spindle control function, a different pair of spindles can be
used for another spindle control function.
- Spindle synchronization I
- Tool Spindle Synchronization IA (Spindle-Spindle, Polygon)
- Tool Spindle Synchronization IB (Spindle-Spindle, Polygon)
- Tool Spindle Synchronization II (Hobbing)
- Spindle superimposition control
- Spindle synchronization II [Only for C80 Series]
The same reference spindle can be used when the following spindle control functions are combined.
- Spindle synchronization I
- Tool Spindle Synchronization IA
- Spindle synchronization II [Only for C80 Series]
(Note 1) For C80, spindle synchronization II can also be commanded. However, in case of machining center systems,
only spindle synchronization I and spindle synchronization II can be used among spindle synchronization
functions.
(Note 2) The guide bushing spindle synchronization is not included in the number of multiple spindle synchronization
sets.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L

This function enables the following machining.
[Example for Lathe systems]
Spindle synchronization I command (S1-S2)
+ Tool spindle synchronization IA command (S3-S4)

Spindle synchronization I command (S1-S2)
+ Tool spindle synchronization IA command (S1-S5)
Spindle synchronization I command (S1-S2)
+ Tool spindle synchronization II command (S3-C4)
Spindle/C axis synchronization control command (S1/C1-S2)
+ Tool spindle synchronization II command (S5-C1)
Spindle synchronization I command (S1-S2)
+ Spindle superimposition control command (S4-S3)
Tool spindle synchronization IA command (S5-S1)
+ Tool spindle synchronization IA command (S3-S4)
Tool spindle synchronization II command (S5-C1)
+ Tool spindle synchronization II command (S3-C4)
Spindle superimposition control command (S1-S5)
+ Spindle superimposition control command (S4-S3)
S1
S4
S2
S3
S1 S2
S5
S1
C4
S2
S3
S1/C1 S2
S5
S1
S4
S2
S3
S1
S4
S5
S3
C1
C4
S5
S3
S1
S4
S5
S3

Command format
For details on the command format which starts each function, refer to the respective chapters.
Spindle synchronization control cancel
(1) Command to cancel all synchronization modes
Cancels all the synchronized sets. The format varies depending on the parameter settings.
(2) Spindle synchronization I, tool spindle synchronization IA (spindle-spindle, polygon), or spindle superimposition control cancel command
(3) Tool spindle synchronization II (hobbing) cancel command (when the G code list of the program is 2, 3, 4, or 5)
(4) Tool spindle synchronization II (hobbing) cancel command (when the G code list of the program is 6 or 7)
Cancel tool spindle synchronization II (hobbing) of the specified part system.
(5) Tool spindle synchronization IB (spindle-spindle, polygon) cancel command
Cancel tool spindle synchronization IB (spindle-spindle, polygon) of the specified part system.
G113 H0 ; Cancels all the active tool spindle synchronization II (hobbing) commands.
G113 D0 ;

Cancels all the active spindle synchronization I, tool spindle synchronization IA (spindle-spindle, polygon), and spindle superimposition commands.
G113 ;
G113 D_ ;
D : Synchronized or superimposed spindle to cancel (For a spindle number command, the range is from 1 to the number of available spindles, or from 1 to 9 for a spindle name command.)
G113 H_ ;
H : Reference spindle to cancel (For a spindle number command, the range is from 1 to the number of available spindles, or from 1 to 9 for a spindle name command.)
G80.4 ;
G50.2 ;

8.1.16 Spindle Speed Fluctuation Detection
When this function is valid and the spindle actual speed fluctuates for the commanded speed by the program due to external factors such as load fluctuation, the NC outputs the signal (Spindle speed out of setting range) to PLC and the operation error occurs.
PLC can take the necessary measure for the fluctuation of the spindle speed using the output signal (Spindle speed out of setting range) from the NC.
The operation error output from the NC does not stop the automatic operation or the spindle.
A parameter is used to switch whether or not to output the operation error during spindle speed fluctuation detection (G162).
Command format
Starting the spindle speed fluctuation detection
The spindle speed fluctuation detection is started by commanding G162.
Canceling the spindle speed fluctuation detection
The spindle speed fluctuation detection is canceled by commanding G163.

M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
G162 S__ P__ Q__ R__ I__ ;
S : Detection target spindle name (1 to 9)
P : Delay time for starting spindle speed fluctuation detection (0 to 99.999 (s))
Q : Spindle speed attainment detection range (1 to 100 (%))
R : Spindle speed fluctuation allowance rate (1 to 100 (%))
I : Allowable fluctuation range in spindle speed (0 to 999999 (r/min))
G163 S__ ;
S : Detection target spindle name (1 to 9)
(r/min)
(S)
Spindle rotation speed
Spindle speed fluctuation detection in monitor
Allowable fluctuation speed range
(Set by "R" or "I" address.)
In spindle speed fluctuation
detection
Spindle speed fluctuation detection:
Spindle speed out of setting range
Commanded speed
Actual speed
Time
G162 command

8.1.17 Spindle Motor Temperature Output to PLC
This function outputs spindle motor temperature information to R registers.
Spindle motor temperature can be monitored by this function. The function makes it possible, for instance, to add MTB original custom spindle control based on the spindle motor temperature, and to notify external equipment of temperature information.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L

8.2 Tool Functions (T)
8.2.1 Tool Functions (T Command)
The command is issued with an 8-digit number following address T (T0 - T99999999). The tool function is used to command the tool No. In the lathe specification controller, the tool compensation (tool length compensation, tool nose wear compensation) Nos. are also indicated.
(1) M system
Tool function, or T function, is used to designate the tool No. and tool compensation No.
This can be designated with an 8-digit number following address T (0 to 99999999). Up to four sets of T commands can be issued in one block. Note that the number of T commands to be issued within the same block is determined by parameter.
BCD output or binary output can be selected by parameter.
Output signal is 8-digit BCD code and start signal, signed 32-bit binary data and start signal, or non-signed 32-bit binary data and start signal.
T function can be designated with any other kind of commands. In the case where a movement command is in the same block, two different command sequences are available. Depending on machine specifications, either one of the following two will be applied.
(a) T function is executed after the movement is completed.
(b) T function is executed at the same time as when the movement command is issued.
Processing and completion sequences are required for all the T commands.
(Note 1) In some setting and display units, there may be screens that cannot display all eight digits.
(2) L system
The command is issued with an 8-digit number following address T (T0 to T99999999). The high-order digits are designated as the tool No., and the low-order digit(s) are designated as the offset No. Each number of high/low-order digits depends on the specifications of MTB (the parameter setting).
The tool No. code data and start signal will be output to the PLC.
All the other details are the same as in M system.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L

T

T

Tool offset No.
Tool offset No.
Tool No.
Tool No.
T

Tool offset No.
Tool No.

8.3 Miscellaneous Functions (M)
8.3.1 Miscellaneous Functions
Miscellaneous function, or M function, is used to command auxiliary functions for NC, such as rotating the spindle forward/backward or stopping it, as well as turning the cooling oil ON/OFF.
These functions are designated by an 8-digit number (0 to 99999999) following the address M, and multiple commands can be issued in a single block. The number of M commands that can be issued within the same block depends on the parameter setting. ([M8] maximum 4 sets, [C80] maximum 6 sets)
BCD output or binary output can be selected by parameter.
Output signal is 8-digit BCD code and start signal, signed 32-bit binary data and start signal, or non-signed 32-bit binary data and start signal.
(Example) G00 Xx1 Mm1 Mm2 Mm3 Mm4 ;
(1) When the number of M commands in a single block is greater than the setting value of the parameter, the commands issued later are valid.
M00, M01, M02, M30, M96, M97, M98 and M99 are used only for some specific purposes and cannot be assigned as regular M functions.
(2) Processing and completion sequences are required for all M functions except M96, M97, M98 and M99.
Refer to user PLC specification for the relationship between values and functions.
As for M00, M01, M02 and M30, next block is not read into pre-reading buffer due to ban on pre-reading processing.
(3) Although M00, M01, M02, and M30 output an independent signal for each, the independent output of M00, M01, M02 and M30 will be reset upon pressing a reset key.
(4) M command can be designated with other commands within the same block. In the case where a movement command is in the same block, two different command sequences are available. Depending on user PLC specifications, either one of the following two will be applied.
(a) M function is executed after the movement is completed.
(b) M function is executed at the same time as when the movement command is issued.
Processing and completion sequences are required for all the M commands except M96, M97, M98 and M99.
(Note 1) In some setting and display units, there may be screens that cannot display all eight digits.
8.3.2 Multiple M Codes in 1 Block
Multiple sets of M commands can be issued in a block. ([M8] maximum 4 sets, [C80] maximum 6 sets)
Respective processing and completion sequences are required for all M commands included in a block (except M96, M97, M98 and M99).
(Note 1) This function requires a built-in PLC. In this case, the code data and start signals of all the M commands in the same block are transferred simultaneously from the controller to the PLC, and so high-speed machine control can be done by the PLC processing sequence.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80

TypeB C80
M
L

8.3.3 M Code Independent Output
When the M00, M01, M02 or M30 command is assigned during an automatic operation (tape, memory, MDI) or by a manual numerical command, the signal of this function is output. It is turned OFF after the miscellaneous function finishes or by the reset & rewind signal.
If movement or dwell command exists in the same block as these M commands, this signal is output upon completion of the movement or dwell command.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
Machining program M code independent output Response to controller
M00 M00 Fin1 or Fin2
M01 M01 Fin1 or Fin2
M02 M02 Reset & rewind
M30 M30 Reset & rewind

8.3.4 Miscellaneous Function Finish
These signals inform the CNC system that a miscellaneous function (M), spindle function (S), tool function (T) or 2nd miscellaneous function (A, B, C) has been assigned and that the PLC which has received it has completed the required operation. They include miscellaneous function finish signal 1 (FIN1) and miscellaneous function finish signal 2 (FIN2).
Miscellaneous function finish signal 1 (FIN1)
When the controller checks that FIN1 is ON, it sets the function strobes OFF. Furthermore, when the PLC checks that the function strobes are OFF, it sets FIN1 OFF. The controller checks that FIN1 is OFF and advances to the next block.
Below is an example of a time chart applying when a miscellaneous function has been assigned.
Miscellaneous function finish signal 2 (FIN2)
When the controller checks that FIN2 is ON, it sets the function strobes OFF and simultaneously advances to the next block. The PLC checks that the strobe signals are OFF and sets FIN2 OFF.
Below is an example of a time chart applying when a miscellaneous function has been assigned.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
Miscellaneous function finish signal
(FIN1)
Miscellaneous function strobe (MF)
Command
Next block
Miscellaneous function finish signal
(FIN2)
Miscellaneous function strobe (MF)
Command
Next block

8.3.5 M Code Output during Axis Traveling
This function controls the timing at which miscellaneous functions are output, and it outputs a miscellaneous function when axis reaches at the designated position movement.
The command format is as follows.
(1) This command is issued independently immediately before the block with the movement command that activates the miscellaneous function.
(2) Single block stop does not apply to this command.
(3) The maximum number of groups to which the miscellaneous functions in the G117 block can be issued is as follows:
(4) This command can be issued in up to two consecutive blocks.
When issued in three or more consecutive blocks, the last two blocks will be valid.
(Example) G117 Xx1 Zz1 Mm1 Mm2 Mm3 Mm4 ;
G117 Xx2 Zz2 Mm5 Mm6 Mm7 Mm8 ;
G01 X200 Z200 ;
:
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80

M
L
G117 Xx1 Zz1 Cc1 ;
G117
Xx1,Zz1,Cc1

: Command of M code output during axis traveling
: Movement start points
: Miscellaneous function
M commands 4 sets
S commands 2 sets
T commands 1 set
2nd miscellaneous
function 1 set
Mm 1
Mm 2
Mm 3
Mm 4
Mm5
Mm6
Mm7
Mm8
(200, 200)
(x1, z1)
(x2, z2)
Start point
End point

8.3.6 Miscellaneous Function Command High-speed Output
The miscellaneous command high-speed output shortens a processing time per miscellaneous function. There are two functions that can be selected individually.
(1) Change miscellaneous command completion method
Select one of the following methods by the parameter.
High-speed method:
The controller inverts a strobe signal logically at the time of outputting a miscellaneous command. The PLC performs the designated operation and logically inverts the high-speed miscellaneous function finish signal.
The controller completes the miscellaneous function when the strobe signal and the high-speed miscellaneous function finish signal become the same logic level.
Normal method:
Conventional method (Refer to "8.3.4 Miscellaneous Function Finish" for details.)
(2) Selecting miscellaneous command completion method
Select whether or not to wait for a finish signal from the PLC using the parameter.
It can be selected for M, S, T or B individually.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L

- High-speed method that waits for a finish signal from the PLC
The miscellaneous function completes by matching the logic level of the finish signal with that of the strobe signal.
- High-speed method that does not wait for a finish signal from the PLC
When a series of miscellaneous commands is issued, the completion of the previous miscellaneous command is waited.
- Normal method that waits for a finish signal from the PLC
Conventional method.
- Normal method that does not wait for a finish signal from the PLC
When a series of miscellaneous commands is issued, the completion of the previous miscellaneous command is waited.
Mxx Myy
MFINn
M code data Mxx code
data
Mxx
strobe
Myy
strobe
Myy code
data
Machining program Next block
Strobe (MFn)
Mxx Myy
MFINn
M code data
Strobe (MFn)
Machining program Next block
Mxx code
data Myy code data
Mxx

strobe
Myy strobe
Myy
FIN2
Mxx
M code data
Strobe (MFn)
Machining program
Mxx code
data Myy code data
Mxx
strobe
Myy
strobe
Next block
Myy
FIN2
Mxx Next block
Strobe (MFn)
M code data
Machining program
Mxx code
data Myy code data
Mxx
strobe
Myy
strobe

8.4 2nd Miscellaneous Functions (B)
8.4.1 2nd Miscellaneous Functions
The code data and start signals are output when an 8-digit number is assigned following the address code A, B or C - whichever does not duplicate the axis name being used.
Processing and complete sequences must be incorporated on the PLC side for all 2nd miscellaneous commands.
(Note 1) This function requires a built-in PLC.
(Note 2) There are some screens in the setting and display unit that cannot display all eight digits.
8.4.2 2nd Miscellaneous Function Name Extension
The 2nd miscellaneous function name same as the additional axes (A, B, C) can be used by specifying the command address of the 2nd miscellaneous function with two characters.
Whether the command address has one character or two characters can be set by the parameter.
The operation of the 2nd miscellaneous function is same as the operation with the one character address method.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L

9
Tool Compensation

9.1 Tool Length/Tool Position
9.1.1 Tool Length Offset
These commands make it possible to control the axis movement by compensating the position of the end point of the movement command by a compensation amount set on the tool compensation screen.
Using this function, it is possible to compensate the difference in distance between the actual position of the machine's tool nose and the program coordinate position made by the tool length and to enhance both the programming and operational efficiency.
(1) M system
Compensation can be canceled by the following G commands.
(Note) When the tool length compensation axis is returned to the reference position, the compensation of that axis is canceled.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA

E80
TypeB C80
M
L
G43 Zz1 Hh1 ;
G44 Zz1 Hh1 ;
G43
G44
Zz1
Hh1
: Tool length compensation command + direction (z1+h1)
: Tool length compensation command + direction (z1-h1)
: Compensation axis. Tool length compensation can be provided not only for the Z axis but for all the other axes (X, Y, etc.) which can be controlled in the system.
: Compensation No.
G49 ;
G43 H0 ;
G44 H0 ;

(2) L system
(a) Shape compensation
Tool length is compensated in reference to the programmed base position. The programmed base position is usually the center of the tool rest or the nose position of the base tool.
(b) Wear compensation
The wear of a tool nose can be compensated.
X-axis tool nose wear
compensation amount
Z-axis tool nose wear compensation amount
Z-axis tool length
compensation
Z-axis tool length
compensation
Tool used for machining
Base tool
Base position
(base point)
X-axis tool length
compensation
X-axis tool length
compensation
The programmed base position is
the center of the tool rest:
The programmed base position is
the nose of the base tool:
X
Z

(c) Command format
Tool compensation is performed by a T command. It is specified in eight digits following address T. Tool compensation is divided into two types: tool length compensation and tool nose wear compensation. It depends on the machine specifications as to which digit of T command denotes the tool No., tool length compensation No. or tool nose wear compensation No. (specified by parameters).
(i) Specifying tool length and wear compensation Nos. together using low-order digits of the T command
(ii) Specifying tool length and wear compensation Nos. separately
The tool compensation for the lathe is valid only for the X and Z axes. If an additional axis (Y axis) and the second additional axis are added, the tool compensation will be validated for each additional axis. It supports 4 axes in total.
The additional axis is the third or fourth axis which is selected using a parameter.
T

T

Tool length compensation No. and tool nose wear
compensation No.
Tool No.
Tool No.
Tool length compensation No. and tool nose wear
compensation No.
T

Tool No.
Tool length compensation No. and tool nose wear
compensation No.
T

T

Tool nose wear compensation No.
Tool length compensation No.
Tool No.
Tool nose wear compensation No.
Tool length compensation No.
Tool No.
T

Tool nose wear compensation No.
Tool length compensation No.
Tool No.

9.1.2 Tool Position Offset
This function uses commands to control the movement by changing the positions of the end points of the movement commands to positions which have been extended or reduced by an amount equivalent to the tool compensation amount.
This function can be used to compensate for the difference in distance between the position where the tool on the machine is actually mounted and the programmed coordinate position based on the tool position and thereby improve the efficiency of both machining and operation.
With tool position offset, the offset operation is performed only for blocks containing a G45 to G48 command.
(1) If the start and end points are on an axis, the radius can be extended or reduced only for one-quarter, one-half and three-quarter arcs.
(2) In the case of absolute commands, the position is extended or reduced in each axial direction from the end point of the previous block along the line of the movement toward the position commanded in the block containing the G45 (or G46, G47 or G48) command.
(3) In the case of simultaneous n axes command, the same amount of offset is applied to all the axes that have the command within the range of the number of the axes which can be simultaneously controlled. Tool position offset is also valid for additional axes.
9.1.3 Tool Compensation for Additional Axes
The tool compensation for the lathe is valid for the first axis (normally X axis) and the second axis (normally Z axis). If additional or second additional axes are added as the third and subsequent axes, the tool compensation is also valid for each additional axes.
The additional axes to which the tool compensation is executed are determined according to the parameter setting.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
G45 G00 Xx1 Yy1 Dd1 ;
G45
Xx1,Yy1
Dd1
: Tool position offset command
: Movement axes
: Offset No.
G45 command G46 command G47 command G48 command

Extension by amount equivalent
to offset amount
Reduction by amount equivalent
to offset amount
Extension by twice the offset
amount
Reduction by twice the offset
amount
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
Program
command
Program
command
Program
command
Program
command
Actual
movement
amount
Actual
movement
amount
Actual
movement
amount
Actual
movement
amount

9.1.4 Tool Position Compensation (G43.7)
The position compensation of a turning tool is executed when turning is performed in a machine of machining center system. Use of the tool position compensation enables the three base axes (X, Y and Z axes) to be compensated from the tool base position (base point).
Before setting the compensations of the three base axes, set the parameter to switch the tool compensation display type to type III.
Command format
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
G43.7 H__; Tool position compensation start
G49; Tool position compensation cancel
H : Compensation No. (H0 cancels tool position compensation.)
X(+)
Z(+)
Y(+)
Y axis tool compen sation amount
(base axis J)
X axis tool compensation
amount
(base axis I)
Z axis tool
compensation
amount
(base axis K)
Base position (base point)

9.2 Tool Radius
9.2.1 Tool Radius Compensation
These commands function to provide tool radius compensation. Through a combination with the G command and D address assignment, they compensate for the actual tool center path either inside or outside the programmed path by an amount equivalent to the tool radius.
The tool path is calculated by the intersection point arithmetic system and, as a result, excessive cut amounts on the inside of corners are avoided.
The tool radius compensation command controls the compensation from that block in which G41 or G42 is commanded. At start of the compensation, regardless of continuous operation or single block operation, three blocks of movement commands are always pre-read consecutively before execution. If there are fewer than three blocks of movement commands, up to five blocks are pre-read.

Similarly, during the compensation mode, up to five blocks are read for compensation calculation.
In the compensation mode, the program is read in up to five blocks ahead including blocks with no movement, and interference check using tool radius is conducted in up to three blocks of movement commands ahead.
The maximum number of blocks pre-read at start of the compensation and during the compensation mode can be changed by the parameter.
The compensation plane, movement axes and next advance direction vector are based on the plane selection command designated by G17 to G19.
G17: XY plane, X, Y, I, J
G18: ZX plane, Z, X, K, I
G19: YZ plane, Y, Z, J, K
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
G code Function
G38 Vector designation during tool radius compensation
G39 Corner arc during tool radius compensation
G40 Tool radius compensation cancel
G41 Tool radius compensation left command
G42 Tool radius compensation right command
G17 G01 G41 Xx1 Yy1 Dd1 ;
G17 : Compensation plane
G01 : Cutting command
G41 : Tool radius compensation left command
Xx1,Yy1 : Movement axis
Dd1 : Compensation No.
r r
r: Tool radius compensation amount Programmed path
Tool center path
M800/M80/E80/C80 Series Specifications Manual (Function)
9 Tool Compensation
IB-1501505-N 168
An arc is inserted at the corner by the following command during tool radius compensation.
The compensation vector can be changed in following two ways.
The tool radius compensation vector amount and direction are retained.
The tool radius compensation vector direction is updated by I and J.
The tool radius compensation is canceled by the following command.
The vector prior to canceling is prepared by calculating the intersection point with the I and J direction.
G39 Xx1 Yy1 ;
G39
Xx1,Yy1
: Corner arc during tool radius compensation
: Movement amount
G38 Xx1 Yy1 ;
G38
Xx1,Yy1
: Vector designation for tool radius compensation
: Movement amount
G38 Xx1 Yy1 Ii1 Jj1 Dd1 ;
G38
Xx1,Yy1
Ii1,Jj1
Dd1
: Vector designation for tool radius compensation
: Movement amount
: Compensation vector direction
: Compensation vector length
G40 Xx1 Yy1 Ii1 Jj1 ;
G40
Xx1,Yy1
Ii1,Jj1
: Tool radius compensation cancel
: Movement amount
: Compensation vector direction
Tool center path Arc inserted at corner
Programmed path
N12
N11
N13
N14 N15
N11 G01 Xx11;
N12 G38 Xx12 Yy12;
N13 G38 Xx13 Yy13;
N14 G38 Xx14 Ii14 Ji14 Dd14;
N15 G40 Xx15 Yy15; Intersection point vector
Tool center path
Vector with length D (i14, j14)
Holding of previous
intersection point vector
N11
N12 N13
N14

(i14,J14)
N11 G01 Xx11 ;
N12 Xx12 Yy12 ;
N13 Xx13 Yy13 ;
N14 G40 Xx14 Ii14 Jj14 ;
When i and j commands
are assigned to G40
Tool center path

9.2.2 3-dimensional Tool Radius Compensation
(*1) This function is available during program format switch.
This command serves the function of compensating for the spherical radius of ball end mills. It compensates for the actual tool center path to be either more outside or inside the programmed path by an amount equivalent to the tool radius amount in accordance with the 3-dimensional vectors.
With 3-dimensional tool radius compensation, the compensation is controlled from the block in which the block containing the G41 or G42 command has been designated.
The radius from the tool spherical center to the end nose serves as the compensation amount that corresponds to the tool compensation No. designated by d1. The compensation Nos. that can be used are limited by the "number of tool compensation sets." (Refer to the section "9.3.1 Number of Tool Offset Sets".)
If the compensation vectors (tool spherical center vectors) are to be changed, the G41 and I, J and K commands must be assigned.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L (*1) (*1)
G code Function
G40
G41
G42
Tool radius compensation cancel
Tool radius compensation left command (compensation in the direction toward IJK)
Tool radius compensation right command (compensation in the direction away from
IJK)
G01 G41 Xx1 Yy1 Zz1 Ii1 Jj1 Kk1 Dd1 ;
G01
G41
Xx1,Yy1,Zz1
Ii1,Jj1,Kk1
Dd1
: Cutting
: Tool radius compensation left command
: Movement axis
: Tool sphere center vectors
: Compensation No.
(x, y, z)
r:
(x, y, z)
Z (K)
X (I) Y (J)
Tool
Tool center
coordinates
(I, J, K) Normal line vector
Tool radius
Work
Programmed
coordinates position 3-dimensional
compensation vector

9.2.3 Tool Nose Radius Compensation (G40/41/42)
Because a tool nose is generally rounded, a hypothetical tool nose point is used for creating programming. As a result, due to this roundness of the tool nose, there will be a gap between the programmed shape and the actual cutting shape during taper cutting or circular cutting. Nose radius compensation is a function to automatically calculate and offset this error by setting the tool nose radius value.
"Nose radius compensation" is a type of compensation that is available when turning is performed on a lathe.
"Nose radius compensation for machining center system" is a function which enables the nose radius compensation when turning is performed on a machining center. The basic operation follows the specifications of "Tool Nose Radius Compensation".
At start of the compensation, regardless of continuous operation or single block operation, two to five blocks are always read for intersection point calculation before execution. (Two blocks of movement commands are pre-read. If there are fewer than two blocks of movement commands, up to five blocks are pre-read.)
Similarly, during the compensation mode, up to five blocks are pre-read for compensation calculation.
The maximum number of blocks pre-read at start of the compensation and during the compensation mode can be changed by the parameter.
Nose R interference check
In the nose radius compensation mode, the program is read in up to five blocks ahead including blocks with no movement, and an interference check using the nose radius is conducted in up to three blocks of movement commands ahead.

M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
G code Function
G40 Nose R compensation cancel
G41 Nose R compensation left command
G42 Nose R compensation right command
Tool nose center path with no nose R
compensation (Shaded part indicates the
cutting shape gap)
Tool nose center path with
nose R compensation
Tool nose
center
Tool nose R
Hypothetical tool
nose point

9.2.4 Automatic Decision of Nose Radius Compensation Direction (G46/40)
The nose radius compensation direction is automatically determined from the tool nose point and the specified
movement vector.
The compensation directions based on the movement vectors at the tool nose points are as follows:
9.2.5 Tool Radius Compensation Diameter Designation
Tool diameter designation handles the compensation amount as diameter value and compensates the amount set in the
tool compensation amount screen when tool radius compensation (G41/G42 command) is commanded.
Whether compensation amount is handled in radius value or diameter value is switched by the parameter.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
G code Function
G40
G46
Nose radius compensation cancel
Nose radius compensation ON (Automatic decision of compensation
direction)
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
12 34 5678
R R L L
R
R R
R
R R
R
R R
R L
L
L L
L
L L
L
L L

R R L L
R
R R
R
R R
R
R R
R L
L
L L
L

L L
L
L L
Tool nose
direction
Tool nose
direction Tool
nose
progress
direction
Tool
nose
progress
direction
Tool nose point Tool nose point
Mouvement vectors
(tool nose points 1 to 4)
Mouvement vectors
(tool nose points 5 to 8)
Range of each
tool nose point
(1 to 4)
Range of each
tool nose point
(5 to 8)

9.3 Tool Offset Amount
9.3.1 Number of Tool Offset Sets
[M system]
[L system]
The number of tool compensation sets (the number of tool offset sets) for the fixed allocation is shown in the following tables. Refer to "9.3.3 Number of Tool Offset Sets Allocation to Part Systems" for the arbitrary allocation.
<M system>
<L system>
(Note) Whether the tool compensation memory is provided commonly for the part systems or independently for the part systems depends on the parameter settings.
Number of tool compensation sets M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
Number of tool offset sets (99 sets)
Number of tool offset sets (128 sets)
Number of tool offset sets (200 sets)
Number of tool offset sets (256 sets)
Number of tool offset sets (400 sets)
Number of tool offset sets (999 sets)
Number of tool compensation sets M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
Number of tool offset sets (99 sets)
Number of tool offset sets (128 sets)
Number of tool offset sets (200 sets)
Number of tool offset sets (256 sets)
Number of tool offset sets (400 sets)
Number of tool offset sets (999 sets)
Function name Common for part systems or 1-part
system specification
Independent for part systems
and multi-part system
specification
Number of tool offset sets (200 sets) 200 sets Divide the number of tool offset
sets by the number to obtain the
number of sets per part system.
(If there is the remainder, the
remainder goes to the 1st part
system.)
Number of tool offset sets (400 sets) 400 sets
Number of tool offset sets (999 sets) 999 sets
Function name Common for part systems or 1-part
system specification
Independent for part systems
and multi-part system
specification
Number of tool offset sets (99 sets) 99 sets Divide the number of tool offset
sets by the number to obtain the
number of sets per part system.
(If there is the remainder, the

remainder goes to the 1st part
system.)
Number of tool offset sets (128 sets) 128 sets
Number of tool offset sets (256 sets) 256 sets
Number of tool offset sets (400 sets) 400 sets
Number of tool offset sets (999 sets) 999 sets

9.3.2 Offset Memory
9.3.2.1 Tool Shape/Wear Offset Amount
This function registers the tool shape compensation and wear compensation amounts. Compensation may encompass two or more axes.
Tool compensation types I, II and III are available for M system, which can be selected by the parameter. For L system, tool compensation type III is always used.
(1) Shape compensation amount
The tool length compensation amount, tool radius compensation amount, nose radius compensation amount, nose radius imaginary tool tip point or tool width can be set as the shape compensation amount.
The compensation amount that can be set and used differs depending on whether compensation amount setting type I,II or III is used.
(2) Wear compensation amount
When the tip of the tool used has become worn, the wear compensation amount is used to compensate this wear. Types of wear compensation amounts include the tool length wear compensation amount, tool radius wear compensation amount, and nose radius wear compensation amount.
The wear compensation amount can be used with compensation amount setting types II and III, and it is added to the shape compensation amount for compensation.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L

(a) Type I: 1-axis compensation amount [M system]
This is the value that is used by rotary tools.
As the tool length compensation amount, among the compensation amounts for the position of the tool moving in the direction parallel to the control axis, the compensation amount in the longitudinal direction of the rotary tool is registered. The tool length compensation amount is set as a minus value.
As the tool radius compensation amount, among the compensation amounts for the position of the tool moving in the direction parallel to the control axis, the compensation amount in the radial direction of the rotary tool is registered. The tool radius compensation amount is set as a plus value.
One compensation amount data is registered in one compensation No., and the compensation Nos. are assigned using the address D or H commands. When a No. is assigned by a D address command, compensation is provided in the form of the tool radius; when it is assigned by an H address command, it is provided in the form of the tool length.
(b) Type II: 1-axis compensation amounts/with wear compensation [M system]
As with type I, type II is for the compensation amounts used by rotary tools.
With type II, four kinds of compensation amount data are registered in one compensation No.: the tool length compensation amount, tool length wear compensation amount, tool radius compensation amount, and tool radius wear compensation amount.
When a compensation No. is assigned by address D as the compensation amount, the tool radius is compensated using the amount obtained by adding the shape compensation amount and tool radius wear compensation amount. Further, the tool length is compensation using the amount obtained by adding the shape compensation amount and tool length wear compensation amount.
Tool length compensation amount Wear compensation amount when
Compensation types I Compensation types I and II using type II
R
Tool length
compensation
amount
Workpiece
Table
R
Tool length
compensa tion amount
Shape
compen sation
amount
Tool radius wear
compensation
amount
Workpiece
Table
M
Tool length
wear
compensation
Tool radius wear amount
compensation
amount

(c) Type III: 2-axis compensation amounts [M system][L system]
Type III is for the compensation amounts used by non-rotary tools.
As the compensation amounts, the tool length along the X, Y and Z axes and the wear amount along each of these axes, the nose radius and nose radius wear amount, tool tip point P and tool width can be registered.
Compensation is carried out in the directions of the X, Y and Z axes from the base position in the program. Generally, the center of the tool rest or the tip of the base tool is used as the programmed base position.
The tool tip contour arc radius (nose radius) of a non-rotary tool with an arc (nose radius) at its tip is registered as the nose radius compensation amount.
The X-axis tool length compensation amount, Z-axis tool length compensation amount and nose radius compensation amount are set as plus amounts.
1. The programmed base position is the center of
the tool rest:
2. The programmed base position is the tip of the
base tool:
X-axis tool length
compensation
amount
Base
position
(base point)
Z-axis tool length
compensation amount
Z-axis tool length
compensation amount
Tool used for machining
X-axis tool length
compensation
amount
Base position
(base point)
Base tool
Nose radius
compensation
amount
Tool nose
center
Imaginary tool
nose point
X
Z
Z-axis tool length wear
compensation amount
Tool nose
X-axis tool length
wear compensa tion amount

9.3.2.2 Compensation Type Selection by Parameter
This function switches the tool compensation type with the parameter.
The type is switched to the tool compensation type III by setting the parameter, regardless of #1037 cmdtyp.
This function enables tool compensation for a turning tool by registering the tool compensation amount of the base axes IJK and tool tip point for a machining center system.
(1) Machining center system
Tool compensation type I and II are used for machining center system. However, use of this function switches the type to tool compensation type III.
[Correspondence of the registered data between the compensation types]
(a) Tool compensation type I -> Tool compensation type III
The tool compensation amount of tool compensation type I is handled as tool length Z of tool compensation type III.
(b) Tool compensation type II -> Tool compensation type III
The table below shows the relationship between the registered items.
(2) Lathe system
The tool compensation type is not switched by using this function.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
Tool compensation type II Tool compensation type III
Length Length Z
L wear Wear Z
Radius Nose R
R wear R-wear

9.3.3 Number of Tool Offset Sets Allocation to Part Systems
* Variable number of per-part-system tool offset sets
The number of tool offset sets can be set per part system.

There are two types of the allocation: "Arbitrary allocation" which allocates the number of tool offset sets to each part system arbitrarily and "Fixed allocation" which automatically allocates the number of tool offset sets to each part system equally, and the type can be selected using the parameter.
The arbitrary allocation enables the efficient allocation because when a certain part system needs only a small number of offset sets, the rest can be allocated to another part system. If an auxiliary-axis part system does not need the tool offset set at all, the number of tool offset sets can be set 0 in the auxiliary-axis part system.
"Number of tool offset sets in system" is the total number of tool offset sets of all part systems.
(1) Arbitrary allocation
(a) When the number of tool offset sets is increased in the 1st part system of 4-part system
(b) When the number of offset sets is set "0" to the 3rd part system of 3-part system for use of the 3rd part system as auxiliary-axis part system
(2) Fixed allocation
(Note 1) The maximum number of tool offset sets per part system is 999.
(Note 2) If there is any remainder, the remainder is allocated to the 1st part system.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
Number of tool offset sets in system
[1000 sets]
Number of tool offset sets in system
[1000 sets]
Number of tool offset sets in system
[1000 sets]
Number of tool offset sets in system
[1000 sets]
Number of tool offset sets in system [1000 sets]
250
250
250
250
200
200
200
400
1st part system
2nd part system
3rd part system
4th part system
1st part system
2nd part system
3rd part system
4th part system
334
333
333 500
0
500
1st part system 1st part system
2nd part system
3rd part system
2nd part system
3rd part system
250
250
250
250
1st part
system
2nd part
system
3rd part
system
4th part
system
999
(Note 1)
1st part
system
500
500
1st part
system
2nd part
system
333
333
334
(Note 2)
1st part
system
2nd part

system
3rd part
system
M800/M80/E80/C80 Series Specifications Manual (Function)
9 Tool Compensation
IB-1501505-N 178
179 IB-1501505-N
10
Coordinate System
M800/M80/E80/C80 Series Specifications Manual (Function)
10 Coordinate System
IB-1501505-N 180
10.1 Coordinate System Type and Setting
The coordinate system handled by the NC is shown below.
The points that can be commanded with the movement command are points on the local coordinate system or machine coordinate system.
L0 Local coordinate system zero point Offset set with parameters
G52 Local coordinate system offset (*1) Offset set with program
W0-54 Workpiece coordinate system zero point (G54) (0 when power is turned ON)
W0-55 Workpiece coordinate system zero point (G55)
G54 Workpiece coordinate system (G54) offset (*1) (*1) The G52 offset is available independently for
G55 Workpiece coordinate system (G55) offset G54 to G59.
G92 G92 coordinate system shift
EXT External workpiece coordinate offset
M0 Machine coordinate system zero point
ref Reference position
G52
G92
G55 G54
EXT
ref
G52
R
M 0
W 0 - 54
L 0
L 0
W 0 - 55
M800/M80/E80/C80 Series Specifications Manual (Function)
10 Coordinate System
181 IB-1501505-N
10.1.1 Machine Coordinate System
The machine coordinate system is used to express the prescribed positions (such as the tool exchange and stroke end positions) that are specific to each machine.
The G53 command followed by coordinates moves the tool to the command position in the machine coordinate system.
If a coordinate command is included in the same block as G53, it is treated as a command not in the workpiece coordinate system but in the machine coordinate system.
When the initial position of workpiece coordinate is (0,0) with absolute command.
N01 G01 X500. Y0. F1000
N02 G53 X-500. Y500.
N03 X-500. Y500.
Command format
If the incremental or absolute commands and movement mode have been omitted, operation complies with the modal command that prevails at the time.
G53 (movement on machine coordinate system) is an unmodal command which is effective only in the block where it is assigned. The workpiece coordinate system being selected is not changed by this command.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
G53 X__ (U__) Y__ (V__) Z__ (W__) __ __ ;
X/U/Y/V/Z/W// : Axis address (range of coordinate position command (mm, inch))
(R1)
(M)
X
Y
(W1)
N01
N02
N03
500
1st reference position
Workpiece coordinate system 1
Machine coordinate system
M800/M80/E80/C80 Series Specifications Manual (Function)
10 Coordinate System
IB-1501505-N 182
10.1.2 Coordinate System Setting
The zero point position of the program coordinate system can be shifted to an arbitrary position by G92 command.
As shown in the figure below, when a coordinate system setting is specified by G92, G92 shift amount is applied so that the tool position in the current workpiece coordinate system (*1) is set to the coordinate position specified by G92, and the workpiece coordinate system is shifted accordingly. All the workpiece coordinate systems (G54 to G59 and G54.1

Pn) are also shifted simultaneously at this time, but the machine does not move.
(*1) The "tool position in the current workpiece coordinate system" includes the compensation amounts for tool radius, tool length and tool position compensation.
The following values are set as G92 shift amounts.
X: x0 - x1
Y: y0 - y1
There are two methods to return a coordinate system shifted by G92 command to its original position.
(1) Carry out dog-type reference position return.
(2) Move the coordinate system to the machine coordinate system zero point, then command G92 and G53 in the same block to set the machine coordinate system.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
Coordinate system created by automatic
coordinate system setting
Coordinate system after coordinate system
setting by G92
A workpiece coordinate system in which the
current tool position is set at (x1, y1) will be
newly created.
(a) Tool position (W0) Workpiece coordinate system
(b) G92 commanded position (W1) Workpiece coordinate system after G92 command
(c) G92 shift amount (M) Basic machine coordinate system
G90 G53 G00 X0 Y0 ; Positioning at machine coordinate system zero point
G92 G53 X0 Y0 ; Coordinate system zero setting in machine coordinate system
This returns all the workpiece coordinates (G54 to G59 and G54.1 Pn) to their original positions.
M
W0 y0
(a) x0
M
W0
y1
x1
W1
(b)
(c)
G92 Xx1 Yy1 ;

10.1.3 Automatic Coordinate System Setting
After the power is turned ON, the basic machine coordinate system and the workpiece coordinate system are automatically set without executing the zero point return.
The coordinate systems created are given below.
(1) Machine coordinate system corresponding to G53
(2) G54 to G59 workpiece coordinate system
(3) Local coordinate systems created under G54 to G59 workpiece coordinate systems
The distances from the zero point of G53 machine coordinate system are set to the controller coordinate related parameters.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L

10.1.4 Workpiece Coordinate System Selection
The workpiece coordinate systems facilitate the programming on the workpiece, serving the reference position of the machining workpiece as the zero point.
These commands enable the tool to move to the positions in the workpiece coordinate system. There are extended workpiece coordinate systems (G54.1) in addition to 6 workpiece coordinate systems, which are used by the programmer for programming (G54 to G59). The number of the extended workpiece coordinate systems varies depending on the MTB specifications.
Among the workpiece coordinate systems currently selected by these commands, any workpiece coordinate system with coordinates that have been commanded by the current position of the tool is reset. (The "current position of the tool" includes the compensation amounts for tool radius, tool length and tool position.)
A hypothetical machine coordinate system with coordinates that have been commanded by the current position of the tool is set by these commands. (The "current position of the tool" includes the compensation amounts for tool radius, tool length and tool position.) (G54, G92)
10.1.4.1 Workpiece Coordinate System Selection (6 Sets)
Up to 6 workpiece coordinate systems can be selected.
The G54 workpiece coordinate system is selected when the power is turned ON.
Command format
Workpiece coordinate system selection

Workpiece coordinate system setting
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
G code Function
G54
G55
G56
G57
G58
G59
Workpiece coordinate system 1 (W1)
Workpiece coordinate system 2 (W2)
Workpiece coordinate system 3 (W3)
Workpiece coordinate system 4 (W4)
Workpiece coordinate system 5 (W5)
Workpiece coordinate system 6 (W6)
(G90) G54 to G59 ;
(G54 to G59)G92 X__ Y__ Z__ a__ ;
X,Y,Z : Coordinate position of end point
a : Additional axis
M800/M80/E80/C80 Series Specifications Manual (Function)
10 Coordinate System
185 IB-1501505-N
The workpiece coordinate zero points are provided as distances from the zero point of the machine coordinate system.
Settings can be performed in one of the following two ways:
(1) Setting using the setting and display unit
(2) Setting using commands assigned from the machining program
W1
M
W2
W4 W3
G90 G56 G00 X0 Y0 ;
Start
Machine coordinate system (G53)
Workpiece coordinate
system 1 (G54)
Workpiece coordinate
system 2 (G55)
Workpiece coordinate
system 3 (G56)
Workpiece coordinate
system 4 (G57)
M800/M80/E80/C80 Series Specifications Manual (Function)
10 Coordinate System
IB-1501505-N 186
10.1.4.2 Extended Workpiece Coordinate System Selection (48 Sets) G54.1P1 to P48
In addition to the six workpiece coordinate systems G54 to G59, 48 workpiece coordinate systems can be used by assigning G54.1Pn command.
The command format to select the workpiece coordinate system using the G54.1Pn command and to move on the workpiece coordinate system are given below.
Workpiece coordinate system selection
The numerical value n of P following G54.1 indicates each workpiece coordinate system. Specify a value between 1 and 48.
The workpiece coordinate zero points are provided as distances from the zero point of the machine coordinate system.
Settings can be performed in one of the following two ways:
(a) Setting using the setting and display unit
(b) Setting using commands assigned from the machining program
G54Pn can be used as the extended workpiece coordinate system selection command by setting the parameter.
10.1.4.3 Extended Workpiece Coordinate System Selection (96 Sets) G54.1P1 to P96
In addition to the six workpiece coordinate systems (G54 to G59), 96 workpiece coordinate systems can be used by assigning G54.1Pn command. Refer to "Extended workpiece coordinate system selection (48 sets) G54.1P1 to P48" for details.
10.1.4.4 Extended Workpiece Coordinate System Selection (300 Sets) G54.1P1 to P300
In addition to the six workpiece coordinate systems (G54 to G59), 300 workpiece coordinate systems can be used by assigning G54.1Pm command. Refer to "Extended Workpiece Coordinate System Selection (48 sets) G54.1P1 to P48" for details.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
(G90) G54.1Pn ;
M850W M830W M850S M830S M80W M80
TypeA
M80

TypeB
E80
TypeA
E80
TypeB C80
M
L
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L

10.1.5 External Workpiece Coordinate Offset
External workpiece coordinate offset that serves as the reference for all the workpiece coordinate systems is available outside the workpiece coordinates.
By setting the external workpiece coordinate offset, the external workpiece coordinate system can be shifted from the machine coordinate system, and all the workpiece coordinate systems can be simultaneously shifted by an amount equivalent to the offset.
When the external workpiece coordinate offset is zero, the external workpiece coordinate systems coincide with the machine coordinate system.
It is not possible to assign movement commands with the external workpiece coordinate selected.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
Workpiece
coordinate 3 (G56)
Workpiece
coordinate 3 (G56)
Workpiece
coordinate 2 (G55)
Workpiece
coordinate 2 (G55)
Workpiece
coordinate 1 (G54)
Workpiece
coordinate 1 (G54)
Workpiece
coordinate 6 (G59)
Workpiece
coordinate 6 (G59)
Workpiece
coordinate 5 (G58)
Workpiece
coordinate 5 (G58)
Workpiece
coordinate 4 (G57)
Workpiece
coordinate 4 (G57)
Machine coordinate zero point
Machine coordinate zero point
Machine coordinate system (= External workpiece coordinate system)
Machine coordinate system
External workpiece coordinate system
External workpiece coordinate offset

10.1.6 Workpiece Coordinate System Preset (G92.1)
This function presets the workpiece coordinate system, which has been shifted by the programmed command or the manual operation, as the workpiece coordinate system which has been offset by the programmed command (G92.1) from the machine zero point by an amount equivalent to the workpiece coordinate offset amount.
The workpiece coordinate system is shifted from the machine coordinate system when the such operations or the programmed commands as below have been performed.
- When manual intervention has occurred in the manual absolute OFF status
- When a movement command was performed in the machine lock status
- When movement was initiated by handle interrupt
- When a movement command was performed in the mirror image mode
- When a local coordinate system was set using the G52 command
- When a workpiece coordinate system was shifted using the G92 command
Just as when manual reference position return has been performed, this function presets the workpiece coordinate system which has been shifted once to the workpiece coordinate system which has been offset from the machine zero point by an amount equivalent to the workpiece coordinate offset amount.
Furthermore, whether to preset relative coordinates as well is selected with a parameter.

Command format
Designate the addresses of the axes to be preset.
Axes whose addresses have not designated will not be preset.
Depending on the command type, G50.3 command is used in stead.
A program error results when a value other than 0 is commanded.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
G92.1 (G50.3) X0 Y0 Z0 0 ; (where is an additional axis)

10.1.7 Local Coordinate System
This function is for assigning a coordinate system on the workpiece coordinate system now being selected. This enables the workpiece coordinate system to be changed temporarily.
The local coordinate system can be selected independently on each workpiece coordinate system G54 to G59.
The command format of the local coordinate system is given below.
The local coordinate zero points are provided as distances from the zero point of the designated workpiece coordinate system (local coordinate offset).
In the incremental command mode, the position obtained by adding the local coordinate offset amount to the previously specified offset amount serves as the new local coordinate zero point.
If no workpiece coordinates are designated, the local coordinates will be created on the currently selected workpiece coordinates.
This command is unmodal but the local coordinate system created by G52 is valid until the next G52 command is issued.
The local coordinate system is canceled by the input of the reset signal or by manual or automatic dog-type reference position return.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
G code Function
G54 G52
G55 G52
G56 G52
G57 G52
G58 G52
G59 G52
Local coordinate system on the workpiece coordinate system 1
Local coordinate system on the workpiece coordinate system 2
Local coordinate system on the workpiece coordinate system 3
Local coordinate system on the workpiece coordinate system 4
Local coordinate system on the workpiece coordinate system 5
Local coordinate system on the workpiece coordinate system 6
(G54) G52 Xx1 Yy1 Zz1 ;
(G54)
G52
Xx1,Yy1,Zz1
: Workpiece coordinate system selection
: Local coordinate system setting
: Local coordinate offset amount
M
G54 G52
(G53)
(G54)
W 1
L 1
y 1
x 1
Local coordinate
Workpiece coordinate 1
Machine coordinate system

10.1.8 Coordinate System for Rotary Axis
The axis designated as the rotary axis with the parameters is controlled with the rotary axis' coordinate system.
The rotary axis includes the rotating type (short-cut valid/invalid) and linear type (workpiece coordinate position linear type, all coordinate position linear type).
The workpiece coordinate position range is 0 to 359.999 for the rotating type, and 0 to 99999.999 for the linear type.
The machine position and relative position differ according to the parameters.
The rotary axis is commanded with a degree () unit regardless of the inch or metric designation.
The rotary axis type can be set with the parameters for each axis.
M850W M830W M850S M830S M80W M80
TypeA
M80

TypeB
E80
TypeA
E80
TypeB C80
M
L
Rotary axis
Linear axis Rotating type rotary axis Linear type rotary axis
Short-cut invalid Short-cut valid Workpiece coordinate
position linear type
All coordinate position
linear type
Workpiece coordinate
position Displayed in the range of 0 to 359.999. Displayed in the range of 0 to 99999.999.
Machine position/
relative position Displayed in the range of 0 to 359.999. Displayed in the range of 0 to
99999.999.
ABS command
The incremental
amount from the end
point to the current
position is divided by
360, and the axis
moves by the
remainder amount
according to the sign.
Moves with a short-cut
to the end point.
In the same manner as the normal linear axis, moves according to the
sign by the amount obtained by subtracting the current position from
the end point (without rounding up to 360 degrees.).
INC command Moves in the direction of the commanded sign by the commanded incremental amount starting at the current
position.
Reference position
return
Follows the absolute/incremental command for a movement to the interim position.
Returns to the reference position from the interim position within a 360
degree movement.
Moves and returns in the reference
position direction for the difference
from the current position to the
reference position.

10.1.9 Plane Selection
G17, G18, and G19 are for specifying the planes for the arc, tool radius compensation, coordinate rotation and other
such commands.
(1) A parameter can be used to set either the X, Y or Z axis to which the additional axis is to be parallel.
(2) A parameter can be used to set the initialization status (when the power has been turned ON or when the reset
status has been entered) to G17, G18 or G19.
(3) The movement commands have no connection with the plane selection.
(Example)
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
G17; Xp-Yp plane designation
G18; Zp-Xp plane designation
G19; Yp-Zp plane designation
G19 X100. ;
With these program commands, X100. is the axis which does not exist on the G19
(Yp, Zp) plane, Yp-Zp plane is selected by G19 and the X axis moves by 100. mm
separately from the plane selection.
G17 X100 . R50. ; With these program commands, the Xp-Yp plane is selected by G17 and the arc
command is controlled on the X-Y plane by this command.

10.1.10 Origin Set/Origin Cancel
(1) Origin set
Origin set is a function that shifts the coordinate system so that the current position is the zero point on the
workpiece coordinate system containing the workpiece coordinate system's offset value.
The relative position counter and workpiece coordinate counter are set to "0" with this operation. In other
words, this is the same as the coordinate system setting command "G92 X0;". (For target axis: X)
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA

E80
TypeB C80
M
L
Items updated by origin set
Workpiece offset (10, 15)
Workpiece coordinate
zero point
Workpiece
coordinate zero
point
Current coordinate
(50, 30)
Machine
zero point
Machine
zero point
Execution of origin set
G92 offset (10, 15)
Current coordinate
(0, 30)
Workpiece offset (10, 15)
G92 offset (60, 15)
M800/M80/E80/C80 Series Specifications Manual (Function)
10 Coordinate System
193 IB-1501505-N
(2) Origin cancel
Origin cancel is a function that manually cancels all deviated amounts, and shifts to the designated zero point
with the workpiece offset.
The relative position counter and machine position counter are set to "0" with this operation. In other words,
this is the same "G92 G53 X0 ;". (For target axis: X)
10.1.11 Counter Set
The relative position counter can be set to an arbitrary value by operating the setting and display unit screens.
Select the axis and then input a value. Finally, press the key.
Only the [Relative Position] display field will change to the set value. The other coordinate positions displayed will not
change.
Up to 9 digits can be input in the integer section. The number of digits after the decimal point depends on the parameter
setting.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
Execution of origin cancel
G54 Workpiece
coordinate zero point
G52G54 Local offset
(20, 15)
G54 Workpiece
offset (10, 15)
G92 offset (10, 15)
G55 Workpiece offset (20, 0)
G54 Current coordinates
(30, 15)
Machine
zero point
Machine zero
point
G55 Current coordinates
(30,15)
G55 Workpiece coordinate
zero point
G52G55 Local offset
(50,30)
G54 Workpiece
coordinate zero point
G52G54 Local offset
(0,15)
G54 Workpiece
offset (10,15)
G92 Offset (0,15)
G54 Current coordinates
(60,15)
G55 Current coordinates
(90,15)
G55 Workpiece
coordinate zero point
G52G55 Local offset
(0,30)
G55 Workpiece offset
(20,0) Items updated by origin cancel
INPUT
M800/M80/E80/C80 Series Specifications Manual (Function)

10.1.12 Workpiece Position Offset for Rotary Axis
For a machine equipped with a table rotary axis, this function corrects installation errors between workpiece coordinate zero point and workpiece reference position.
When a workpiece set on a rotary table is machined, if there is a difference between the workpiece coordinate zero point and the workpiece reference position, an error occurs in a machined shape. Setting the installation error between the workpiece coordinate zero point and the workpiece reference position (workpiece position offset amount for rotary axis) corrects in accordance with the table rotation angle for each block. This makes it possible to reduce the shape error at the time of machining, which enables machining with high accuracy.
This function is available only in the 1st part system. When this function is used in other than the 1st part system, an program error occurs.
The error is compensated for the axis set to be valid by the relevant parameter.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
<When the workpiece position offset for
rotary axis is disabled>
<When the workpiece position offset for
rotary axis is enabled>
Workpiece position
after rotating -90 Workpiece position
before rotating
Rotate -90 Rotate -90
Shape error
Tool path
Workpiece coordinate
system zero point
Workpiece reference
position
Installation
error
Tool path
Offset amount after
rotation
Installation
error

Workpiece position offset for rotary axis is valid in a machine configuration of the right-hand orthogonal coordinate system defined in ISO standard.
Workpiece position offset for rotary axis is applicable to the following three types of machine configuration:
(Note 1) This function cannot be applied to a machine whose tool direction from the tool tip to the base is not parallel to the Z axis (Z axis positive direction) when machine position of all the rotary axes is 0 degree.
(Note2) This function cannot be applied to a machine whose rotation center axis of rotary axis is not parallel to any of the orthogonal coordinate axes.
Command format
Workpiece position offset for rotary axis
(1) Make sure to command G54.2 independently. When it is commanded in the same block with other G codes, travel commands and miscellaneous commands, an program error occurs.
(2) When address P is not commanded, an alarm occurs. Also, commanding values other than "0" to "8" to the address P causes an alarm.
(3) If P is given in a block that contains no G54.2 command, the address P is not regarded as a command for specifying the workpiece position offset No. for rotary axis.
(4) G54.2 is a modal command of the G group 23.
(5) When "G54.2 Pm" is given during "G54.2 Pn", offset is applied with the offset set No. "m".
(6) Set the compensation amount of the group specified with address P to system variables. Refer to the "Programing Manual" for system variables for setting compensation amount.
Type Table tilt type Combined type 4-axis machine
Description 2 rotary axes on table side A rotary axis each on tool
head side and table side 3 orthogonal axesand 1 rotary axis
Example of
machines

Primary rotary
axis (a) The 1st rotary axis on the table side Rotary axis on the tool side Not applicable
Secondary
rotary axis (b) The 2nd rotary axis on the table side Rotary axis on the table side Not applicable
G54.2 P__ ;
P : Set No. of workpiece position offset for rotary axis (n = 0 to 8)
(a)
(b)
(a)
(b)

10.1.13 Workpiece Coordinate System Shift
This function can shift the workpiece coordinate system.
When a workpiece coordinate system which is considered at programming is misaligned with an actual set workpiece

coordinate or a workpiece coordinate set by automatic coordinate system setting, the measured workpiece coordinate system can be shifted to the workpiece coordinate system at the program creation so that the machining can be performed without modification of the machining program. This function also eliminates the need to change the machining program even when the workpiece shape is changed.

The methods for the setting are as follows:

- Setting on screen
- Setting with machining program (G code command)
- Setting by automatic measurement
- Setting and acquiring with system variables

M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
Setting the shift amount to O' -O to the shift amount of the workpiece coordinate system
X' -Z': Actual measured coordinate system
X .Z: Coordinate system at programming
Setting the change amount of the workpiece shape to the shift amount of the workpiece coordinate system
Z
Z'
X'
X
O
O'
X
Z
wk_Z
O
X
Z
O
X
Z
O O
wk_Z
X -Z: Coordinate system at programming
wk_z: Change amount of workpiece shape Workpiece shape at programming
Workpiece for actual machining
Sets wk_z to shift amount of workpiece
coordinate system

10.2 Return

10.2.1 Manual Reference Position Return

This function enables the tool to be returned manually to the position (reference position) which is characteristic to the machine.

(1) Return pattern to reference position
[Dog type]
[High-speed type]
(2) Differences according to detection method
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
When starting in same direction as final advance
direction
When starting in opposite direction as final
advance direction
First return after power ON Second return and following
Incremental position detection
method Dog-type High-speed type
Absolute position detection method High-speed type High-speed type
R
Dog
Creep speed
Reference position
return speed
R
Dog
R
Dog
Rapid traverse rate

10.2.2 Automatic 1st Reference Position Return

The machine can be returned to the first reference position by assigning the G28 command during automatic operation. If the interim point is commanded, the machine is moved up to that point by rapid traverse so that it is positioned and then returned separately for each axis to the first reference position.
Alternatively, by assigning the G29 command, the machine can be first positioned separately for each axis at the G28 or G30 interim point, and then positioned at the assigned position.
The G28 programming format is given below.
Tool is first positioned by rapid traverse to the assigned position (interim point) and then is returned to the 1st reference position for each axis independently.
The G29 programming format is given below.
The tool is first moved by rapid traverse for each axis to the interim position which is passed through with G28 or G30, and is then positioned by rapid traverse at the position assigned by the program.
R1 1st reference position
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
G code Function
G28 Automatic 1st reference position return
G29 Start position return (The tool first returns to the interim position from the 1st reference position, and then is positioned at the position assigned in the program.)
G28 Xx1 Yy1 Zz1 ;
G28
Xx1,Yy1,Zz1
: Return command
: Return control axes (coordinate of interim point)
G29 Xx1 Yy1 Zz1 ;
G29
Xx1,Yy1,Zz1
: Return command
: Return control axes (coordinate of assigned position)
R
G28
G28
G29
G29 - Y
- X
R1
Non-interpolation
movement
Interpolation or
non-interpolation can
be selected
Interim
point
Interpolation or
non-interpolation can be
selected

If the position detector is for the incremental detection system, the first reference position return for the first time after the NC power has been turned ON will be the dog-type. However, whether the second and subsequent returns are to be the dog type or the high-speed type can be selected by designating a parameter.
The high-speed type is always used when the position detector is for the absolute position detection system.
(Note 1) The automatic 1st reference position return pattern is the same as for manual reference position return.
(Note 2) The number of axes for which reference position return can be performed simultaneously depends on the number of simultaneously controlled axes.
(Note 3) If, at the time of the first reference position return, the tool radius compensation or nose radius compensation has not been canceled, it will be temporarily canceled during the movement to the interim point. The compensation is restored at the next movement after the return.
(Note 4) If, at the time of the reference position return, the tool length compensation has not been canceled, it will be canceled and the compensation amount also cleared upon completion of reference position return. The tool length compensation can also be canceled temporarily using a parameter. In this case, however, the tool compensation is restored by the next movement command.
(Note 5) Interpolation or non-interpolation can be selected using a parameter for the movement up to the G28 interim point or for the movement from the G29 interim point to the command point. Non-interpolation applies for movement from the G28 interim point to the reference position and movement up to the G29 interim point.
(Note 6) When a single block operation is selected, it can be chosen by parameter setting whether or not to enable interim point stop.

10.2.3 2nd, 3rd, 4th Reference Position Return
As with automatic 1st reference position return, commanding G30Pn during automatic operation enables the tool to be returned to the set points (2nd, 3rd or 4th reference positions) characteristic to the machine. The 2nd, 3rd and 4th reference positions can be set by parameters.
The G30 programming format is given below.
The tool is first positioned by rapid traverse to the assigned interim point and then is returned to the reference position for each axis independently.
R1: 1st reference position
R2: 2nd reference position
R3: 3rd reference position

R4: 4th reference position
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
G code Function
G30 P2
G30 P3
G30 P4
2nd reference position return
3rd reference position return
4th reference position return
G30 Xx1 Yy1 Zz1 Pp1 ;
G30
Xx1,Yy1,Zz1
Pp1
: Return command
: Return control axes (coordinate of interim point)
: Return position No.
R1
R2
R4
R3
G30 P2
G30 P3
G30 P4
- Y
- X
Start point Interim point

(Note 1) The second reference position return is performed if the P address is omitted.
(Note 2) The number of axes for which reference position return can be performed simultaneously depends on the number of simultaneously controlled axes.
(Note 3) If, at the time of the reference position return, the tool radius compensation or nose R compensation has not been canceled, it will be temporarily canceled during the movement up to the interim point. The compensation is restored at the next movement command after the return.
(Note 4) If, at the time of the reference position return, the tool length compensation has not been canceled, it will be canceled and the compensation amount also cleared upon completion of reference position return. The tool length compensation can also be canceled temporarily using a parameter. In this case, however, the tool compensation is restored by the next movement command.
(Note 5) Whether interpolation or non-interpolation is to apply to the movement up to the interim point can be selected using a parameter. Non-interpolation applies for movement from the interim point to each of the reference positions.
(Note 6) When a single block operation is selected, it can be chosen by parameter setting whether or not to enable interim point stop.
10.2.4 Reference Position Check
By commanding G27, a machining program, which has been prepared so that the tool starts off from the reference position and returns to the reference position, can be checked to see whether the tool will return properly to the reference position.
Command format
The tool is first positioned by rapid traverse to the assigned position and then, if this is the reference position, the reference position arrival signal is output.
When the address P is omitted, the first reference position check will be applied.
(Note 1) The number of axes for which reference position check can be performed simultaneously depends on the number of simultaneously controlled axes.
(Note 2) An alarm results unless the tool is positioned at the reference position upon completion of the command.
(Note 3) Whether interpolation or non-interpolation is to apply to the movement can be selected using a parameter.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
G27 Xx1 Yy1 Zz1 Pp1 ;
G27
Xx1,Yy1,Zz1
Pp1
: Check command
: Return control axes
: Check No.
P1:1st reference position check
P2: 2
P3: 3
P4: 4

10.2.5 Absolute Position Detection

The absolute position detection function holds the position data of the actual machine position and the machine coordinates in the controller even after the power is turned OFF. When the power is turned ON again, a position command can be executed in automatic operation immediately without executing reference position return. (High-speed return is always used for the reference position return command.)

There are two types of absolute position detection method: dog type and dog-less type, which use different reference position establishment methods.

The type is selected with the parameter.

(Note) This function is valid for the NC axis and the PLC axis. This function cannot be used for the spindle and the auxiliary axis.

M850W M830W M850S M830S M80W M80

TypeA

M80

TypeB

E80

TypeA

E80

TypeB C80

M

L

Method Details Establishment of zero point Adjustment of zero point

position

Dog-less

type

Machine end stopper

method

The zero point is established

by pressing the machine

against a set point on the

machine.

The zero point is established

when a torque limit is applied

on the servo and the torque

limit is reached by pressing

against the machine stopper.

Input a value equivalent to the

shift amount on the absolute

position setting screen.

Basic position

alignment

method

Method I

The zero point position is set

from the screen.

The zero point is established

by inputting it through the

absolute position setting

screen.

Input a value equivalent to the

shift amount on the absolute

position setting screen. Method II

Grid-on method

[Only for C80 Series]

The axis is positioned to the

nearest grid point.

The axis is activated in

reference position return

mode.

Set a value in the parameter.

Dog-type Same method as incremental

detection dog-type.

The zero point is established

with dog-type reference

position return completion.

Set a value in the parameter.

10.2.6 Tool Exchange Position Return

By specifying the tool change position in a parameter and also assigning a tool change position return command in a machining program, the tool can be changed at the most appropriate position.

The axes for which returning to the tool change position is performed and the order in which the axes begin to return can be changed by commands.

Command and return order

[M system]

[L system]

(Note 1) An arrow () indicates the order of axes that begin to return. A period (/) indicates that the axes begin to return simultaneously.

Example : "Z axis X axis" indicate that the Z axis returns to the tool change position, then the X axis does.

(Note 2) G30.6 is only for the M system.

The tool change position return ON/OFF for the additional axis can be set with parameter for the additional axis.

For the order to return to the tool change position, the axes return after the standard axis completes the return to the tool change position (refer to above table).

The additional axis cannot return to the tool change position alone.

M850W M830W M850S M830S M80W M80

TypeA

M80

TypeB
E80
TypeA
E80
TypeB C80
M
L
G30.n ;
n = 1 to 6 : Specify the axes that return to the tool change position and the order in which they return. (For L system, n = 1 to 5)
Command Return order
G301 Z axis X axis / Y axis (additional axis)
G302 Z axis X axis Y axis (additional axis)
G303 Z axis Y axis X axis (additional axis)
G304 X axis Y axis / Z axis (additional axis)
G305 Y axis X axis / Z axis (additional axis)
G306 X axis / Y axis / Z axis (additional axis)
Command Return order
G301 X axis only (additional axis)
G302 Z axis only (additional axis)
G303 X axis Z axis (additional axis)
G304 Z axis X axis (additional axis)
G305 X axis / Z axis (additional axis)

11.1 Program Control
11.1.1 Optional Block Skip
It is possible to command to selectively ignore a part, from a "/" (slash) code to the end of the block, of a machining program. When the optional block skip input signal from the external source is turned ON for automatic operation, the block with the "/" code is skipped. If the optional block skip signal is turned OFF, the block with the "/" code will be executed without being skipped.
Skipping from a "/" in the middle of a program to the end of the program can also be enabled by parameter setting.
11.1.2 Optional Block Skip Addition
When "/n (n:1 to 9)" (slant code) is programmed at the head of a block, and the optional block skip n input signal from the external source is turned ON for automatic operation, the block with the "/n" code is skipped.
If the optional block skip n signal is turned OFF, the block with the "/n" code will be executed without being skipped.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
Programming example Optional block skip
Switch OFF Switch ON
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
 :
N7 ;
N6 ;
N3 ;
N2 ;
N1 ;
 / N4 ;
 / N5 ;
 :
N1
N2
N3
N4
N5
N6
N7
 :
N1
N2
N3
N6
N7

11.1.3 Single Block

The commands for automatic operation can be executed one block at a time (block stop) by turning ON the single block input signal. When the single block input signal is turned ON temporarily during continuous operation, the machine will stop after that block has been executed.

Even when operation is switched to another automatic operation mode (for example, memory operation mode to MDI operation mode) during continuous operation, the machine will stop after that block has been executed.

As with the multi-part system specification, the following function can be selected instead.

Multi-part system single block (L system)

This function is for executing single block operation while maintaining the synchronization between the part systems when two or more part systems are operated. When one part system has been stopped by single block stop, the other part systems are stopped by feed hold.

M850W M830W M850S M830S M80W M80

TypeA

M80

TypeB

E80

TypeA

E80

TypeB C80

M

L

G01 X1000 G01 Z100 G01 Z1000

Automatic operation

start (ST)

Movement block

INVALID VALID VALID

Single block (SBK)

SBK ON at start SBK change during movement SBK ON after block completion

11.2 Program Test

11.2.1 Dry Run

F code feed commands for automatic operation can be switched to the manual feed rate data of the machine operation board by turning ON the dry run input signal.

11.2.2 Machine Lock

When the machine lock input signal is set to ON, the NC operations can be executed without assigning commands to the NC axes.

The feed rate in the machine lock status is the command speed.

The M, S, T and B commands are executed as usual and operation is completed by returning the FIN signal.

(1) Reference position return (manual, G28, G29, G30) is controlled as far as the interim point in the machine lock status but the block is completed when the interim point is reached.

(2) Machine lock is effective in the signal status applying when the axis has stopped.

(3) Block stop will be applied if the machine lock signal is turned ON to OFF or OFF to ON during automatic operation.

11.2.3 Miscellaneous Function Lock

The M, S, T and B (2nd miscellaneous function) output signals are not output to the machine or PLC when the miscellaneous function lock signal of external input is turned ON. This function can be used when checking only the movement commands in a program check.

The start signals of the M command are output for the M00, M01, M02 and M30 commands, and so a completion signal must be returned.

(1) Fixed cycle spindle functions containing an S code and any M, S, T or B function assigned by a manual numerical command or in automatic operation will not be executed. The code data and strobe (MF, SF, TF, BF) outputs are stopped.

(2) If this signal is set ON after the code data has already been output, the output is executed as it would normally be executed until the end (until FIN1 or FIN2 is received and the strobe is turned OFF).

(3) Even when this signal is ON, the M00, M01, M02 and M30 commands among the miscellaneous functions are executed, and the decode signal, code data and strobe signals are also output as they would be normally.

(4) Any miscellaneous functions which are executed only inside the controller and not output (M96, M97, M98, M99) are executed as they would be normally even if this signal is ON.

M850W M830W M850S M830S M80W M80

TypeA

M80

TypeB

E80

TypeA

E80

TypeB C80

M

L

Command Dry run switch ON

Rapid traverse selection switch OFF Rapid traverse selection switch ON

G00,G27,G28,G29,G30,G60 Manual feed rate Rapid traverse rate

G01,G02,G03 Manual feed rate Cutting clamp speed

M850W M830W M850S M830S M80W M80

TypeA

M80

TypeB

E80

TypeA

E80

TypeB C80

M
L
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L

11.2.4 Graphic Check
11.2.4.1 Graphic Check
The machining program movement path can be confirmed with the graphic drawing without executing automatic operation. Therefore, the machining program can be checked while drawing the figure accurately at a high speed.
There are two description method for the graphic check function: 2D check and 3D check.
The drawing's viewpoint can be moved, enlarged and reduced while drawing. The three axes displayed are set with the parameters.
(Note) Automatic operation is disabled during graphic check for M80/E80.
11.2.4.2 3D Solid Program Check
The machining program movement path can be confirmed with the graphic drawing without executing automatic operation. Therefore, the machining program can be checked while drawing the figure accurately at a high speed.
There are two types of check methods for the 3D check: Check method I and Check method II. The Check method I simplifies the machining result of machining program and simulates at a high speed. The check method II simulates the machining result of machining program at a higher accuracy than the Check method I.
The workpiece shape's viewpoint can be moved, enlarged and reduced while drawing. The three axes displayed are set with the parameters.
The workpiece shape and tool shape used are set on this screen.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L

11.2.4.3 Graphic Check Rotary Axis Drawing
When the rotary axis (C axis) is designated with the parameter in program check (2D), the path is drawn depending on the rotary axis. The rotary axis can be set for each part system.
Refer to "11.2.4.1 Graphic Check" for details on the graphic check.
(Note 1) When the control axis address other than C axis is designated with the parameter, the path corresponding to the rotary axis is not drawn.
(Note 2) The workpiece coordinate system must be set so that the center of the rotary axis becomes the coordinate system zero point.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
Image of actual tool and workpiece Example of machining program
G83Z-20.R-5.Q5000F300 ;
G0C90. ;
G83Z-20.R-5.Q5000F300 ;
G0C180. ;
G83Z-20.R-5.Q5000F300 ;
G0C270. ;
G83Z-20.R-5.Q5000F300 ;
G80 ;
Drawing image when the rotary axis
drawing is invalid
Drawing image when the rotary axis
drawing is valid
X
Y

Z
C

11.2.5 Graphic Trace
11.2.5.1 Graphic Trace
This function draws the machine tool's machine position. The movement path following the actual automatic operation or manual operation, or the tool tip movement path can be drawn, and the machine operation during machining can be monitored.
For the display mode, 1-plane, 2-plane and 3-dimensional display are provided. In the 3-dimensional display mode, cubic shapes can be rotated and tracing of the figure seen from the desired direction can be assigned.
One of the following functions is required for the trace of tool path:
- Tool center point control
- Tool length compensation along the tool axis
- Tool handles feed & interruption, workpiece installation error compensation
- Workpiece installation error compensation
- Inclined surface machining command
- Simple inclined surface machining command
- 3-dimensional tool radius compensation (tool's vertical-direction compensation)
- 3-dimensional manual feed
- R-Navi
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L

11.2.5.2 Graphic Trace Rotary Axis Drawing
When the rotary axis (C axis) is designated with the parameter in program trace, the path is drawn depending on the rotary axis. The rotary axis can be set for each part system.
Refer to "11.2.5.1 Graphic Trace" for details on the graphic trace.
(Note 1) When the control axis address other than C axis is designated with the parameter, the path corresponding to the rotary axis is not drawn.
(Note 2) The workpiece coordinate system must be set so that the center of the rotary axis becomes the coordinate system zero point.
11.2.6 Machining Time Computation
This function analyzes the machining program without moving the axis and calculates the approximate time required for machining.
Machining time is calculated by accumulating the following times:
- Rapid traverse time
- Cutting feed time
- Dwell time
- MSTB time
The machining time is displayed as "hour: minute: second".
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
Image of actual tool and workpiece Example of machining program
G83Z-20.R-5.Q5000F300 ;
G0C90. ;
G83Z-20.R-5.Q5000F300 ;
G0C180. ;
G83Z-20.R-5.Q5000F300 ;
G0C270. ;
G83Z-20.R-5.Q5000F300 ;
G80 ;
Drawing image when the rotary axis
drawing is invalid
Drawing image when the rotary axis
drawing is valid
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
X
Y
Z

C

11.2.7 Manual Arbitrary Reverse Run (Program Check Operation)
The manual arbitrary reverse run can be performed by controlling the feedrate being in the automatic operation in the memory or MDI mode in proportion to the manual feedrate by jog or the rotation speed by manual handle.
This function allows a program to run the executed blocks backward (reverse run) after the block stop in the automatic operation. The buffer correction of the program can be performed after reverse run to a desired point and the corrected program can be run.
Example of machining operation
$1: Part system 1
$2: Part system 2
Timing diagram in override 100%
Timing diagram in manual arbitrary reverse run
The total operation time is increased in the timing diagram for the manual arbitrary reverse run, however the synchronization between part systems can be maintained and the cutting-off machining starts after the turning machining is completed in forward run. The synchronization between part systems is maintained in both forward and reverse run.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
N103 G4
N102 G1 X
N203 G1 X
N101 G1 Z
N201 T1000 N202 G0 Z
$1
$2
$1:
$2:
$1:
$2:
$1:
$2:
$2
$1
$1
$2
Turning machining
Tool exchange
Turning machining
Tool positioning
Standby
Cutting-off machining
Tool exchange
$1 N101 G1 Z
$2
N102 G1 X N103 G4
N201 T1000 N202 G0 Z N203 G1 X
N101 G1 Z
N201 T1000
$1
$2
N102 G1 X
N202 G0 Z
N103 G4
N203 G1 X
The synchronization is maintained and the cutting-off machining
starts in the part system 2 after the turning machining is
completed in the part system 1 (in forward run).
Reverse run: Executed blocks can be executed again in the reverse order.
Forward run: Blocks are executed in the order same as automatic operation.

11.2.8 High-speed Simple Program Check
This function checks whether a program error occurs by operating the machining program without the axes movements.
The estimated machining time can be checked in time shorter than the actual execution time of the machining program.
This function is valid with the "High-speed simple program check" signal ON .
The machining program is operated in the reduced time according to the coefficient which is set to the time reduce coefficient.
The estimated machining time of the machining program is output to time measurement output.
The miscellaneous command code which outputs strobes can be allocated arbitrarily with the parameter during the high speed simple program check.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80

TypeB C80
M
L
Reducing execution time according to time reduce coefficient
Actual execution time
Execution time by high-speed simple
program check (example: 1/4)
Estimated machining time to be output [ms]
Converting to time of normal operation

11.3 Program Search/Start/Stop
11.3.1 Program Search
The program No. of the program to be operated automatically can be designated and called. Upon completion of search, the head of the program searched is displayed.
Machining programs are stored in the memory inside the NC system.
11.3.2 Sequence Number Search
Blocks can be indexed by setting the program No., sequence No. and block No. of the program to be operated automatically.
The searched program is displayed upon completion of the search.
Machining programs are stored in the memory inside the NC system.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L

11.3.3 Collation and Stop
This function enables the single block stop status to be established at any block without having to set the SINGLE BLOCK switch to ON.
It can be used to readily check the machining shape up to the designated block and resume machining.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L

G91 ;
:
G00 Z-150. ;
N100 G81 X-100. Z-100. R-50. F100 ;
N101 X-100. ;
N102 X-100. ;
N103 Y100. ;
N104 X100. ;
N105 X-100. ;
:
Collation and stop is executed when drilling of one hole is completed (N100 block is completed) as shown on the left.
The hole depth is measured to confirm that the dimensions are correct. If the dimensions are not correct, the tool compensation amount is changed.
If machining is started from the head of the program, accurate hole drilling can be carried out.
3 2 1
4 5 6

11.3.4 Program Restart
With this function, the program search can be executed while updating the coordinate values and the modal information in the same manner as an actual program operation.
Therefore, this function enables machining from a block in the middle of the program as if the actual machining was carried out from the beginning.
This function is used to restart machining when a machining program is to be resumed after it has been suspended

midway due to tool damage or for some other reason.
The machine will not move during the search.
When the search is completed, the distance from the current position of the machine (workpiece coordinates) to the restart position (start point of the searched block) is displayed as restart remaining distance on the screen.
After the program restart, positioning to the restart position is carried out at the cycle start, and automatic operation is performed for the searched and subsequent blocks.
Positioning to the restart position can also be manually performed.
After the program restart, an arbitrary M, S, T or B command can be executed by the manual numerical value command before the cycle start.
There are two search methods by the program restart.
The validity of the automatic top search can be changed with control parameter.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
Restart method Details
Restart search type 1
After machining is reset due to a tool breakage, etc., machining is restarted from the designated sequence number and/or block number.
Only the program which had been executed just before can be restarted.
Even after the power is turned ON again, the program can be restarted if the program has been executed before the power supply is turned OFF.
Restart search type 2
If a machining program different from the machining program to be restarted was run before starting restart search, specify the sequence No. and block No. before restarting the machining.
Automatic top search OFF A top search must be executed from the screen. Then, command a sequence No. and block No., and restart a program.
Automatic top search ON
A top search may not be executed from the screen. A top search is automatically executed, so it is not necessary to execute a top search from the screen. Command a sequence No. and block No., and restart a machining.
An arbitrary program can be restarted by designating the program No.
When a program No. is omitted, the program currently searched is restarted.

11.3.5 Automatic Operation Start
With the input of the automatic operation start signal (change from ON to OFF), the automatic operation of the program that has been operation searched is started by the controller (or the halted program is restarted).
Automatic operation startup is performed on a part system by part system basis.
[C80 Series]
Trigger edge for a cycle start (ST) can be selected by the parameter.
- Enabled at the falling edge (the automatic operation start signal is turned ON to OFF)
- Enabled at the rising edge (the automatic operation start signal is turned OFF to ON)
11.3.6 NC Reset
This function enables the controller to be reset.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
Reset 1 Reset 2 Reset & Rewind
1 G command modals Retained Initialized Initialized
2 Tool compensation
data Retained Canceled
(no operations) Canceled
3 Memory indexing Executed Not executed Executed
4 Errors/alarms Reset Reset Reset
5 M, S and T code
outputs Retained Retained Retained
6 M code independent
output OFF OFF OFF
7 Control axis moving Decelerated and stopped Decelerated and stopped Decelerated and stopped
8 Output signals "In reset" signal "In reset" signal "In reset" signal
"In rewind" signal

G01 X100 G01 Z100
Automatic operation
start (ST)
Movement block

11.3.7 Feed Hold
When the feed hold signal is set ON during automatic operation, the machine feed is immediately decelerated and stopped. The machine is started again by the "Automatic operation start (cycle start)" signal.
(1) When the feed hold mode is entered during cycle start, the machine feed is stopped immediately, but the M, S, T and B commands in the same block are still executed as programmed.
(2) When the mode is switched during automatic operation to manual operation (such as jog feed, handle feed or incremental feed), the feed hold stop mode is entered.
(3) An interrupt operation based on manual operation (such as jog feed, handle feed or incremental feed) can be executed during feed hold.
11.3.8 Search & Start
If the search & start signal is input in a status where the memory mode is selected, the designated machining program is searched and executed from its head.
If the search & start signal has been input during automatic operation in the memory mode, search & start is executed after resetting.
11.3.10 Auto-restart
A machining program is restarted automatically at the completion of the machining program execution.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
Atomatic operation
start
Feed hold
Axis movement
state

11.4 Interrupt Operation
11.4.1 Manual Interruption
Manual interrupt is a function that enables manual operations to be performed during automatic operation.
The methods to select the operation mode are as follows:
- Initiates the interrupt by switching from the automatic mode to manual mode
- Initiates the interrupt by selecting the manual mode at the same time as the automatic mode
(Refer to "11.4.9 Simultaneous Operation of Manual and Automatic Modes".)
Whether the manual interrupt amount is to be retained and automatic operation is to be continued is determined by setting manual absolute mode ON or OFF (refer to "11.4.3 Manual Absolute Switch").
11.4.2 Automatic Operation Handle Interruption
The handle command can interrupt and be superimposed onto a command without suspending automatic operation and the machine can be moved by rotating the manual pulse generator during automatic operation.
If the spindle load is greatly exceeded when cutting a workpiece as per the machining program due to a high rough cutting amount in face machining, for instance, automatic handle interrupt makes it possible to raise the Z surface and reduce the load easily without suspending feed in the automatic operation mode.
Automatic handle interrupt is conducted by setting the "automatic handle interrupt" valid switch which is provided separately from the "manual operation mode". The axis selection, pulse scale factor and operation are conducted as for manual handle feed.
Whether, after an interrupt, to return to the path of the machining program by automatic operation or remain offset by the amount equivalent to the interrupt amount is determined using a parameter.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80

TypeB C80
M
L
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
100
10
1
Z Y X
~
~
G01 Z _ F_;
X _ Y _;
X _ Y_;
Z _ Y _;
Interrupt
Tool
Handle feed
Workpiece
Automatic
feed
Feed path with automatic feed and handle feed
superimposed

11.4.3 Manual Absolute Switch
The program absolute positions are updated by an amount equivalent to the distance by which the tool is moved by hand when the manual absolute switch signal is turned ON.
In other words, the coordinate system based on the original program will not shift even if the tool (machine) is moved by hand. Thus, if automatic operation is started in this case, the tool will return to the path before manual movement.
The manual absolute ON state will be entered when the power is turned ON.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
W
X M0
-Y
Feed hold stop Programmed path (absolute command)
Manual interrupt
(The coordinate system W is not shifted)
Path after manual interrupt
Tool passes along same path as that programmed
With manual absolute signal ON
W
W
X M0
-Y
Manual interrupt
(The coordinate
system W is shifted) Manual interrupt amount
Feed hold stop
Programmed path (absolute command)
Manual interrupt
(The coordinate system W is shifted)
Path after manual interrupt
Path is shifted by an amount equivalent to manual interrupt
value (Zero point of the coordinate system W moves)
With manual absolute signal OFF

11.4.4 Thread Cutting Cycle Retract
This function suspends the thread cutting cycle if a feed hold signal has been input during thread cutting in a thread cutting cycle.
If a feed hold signal is input during chamfering or thread cutting without chamfering, operation stops at the position where the block following the thread cutting is completed.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA

E80
TypeB C80
M
L

Position where the block following the thread cutting is
completed
Chamfering angle
Suspension position
Feed hold
Period when thread cutting is
performed

11.4.5 Tapping Retract
If tapping is interrupted by a reset or emergency stop signal that is input during tapping and the tap is left engaged inside the workpiece, the tap tool engaged inside the workpiece can be rotated in the reverse direction so that it will be disengaged by inputting the tap retract signal.
This function can be used when the machining was interrupted upon reset, emergency stop or power OFF during tapping cycle.
(Note that "power OFF" is applied only when the absolute position detection system is valid.)
A return is made to the initial point by tap retract.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
Z
Tap feed
(spindle forward)
Tap retract
(spindle reverse)
Retract signal
Tap bottom
spindle

11.4.6 Manual Numerical Value Command
Commands of spindle function (S), miscellaneous function (M), tool function (T) and 2nd miscellaneous function (B) can be executed through the Monitor screen or Setup screen.
This enables operations such as spindle speed changing, starting, stopping, calling and selecting assigned tools and replacing of the spindle tools to be done easily without having to prepare or revise the machining program.
The corresponding macro program can be executed from the manual numerical value command.
(*1) The M code macros that can be used for manual numerical value command are limited to those with a call type of M98.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
Miscellaneous command
macro call
Calls and executes the macro program registered as an M code macro (*1) from the M command.
Calls and executes the macro program registered as an M code macro (*1) from the M command.
T command macro call Calls and executes the T code macro program registered exclusively for manual numerical value command from the T command.

11.4.7 Arbitrary Reverse Run
This function allows a program to run the executed blocks backward (hereinafter called "reverse run") after the block stop in the automatic operation.
The following steps are available:
- Execute the reverse run to the point to go back,
- Run the reversed blocks again following the program (hereinafter called "forward run") and
- Continue the remaining blocks from the point of the interruption.
Maximum 200 blocks can be executed in the reverse run.
Only the 1st to 3rd axes of each part system can be used for this function.
(Example 1) Reverse run
(Example 2) Forward run after the reverse run
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA

E80
TypeB C80
M
L
Reverse
run
Block stop
Reverse
run
Block stop
Forward
run

11.4.8 MDI Interruption
This function enables MDI programs to be executed during automatic operation in the single block stop status. When the modal status is changed in the MDI program, the modal status in the automatic operation mode is also changed.
11.4.9 Simultaneous Operation of Manual and Automatic Modes
This function enables manual operations to be performed during automatic operation by selecting an automatic operation mode (tape, MDI or memory) and manual mode (handle, step, jog or manual reference position return) simultaneously.
(Arbitrary feed based on the PLC is also possible.)
The feed rates for the axes subject to automatic commands and the feed rates for axes subject to manual command are set separately. The acceleration/deceleration modes (rapid traverse, cutting feed) are also set separately. Rapid traverse override, cutting feed override and second cutting feed override are valid both for axes subject to automatic commands and manual commands. Override cancel is valid for axes subject to automatic commands.
Manual interlock is applied to axes subject to manual commands; automatic interlock is applied to axes subject to automatic commands.
11.4.10 Simultaneous Operation of JOG and Handle Modes
When executing the jog feed and handle feed, both these feeds are available without changing the mode each time by inputting the jog mode signal and simultaneous operation of jog and handle modes signal to the control unit. However, while axis is moving in one of the two modes, the feed in the other mode is not valid.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L

11.4.11 Reference Position Retract
When the retract signal is turned ON during the automatic and manual operation, this function can retract the tool immediately to a set reference position.
The reference position to be retracted to can be selected from the 1st reference position to 4th reference position with 2-bit input signal.
Set the retracting order of axes with parameter.
(1) Other operations
(a) When the retract signal is turned ON, the control unit is reset, the operation is interrupted, and the machining program is indexed.
(b) When the rapid traverse input signal is input, the rapid traverse rate is applied. When the rapid traverse input signal is not input, the manual feed rate is applied.
(c) If the retract signal is input during execution of a tapping cycle, the operation will be the tapping retract, and the normal reference position retract will be executed from the end point of tapping retract operation.
(d) Even if the retract signal is input during the thread cutting cycle, it will be invalid. However, if the retract signal is input in a block other than the thread cutting block, the retracting operation will be executed.
(e) If the retract signal is turned OFF midway during retracting, the operation will decelerate and stop. However, since the machining program is indexed, the block can not be resumed.
(f) The retract signal is invalid if the coordinate system is not established. An operation error will occur when the retract signal is input in such case.
M850W M830W M850S M830S M80W M80
TypeA
M80

TypeB
E80
TypeA
E80
TypeB C80
M
L
M800/M80/E80/C80 Series Specifications Manual (Function)
11 Operation Support Functions
IB-1501505-N 228
11.4.12 Tool Retract and Return
Even if the machining program's operation is halted and the tool is escaped to change the tool or check the workpiece, etc., the tool can be returned to the halted point (machining halted point) and machining resumed.
The two main functions are as follow.
- After the machining program is halted, the halt point is designated, and the tool is escaped manually.
The transit points for returning are designated when escaping.
- The tool returns automatically.
When returning, the tool passes through the transit points designated when escaping and returns to the halt point.
Then, machining restarts.
a. Machining program halt
b. Halt point designation
c. Operation mode changeover
d. Tool retract
e. Transit point designation
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
#1
#2

a,b,c
e
d
d
d e
Y
Z
X
Halt point
Return start point
#2
#1
Escape path
No. 2 transit point
No. 1 transit point
M800/M80/E80/C80 Series Specifications Manual (Function)
11 Operation Support Functions
229 IB-1501505-N
11.4.13 Skip Retract
This function is used to return to the opposite advance direction when the skip signal is input during G31 command.
11.4.14 PLC Interruption
The interrupt program set with the R register is executed with the signals from the PLC during single block stop in program operation or during the manual mode.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
M800/M80/E80/C80 Series Specifications Manual (Function)
11 Operation Support Functions
IB-1501505-N 230
11.4.16 Machining Interruption
Machining interruption is a function which enables interrupt operations in the table below while a program is normally executed.
Interruption programs (called "retract programs") need to be prepared in advance to validate various interruption operations.

This function is available only during memory mode operation, but not during MDI operation.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
Interrupt operation Details of operation Purpose
Program-based retraction When the retract button is pressed, the program immediately
branches to the predetermined retraction program.
A safe tool-path that avoids interference can be programmed
in the retraction program.
On returning from the retraction program, the tool returns to the
programmed position called machining start point, from which
the operation can be restarted.
e.g. when machining is temporarily
suspended due to such as tool
breakage, and then restarted after
the issue is solved.
Returns to the machining start point from the status of
machining in progress
Emergency stop When an emergency stop occurs during program execution,
machining stops in a feed hold status. When the NC is
restarted after the cancellation of emergency stop, a tool
returns from the stop position (caused by emergency stop) to
the interpolation restart position, and then operation restarts
along the original program path.
e.g. when machining is temporary
suspended due to such as the
emergency stop
Returns to the interpolation interrupted position from the
emergency stop position, then the interpolation restarts
Machining start point Machining end point
Emergency stop
Interpolation restart position
Stop position

12
Program Support Functions

12 Program Support Functions

12.1 Machining Method Support Functions
12.1.1 Program
12.1.1.1 Subprogram Control [Layers]
When the same pattern is repeated during machining, the machining pattern can be registered as one subprogram and
the subprogram can be called from the main program as required, thereby realizing the same machining easily. Efficient
use of program can be made. The subprogram is called with the program No. and sequence No. or the file name and
sequence No.
(1) Calling the subprogram with M98 command
Subprograms can be nested up to 10 levels deep.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M 10 10 10 10 10 10 10 10 10 10
L 10 10 10 10 10 10 10 10 10 10
M98 P__ H__ L__ ,D__ ;
or, M98 <File name> H__ L__ ,D__ ;
M98 : Subprogram call command
P : Program No. in subprogram to be called. (Own program if omitted.)
Note that P can be omitted only during memory operation MDI operation, high-speed program
server operation, SD card operation and hard disk operation.
(Max. 8-digit value)
A four-digit or eight-digit program No. starting with O No. can be called by the parameter.
However, the commanded subprogram is called when the number of digits of the command value
is larger than the one set in the parameter.
<File name> : A file name can be designated instead of the program No. In this case, enclose the file name with
brackets <>.
(The file name can have up to 32 characters, including the extension.)
(Example) M98 <PARTS-12.RAF>;
H : Sequence No. in subprogram to be called (Head block if omitted)
L : Number of subprogram repetitions
(If omitted, this is handled as L1. When L0 is set, the subprogram is not called.)
(1 to 9999 times)
,D : Device No. where subprogram is stored.
The setting of ",D" depends on the model.
M98 P1 ;
P1000 P1 P2 P10
M99 ;

M99 ;
M99 ;
M02/M30 ;
M98 P2 ;
M98 P3 ;

10-level nesting
Main program:
Level 0 (P1000)
Subprogram:
Level 1 (P1)
Subprogram:
Level 2 (P2)
Subprogram:
Level 10 (P10)

A subprogram branch destination or repetition of a subprogram can be specified.
(2) Returning to main program from the subprogram with M99 command
(3) Calling the subprogram with M198 command (only for M8 series)
A program registered in the data server (SD card in control unit) or Front SD card can be called out as a subprogram.
To call a program in the SD card as the subprogram, command as shown below in the main program.
(Note 1) Sequence No. call (M198 H****) is not possible.
(Note 2) The device that can be used for M198 subprogram call differs depending on the NC models.
The device is the front-side SD card for M800S/M80/E80, or the SD card in the control unit for M800W/M80W.
(Note 3) Calling of the subprogram with the M198 command is limited to once in the subprogram nest.
The subprogram can be called only from the memory or MDI program.
(Note 4) The data from the head of the program to the first LF (line feed code. 0x0A as hexadecimal) is invalid, and cannot be run or displayed. Note that if the head starts from an O number (program No.), the program is valid from the head.
(Note 5) A program registered in an SD card can be executed from only one part system. A program error will occur if an attempt is made to execute the programs in the SD card simultaneously by two or more part systems. If all the part system is reset when the error occurred, programs will be displayed as only "%" except for the first part system.
(Note 6) Refer to "(1) Calling the subprogram with M98 command" for <File name> and calling the subprogram with O No.
(4) Returning to main program from the subprogram with M99 command (only for M8 series)
Specifying a subprogram branch destination Specifying repetition of a subprogram
M99 P__ ;
P : Sequence No. of return destination (returned to block that follows the calling block)
M198 P__ L__ ;
or, M198 <File name> L__ ;
M198 : Call command
P : Program No. in SD card to be called as subprogram (Max. 8 digits)
A four-digit or eight-digit program No. starting with O No. can be called by the parameter.
However, the commanded subprogram is called when the number of digits of the command value is larger than the one set by the parameter.
<File name> : A file name can be designated instead of the program No. In this case, enclose the file name with brackets <>.
(The file name can have up to 32 characters, including the extension.)
L : Number of subprogram repetitions (Max. 4 digits)
This can be omitted. (If omitted, this is handled as L1.)
When L0 is set, the subprogram is not called.
M99 ;

P1000
M98 P1 H1;
M98 P1 H100;
M02 / M30;
P1
N1;
M99;
N100;
M99;
Main program Subprogram
M 9 9 ;
M 9 8 P 1 L 5 ;
M 0 2 / M 3 0 ;

P1000 P1
M98 P1 L5;
M02 / M30;
M99 ;
Main program Subprogram
Return after executing
five times
Executing
five times

(5) Subprogram calling/return block operation switching (only for C80 series)
The subprogram call command M98 (including the macro call command G65) is usually treated as an executable statement; however, it can also be treated in the same manner as a macro statement depending on the parameter setting. When it is treated as a macro statement, it can be processed in batch with the commands in the call

destination, the movement commands before and after subprogram call can be processed continuously, and continuous movement is enabled without speed fluctuation.

12.1.1.2 Figure Rotation

If the same pattern is used repeatedly on a concentric circle, one of the rotating machining patterns can be registered as a subprogram. When the subprogram is called from the main program, if the rotation center is designated, a path similar to the rotary phase can be easily created on the concentric circle. This simplifies creation of the program.

The program format is shown below.

M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L

M98 Ii1 Jj1 (Kk1) Pp1 Hh1 Ll1 ,Dd1;
or, M98 Ii1 Jj1 (Kk1) <File name> Hh1 Ll1 ,Dd1 ;

M98 : Subprogram call command
Ii1 Jj1 (Kk1) : Rotation center coordinates
Pp1 : Program No. in subprogram to be called. (Own program if omitted.)
 Note that P can be omitted only during memory operation and MDI operation.
 (Max. 8-digit value)
 A four-digit or eight-digit program No. starting with O No. can be called by the parameter.
<File name> : A file name can be designated instead of the program No. In this case, enclosed the file name with brackets <>.
 (The file name can have up to 32 characters, including the extension.)
 (Example) M98 <PARTS-12.RAF>;
Hh1 : Sequence No. in subprogram to be called (Head block if omitted)
Ll1 : Number of subprogram repetitions
 (If omitted, this is handled as L1. When L0 is set, the subprogram is not called.)
 (1 to 9999 times)
 ,Dd1 : Subprogram device No. (0 to 4)
 The subprogram in the memory can be used when ,D is omitted.
 The device No. is set with the machining parameters.

j1
i1
Rotation
center
l1 times Basic figure

(1) The first subprogram called out with subprogram call is executed at a 0 rotation angle. The path is created as commanded.
(2) If the number of repetitions is set to two or more, the rotation angle is obtained from the called subprogram's start point, end point and rotation center coordinate. The path of the first subprogram is used as a basic figure and is rotated and arranged for the designated number of call repetitions, using the rotation center coordinates as a reference.
(3) During figure rotation, all blocks in the subprogram are treated as to be rotated.
(4) If the subprogram start point and end point are not on the same circle having the commanded figure rotation center coordinates as the center, the axis will interpolate using the subprogram's end point as the start point, and the end point in the first movement command block in the rotated subprogram as the end point.
(5) The figure is rotated on the workpiece coordinate system, and can be shifted with the G92, G52, G54 to G59 (workpiece coordinate system shift) command.
(6) Functions (reference position return, uni-direction positioning, etc.) on the machine coordinate system for the rotary plane axis cannot be used while the figure is rotated. However, the machine coordinate system functions can be used for axes other than the rotation plane.
(7) A program error will occur if figure rotation is commanded during figure rotation.
(8) Figure rotation and coordinate rotation by program cannot be commanded simultaneously.

12.1.1.3 Scaling

The shape commanded by the program can be extended or reduced to the desired size by applying a scale factor to the movement axis command position.

The program format is given below.

The scale factor ranges from 0.000001 to 99.999999 times.

(Note 1) Scaling cannot be applied to compensation amount for tool radius compensation, tool position offset, or tool length compensation, etc. (The compensation and offset are calculated for the scaled shape.)
(Note 2) Scaling applies only to the axes commanded with G51 block; it does not apply to axes which have not been commanded.

When the scale factor is not assigned, the parameter setting applies instead.

M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
Gcode Function

G50
G51
Scaling cancel
Scaling ON
G51 Xx1 Yy1 Zz1 Pp1 ;
G51
Xx1,Yy1,Zz1
Pp1
: Call command
: Scaling center coordinate position
: Scale factor
Y
X
sc :
 :
s1, s2, s3 :
p1, p2, p3
sc s1 p1
s2 s3
p2
p3
x 1
y 1
Scaling center
Programmed shape
Shape after scaling

12.1.1.4 Axis Name Switch
The axis name switch function switches the name of command axis and control axis.
When switching the name of X-axis and Y-axis by axis name switch command, the machine performs as follow.
(Example)
 G111 X Y ;
 G01 X100. ; (Y axis moves to 100.mm)
 G01 Y100. ; (X axis moves to 100.mm)
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
G111 Axis name1 Axis name2 ;
G111
Axis name 1,2
: Axis name switch command
: Axes to be performed the name switch command
 When the axis name switch command is canceled, assign only "G111;" command.
<Before axis name
switch> <After axis name switch>
Command axis name Control axis Command axis name Control axis
X Xaxis -> X Yaxis
Y Yaxis Y Xaxis

12.1.2 Macro Program
12.1.2.1 User Macro [Layers]
(1) Macro commands 1 ; G65 to G67
In order to carry through one integrated function, a group of control and arithmetic instructions can be used
and registered as a macro program. Furthermore, subprograms with a high degree of expandability can be
configured by setting these macro programs as types which are capable of conducting control and arithmetic
operations using variable commands.
The program formats are given below
The macro program is called immediately by this command
The macro program is executed from the block with the axis command following this command.
The macro program is executed with the word data of each block as the argument.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M 4 4 4 4 4 4 4 4 4 4
L 4 4 4 4 4 4 4 4 4 4
G code Function
G65
G66
G66.1
G67
Macro call (Sample call)
Macro modal call A

Macro modal call B
Macro modal call cancel
G65 P__ L__ --Argument--;or,G65 <File name> L__ --Argument--;
G65 : Call command
P : Program No.
A four-digit or eight-digit program No. starting with O No. can be called by the parameter.
<File name> : File name
When designating the file name, enclose the file name with brackets < >.
L : Number of repetitions
Argument : Variable data assignment
G66 P__ L__ --Argument--;or,G66 <File name> L__ --Argument--;
G66 : Call command
P : Program No.
A four-digit or eight-digit program No. starting with O No. can be called by the parameter.
<File name> : File name
When designating the file name, enclose the file name with brackets < >.
L : Number of repetitions
Argument : Variable data assignment
G66.1 P__ L__ --Argument--;or, G66.1 <File name> L__ --Argument--;
G66.1 : Call command
P : Program No.
A four-digit or eight-digit program No. starting with O No. can be called by the parameter.
<File name> : File name
When designating the file name, enclose the file name with brackets < >.
L : Number of repetitions
Argument : Variable data assignment

The following macro command functions are available.
(Note 1) The variable commands are provided under the optional specifications independently of the user macros. If they are to be used, specify the optional specifications separately.
(2) Macro commands 2
Specific G commands and the miscellaneous commands (M, S, T, B) can be used for macro call.
(a) Macro call using G codes
Simply by assigning a G code, it is possible to call user macro programs with the prescribed program number.
Format
The correspondence between the G** code which performs macro call and the program number for the macro to be called is set by a parameter.
[M8 Series]
G codes and G codes with decimal points can be used for this function. Consecutive G code macros can be set all at once by designating the first G code, the first No. of the program, consecutive number of G codes, and macro call type.
Maximum of 538 G codes can be used.
- In the range of G1 to G9999, 10 codes can be set individually, and 255 codes can be set all at once.
- In the range of G0.1 to G999.9, 10 codes can be set individually, and 255 codes can be set all at once.
- 8 codes are set by parameters (G200, G300, G400, G500, G600, G700, G800 and G900)
[C80 Series]
Up to 10 codes from G100 to G999 can be used for this command.
(Note 1) The G codes that are used in the system also can be made available for this use by parameter setting.
(Note 2) G101 to G110 and G200 to G202 are user macro I codes. However, if a parameter is set for the G code call code, the G code call will have the priority, and these cannot be used as the user macro I.
Arithmetic commands
#1=<Expression> ;
Various arithmetic operations can be conducted between variables by the above.
"<Expression>" is a combination of constants, variables, functions and operators.
Assignment of priority of arithmetic operations
The portion in which the operator is to be given priority can be enclosed in [ ].
Up to five pairs of square parentheses [ ] including the function [ ] can be used.
The normal priority of operation is functions and multiplication/division followed by addition/subtraction.
Control commands
(1) IF[<Conditional expression>]GOTO n ;
(2) WHILE[<Conditional expression>]Do m ;

END m ;
The flow of the program can be controlled by these commands. "n" denotes the sequence numbers of the branching destination. "m" is an identification number, and 1 to 127 can be used. Note that only 27 nestings can be used.
G** P__ L__ Argument;
G** : G code for performing macro call
P : Argument (When macro argument L/P valid function is enabled. Disabled when it is invalid.)
L : Argument (When macro argument L/P valid function is enabled. Disabled when it is invalid.)
Argument : Variable data designation

(b) Macro call using miscellaneous commands (M, S, T, B code macro call)
Simply by designating an M (or S, T, B) code, it is possible to call user macro programs with the prescribed program number. (Entered M codes and all S, T and B codes can be used.)
Format
The correspondence between the M** code which performs macro call and the program number for the macro to be called is set by a parameter. Up to 10 M codes from M00 to M9999, M198 can be entered. Select codes to be entered other than the codes basically required by the machine and M codes of M0, M1, M2, M30 and M96 through M99.
(Note 1) G commands in G code macro programs are not subject to macro calls but normal G commands. M commands in M code macro programs are not subject to macro calls but normal M commands. (The same applies to S, T and B codes.)
(Note 2) The registration of the program number used for calling the G code macro or M (or S, T, B) code macro can be done independently for each part system.
(3) Macro argument L/P valid
This function allows the addresses L (number of subprogram repetitions) and P (calling program No.) used as commands in user macro to be used as arguments. This function is enabled by a parameter.
Followings can be used by user macro.
- G65 Macro call (Sample call)
- G66 Macro modal call A
- G66.1 Macro modal call B
- Macro call using G codes
- Macro call using miscellaneous commands
- ASCII macro
(4) Common variables protection
This function protects the common variables used for machine tool builder macro from being changed by user operation.
The common variables in the range designated with the parameter cannot be changed by user operation, such as through a machining program, screen operation or file input.
The range of common variables to be protected can be designated individually for each part system.
M** (or S**;, T**;, B**;) P__ L__ Argument;
M** (S**, T**, B**) : M (or S, T, B) code for performing macro call
P : Argument (When macro argument L/P valid function is enabled. Disabled when it is invalid.)
L : Argument (When macro argument L/P valid function is enabled. Disabled when it is invalid.)

12.1.2.2 Machine Tool Builder Macro
This function enables dedicated macro programs made by MTB to be registered in the CNC. By registering the macro as a program numbered in the 100010000s, the macro program display, editing and input/output can be protected with a password and the macro program confidentiality can be kept.
Machine tool builder macro programs are stored in a dedicated area which means that the user program registration area is not reduced in the process.
When registering a machine tool builder macro, secure its space by formatting.
Macro program memory capacity
(Note 1) "When the simple programming is in use" means that the simple programing (NAVI MILL/NAVI Lathe) is being used and the macro is stored in the machine tool builder macro area.
(Note 2) The memory capacity and the maximum registrable number of programs vary depending on the simple programing macro when the simple programming macro is registered in the machine tool builder macro area.
The macro program registered as a machine tool builder macro is called out as "G65 command" or "G code macro equivalent to G65". The macro program is described in the same manner as a conventional machining program.
Variables for the machine tool builder macros can be used within the machine tool builder macros. These variables can be used commonly within the machine tool builder macro programs.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
Model
When the simple programming is in use
(Note 1) When the simple programming is not in use
Memory capacity (KB)
Max. registrable
number of programs
(programs)
Memory capacity (KB)
Max. registrable
number of programs
(programs)
M800W
128 500 256 600
M800S
M80
M80W 80 100 208 200
E80
C80 - - 208 200

Command format
User macro call (G65)
(Note) The machine tool builder macro program cannot be called with G66, G66.1 or M98. Note that a machine

tool builder macro program can be called from a machine tool builder macro program using M98.
Macro call with G code (G***)
Miscellaneous command macro call (M or T code macro call)
(Note) If M96, M97, M98, M99, M198 or the M code for G83 S Mode (for M system only) is commanded, machine tool builder macro will not be called and the said M code will be handled as a normal miscellaneous command.
Miscellaneous command macro call (S code, 2nd miscellaneous command macro call) [only for C80 series]
(Note) S command and 2nd miscellaneous command cannot be defined in macro definition program. They are ignored.
G65 P__ L__ Argument ;
P : Machine tool builder macro program No.(100010000 to 199999998)
L : Number of repetitions (0 to 9999)
Argument : Variable data designation
G*** Argument;
*** : G code defined in macro definition program or G command macro parameter
Argument : Variable data designation
Argument is used when a local variable must be delivered to the macro program. Designate a real value after the address.
M*** Argument; (or T***)
*** : M (or T) code defined in macro definition program
Argument : Variable data designation
Use this argument when a local variable needs to be passed on to the macro program. Designate a real value after the address.
S*** Argument; (or B***)
*** : S code and 2nd miscellaneous command code which are defined in macro list parameter
Argument : Variable data designation
Use this argument when a local variable needs to be passed on to the macro program. Designate a real value after the address.

12.1.2.3 Macro Interruption
This function inputs from the machine to interrupt the program currently being executed, and instead calls and executes another program.
The program can be operated flexibly enough to meet varying conditions.
There are two types of interrupts, type 1 and type 2, as described below, and they are selected using a parameter.
[Interrupt type 1] The block being executed is immediately interrupted, and the interrupt program is run immediately.
[Interrupt type 2] After the block being executed is complete, the interrupt program is executed.
The command format is given below.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
M96 P__ H__ ; or, M96 <File name> H__ ; User macro interrupt valid
M96
P
<File name>
H
: Interrupt valid command
: Interrupt program number
A four-digit or eight-digit program No. starting with O No. can be called by the parameter.
: File name
When designating a file name, enclose the file name in brackets <>.
: Interrupt sequence No.
M97 ; User macro interrupt invalid
M97 : User macro interrupt end command
M96 Pp1;
M99 (Pp2) ;
Op1 ;
Np2 ;
Np2 ;
M97 ;
User macro interrupt signal (UIT)
Current program
Interrupt program
(If Pp2 is specified)
Interrupt signal (UIT) not acceptable within a user macro program

12.1.2.4 Variable Command
[M system]
[L system]
Programming can be given flexible and general-purpose capabilities by designating variables instead of directly assigning numbers for addresses in programs and by supplying the values of those variables as required when running the programs.
Arithmetic operations (adding, subtracting, multiplying and dividing) can also be conducted for the variables.
Number of variable sets specifications
Variable sets M850W M830W M850S M830S M80W M80
TypeA

M80
TypeB
E80
TypeA
E80
TypeB C80
200 sets
600 sets
700 sets
8000 sets
(600 + 100 number of part systems)
sets
(7900 + 100 number of part systems)
sets
Variable sets M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
200 sets
600 sets
700 sets
8000 sets
(600 + 100 number of part systems)
sets
(7900 + 100 number of part systems)
sets
Type Number Function
Common variables Common variables 1 Common variables 2
Can be used commonly for main,
sub and each macro program.
When using the common variables
across multiple part systems, Some
MTB specifications allow you to
designate the number of common
variables that are common to part
systems.
For 1-part system
specifications
200 sets 500 to 999 100 to 199
600 sets 500 to 999
100100 to 800199(Note 6) 100 to 199
700 sets 400 to 999
100100 to 800199(Note 6) 100 to 199
8000 sets
400 to 999
100100 to 800199(Note 6)
900000 to 907399
100 to 199
For multi-part
system
specifications
600+100 sets 400 to 999
100100 to 800199(Note 6)
100 to 199number of
part systems
7900+100
sets
400 to 999
100100 to 800199(Note 6)
900000 to 907399
100 to 199number of
part systems
Local variables 1 to 33 Can be used as local in macro
program.
ZR device access variables
(only for C80 series)
50000 to 50749
51000 to 51749
52000 to 52749
Can be read and written by the PLC
or GOT.
System variables 1000 to Application is fixed in system.
Fixed cycle variables 1 to 32 Local variables in fixed cycle
program.

(Note 1) All common variables are held even when the power is turned OFF.
(Note 2) The common variables can be emptied by resetting or turning the power OFF when the parameters are set
accordingly.
(Note 3) The common variables are divided into the following two types.
Common variable 1: Variables that can be used commonly through the part systems.
Common variable 2: Variables that can be used commonly within that part system's program.
(Note 4) The variable names can be set for some common variables.

(Note 5) The common variables used for machine tool builder macro can be protected from being changed by user operation.
(Note 6) The part system common variable which can be used is shown in the table below.
Variable expressions
Variable : #Numerical value #100
(Numerical value: 1,2,3, ...)
: # [Expression] #100
Expression : Numerical value
: Variable
: Expression Operator Expression #100 + #101
: - (minus) Expression -#120
: [Expression] [#110]
: Function [Expression] SIN [#110]
Variable definition
Variable = expression
(Note 1) Variables cannot be used with addresses "O" and "N".
Variable sets Common variables 1
Variable sets
specification
600 sets #100100 to #100199 (Equivalent to # 100 to #199 in 1st part system)
#200100 to #200199 (Equivalent to # 100 to #199 in 2nd part system)
#300100 to #300199 (Equivalent to # 100 to #199 in 3rd part system)
#400100 to #400199 (Equivalent to # 100 to #199 in 4th part system)
#500100 to #500199 (Equivalent to # 100 to #199 in 5th part system)
#600100 to #600199 (Equivalent to # 100 to #199 in 6th part system)
#700100 to #700199 (Equivalent to # 100 to #199 in 7th part system)
#800100 to #800199 (Equivalent to # 100 to #199 in 8th part system)
700 sets(600+100)
8000 sets(7900 100)

12.1.3 Fixed Cycle
List of fixed cycles
Type of fixed cycle
M system L system Remarks
Gcode
list 1
Gcode
list 2
Gcode
list 3
Gcode
list 4
Gcode
list 5
Gcode
list 6
Gcode
list 7
Fixed cycle for drilling
G73 G80 G80 G80 G80 G80 G80
Refer to 12.1.3.1.
Refer to 12.1.3.2 (Type II).
Refer to 4.5.3.
::::::
G89 G89 G89 G89 G89 G89 G89
G79 G83.2 G79 G83.2 G79 G83.2
G98 G98 G98 G98 G98 G98 G98
G99 G99 G99 G99 G99 G99 G99
G187 G187 G187 G187 G187 G187 G187
Special fixed cycles
G34
G35 - - - - - - Refer to 12.1.3.3.
G36
Fixed cycles for turning
machining
G174 G90 G77 G90 G77 G90 G77
G175 G92 G78 G92 G78 G92 G78 Refer to 12.1.3.4.
G176 G94 G79 G94 G79 G94 G79
Compound-type fixed
cycles for turning
machining
G70 G70 G70 G70 G70 G70
Refer to 12.1.3.5.
Refer to 12.1.3.6 (Type II).
Refer to 12.1.8.8.
::::::
- G76 G76 G76 G76 G76 G76
G76.1 G76.1 G76.1 G76.1 G76.1 G76.1
G76.2 G76.2 G76.2 G76.2 G76.2 G76.2
Small-diameter deep hole drilling cycle G83 - - - - - - Refer to 12.1.3.7.

12.1.3.1 Fixed Cycle for Drilling
(1) M system
These functions enable drilling, tapping and other hole machining cycles to be assigned in a simple 1-block

program.
(*1) The Punch Tap cycle is a function that uses a Punch Tap-exclusive tool to synchronously control the spindle and the servo axis to cut in the workpiece and execute the tapping.
There are two levels of hole machining axis return which apply upon completion of the fixed cycle machining operation.
The basic program format for the fixed cycle commands is shown below.
For details on the synchronous tapping cycle (including pecking tapping cycle and deep-hole tapping cycle), refer to the section "4.5.3 Synchronous Tapping".
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
Gcode Function
G73 Step cycle
G74 Reverse tapping cycle
G75 Circular cutting cycle
G76 Fine boring cycle
G80 Fixed cycle cancel
G81 Drilling, spot drilling cycle
G82 Drilling, counterboring cycle
G83 Deep hole drilling cycle
G84 Tapping cycle
G85 Boring cycle
G86 Boring cycle
G87 Backboring cycle
G88 Boring cycle
G89 Boring cycle
G187 Thread milling cycle
G84.5, G84.6, G84.8 Punch Tap cycle (*1)
G74.5, G74.6, G74.8 Reverse Punch Tap cycle (*1)
Gcode Function
G98 Initial point level return
G99 R point level return
G8*(G7*) X__ Y__ Z__ R__ Q__ P__ F__ L__ S__ ,S__ ,I__ ,J__ ;
G8*(G7*) X__ Y__ Z__ R__ Q__ P__ F__ L__ S__ ,R__ ,I__ ,J__ ;
G8*(G7*) : Hole drilling mode
X/Y : Hole position data
Z/R/Q/P/F : Hole machining data
L : Number of repeats
S : Spindle rotation speed
,S : Spindle rotation speed during return
,R : Synchronization switch
,I : Positioning axis in-position width
,J : Drilling axis in-position width
M800/M80/E80/C80 Series Specifications Manual (Function)
12 Program Support Functions
249 IB-1501505-N
n q
q M03
M04
q
q
q
n
q
q
M03
M04
M03
M05
M03
M19
M19
M03
M03
M05
M03
X
Z
Y (1)
(2)
(3)
G73
Step cycle
G98 mode
Initial
point
R point
G99 mode
Z point
G74
Reverse tapping cycle

G98 mode
Initial point
R point
Z point
G75
Perfect circle cutting cycle
Initial
point
R point
Z point
G98 mode
G99 mode
G76
Fine boring cycle
Initial point
G98 mode
R point
Z point
M19 Shift
G99 mode
G81
Drilling, spot drilling cycle
Initial point
R point
Z point
G98 mode
G98 mode
G98 mode
G98 mode
G98 mode
G98 mode
G98 mode
G98 mode
G99 mode
G99 mode
G99 mode
Dwell
Dwell
Dwell
G82
Drilling, counterboring cycle
Initial point
R point
Z point
G83
Deep hole drilling cycle
Initial
point
R point
Z point
G84
Tapping cycle
Initial point
R point
Z point
G85
Boring cycle
Initial point
R point
Z point
G86
Boring cycle
Initial
point
R point
Z point
G87
Back boring cycle
Initial point
R point
Z point
G88
Boring cycle
Initial point
R point
Z point
G89
Boring cycle
Initial point
R point
Z point
G187
Thread milling cycle
Dwell
Helical
interpolation
Movement
Tool pull-out

Movement (approach)
(1) Helical grooving
(2) Tapping
(3) Retract
G84.5 (G84.6, G84.8)
Punch Tap cycle
Dotted line: Tool edge path at
conventional tapping
Tool edge path at
executing Punch Tap
Solid line:

(2) L system
These functions enable drilling, tapping and other hole machining cycles to be assigned in a simple 1-block program.
The fixed cycle mode is canceled when G80 or some G command of the G01 group is issued. Data is also cleared to zero simultaneously.
Command format
End-face drilling
Longitudinal hole drilling
Cancel
Gcode Drilling axis Drilling work start Motion at hole bottom Retract motion Use
G80 Cancel
G83 Z Cutting feed
Intermittent feed
In-position check
Dwell Rapid traverse feed Deep-hole drilling cycle1
G84
(G84.1) Z Cutting feed
In-position check
Dwell
Spindle CCW
Cutting feed
Tapping cycle
(Reverse tapping cycle)
Pecking tapping cycle
Deep tapping cycle
G85 Z Cutting feed In-position check
Dwell Cutting feed Boring cycle
G87 X Cutting feed
Intermittent feed
In-position check
Dwell Rapid traverse feed Deep-hole drilling cycle1
G88
(G88.1) X Cutting feed
In-position check
Dwell
Spindle CCW
Cutting feed
Tapping cycle
(Reverse tapping cycle)
Pecking tapping cycle
Deep tapping cycle
G89 X Cutting feed In-position check
Dwell Cutting feed Boring cycle
G83.2 Z/X Cutting feed
Intermittent feed
In-position check
Dwell Rapid traverse feed Deep-hole drilling cycle2
G185 X Circular interpolation - Rapid traverse feed Hole edge chamfering cycle
G187 X/Y/Z Cutting feed - Rapid traverse feed Thread milling cycle
G8* X/U__ C/H__ Z/W__ R__ Q__ P__ F__ K__ D__ S__ ,S__ M__ ;
G8* : Hole machining mode (G83, G84, G85)
X/U/C/H : Hole position data
Z/W/R/Q/P/F : Hole machining data
K : Number of repetitions
D : Tool spindle number
S : Spindle rotation speed
,S : Spindle rotation speed during return
M : Miscellaneous command
G8* Z/W__ C/H__ X/U__ R__ Q__ P__ F__ K__ D__ S__ ,S__ M__ ;
G8* : Hole machining mode (G87, G88, G89)
Z/W/C/H : Hole position data
X/U/R/Q/P/F : Hole machining data
K : Number of repetitions
D : Tool spindle number
S : Spindle rotation speed
,S : Spindle rotation speed during return
M : Miscellaneous command
G80 ;

The drilling cycle motions generally are classified into the following seven.
Motion 1: Rapid positioning up to the initial point of X (Z) and C axes.
If the "positioning axis in-position width" is designated, the in-position check is conducted upon completion of

the block.
Motion 2: Output if the C axis clamp M code is given.
Motion 3: Rapid positioning up to the R point.
Motion 4: Hole machining at cutting feed.
If the "drilling axis in-position width" is designated, the in-position check is conducted upon completion of the block. However, in the case of deep-hole drilling cycles 1 and 2, the in-position check is not conducted with the drilling of any holes except the last one. The in-position check is conducted at the commanded hole bottom position (last hole drilling).
Motion 5: Motion at the hole bottom position. It varies depending on the fixed cycle mode.
Spindle CCW (M04), spindle CW (M03), dwell, etc., are included.
Motion 6: Return to the R point.
Motion 7: Return to the initial point at rapid traverse feed.
(Motions 6 and 7 may be conducted as a single motion depending on the fixed cycle mode.)
(Note) With a synchronous tap command, the in-position check is conducted in accordance with the parameters.
Whether the fixed cycle is complete with motion 6 or 7 can be specified by using either of the following G commands:
G98 : Initial level return
G99 : R point level return
These commands are modal. For example, once G98 is given, the G98 mode is entered until G99 is given. The G98 mode is entered in the initial state when the controller is ready.
Motion 1 Motion 2
Motion 3
R point
Motion 4
Motion 5
Motion 6
Motion 7
Initial point

There are two levels of hole machining axis return which apply upon completion of the fixed cycle machining operation.
Gcode Function
G98
G99
Initial point level return
R point level return
n
q q
f
2f
X
Z
Y X
Y Z
(A)
C
G185
Hole edge chamfering cycle
Dwell
Helical
interpolation
Movement
Tool pull-out
Movement (approach)
G187
Thread milling cycle
Dwell
Dwell
Dwell
Dwell
Dwell
Dwell
Dwell
Initial point
Dwell
Initial point
Dwell
G83.2
Deep-hole drilling cycle
Z / X point
G84/88
Tapping cycle
(C-axis clamp)
Reverse
rotation of
spindle/rotary
tool Z / X point
R point
G98 mode
(C-axis unclamp)
Forward rotation of
spindle/rotary tool
Output or no output can be set using a
parameter for the C-axis clamp/unclamp
M code
The rotation direction of the tapping is
reversed using Reverse tapping cycle
G84.1 (G88.1).

G85/89
Boring cycle
(C-axis clamp)
Z / X point
R point
G98 mode
(C-axis unclamp)
Dwell
Output or no output can be set using a
parameter for the C-axis clamp/unclamp
M code
Initial point
Initial point
Z / X point
G99 mode G98 mode R point
Z / X point
G99 mode G98 mode
R point
G83/G87
Deep-hole drilling cycle (G83: Z-axis direction, G87: X-axis direction)
When Q command is given When Q command is not given
(A) Chamfering width

12.1.3.2 Fixed Cycle for Drilling (Type II)
In the longitudinal hole drilling fixed cycle, the X axis is designated as the hole drilling axis. However, in the longitudinal hole drilling fixed cycle (type II), the Y axis can be designated as the hole drilling axis with the longitudinal hole drilling axis selection function.
The relationship between the longitudinal hole drilling axis selection signal's ON/OFF state and the hole drilling axis of the fixed cycle for drilling is shown below.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
Gcode Details Y axis cross tap function
selection signal state Hole drilling axis
G80 Cancel - -
G83 Deep hole drilling cycle 1
ON
Z
OFF
G84 (G84.1) Tapping cycle
ON
Z
OFF
G85 Boring cycle
ON
Z
OFF
G87 Deep hole drilling cycle 1
ON Y
OFF X
G88 (G88.1) Tapping cycle
ON Y
OFF X
G89 Boring cycle
ON Y
OFF X
G83.2 Deep hole drilling cycle 2
ON
Z/X
OFF

12.1.3.3 Special Fixed Cycle
These functions enable drilling, tapping and other hole machining cycles to be assigned in a simple 1-block program.
Special fixed cycles must always be used in combination with fixed cycles.
The special fixed cycles are as follows:
(1) Bolt hole circle (G34)
The tool starts at the point forming angle with the X axis on the circumference of a circle with radius R whose center is the coordinates designated by X and Y, and it drills "n" number of holes at "n" equal intervals along the circumference of that circle. The drilling data for the standard fixed cycle of the G81 or other such command is retained for the drilling operation at each hole position.
All movements between the hole positions are conducted in the G00 mode. The data is not retained upon completion of the G34 command.
As shown in the figure, the tool is positioned above the final hole upon completion of the G34 command. This means that when it is to be moved to the next position, if the command is issued with incremental position, it will be necessary to calculate the coordinate position. Thus, it is convenient to issue the command with absolute position.
M850W M830W M850S M830S M80W M80

TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
Gcode Function
G34 Bolt hole circle
G35 Line at angle
G36 Arc
G37.1 Grid
G34 Xx Yy Ir J Kn ;
Xx,Yy
Ir
J
Kn
: Center position of bolt hole circle; this is affected by the G90/G91 commands.
: Radius "r" of circle; it is based on the least command increment and is provided using a positive number.
: Angle at point to be drilled initially; the counterclockwise direction is taken to be positive.
: Number "n" of holes to be drilled; any number of holes from 1 through 9999 can be designated; 0 cannot be assigned.
When 0 has been designated, the alarm will occur. A positive number provides positioning in the counterclockwise direction;
a negative number provides positioning in the clockwise direction.
I
W
Y1
X1

G0 command Position prior to
execution of G34
command
n = 6 holes

(2) Line at angle (G35)
With the starting point at the position designated by X and Y, the tool drills "n" number of holes each at interval "d" in the direction forming angle with the X axis. A standard fixed cycle applies for the drilling operation at each of the hole positions and so there is a need to retain beforehand the drilling data (drilling mode and drilling data). All movements between the hole positions are conducted in the G00 mode. The data is not retained upon completion of the G35 command.
(3) Arc (G36)
The tool starts at the point forming angle with the X axis on the circumference of a circle with radius "r" whose center is the coordinates designated by X and Y, and it drills "n" number of holes aligned at angle interval . As with the bolt hole circle function, the drilling operation at each of the hole positions is based on a hold drilling fixed cycle and so there is a need to retain the drilling data beforehand.
All movements between the hole positions are conducted in the G00 mode. The data is not retained upon completion of the G36 command.
G35 Xx Yy Id J Kn ;
Xx,Yy
Id
J
Kn
: The starting point coordinates; they are affected by the G90/G91 commands.
: Interval "d"; it is based on the least command increment and when "d" is negative, drilling proceeds in the point symmetrical direction centered on the starting point.
: Angle ; the counterclockwise direction is taken to be positive.
: Number "n" of holes to be drilled including the starting point; any number of holes from 1 through 9999 can be assigned.
G36 Xx Yy Ir J P Kn ;
Xx,Yy
Ir
J
P

Kn
: Center coordinates of arc; they are affected by the G90/G91 commands.
: Radius "r" of arc; it is based on the least command increment and is provided with a positive number.
: Angle at the point to be drilled initially; the counterclockwise direction is taken to be positive.
: Angle interval ; when it is positive, the tool drills in the counterclockwise direction and when it is negative, it drills in the clockwise direction.
: Number "n" of holes to be drilled; any number of holes from 1 through 9999 can be assigned.
W
Y
X
X1
d

y1
Position prior to
execution of G35
command
N=5 holes
W
X1

Y1

n=6 holes
Position prior to
execution of G36
command

(4) Grid (G37.1)
With the starting point at on the position designated by X and Y, this function enables the tool to drill the holes on the lattice with "nx" number of holes at parallel intervals of x to the X axis. Drilling proceeds in the X-axis direction. The drilling operation at each of the hole positions is based on a standard fixed cycle and so there is a need to command the drilling data (drilling mode and drilling data) beforehand. All movements between the hole positions are conducted in the G00 mode. The data is not retained upon completion of the G37.1 command.
G37.1 Xx Yy Ix Pnx Jy Kny ;
Xx,Yy
Ix
Pnx
Jy
Kny
: The starting point coordinates; they are affected by the G90/G91 commands.
: X-axis interval x; it is based on the least command increment; when x is positive, the intervals are provided in the positive direction as seen from the starting point and when it is negative, they are provided in the negative direction.
: Number of holes "nx" in the X-axis direction; any number of holes from 1 through 9999 can be assigned.
: Y-axis interval y; it is based on the least command increment; when y is positive, the intervals are provided in the positive direction as seen from the starting point and when it is negative, they are provided in the negative direction.
: Number of holes "ny" in the Y-axis direction; any number of holes from 1 through 9999 can be assigned.
W
x1
y
x
y1
Position prior to execution
of G37.1 command
nx=10 holes
ny=8 holes

12.1.3.4 Fixed Cycle for Turning Machining
By using this function, the shape normally programmed in several blocks for rough cutting, etc., in the turning machining can be commanded in one block.
By editing the standard fixed cycle subprograms, the fixed cycle sequences can be changed by the user. The user can also register and edit an original fixed cycle program.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
G code [L system] G code [M system] Function
G77 G174 Longitudinal cutting fixed cycle
G78 G175 Thread cutting fixed cycle
G79 G176 Face cutting fixed cycle

(1) Longitudinal cutting fixed cycle (G77/G174)
(a) Straight cutting
Straight cutting in the longitudinal direction can be performed consecutively by the following block:
(b) Taper cutting
Taper cutting in the longitudinal direction can be performed consecutively by the following block:
r: Taper part depth (radius designation, incremental position, sign is required)
G77 X/U__ Z/W__ F__ ; [L system]
G174 X__ Z__ F__ ; [M system]
X/U X axis end point coordinate
Z/W Z axis end point coordinate
F Feedrate
G77 X/U__ Z/W__ R__ F__ ; [L system]
G174 X__ Z__ R__ F__ ; [M system]
X/U X axis end point coordinate
Z/W Z axis end point coordinate
R Taper part depth (radius designation, incremental position, sign is required)
F Feedrate
X
2
Z
X
1
4
3

Z W
U
Cutting feed 2
Cutting feed
Rapid traverse feed
Rapid
traverse feed
End point
coordinate
X
Z
X
1
4
3
Z W
2
U
2
r
Cutting feed
Cutting feed
Rapid traverse feed
Rapid
traverse feed
End point
coordinate

(2) Thread cutting fixed cycle (G78/G175)
(a) Straight thread cutting
Straight thread cutting can be performed by the following block:
(b) Taper thread cutting
Taper thread cutting can be performed by the following block:
r : Taper part depth (radius designation, incremental position, sign is required)
G78 X/U__ Z/W__ F/E__ Q__ ; [L system]
G175 X__ Z__ F/E__ Q__ ; [M system]
X/U X axis end point coordinate
Z/W Z axis end point coordinate
F/E Lead of Longitudinal axis (axis which moves most) direction
Q Thread cutting start shift angle
G78 X/U__ Z/W__ R__ F/E__ Q__ ; [L system]
G175 X__ Z__ R__ F/E__ Q__ ; [M system]
X/U X axis end point coordinate
Z/W Z axis end point coordinate
R Taper part depth (radius designation, incremental position, sign is required)
F/E Lead of Longitudinal axis (axis which moves most) direction
Q Thread cutting start shift angle
Z W
1
2
4
3
X
Z
X
U
2
Rapid traverse feed
Rapid
traverse feed
Rapid traverse feed
Thread cutting cycle
End point coordinate
Z W
1
2
4
3
X
X
Z
U
2
r End point
coordinate
Rapid traverse feed
Rapid
traverse feed
Rapid traverse feed
Thread cutting cycle

Chamfering
: Thread chamfering amount
Set the chamfer amount with the parameters.

The setting range is 0 to 12.7L with increments of 0.1L.
: Thread chamfering angle
The thread chamfering angle can be set in a given parameter in 1 steps in the range of 0 to 89

(3) Face cutting fixed cycle (G79/G176)
(a) Straight cutting
Straight cutting in the end face direction can be performed consecutively by the following block:
(b) Taper cutting
Taper cutting in the end face direction can be performed consecutively by the following block:
r: Taper part depth (radius designation, incremental position, sign is required)
G79 X/U__ Z/W__ F__ ; [L system]
G176 X__ Z__ F__ ; [M system]
X/U X axis end point coordinate
Z/W Z axis end point coordinate
F Feedrate
G79 X/U__ Z/W__ R__ F__ ; [L system]
G176 X__ Z__ R__ F__ ; [M system]
X/U X axis end point coordinate
Z/W Z axis end point coordinate
R Taper part depth (radius designation, incremental position, sign is required)
F Feedrate
X Z W
1
2
4
3
X
Z
U
2
End point coordinate
Rapid traverse
feed
Rapid
traverse feed
Cutting
feed
Cutting
feed
X Z W
1
2 4
3
Z
X
U
2
r
Rapid
traverse feed
Rapid traverse
feed
Cutting
feed
Cutting feed
End point coordinate

12.1.3.5 Compound Type Fixed Cycle for Turning Machining
The shape normally programmed in several blocks for rough cutting, etc., in the turning machining can be commanded in one block. This function is useful for machining program simplification.
Compound type fixed cycle for turning machining are as follows:
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
G code Function
G71 Longitudinal rough cutting cycle Compound type fixed cycle for turning machining I
G72 Face rough cutting cycle
G73 Molding material in rough cutting cycle
G70 Finish cycle
G74 Face cutting-off cycle Compound type fixed cycle for turning machining II
G75 Longitudinal cutting-off cycle
G76 Compound type thread cutting cycle

(1) Longitudinal rough cutting cycle (G71)
The finish shape program is called, and straight rough cutting is performed while intermediate path is being calculated automatically.
The path to the cycle command point and whether or not to retract a tool after roughing along finishing shape can be selected by parameters.
G71 Ud Re Hh ;
G71 Aa Pp Qq Uu Ww Ff Ss Tt ;
Ud : Cut depth (modal) ..... Can also be set with the Reversible parameter.
Increment: m or 1/10000 inch (Radius value command)
Re : Retract amount (modal) ... Can also be set with the Reversible parameter.
Increment: m or 1/10000 inch (Radius value command)
Hh : Pocket machining (modal) ..... Can also be set with the Reversible parameter.
0: No pocket machining
1: Pocket machining
Aa : Finished shape program No. (Program being executed when omitted)
A four-digit or eight-digit program No. starting with O No. can specify the finish shape program by the parameter.
Pp : Finished shape start sequence No. (program head when omitted)
Qq : Finished shape end sequence No. (To the end of the program when omitted)
However, if M99 precedes the Q command, up to M99.
Uu : Finishing allowance in X axis direction (If omitted, finishing allowance in X axis direction is handled as "0".)
Increment: m or 1/10000 inch (Whether diameter value or radius value is commanded depends on the parameter setting.)
Ww : Finishing allowance in Z axis direction (If omitted, finishing allowance in Z axis direction is handled as "0".)
Increment: m or 1/10000 inch (Radius value command)
Ff : Cutting feedrate (If omitted, cutting feedrate (modal) before G71 is applied.)
Ss, Tt : Spindle command, tool command
Example of a finished shape without pocket Example of a finished shape with pocket
With the beginning of the pockets, the tool is pulled up in the 45-degree direction with each cycle, and finally roughing along finishing shape is performed.
By setting parameters, the tool can be moved to the cycle command point at rapid traverse without roughing along finishing shape.
A method that traces the finished shape with each cycle is used for the beginning of the pockets.
Roughing along finishing shape can be executed by setting parameters.
S: Cycle command point
A: Rough cutting start point
(R) Rapid traverse
(f) Cutting feed
G71 Ud Re H0;
G71 Pp Qq ;
p
(R)
(R)
(R)
45
(f)
(f)
(f)
X
Z
q
w
u/2
A
d
(R/f)
e
S
G71 Ud Re H1;
G71 Pp Qq ;
(f)
q
w
p
u/2
(R)
(R)
A
d
(R/f)
(f) (R)
X
Z e
S

(2) Face rough cutting cycle (G72)
The finish shape program is called, and rough cutting is performed in the end face direction while intermediate path is being calculated automatically.
The path to the cycle command point and whether or not to retract a tool after roughing along finishing shape can be selected by parameters.
G72 Wd Re Hh ;
G72 Aa Pp Qq Uu Ww Ff Ss Tt ;

Wd : Cut depth (modal) ..... Can also be set with the Reversible parameter.
Unit: m/1/10000 inch (Radius value command)
Re : Retract amount (modal) ... Can also be set with the Reversible parameter.
Unit: m/1/10000 inch (Radius value command)
Hh : Pocket machining (modal) ..... Can also be set with the Reversible parameter.
0: No pocket machining
1: Pocket machining
Aa : Finished shape program No. (Program being executed when omitted)
A four-digit or eight-digit program No. starting with O No. can specify the finish shape program by the parameter.
Pp : Finished shape start sequence No. (program head when omitted)
Qq : Finished shape end sequence No. (To the end of the program when omitted)
However, if M99 precedes the Q command, up to M99.
Uu : Finishing allowance in X axis direction (If omitted, finishing allowance in X axis direction is handled as "0".)
Increment: m or 1/10000 inch (Whether diameter value or radius value is commanded depends on the parameter setting.)
Ww : Finishing allowance in Z axis direction (If omitted, finishing allowance in Z axis direction is handled as "0".)
Increment: m or 1/10000 inch (Radius value command)
Ff : Cutting feedrate (If omitted, cutting feedrate (modal) before G72 is applied.)
Ss, Tt : Spindle command, tool command
Example of a finished shape without pocket Example of a finished shape with pocket
With the beginning of the pockets, the tool is pulled up in the 45-degree direction with each cycle, and finally roughing along finishing shape is performed.
By setting parameters, the tool can be moved to the cycle command point at rapid traverse without roughing along finishing shape.
A method that traces the finished shape with each cycle is used for the beginning of the pockets.
Roughing along finishing shape can be executed by setting parameters.
S: Cycle command point
A: Rough cutting start point
(R) Rapid traverse
(f) Cutting feed
G72 Wd Re H0;
G72 Pp Qq ;
d
P
(R)
(R)
45 (R)
(f)
(f)
(f)
e
(f)
X
Z
q
w
u/2
(R) S
(R/f) A
G72 Wd Re H1;
G72 Pp Qq ;
d
P
(R)
(R)
(R)
(R)
(f)
(f)
(f)
X
e
Z
q
S
(R/f) A
w
u/2

(3) Molding material in rough cutting cycle (G73)
The finish shape program is called. Intermediate path is automatically calculated and rough cutting is performed conforming to the finish shape.
G73 Ui Wk Rd ;
G73 Aa Pp Qq Uu Ww Ff Ss Tt ;
Ui
Wk
Rd
:Cutting allowance in the X axis direction i
:Cutting allowance in the Z axis direction k
:Split count d
- Cutting allowance when P, Q command is not given.

- Modal data
- Sign is ignored.
- Cutting allowance is given with a radius designation.
Aa :Finish shape program No.
(If it is omitted, the present program is assumed to be
designated.)
A file name can be designated instead of address A by
enclosing the file name in brackets <>. (The file name can
have up to 32 characters, including the extension.)
Pp
Qq
:Finish shape start sequence No.
:Finish shape end sequence No.
(If it is omitted, the program top is assumed to be designated.)
(If it is omitted, the program end is assumed to be
designated.)
However, if M99 precedes the Q command, up to M99.
Uu
Ww
:Finishing allowance in the X axis direction u
:Finishing allowance in the Z axis direction w
- Finishing allowance for the finish shape commanded by the
address P or Q.
- Sign is ignored.
- Diameter or radius is designated according to the
parameter.
- The shift direction is determined by the shape
Ff
Ss
Tt
:Cutting feed rate (F function)
:Spindle speed (S function)
:Tool selection (T function)
The F, S, and T commands in the finish shape program are
ignored, and the value in the rough cutting command or the
preceding value becomes effective.
k + w
X
Z
S1
S2
S3
S
i + u/2
u/2
w
A
E
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
1
M800/M80/E80/C80 Series Specifications Manual (Function)
12 Program Support Functions
IB-1501505-N 266
(4) Finish cycle (G70)
After rough cutting is performed by using G71 to G73, finish cutting can be performed by using the G70 command.
(a) The F, S, and T commands in the rough cutting cycle command G71 to G73 blocks are ignored, and the F, S,
and T commands in the finish shape program become effective.
(b) The memory address of the finish shape program executed by G71 to G72 is not stored. Whenever G70 is
executed, a program search is made.
(c) When the G70 cycle terminates, the tool returns to the start point at the rapid traverse feed rate and the next
block is read.
(Example1) Sequence No. designation
(Example2) Program No. designation
In either example 1 or 2, after the N100 cycle is executed, the N110 block is executed.
G70 Aa Pp Qq Hh;
Aa : Finish shape program No.
(If it is omitted, the program being executed is assumed to be designated.)
A file name can be designated instead of address A by enclosing the file name in brackets <>.
(The file name can have up to 32 characters, including the extension.)
Pp : Finish shape start sequence No.
(If it is omitted, the program top is assumed to be designated.)

Qq : Finish shape end sequence No.
(If it is omitted, the program end is assumed to be designated.)
However, if M99 precedes the Q command, up to M99.
Hh : Tool feed directions when the cutting-edge angle is compensated
0: Not compensate the cutting-edge angle
1: Compensate the cutting-edge angle in the longitudinal direction (same tool feed direction as G71/G73 command)
2: Compensate the cutting-edge angle in the end face direction (same tool feed direction as G72 command)
When H address is omitted, the cutting-edge is not compensated.
When the tool shape compensation for turning is disabled, H address is ignored.
N100 G70 P200 Q300 ;
N110
N120
N200
N300
N310
~
~
~~ ~
N200 . . . . . ;
N300 . . . . . ;
Finish shape program
N100 G70 A100 ;
G01 X100 Z50 F0.5 ;
M99 ;
~
~ ~
N110 . . . . . ;
N120 . . . . . ;
O100

12.1.3.6 Compound Type Fixed Cycle for Turning Machining (Type II)
(1) Face cutting-off cycle (G74)
When the slotting end point coordinates, cut depth, cutting tool shift amount, and cutting tool relief amount at the cut bottom are commanded, automatic slotting is performed in the end face direction of a given bar by G74 fixed cycle.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
G74 Re ;
G74 Xx1/(Uu1) Zz1/(Ww1) Pi Qk Rd Ff ;
Re
Xx1/Uu1
Zz1/Ww1
Pi
Qk
: Retract amount e (when X/U, Z/W command is not given) (Modal)
: B point coordinate (absolute/incremental position)
: B point coordinate (absolute/incremental position)
: Tool shift amount (radius designation, incremental position, sign not required)
: Cut depth k (radius designation, incremental position, sign not required)
Rd : Relief amount at cut bottom d (If sign is not provided, relief is made at the first cut bottom. If minus sign is provided, relief is made not at the first cut bottom but made at the second cut bottom and later.)
Ff : Feed rate
9 and 12 just before the last cycle are
executed with the remaining distance.
2, 4, 6, 8, 10, 11 and 12 are executed
at the rapid traverse feed rate.
k k k k
x
u/2
1
2 4 3
5
6 7 8
9
10
11
12
i
d
e
z w
B
Start point

(2) Longitudinal cutting-off cycle (G75)
When the slotting end point coordinates, cut depth, cutting tool shift amount, and cutting tool relief amount at the cut

bottom are commanded, automatic slotting is performed in the longitudinal direction of a given bar by G75 fixed cycle.

G75 Re ;

G75 Xx1/(Uu1) Zz1/(Ww1) Pi Qk Rd Ff ;

Re

Xx1/Uu1

Zz1/Ww1

Pi

Qk

: Retract amount e (when X/U, Z/W command is not given) (Modal)

: B point coordinate (absolute/incremental position)

: B point coordinate (absolute/incremental position)

: Cut depth i (radius designation, incremental position, sign not required)

: Tool shift amount k (radius designation, incremental position, sign not required)

Rd : Relief amount at cut bottom d (If sign is not provided, relief is made at the first cut bottom. If minus sign is provided, relief is made not at the first cut bottom but made at the second cut bottom and later.)

Ff : Feed rate

9 and 12 just before the last cycle are executed with the remaining distance.

2, 4, 6, 8, 10, 11 and 12 are executed at the rapid traverse feed rate.

k x

u/2

1 2

3

4 5

6

7

8

9

10

11

12 i

d

e

z w

B

i

i

i

Start point

(3) Compound type thread cutting cycle (G76)

When the thread cutting start and end points are commanded, cut at any desired angle can be made by automatic cutting so that the cut section area (cutting torque) per time becomes constant in the G76 fixed cycle.

Various longitudinal threads can be cut by considering the thread cutting end point coordinate and taper height constituent command value.

Command Format

G76 Pmra Q dmin Rd ;

G76 Xx1/Uu1 Zz1/Ww1 Ri Pk Q d Fl ;

m

r

a

 dmin

d

Xx1/Uu1

Zz1/Ww1

Ri

Pk

Q d

Fl

: Cut count at finishing 01 to 99 (modal)

: Chamfering amount 00 to 99 (modal). Set in 0.1-lead increments.

: Nose angle (included angle of thread) 00 to 99 (modal) Set in 1-degree increments.

: Least cut depth

 When the calculated cut depth becomes smaller than dmin, the cut depth is clamped at dmin.

: Finishing allowance (modal)

: X axis end point coordinate of thread part. --- Absolute/Incremental position

: Z axis end point coordinate of thread part. --- Absolute/Incremental position

: Taper height constituent in thread part (radius value). When i = 0 is set, straight screw is made.

: Thread height. Designate the thread height in a positive radius value.

: Cut depth. Designate the first cut depth in a positive radius value.

: Thread lead

Configuration of one cycle

In one cycle, 1, 2, 5, and 6 move at rapid traverse feed and 3 and 4 move at cutting feed designated in F command.

When Ri is negative

When Ri is positive

r x

k

z w

S

u/2
1
2
3
4
5
6
a /2
(- i)
r
x
i
k
z w
S
u/2
1
2
3 4
5
6
a /2
k

a
First time d
Second time
d 2
nth time d n
Finishing allowanced
(Cut "m" times at finishing)

12.1.3.7 Small-diameter Deep-hole Drilling Cycle
In deep hole drilling, cutting and retract are repeated and the workpiece is machined multiple times. In addition, when PLC signals are input during cutting, the cutting for the time concerned is skipped. In this way, this cycle reduces the load applied to the tool.
Command format
The small-diameter deep-hole drilling cycle mode is established by designating the M code command which was set in the parameter.
If the G83 command is designated in this mode, the small-diameter deep-hole drilling cycle is executed.
The mode is canceled by the following conditions.
- Designation of a fixed cycle cancel command (G80, G commands in Group 1)
- Resetting
The signal is not output in respect to the M command which changes the mode to the small-diameter deep-hole drilling mode.
12.1.4 Mirror Image
12.1.4.1 Mirror Image by Parameter Setting
A parameter is used to designate the axis for which the mirror image function is to be executed before the machining program is run.
When mirror image is set to ON by the parameter, an operation which is symmetrical on the left and right or at the top or bottom is performed.
Each axis has its own parameter.
12.1.4.2 Mirror Image by External Input
Signals from an external device (PLC) to request the mirror image operation either while a machining program is running or before it is run.
When ON has been set for mirror image from an external device, an operation which is symmetrical on the left and right or at the top or bottom is performed.
Each axis has its own request signal.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
G83 Xx1 Yy1 Zz1 Rr1 Qq1 Ff1 Ii1 Pp1 ;
Xx1, Yy1
Zz1
Rr1
Qq1
Ff1
Ii1
Pp1
: Hole drilling position
: Hole bottom position
: R point position
: Depth of cut in each pass (designated with incremental position)
: Cutting feed rate
: Feedrate from R point to the cutting start position, the speed for returning from hole bottom
: Dwell time at hole bottom position
M850W M830W M850S M830S M80W M80
TypeA
M80

TypeB
E80
TypeA
E80
TypeB C80
M
L
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L

12.1.4.3 Mirror Image by G Code
Using a program for the left or right side of a shape, this function can machine the other side of the shape when a left/right symmetrical shape is to be cut.
Mirror image can be applied directly by a G code when preparing a machining program.
The program format for the G code mirror image is shown below.
With the local coordinate system, the mirror image is applied with the mirror positioned respectively at x1, y1 and z1.
The program format for the G code mirror image cancel is shown below.
The x1, y1 and z1 indicate the axes for which the mirror image function is to be canceled and the coordinate position is ignored.
In the case of G51.1 Xx1 ;
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
Gcode Function
G50.1
G51.1
G code mirror image cancel
G code mirror image ON
G51.1 Xx1 Yy1 Zz1 ;
G51.1
Xx1,Yy1,Zz1
: Mirror image on
: Command axes and command positions
G50.1 Xx1 Yy1 Zz1 ;
G50.1
Xx1,Yy1,Zz1
: Mirror image cancel
: Command axes
X
Y
Original shape (program) Shape achieved when machining
program for the left side has been
executed after the mirror command
Mirroring axis

12.1.4.4 Mirror Image for Facing Tool Posts
With machines in which the base tool post and facing tool post are integrated, this function enables the programs prepared for cutting at the base side to be executed by the tools on the facing side.
The distance between the two posts is set beforehand with the parameter.
The command format is given below.
When the G68 command is issued, the subsequent program coordinate systems are shifted to the facing side and the movement direction of the X axis is made the opposite of that commanded by the program.
When the G69 command is issued, the subsequent program coordinate systems are returned to the base side.
The facing tool post mirror image function can be set to ON or OFF automatically by means of T (tool) commands without assigning the G68 command.
A parameter is used to set ON or OFF for the facing tool post mirror image function corresponding to the T commands.
12.1.4.5 T Code Mirror Image for Facing Tool Posts
If, when tools that correspond to tool Nos. 1 to 64 are selected (T commands), these are tool Nos. for which the facing tool post mirror image function has already been designated with a parameter, the status equivalent to G68 (facing tool post mirror image ON) is established. When the commands apply to tool Nos. for which the facing tool post mirror image function is not designated, the status equivalent to G69 (facing tool post mirror image OFF) is established.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80

M
L
Gcode Function
G68
G69
Facing tool post mirror image ON
Facing tool post mirror image OFF
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
Z
X

(G69)
(G68)
Programmed path
Facing side path (mirror
image ON)
Base post
Parameter for distance
between posts (radial value,
X axis only)
Facing post

12.1.5 Coordinate System Operation
12.1.5.1 Coordinate Rotation by Program
Coordinate rotation by program is used to rotate the programmed shape by the specified angle and to machine it.
Even complex shapes can be easily machined in the rotated position.
The program format for the coordinate rotation command is given below.
(1) M system
(Example)
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
G68 X__ Y__ R__ ; Coordinate rotation ON
G69 ; Coordinate rotation cancel
X,Y : Rotation center coordinates
R : Angle of rotation
X'
X
Y'
Y
R
W
W'
Rotation center coordinate (Programmed
coordinate)
Actual machining
shape
Coordinate system
before rotation
Coordinate system after rotation

(2) L system
(Note) This function rotates the coordinate system and realizes mainly drilling and tapping.
(Example)
G68.1 X__ Z__ R__ ; Coordinate rotation ON
G69.1 ; Coordinate rotation cancel
X,Z : Rotation center coordinates
R : Angle of rotation
X
Z
X
Z
W
W
Coordinate system
after rotation
Actual
machining

shape
(Programmed coordinate)
Coordinate system
before rotation
Rotation
center
coordinate
Rotation
angle

12.1.5.2 Coordinate Rotation by Parameter
If a deviation occurs between the workpiece alignment line and machine coordinate system's coordinate axis when the workpiece is mounted, the machine can be controlled to rotate the machining program coordinates according to the workpiece alignment line deviation. The coordinate rotation amount and the rotation center are set with the parameters.
The coordinate rotation amount can also be set with the G10 command.
(1) As for the rotation center coordinate position, designate the position on the machine coordinate system.
(2) All workpiece coordinate systems from G54 to G59, G54.1 rotate with the rotation command.
The machine coordinate system does not rotate.
(3) If the setting is made on the parameter screen, the setting value will be valid at the timing of the followings:
Automatic operation:
After setting the parameters, the setting value will be valid from the next block.
Manual operation:
After setting the parameters, the setting value will be valid when the PLC signal (Coordinate rotation by parameter: Coordinate switch for manual feed) is ON.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
Ym
Xm
G56
G54
G55
G57
W1'
W2'
W3'
W4'
M
W1
W2
Rotation center
Rotation angle

12.1.5.3 3-dimensional Coordinate Conversion
With the 3-dimensional coordinate conversion function, a new coordinate system can be defined by rotating and moving in parallel the zero point in respect to the X, Y and Z axes of the currently set workpiece coordinate system. By using this function, an arbitrary spatial plane can be defined, and machining on that plane can be carried out with normal program commands.
When the G68 (M system) /G68.1 (L system) command is issued, the zero point is shifted by the command value (x, y, z) in respect to the current local coordinate system. A new G68/G68.1 program coordinate system rotated by the designated rotation angle r in respect to the commanded rotation center direction (i, j, k) is created.
The local coordinate system is the same as the workpiece coordinate system when the local coordinate system offset is not ON.
The program format is as follows.
(1) M system
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
G68 X__ Y__ Z__ I__ J__ K__ R__ ;
G68 : 3-dimensional coordinate conversion mode command
X,Y,Z : Rotation center coordinates
I,J,K : Rotation center axis direction
R : Rotation angle
G69 ;
G69 : 3-dimensional coordinate conversion mode cancel command
Y
X
Z
X
Z

Y
G68/G68.1 program
coordinate system
Workpiece coordinate
system Machine coordinate
system

(2) L system
G68.1 X__ Y__ Z__ I__ J__ K__ R__ ,E__ ;
G68.1 3-dimensional coordinate conversion mode command
X,Y,Z Rotation center coordinates
I,J,K Rotation center axis direction
R Rotation angle
,E Command coordinate system selection
G69.1 ;
G69.1 3-dimensional coordinate conversion mode cancel command

12.1.6 Dimension Input
12.1.6.1 Corner Chamfering/Corner R
This function executes corner processing by automatically inserting a straight line or an arc by the commanded amount between two consecutive movement blocks (G01/G02/G03).
The corner command is executed by assigning the ",C" or ",R" command for the block at whose end point the corner is inserted.
(1) Corner chamfering I/ Corner R I
When ",C" or ",R" is commanded for linear interpolation, corner chamfering or corner R can be inserted between linear blocks.
(Note 1) If a corner chamfering or corner R command is issued specifying a length longer than the N1 or N2 block, a program error occurs.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
Corner chamfering I Corner R I
Example: Example:
N1 G01 Xx1 Zz1 ,Cc1 ;
N2 Zz2 ;
N1 G01 Xx1 Zz1 ,Rr1 ;
N2 Zz2 ;

N1 G01 Xx1 Zz1 ,Cc1 ;
N2 Zz2 ;
N 2
N 1
c 1
c 1

N1 G01 Xx1 Zz1 ,Rr1 ;
N2 Zz2 ;
N 2
r 1
N 1

(2) Corner chamfering II/ corner R II
When ",C" or ",R" is commanded in a program between linear-circular, corner chamfering or corner R can be inserted between blocks.
When the parameters are set, "I_", "K_", "C_" can be used to command chamfering instead of ",C", and "R_" can be used to command rounding instead of ",R_". (L system only)
(a) Corner chamfering II (Linear - circular)
(b) Corner chamfering II (Circular - linear)
(c) Corner chamfering II (Circular - circular)
Cc1
1
2
Cc1
Example:G01 X_Z_ ,Cc1;
G02 X_Z_ Ii1 Kk1;
Hypothetical corner intersection
Chamfering end point
Chamfering start point
Cc1
2
1
Cc1
Example:G03 X_Z_ Ii1 Kk1 ,Cc1;

G01 X_Z_;
Hypothetical corner intersection
Chamfering end point
Chamfering start point
2
Cc1
1
Cc1
Example:G02 X_Z_ Ii1 Kk1 ,Cc1;
G02 X_Z_ Ii2 Kk2;
Hypothetical corner intersection
Chamfering
end point
Chamfering
start point

(d) Corner R II (Linear - circular)
(e) Corner R II (Circular - linear)
(f) Corner R II (Circular - circular)
2
1
Rr1
Example:
G02 X_Z_ Ii1 Kk1;
G01 X_Z_ ,Rr1;
Hypothetical corner
intersection
Corner R start point
Corner R end point
2
1
Rr1
Example: G03 X_Z_ Ii1 Kk1 ,Rr1;
G01 X_Z_;
Corner R end point
Corner R start point
Hypothetical corner
intersection
2
1
Rr1
Example: G02 X_Z_ Ii1 Kk1 ,Rr1;
G02 X_Z_ Ii2 Kk2;
Corner R start point
Corner R
start point
Hypothetical corner intersection

(3) Specification of corner chamfering Expansion/ corner R Expansion
An E address can be used to specify the speed for corner chamfering or corner R. This enables a corner to be cut to a correct shape.
(Example)
An E address is a modal and remains effective for feeding in next corner chamfering or corner R.
An E address has two separate modals: synchronous and asynchronous feed rate modals. The effective feed rate is determined by synchronous (G95) or asynchronous (G94) mode.
If an E address is specified in 0 or no E command has been specified, the feed rate specified by an F command is assumed as the feed rate for corner chamfering or corner R.
An E address modal is not cleared even if the reset button is pressed.
It is cleared when the power is turned OFF. (In the same manner as F commands.)
F
F
F
F
E
E
X_Z_ ;
X_Z_ ;
X
Z
G01 X_Z_ ,Cc1 Ff1 Ee1 ;
G01 X_Z_ ,Rr1 Ff1 Ee1 ;

(4) Corner chamfering / corner R (I, K designation) (L system only)
With this command format, by means of parameter settings, corners are chamfered using the "I", "K" or "C" address without a comma, and corners are rounded using the "R" address.
The ",C" and ",R" addresses with commas can also be used.
(a) Corner chamfering (I, K designation)
Corners are chamfered using the "I_", "K_" or "C_" address with no comma.
Corners can be chamfered to any angle.
Signs, if they are provided for the corner chamfering commands, are ignored.
Command format
- If multiple "I", "K" or "C" addresses or duplicated addresses have been designated in the same

block, the last address will take effect.
- If both corner chamfering and corner R commands are present in the same block, the last command will take effect.
- If "C" is used as the name of an axis, corner chamfering commands cannot be designated using the "C" address.
- If "C" is used as a 2nd miscellaneous function, corner chamfering commands cannot be designated using the "C" address.
- Corner chamfering commands using the "I" or "K" address cannot be designated in an arc command block. "I" and "K" are the arc center commands.
N100 Xx1/Uu1 Zz1/Ww1 Ii1/Kk1/Cc1 ;
N200 Xx1/Uu1 Zz1/Ww1 ;
Xx1/Uu1
Zz1/Ww1
Ii1/Kk1/Cc1
: X-axis end point coordinate
: Z-axis end point coordinate
: The length from the hypothetical corner intersection to the chamfering start point or
chamfering end point is designated using the I, K or C address.
N100
0 Z
X
N200
i, k, c
i, k, c Chamfering start point
Chamfering end point
Hypothetical corner
intersection
M800/M80/E80/C80 Series Specifications Manual (Function)
12 Program Support Functions
IB-1501505-N 284
(b) Corner R (I, K designation)
Corners are rounded using the "R_" address with no comma.
Corners can be rounded to any angle.
Signs, if they are provided for the corner R commands, are ignored.
Command format
- If both corner chamfering and corner R commands are present in the same block, the last address will take effect.
- Corner R commands using the "R" address cannot be designated in an arc command block. "R" is regarded as the arc radius command in such a block.
N100 Xx1/Uu1 Zz1/Ww1 Rr1 ;
N200 Xx1/Uu1 Zz1/Ww1 ;
Xx1/Uu1
Zz1/Ww1
Rr1
: X-axis end point coordinate
: Z-axis end point coordinate
: Radius of corner R arc
N100
0 Z
X
N200
r
Hypothetical corner
intersection
Corner R end point
Corner R start point
M800/M80/E80/C80 Series Specifications Manual (Function)
12 Program Support Functions
285 IB-1501505-N
(5) Interrupt during corner chamfering / Interrupt during corner R
Shown below are the operations of manual interruption during corner chamfering or corner R.
(a) With an absolute command and manual absolute switch ON:
(b) With an incremental command or manual absolute switch OFF:
N1 G28 XZ;
N2 G00 X40. Z120.;
N3 G03 X140.Z70. K-50. ,R20. F100 ;
N4 G01 X40. Z20. ;
:
Amount of interruption
Path with interruption
Path without interruption
N1 G28 XZ;
N2 G00 U40. W120.;
N3 G03 U100. W-50. K-50. ,R20.
F100 ;
N4 G01 U-100.W-50. ;
:
Amount of interruption
Path with interruption
Path without interruption
X
140.
40.
20. 70.
N4
N3
120.
Z

(mm)
X
140.
40.
20. 70.
N4
N3
120.
Z
(mm)

12.1.6.2 Linear Angle Command
The end point coordinates are automatically calculated by assigning one element (one component of the selected plane) of the end point coordinates and the linear angle.
Example
(Note 1) If the axis "A" or 2nd miscellaneous function "A" is used, address "A" is treated as the axis "A" command or the 2nd miscellaneous function, respectively.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
G17 Xx1 Aa1 ; or G17 Yy1 Aa1 ;
G17
Xx1,Yy1
Aa1
: Plane selection
: 1 element of the end point coordinate
: Angle
X
Y
X
Y

End point (Automatically
calculated with operation)
Start point

12.1.6.3 Geometric Command
(1) Geometric I
When it is difficult to calculate the intersection point of two straight lines in a continuous linear interpolation command, the end point of the first straight line will be automatically calculated inside the CNC and the movement command will be controlled, provided that the slope of the first straight line as well as the end point coordinates and slope of the second straight line are commanded.
(2) Geometric IB
With the geometric IB function, the contact and intersection are calculated by commanding an arc center point or linear angle in the movement commands of two continuous blocks (only blocks with arc commands), instead of commanding the first block end point.
(a) Two-arc contact
(b) Linear-arc (arc-linear) intersection
(c) Linear-arc (arc-linear) contact
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L

X
Z 1st straight line
Intersection point
(automatic calculation)
2nd straight line
Angle Angle
Horizontal axis
End point
Current position
X
Z 1st arc
Contact point
(automatic
calculation)
2nd arc
Radius
Radius

Arc center
End point
Current position
Arc center
X
Z
1st block (arc)
Intersection point
(automatic calculation)
2nd block (linear)
Arc center
End point Current position
Arc center
Current position
Intersection point
(automatic calculation)
End point
2nd block (arc)
1st block (linear)
X
Z
2nd block
(arc)
Contact point
(automatic calculation)
2nd block (linear)
Radius
End
point
Current
position
Current position
Contact point
End (automatic calculation)
point
1st block (arc) 1st block (linear)
Radius

12.1.6.4 Polar Coordinate Command
With this function, the end point position is commanded with the radius and angle.
Command format
Example of program
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
G16 ; Polar coordinate command mode ON
G15 ; Polar coordinate command mode OFF
G1x ;
G16 ;
Plane selection for polar coordinate command (G17/G18/G19)
Polar coordinate command mode ON
G9x G01 Xx1 Yy1 F2000 ;
:
Polar coordinate command
G9x : Center selection for polar coordinate command (G90/G91))
G90The workpiece coordinate system zero point is the polar coordinate center.
G91The present position is the polar coordinate center.
x1 : 1st axis for the planeThe radius commanded
y1 : 2nd axis for the planeThe angle commanded

G15 ; Polar coordinate command mode OFF
y1
x1
X
Y
Commanded position
(end point)
For G90/G17(X-Y plane)
Plus
Minus Present position

12.1.7 Axis Control
12.1.7.1 Chopping
12.1.7.1.1 Chopping
This function continuously raises and lowers the chopping axis independently of the program operation when workpiece contours are to be cut. It can be used for grinding operations using machining centers, for instance.
Which of the axes is to serve as the chopping axis is set by a parameter beforehand.

(1) Chopping action
(Note 1) The upper dead point position, lower dead point position and number of cycles are set and the start and stop commands are designated by input signals from the user PLC.
(Note 2) The setting for the number of cycles differs according to the motor, inertia and other factors.
The chopping operation is performed as follows.
(a) The axis moves from the base position to the upper dead point by rapid traverse.
(b) Next, the axis moves repeatedly from the upper dead point to the lower dead point and then from the lower dead point to the upper dead point. (Sinusoidal waveforms)
The feed rate is tailored to achieve the number of cycles set for the up/down motion.
Chopping override
Override in 1% increments from 0% to 100% can be applied to the chopping operation.
(Note) Bear in mind that the override increment differs according to the machine specifications.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
The chopping operation is initiated by setting the upper dead point position, lower dead point position and number of cycles (number of up/down movements per minute) and pressing the chopping start switch.
Grindstone
Chopping action
Workpiece
Base position
Upper dead point
Lower dead point
Start Stop
Rapid traverse Rapid traverse

12.1.7.2 Normal Line Control
This function controls the swiveling of the C axis (rotary axis) so that the tool is always pointing in the normal line direction for the X and Y axes movement commands during program operation. It can be used for machining hale, for sewing operations involving sewing machines, carpets, etc. It is valid for only one C axis (rotary axis).
At the block seams, the C axis turning is controlled so that the tool faces the normal line direction at the next block's start point.
During arc interpolation, the C axis turning is controlled in synchronization with the operation of arc interpolation.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
Gcode Function
G40.1
G41.1
G42.1
Normal line direction control cancel
Normal line direction control left ON
Normal line direction control right ON
C-axis center (rotary axis)
C axis swiveling
Tool tip position
C-axis center (rotary axis)
Tool
Tool end position

12.1.7.3 Circular Cutting
In circular cutting, a system of cutting steps are performed: first, the tool departs from the center of the circle, and by cutting along the inside circumference of the circle, it draws a complete circle, then it returns to the center of the circle.
The position at which G12 or G13 has been programmed serves as the center of the circle.
The program format is given below.
When the G12 command is used (path of tool center)
012345670
When the G13 command is used (path of tool center)
076543210
(Note 1) Circular cutting is carried out on the plane which has been currently selected (G17, G18 or G19).
(Note 2) The (+) and (-) signs for the compensation amount denote reduction and expansion respectively.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80

TypeA
E80
TypeB C80
M
L
G12/(G13) Ii Dd Ff ;
G12
G13
Ii
Dd
Ff
: Circular cutting command CW (clockwise)
: Circular cutting command CCW (counter clockwise)
: Radius of complete circle
: Compensation No.
: Feed rate
Y
X
1
2
3
4
5
6
7
0
Radius
of circle
Compen sation
amount

12.1.7.4 Vibration Cutting Control
While cutting machining is performed, the chips can be dispersed by applying vibration in synchronization with the spindle rotation to the feed axis so that an air-cutting zone is made. Difficult-to-cut workpieces such as stainless steel can be machined easily and at high speed. In addition, this function can reduce the heat generated by machining and extend tool life.
(Note 1) The vibration cutting extension unit is required. [M8]
(Note 2) The vibration axis is the only one in the commanded part system. (Only the specified single axis vibrates even for the cutting command of two or more axes such as a taper.)
(Note 3) This function may affect the surface quality of the workpiece as the axis vibration. Use it for the machining such as rough machining.
[Lathe system]
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
0 180 360 540 720
X
Z
The tool performs machining
while vibrating in the cutting
direction.
When an air-cutting zone is
made, granule-size chips are
dispersed.
Cutting is completed at the first rotation, thus this
zone is regarded as an "air-cutting zone" at the
second rotation.
Second rotation's
machining path
Cutting zone at the first rotation Zone that is cut at the first rotation
Air-cutting zone that is
made by cutting at the
second rotation
Zone that is cut at
the second rotation
and dropped as a
chip
Feed axis
position
Spindle rotation position (degree)

12.1.8 Multi-part System Control
12.1.8.1 Timing Synchronization between Part Systems
Multiple machining programs can be operated independently at same time for multi-axis and multi-part system mixed control CNC. This function enables the timing synchronization between part systems or the operation of only one part system while the machining programs are being operated independently for each part system.
Command format

Timing synchronization with ! code
Timing synchronization with ! code is also valid among three part systems and more.
Timing synchronization with M code
The range of M code for the timing synchronization is determined with the minimum and maximum values set with the parameter beforehand.
(Note 1) The timing synchronization can be disvalued with the parameter setting and "Timing synchronization between part systems ignored" signal. When a part system to be waited for a simultaneous operation is not operating, the currently operating part system will move on to the next block without executing timing synchronization.
This function is useful when conducting a program check on each part system.
(Note 2) The timing synchronization command is normally assigned as a separate command. However, if a movement command and M, S or T command have been assigned in the same block, a parameter is set to decide whether timing synchronization is executed upon executing of the movement command and M, S or T command, or the movement command and M, S or T command are executed upon completion of timing synchronization.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
!n (!m... L ;
!n !m : Part system number for timing synchronization (Multiple command can be performed.)
Follows the parameter if part system number is omitted.
L : Timing synchronization number (0 to 9999)
M*** ;
*** : M code for timing synchronization
Pi 1
Pi 1 Pi 2
Pn 1 Pn 2
Pm 1 Pm 2
Pn 1
Pm 1
Pi 2 Pi 2 Pi 2
!n !m L1;
!i !m L1;
!i !n L1; Simultaneously start after
timing synchronization block
Timing
synchronization
wait
wait
Part system i
program
Part system i
Part system n
Part system m
Simultaneously start
Part system n
program
Part system m
program
Timing
synchronization

12.1.8.2 Start Point Designation Timing Synchronization
Multiple machining programs can be operated independently at same time for multi-axis and multi-part system mixed control CNC. This function enables the timing synchronization with the position in the movement block while the machining programs are being operated independently for each part system.
When a workpiece is being delivered from part system 1 to part system 2, the movement operation in part system 2 can be started in the middle of the part system 1 tool post movement with this function so that the machining time can be reduced.
A part system for start point designation timing synchronization can be designated by adding ! code on the command block G115 and G116.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L

(1) Start point designation timing synchronization Type 1 (G115)
Command format
(a) The other part system starts first when timing synchronization is executed.
(b) The own part system waits for the other part system to move and reach the designated start point, and then starts.
(c) When the start point designated by G115 is not on the next block movement path of the other part system, the

own part system starts once the other part system has reached each start point axis coordinate position.
!n L G115 X Z C ;
!n : Part system number for timing synchronization
L : Timing synchronization number (0 to 9999)
G115 : G command
X Z C : Start point (Designate an axis which checks the timing synchronization and workpiece coordinate value in other part system)
!1 G0 X_
!2 G115
!2 G115
!1 G0 X_
Part system 2
(Other part system)
Part system 1
(Own part system)
Part system 2
(Other part system)
Part system 1
(Own part system)
Designated start point
Designated start point
Timing synchronization
Timing synchronization
X
Z
Z passes through.
X also passes
through.
: Movement
: Command point
: Actual start point

(2) Start point designation timing synchronization Type 2 (G116)
Command format
(a) The own part system starts first when timing synchronization is executed.
(b) The other part system waits for the own part system to move and reach the designated start point, and then starts.
(c) When the start point designated by G116 is not on the next block movement path of the own part system, the other part system starts once the own part system has reached each start point coordinate position.
!n L G116 X Z C ;
!n : Part system number for timing synchronization
L : Timing synchronization number (0 to 9999)
G116 : G command
X Z C : Start point (Designate an axis which checks the timing synchronization and workpiece coordinate value in own part system)
!1
!2 G116
!2 G116
!1
G0 X_
G0 X_
Part system2
(Other part system)
Part system 1
(Own part system)
Part system2
(Other part system)
Part system1
(Own part system)
Designated start point
Designated start point
Timing synchronization
Timing
synchronization
X
Z
Z passes through.
X also passes
through.
: Movement
: Command point
: Actual start point

12.1.8.3 Mixed Control
12.1.8.3.1 Mixed Control (Cross Axis Control)
Performs the mixed control (cross axis control) by G command or PLC signal.
Any axis to be replaced by another axis between part systems.
This makes it possible to perform operations which are not possible with regular axis configurations; for instance, tools which are provided only on part system 1 can be used for machining on part system 2.
This function cannot be used with arbitrary axis exchange control.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB

E80
TypeA
E80
TypeB C80
M
L
C1 C2
Z2
Z1
Z1
X1
X2
X1
X2
Z2
C1 C2
Mix X1 axis and
X2 axis.
1st part system
(X1, Z1, C1)
2nd part system
(X2, Z2, C2)
1st part system 2nd part system
(X1, Z2, C2)

12.1.8.3.2 Arbitrary Axis Exchange Control
An arbitrary axis can be exchanged freely between part systems in the multiple part systems.
The machining can be freer in the multiple part systems by exchanging an axis which can be commanded for machining programs in each part system.
This makes it possible to perform operations which are not possible with regular axis configurations; for instance, tools which are provided only on the 1st part system can be used for machining on the 2nd part system.
This function cannot be used with the mixed control (cross control).
(Example) Using X1 axis in part system 2
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
Before axis exchange After axis exchange
1st part system (X1, Z1, C1)
Machining with 1st spindle
2nd part system (X2, Z2, C2)
Machining with 2nd spindle
1st part system (Z1, C1)
Machining with 1st spindle
2nd part system (X1, Z2, C2)
Machining with 2nd spindle
2nd tool post 2nd tool post
1st tool post 1st tool post
C1 C2
Z2
Z1
X1
X2
X1
Z2
C1 C2

Command format
Arbitrary axis exchange command
Commands the arbitrary axis exchange by G140.
Arbitrary axis exchange return command
Returns the control right of the axis, exchanged by the previous arbitrary axis exchange command (G140) in the commanded part system, to the state before the axis exchange.
Reference axis arrange return command
Returns the control right of the axis, exchanged by the arbitrary axis exchange command (G140) in the commanded part system, to the power-on state.
(Note) For G code list 6 and 7, replace G140, G141 and G142 with G165, G166 and G167.
G140 command address = axis address command address = axis address...;
Command address : Designate the command address used in commands such as the movement command with one alphabetical character set to the parameter after the arbitrary axis exchange command (G140).
Axis address : Designate the axis name for arbitrary axis exchange with two alphanumeric characters set to the parameter.
G141 ;
G142 ;

12.1.8.4 Control Axis Superimposition

12.1.8.4.1 Control Axis Superimposition

In the multi-part system, an axis in a part system can be superimposed on an axis in another part system and can be controlled.

This is effective when machining by the 1st part system (X1, Z1) and the 2nd part system (X2, Z2) are executed simultaneously for the machine configuration where a workpiece moves by a movement command to the Z axis direction. The machining of the reference axis part system (the 1st part system) and the superimposed axis (the 2nd part system) can be operated simultaneously with no need to fix the workpiece position for machining in the superimposed part system (the 2nd part system).

The control axis superimposition can be commanded with G code or PLC signal.

Command format

Superimposition start command

Superimposition end command

M850W M830W M850S M830S M80W M80

TypeA

M80

TypeB

E80

TypeA

E80

TypeB C80

M

L

Reference axis: The basic in the control axis superimposition function (moves only by its own axis command)

Superimposed axis: The axis which moves including the reference axis movement in the control axis superimposition function (moves by reference axis or/and own axis command).

G126 Superimposed axis name = Reference axis name,P__ ;

Superimposed axis name : Specify the superimposed axis name for the superimposition control with 2 alphanumeric characters set to the parameter.

Reference axis name : Specify the reference axis name for the superimposition control with 2 alphanumeric characters set to the parameter.

Put the symbol "-" at the beginning of the reference axis name for synchronizing the superimposed axis with the reference axis in the reverse direction.

, (comma) : Specify as delimiter when the address is needed to be assigned after "superimposed axis name = reference name".

P : Superimposed axis workpiece coordinate system designation (The command range of the coordinate value is mm/inch. The decimal point command is valid.)

G126 Superimposed axis name;

Superimposed axis name : Specify the name of the superimposed axis which is working for the superimposition control with 2 alphanumeric characters set to the parameter.

While using the control axis superimposition function, the workpiece zero point of the superimposed axis moves according to the movement amount of the reference axis. Because the superimposed axis tries to maintain the position in the workpiece coordinate system, it moves as much as the movement amount of the reference axis.

Superimposition control among 3 axes

Superimposition can be controlled among 3 axes.

3 axes tandem superimposition is the condition that an axis is the superimposed axis and becomes the reference axis for another superimposed axis at same time. The first superimposed axis is "1st superimposed axis" and the other axis is "2nd superimposed axis" for 3 axes tandem superimposition.

12.1.8.4.2 Arbitrary Axis Superimposition Control

The arbitrary control axis in other part system can be moved by superimposing on the movement command for the arbitrary control axis in own part system.

M850W M830W M850S M830S M80W M80

TypeA

M80

TypeB

E80

TypeA

E80

TypeB C80

M

L

X1 G126 Z2 = Z1;

Z1

Z1

Z2

Z2

1st tool post

2nd tool post

Before

movement

After

movement

Command :

Reference axis :

Superimposed axis :

(Reference axis)

(Superimposed axis)

X1

G126 Z2 = Z1; Z1

:

G126 Z3 = Z2;

Z1

Z2

Z3

Z2

Z3
1st tool post
2nd tool post
(Reference axis)
(1st superimposed axis)
(2nd superimposed axis)
Before
movement
Command :
Reference axis :
1st superimposed axis :
2nd superimposed axis :
After
movement

12.1.8.5 Control Axis Synchronization between Part Systems
Synchronization control enables an arbitrary control axis in the other part system to move in synchronization with the movement command assigned to an arbitrary control axis.
The direction in which the axis is to move synchronously can also be reversed using a parameter.
[Example of machining to synchronize X2 axis to X1 axis, Y2 axis to Y1 axis, and Z2 axis to Z1 axis in the 1st part system (X1, Y1, Z1) and 2nd part system (X2, Y2, Z2) (Machining center system)]
[Example of machining to synchronize Z2 axis to Z1 axis in the 1st part system (X1, Z1) and 2nd part system (Z2) (Lathe system)]
During synchronization, as the synchronized axis moves in synchronization with the reference axis regardless of automatic operation or manual operation, the movement command cannot be issued to the synchronized axis.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
Part system 1X1,Y1,Z1) Part system 2 X2,Y2,Z2)
Y1 (Reference axis) Y2 (Synchronized axis)
Z1
(Reference axis) Z2
(Synchronized axis)
X1 (Reference axis) X2 (Synchronized axis)
X1
Part system 1 (X1, Z1) Part system 2 (Z2)
Z1 (Reference axis) Z2 (Synchronized axis)

There are two types of control axis synchronization between part systems depending on the command method: Control axis synchronization between part systems I (G command) and control axis synchronization between part systems II (PLC signal). The method is chosen depending on the parameter setting.
Command format (Control axis synchronization between part systems I)
Synchronization start command
Synchronization end command
G125 Synchronized axis name = Reference axis name ;
Synchronized axis name : Command the axis name to be operated as synchronized axis under the control axis synchronization between part systems with two alphanumeric characters set to the
parameter.
Reference axis name : Command the axis name to be operated as reference axis under the control axis synchronization between part systems with two alphanumeric characters set to the
parameter.
G125 Synchronized axis name ;
Synchronized axis name : Command the axis name to be operated as synchronized axis under the control axis synchronization between part systems with two alphanumeric characters set to the
parameter.

12.1.8.6 Balance Cut
Multiple machining programs can be operated independently at same time for multi-axis and multi-part system mixed control CNC. This function enables the operation start timing synchronization between tool posts of two part systems.
When workpiece that is relatively long and thin is machined on a lathe, deflection may result, making it impossible for the workpiece to be machined with any accuracy. In cases like this, the deflection can be minimized by holding tools simultaneously from both sides of the workpiece and using them in synchronization to machine the workpiece (balance cutting). This method has an additional advantage: since the workpiece is machined by two tools, the machining time is reduced.
This function enables the movements belonging to two different part systems to be synchronized so that this kind of machining can easily be accomplished.
Command format
Balance cut command ON (modal)
* In LI can be omitted.
Balance cut command OFF (modal)
(Note) The G code varies depending on the G code list.
G14 and G15 are modal commands. When the G15 command is assigned, the timing synchronization is being executed in all of the cutting feed command blocks until the G14 command is assigned or until the modal information is cleared by the reset signal. The timing synchronization is possible in all blocks by the parameter.
M850W M830W M850S M830S M80W M80

TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
!n L__ G15 ;
!n : Part system number for balance cut
Follows the parameter if the part system number is omitted.
L : Timing synchronization number (0 to 9999)
G14 ;
G code list other than 6/7 G code list 6, 7
Balance cut command ON G15 G68
Balance cut command OFF G14 G69
$1
$3

Whereas synchronization is possible only with the next block when using the code "!" of timing synchronization between part systems, the balance cutting function provides synchronization (at the block start timing) with multiple consecutive blocks.
:
:
:
:
T 0 1 01;
G00 X_ Z_;
!3G15;
G01 Z_ F0. 4;
T 0 1 0 2;
G00 X_ Z_;
!1G15
G01 Z_ F0. 4;
Part system 1 program Part system 3 program

12.1.8.7 Common Memory for Part Systems
For a machine with multiple part systems, the common variables and tool compensation memory which exist for each part system can be made common for all part systems by setting the parameters.
(1) Common variables
In the multi-part system, normally the common variables #100 to #199 are used for each part system, and variables #500 to #999 are common for the part systems. When this function is valid, the common variables #500 to #999 also become variables for each part system.
To use part or all of the common variables #100 to #199 and #500 to #999 commonly for all part systems, set the number of parameters to be used commonly for the part systems in variables #100 to #199 and #500 to #999.
As for the variables designated to be common to part systems, the data for part system 1 is used.
(2) Tool compensation memory
When this specification is valid, the tool compensation memory used for operation in the 2nd or following part system changes to be used with the part system 1 data. Thus, the 2nd part system and following data is not used when the common data is used for the part systems.
This function is only for the lathe system and supported up to 2 part systems.
(Note) The setting (such as number of axes and axis names) for the tool compensation amount of part system 1 and part system 2 must be the same.
If the settings differ, the setting of part system 1 will be applied.
12.1.8.8 Multi-part System Simultaneous Thread Cutting
Multi-part system simultaneous thread cutting allows different part systems to perform thread cutting simultaneously on one spindle.
Multi-part system simultaneous thread cutting has two commands; the command (G76.1) for simultaneously cutting threads in multiple places, which is known as "multi-part system simultaneous thread cutting cycle I", and the command (G76.2) for simultaneously cutting a thread by two part systems, which is known as two-part system simultaneous thread cutting cycle II".
Chamfering is available for multi-part system simultaneous thread cutting cycle I and two-part system simultaneous thread cutting cycle II.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
Multi-part system simultaneous
thread cutting cycle I (G76.1)
Two-part system simultaneous
thread cutting cycle II (G76.2)
1st part system
3rd part system
4th part system
1st part system
2nd part system

12.1.8.8.1 Two-part System Simultaneous Thread Cutting
When G76.2 is issued in the 1st and 2nd part systems, waiting is done until G76.2 is issued in each part system.
The thread cutting cycle starts when the commands are aligned properly.
G76.2 assumes the same thread cutting, and deeply cuts in with the cutting amount using 1st part system and 2nd part system alternately.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
: :
:
:
: :
$1 $2
G00 X Z ;
G76.2 ; G00 X Z ;
G76.2 ;
K

a
Finishing allowance d
d
d2
dn
Cutting with 1st
part system
Cutting with
1st part
system
Cutting with
1st part system
Cutting with 2nd
part system
Cutting with 2nd
part system Cutting with
2nd part
system

Command format
(Note) Two-part system simultaneous thread cutting cycle II (G76.2) can be commanded in part system 1 or 2 only. A program error will occur when issuing the command in the other part systems.
G76.2 X/U__ Z/W__ R__ P__ Q__ A__ F__ ;
X/U : X-axis end point coordinates of thread section
Z/W : Z-axis end point coordinates of thread section
R : Taper height component at thread section
P : Thread height
Q : Cut amount
A : Thread cutting start shift angle
F : Thread lead

12.1.8.8.2 Multi-part System Simultaneous Thread Cutting
If G76.1 is given to multiple part systems, each part system waits for G76.1 to be commanded.
The thread cutting cycle starts when the G76.1 commands are aligned properly.
When "J134" is commanded in $1, $3 and $4
Command format
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
G76.1 X/U__ Z/W__ R__ P__ Q__ J__ F__ ;
X/U : X axis end point coordinate of thread part
Z/W : Z axis end point coordinate of thread part
R : Taper height constituent in thread part
P : Thread height
Q : Cut depth
J : Part system for simultaneous thread cutting
Ones digit: Part system number for the 1st set
Tens digit: Part system number for the 2nd set
:

Ten-millions digit: Part system number for the 8th set
F : Thread lead
:::
: :
:
:
: :
: :
$1 $3 $4
G00 X Z ;
G76.1 J134;
G00 X Z ;
G76.1 J134;
G00 X Z ;
G76.1 J134;
Thread cutting will start simultaneously
after waiting for the 1st, 3rd and 4th part
systems.
Command for the 3rd part
system
Command for the 4th part system
Command for the 1st part system

12.1.8.9 Multi-part System Program Management
In a system composed of multiple part systems, this function manages the program storage method, program search method and program input/output.
- This facilitates the management of such machining programs that run simultaneously in multiple part systems.
- This enables separate programs that run simultaneously in multiple part systems to be handled under one common name.
- The parameter enables or disables this function.
- NC memory (*1) is the only device compatible with this function.
(*1) MDI and machine tool builders macro are included.
<Multi-part system program management INVALID>
<Multi-part system program management VALID>
$1: Part system 1
$2: Part system 2
$n: Part system n
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
100.PRG
200.PRG
300.PRG
M D I
Common for part
systems
Common for part systems
Machining programs
Program management
common for part systems
Program management
common for part systems
Programs are shared and
managed across part
systems.
Programs are shared and
managed across part
systems.
100.PRG
200.PRG
300.PRG
$1
100.PRG
200.PRG
300.PRG
$2
100.PRG
200.PRG
300.PRG
$n
M D I
$1 $2 $n
. . .
. . .
Program management for each part system Program management for each part system
Machining programs
Programs are managed for each part system separately.
Each part system can have its own program Nos.
Programs are managed for each part system separately.

Same program Nos. can be
managed across part systems
in batch

12.1.8.10 Synchronization between Part Systems
12.1.8.10.1 Single Block between Part Systems
Single block between part systems is the function for executing single block operation while maintaining the synchronization between the part systems when two or more part systems are operated in the multi-part system. When one part system has been stopped by single block stop, the other part systems pause in the cycle operation.
In the normal single block, the synchronization between the part systems differs from the synchronization during the continuous operation because the other part systems continue the operation without stop even a part system is stopped by single block stop, and the tool interference could occur in some cases. The synchronization between part systems can be maintained the same as the continuous operation by the single block operation with part systems synchronized.
Valid/invalid can be switched with the PLC signal.
(Example) 3 part systems lathe
Stop: Single block stop
Pause: Cycle operation pause
$1: Part system 1
$2: Part system 2
$3: Part system 3
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
$1
$2
$3
(Single block operation valid)
Block separation
Stop Pause
(Single block operation valid)
(Single block operation valid)
Pause Stop Pause Pause
Stop
Stop Stop
Stop
Pause
Pause
Pause
Pause Pause
Pause Pause
Pause

12.1.8.10.2 Dwell/Miscellaneous Function Time Override
Override can be applied to dwell time and miscellaneous function finish wait time of all part systems. The synchronization between part systems can be maintained when the multiple machining programs are operated with override in the multi axis and multi-part system mixed control CNC.
If a machining program that performs cutting-off machining in part system 2 ($2) after the completion of turning machining in part system 1 ($1) is executed with override when this function is invalid, part system 1 and part system 2 will be out of synchronization and the machining may not be operated properly.
The differences on the start timing for each command are shown in (1) to (3) when executing the machining with the part system 1 ($1) and part system 2 ($2) as shown in the figure below.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
G01 Z G01 X
T1000 G00 Z G01 X
G04
$1
$2
G01 X
G01 X
G01 Z
T1000 G00 Z
$1
$2
$1:
$2:
$1:
$2:
$1:
$2:

$2
$1
$1
$2
Time
(1) Override 100%
Turning machining
Tool exchange
Turning machining
Tool positioning
Standby
Cutting-off machining
Tool exchange
$1
$2 G00 Z
G01 Z G01 X G04
T1000 G01 X
(2) When this function is invalid
Override 50%
Only feed time doubled in the operation with override 50%.
Part systems are out of synchronization and the cutting-off
machining starts during turning machining.
$1
$2
G01 Z G01 X G04
T1000 G00 Z G01 X
(3) When this function is valid
Override 50% Feed time, dwell time and miscellaneous function finish wait time double in the
operation with override 50%.
The synchronization between part systems are maintained and the cutting-off
machining stars after the completion of the turning machining.

12.1.8.10.3 Synchronization between Part Systems OFF
Synchronization between part systems and feedrate change are turned OFF in a part of a machining program to
eliminate a synchronization relation between part systems by single block operation with part systems synchronized or
variation of a machining program feedrate by dry run. This function is effective mainly in blocking the cycle operation
pause or feedrate variation in only some of part systems when the sub part system control II function is being used.
When loader control and ATC control which are operated independently of machining are performed with a sub program
or sub part system control, this function enables a operation with synchronization between part systems in machining
part systems and an independent operation in sub part systems.
ON/OFF can be switched with the system variable or the PLC signal.
The behaviors with synchronization between part systems OFF is as follows:
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
Single block between part systems - The pause is not made from other part systems.
- The other part systems do not pause with block stop.
Dwell/miscellaneous function time override - Override is invalid.
$1
P21 P22
SUB
P11 P12
$2
P11
G144
P12
! L10;
%
P21
P22
! L10;
%
SUB
M99
%
Waiting
Sub part system
Machining program
Part system 2 ($2)
Machining program
Part system 1 ($1)
Calling sub part
system
Simultaneous
machining
with $1 and $2
Simultaneous
machining
with $1 and $2

Loader control
Synchronization between
part systems ON
Synchronization between
part systems OFF
Synchronization between part systems OFF
Sub Part system
Machining program
Synchronization
relation between
part systems is
needed.
No synchronization
relation between
part systems is
needed.

12.1.8.11 Sub Part System Control I
This function activates and operates any non-operating part system (sub part system) in the multi-part system.
Sub part system control I can be used in the same manner as calling subprogram in a non-operating part system. An auxiliary axis machining program can be controlled in the sub part system by commanding Sub part system control I (G122) from the main part system.
In the usage example below, the tool positioning starts to the machining start point at the same time (time T1) as the start of gantry retract by using Sub part system control I (G122) in the flow from feeding the workpiece to moving to cut start position in order to reduce the cycle time.
Select whether main part system or sub part system for each part system in Sub part system control I. When using a part system as sub part system, by setting the operation mode to "Sub part system I operation mode" with the PLC signal and commanding Sub part system control I (G122) from an operating part system, it is possible to activate the part system in the sub part system I operation mode as sub part system.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
($1)
Z1
X3
Z3
X1
T1 T2
T1 T2
T2:
T1:
($2)
($1)
(1) Feed the workpiece
(1) Feed
workpiece
(1) Feed
workpiece
Wait for completion of sub part
system
(2) Clamp
workpiece
(2) Clamp
workpiece
(3) Retract gantry
(3) Retract gantry
(4) Move to cut start position
(4) Move to cut start
position
Machining process when Sub part system control is OFF
Machining process when Sub part system control is ON
Main part system
Tool
Workpiece
Gantry
Time when gantry retract is started
Time when gantry retract is completed
Sub part system
Main part system
Activate sub part system
(2) Clamp (3) Retract the gantry
the workpiece
(4) Move to
cut start position
Flow of machining
Time
Time

Command format
Activate sub part system
Command an activation of sub part systems by Sub part system control I with G122.
Complete sub part system
Command M99 in sub part system to complete an operation of sub part system.
Cancel the standby status for completion of sub part system
When a sub part system is activated in the completion wait method (D0 command), it is possible to cancel the standby status for completion of sub part system in a calling part system by commanding G145 in the sub part system program. G145 is ignored in a sub part system activated in the parallel control method (D1 command).
(Note) For G code list 6 and 7, replace G122 with G153 and G145 with G155.
G122 A__ P__ Q__ K__ D__ B__ H__ Argument;
Or, G122 <File name> P__ Q__ K__D__ B__ H__ Argument;
A : Program No. (1 to 99999999 or 100010000 to 199999998)
<File name> : File name of program (up to 32 characters)
P : Start sequence number (Head of program if omitted.)
Q : End sequence number (To end of program (M99) if omitted.)
K : Number of repetitions (1 to 9999)
D : Synchronization control (0/1)
B : Sub part system identification number (1 to 7)
H : Sub part system reset type (0/1)
Argument : Argument of sub part system local variable (Setting rage of local variable (decimal point command is valid))
M99 ;
G145 ;

12.1.8.12 Sub Part System Control II
This function activates and operates any non-operating part system (sub part system) in the multi-part system. Using sub part systems enables parallel operation between an operating program in main part system and a program called with Sub part system control II (G144).
Sub part systems does not have any controllable axes soon after the activation. When an axis is needed to be controlled in sub part system, command the arbitrary axis exchange control (G140) to give sub part system authorization to control the axis.
In the machine configuration below, when performing the back drill machining (machining (a)) and the cutting by tool (machining (b)), machining (a) and (b) are operated in order only with main part system, however machining (a) and (b) can be operated simultaneously by using the sub part system in addition to the main part system, resulting in a shorter cycle time. In the usage example below, T2 (time when machining (b) is completed) is shorter.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
X1
A1
Z1
Tool
Back drill
(a)
(b)
(a)
(b)
T2:
T1: T1 T2
T1 T2
Machining process when Sub part system control is OFF
Machining process when Sub part system control is ON
Back drill machining
Activation of
sub part system
Operating in main part system
Operating in sub part system
Operating in main part system
Cutting by tool Operating in main part system
Back drill machining
Cutting by tool
Time when back drill machining is completed
Time when cutting by the tool is completed
Time
Time

Command format
Activate sub part system
Command an activation of sub part systems by Sub part system control II with G144.
Complete sub part system
Command M99 in sub part system to complete an operation of sub part system.
Cancel the standby status for completion of sub part system
When a sub part system is activated in the completion wait method (D0 command), it is possible to cancel the standby status for completion of sub part system in a calling part system by commanding G145 in the sub part system program. G145 is ignored in a sub part system activated in the parallel control method (D1 command).

(Note) For G code list 6 and 7, replace G144 with G154 and G145 with G155.
G144 A__ P__ Q__ K__ D__ B__ H__ Argument;
Or, G144 <File name> P__ Q__ K__D__ B__ H__ Argument;
A : Program No. (1 to 99999999 or 100010000 to 199999998)
<File name> : File name of program (up to 32 characters)
P : Start sequence number (Head of program if omitted.)
Q : End sequence number (To end of program (M99) if omitted.)
K : Number of repetitions (1 to 9999)
D : Synchronization control (0/1)
B : Sub part system identification number (1 to 9999)
H : Sub part system designation (1 to number of part system that can be used)
Argument : Argument of sub part system local variable (Setting rage of local variable (decimal point command is valid))
M99 ;
G145 ;

12.1.8.13 Loader Control Part System
This function operates a part system which is dedicated to a carrier loader (hereinafter referred to as "loader") in the machining center system. This function can be used to isolate the loader system from other controls, allowing your machine to operate in automatic operation with CNC machining program.
Compared to when a loader is operated in a workpiece machining part system, the cycle time can be improved because the loader-specific process (such as placing the next workpiece and carrying the machined workpiece) is performed independently while a workpiece is being machined.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L

12.1.9 Data Input/Output by Program
12.1.9.1 Parameter Input by Program
The parameters set from the setting and display unit can be changed in the machining programs.
Command format is as follows.
(Note 1) The sequence of addresses in a block must be as shown above.
When an address is commanded two or more times, the last command will be valid.
(Note 2) The part system No. is set in the following manner: "1" for 1st part system, "2" for 2nd part system, and so forth.
If the address S is omitted, the part system of the executing program will be applied.
As for the parameters common to part systems, the command of part system No. will be ignored.
(Note 3) The axis No. is set in the following manner: "1" for 1st axis, "2" for 2nd axis, and so forth.
If the address A is omitted, the 1st axis will be applied.
As for the parameters common to axes, the command of axis No. will be ignored.
(Note 4) Address H is commanded with the combination of setting data (0 or 1) and the bit designation () (0 to 7).
(Note 5) Only the decimal number can be commanded with the address D.
The value that is smaller than the input setting increment (#1003 iunit) will be round off to the nearest increment.
(Note 6) The character string must be put in angled brackets "<" and ">".
If these brackets are not provided, the program error (P33) will occur.
Up to 63 characters can be set.
(Note 7) G10L70 or G11 must be commanded alone in a block. A program error (P33, P421) will occur if it is not commanded alone in a block.
(Note 8) The following data cannot be changed with the G10 L70 command:
Tool compensation data, workpiece coordinate data, PLC switch, and PLC axis parameter.
(Note 9) The settings of the parameters with (PR) in the parameter list will be enable after the power is turned OFF and ON. Refer to the parameter list in your manual.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
G10 L70 ; Data setting start command
Pparameter No. Spart system No. Aaxis No. H data ; ..... Bit parameter;
Pparameter No. Spart system No. Aaxis No. Ddata ; ..... Numerical value parameter
Pparameter No. Spart system No. Aaxis No. <character string> ; ... Character string parameter
G11 Data setting end command

12.1.9.2 Compensation Data Input by Program
The value of the workpiece coordinate systems selected can be set or changed by program commands.
The tool offset amounts, which have been set from the setting and display unit, can be input by program commands.
(1) Workpiece coordinate system offset input
[M system]
The position of the workpiece coordinate systems selected by the G54 to G59 commands can be set or

changed by program commands.
During the absolute command (G90) mode, the commanded offset amount serves as the new offset, whereas during the incremental command (G91) mode, the currently set offset plus the commanded offset serves as the new offset.
Command format
(Note 1) L2 can be omitted. If the command P is omitted, the specified offset is treated as that of the currently selected workpiece coordinate system.
(Note 2) L20 is used to designate the extended workpiece coordinate system.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
Gcode Function
G10 L2 P0
G10 L2 P1
G10 L2 P2
G10 L2 P3
G10 L2 P4
G10 L2 P5
G10 L2 P6
G10 L20 Pn (n=1 to 300)
External workpiece coordinate system setting
Workpiece coordinate system 1 setting (G54)
Workpiece coordinate system 2 setting (G55)
Workpiece coordinate system 3 setting (G56)
Workpiece coordinate system 4 setting (G57)
Workpiece coordinate system 5 setting (G58)
Workpiece coordinate system 6 setting (G59)
Extended workpiece coordinate system setting (G54.1 P1 to P300)
G10 L2(L20) P__ X__ Y__ Z__ ;
G10 L2(L20) : Workpiece coordinate system setting command
P : Workpiece coordinate system No.
X,Y,Z : Setting values
M800/M80/E80/C80 Series Specifications Manual (Function)
12 Program Support Functions
321 IB-1501505-N
[L system]
When the command is given with absolute positions (X, Z and R), the offset is updated with the values. On the other hand, when the command is given with incremental positions (U, W and C), the currently set offset plus the commanded offset serves as the new offset.
Command format
(Note 1) L2 can be omitted. If the command P is omitted, the specified offset is treated as that of the currently selected workpiece coordinate system.
(Note 2) L20 is used to designate the extended workpiece coordinate system.
Gcode Function
G10 L2 P0
G10 L2 P1
G10 L2 P2
G10 L2 P3
G10 L2 P4
G10 L2 P5
G10 L2 P6
G10 L20 Pn (n=1 to 48)
External workpiece coordinate system setting
Workpiece coordinate system 1 setting (G54)
Workpiece coordinate system 2 setting (G55)
Workpiece coordinate system 3 setting (G56)
Workpiece coordinate system 4 setting (G57)
Workpiece coordinate system 5 setting (G58)
Workpiece coordinate system 6 setting (G59)
Extended workpiece coordinate system setting (G54.1 P1 to P48)
G10 L2(L20) P__ X__ (U__) Z__ (W__) ;
G10 L2(L20) : Workpiece coordinate system setting command
P : Compensation No.
X,Z : Compensation amount for each axis(absolute)
U,W : Compensation amount for each axis(incremental)
M800/M80/E80/C80 Series Specifications Manual (Function)
12 Program Support Functions
IB-1501505-N 322
(2) Tool compensation input
The tool compensation amounts, which have been set from the setting and display unit, can be input by program commands.
The command format differs between the [M system] and the [L system].
[M system]
Type I
TypeII
Command format
[L system]
Command format
(Note 1) L11 can be omitted.
G code Function
G10 L10 Tool compensation amounts

Gcode Function
G10 L10
G10 L11
G10 L12
G10 L13
Tool length shape compensation amount
Tool length wear compensation amount
Tool radius shape compensation amount
Tool radius wear compensation amount
G10 L__ P__ R__ ;
G10 L : Command for setting compensation amount
P : Compensation No.
R : Compensation amount
Gcode Function
G10 L10
G10 L11
Tool length compensation amount
Tool wear compensation amount
G10 L10(L11) P__ X__ (U__) Z__ (W__) [Additional axis]__ [2nd additional axis]_R__
(C__) Q__ ;
G10 L10(L11) : Command for setting compensation amount
P : Compensation No.
X,Z : Compensation amount for each axis (absolute)
U,W : Compensation amount for each axis (incremental)
Additional axis : Additional axis compensation amount (absolute)
2nd additional
axis : 2nd additional axis compensation amount (absolute)
R : Nose R compensation amount (absolute)
C : Nose R compensation amount (incremental)
Q : Hypothetical tool nose point

(3) M system turning tool compensation input
By setting the parameter in M system, the compensation amount, Nose R compensation amount and tool nose point for three basic axes can be written with the following G10 format. In the absolute command (G90) mode, the commanded compensation amount is new compensation amount. In the incremental command (G91) mode, new compensation amount is obtained by adding the commanded compensation amount to the currently set compensation amount.
Command format
Shape compensation
Wear compensation
(4) Cancelling the compensation input
Command format
G10 L12 P__ X__ Y__ Z__ R__ Q__ ;
P : Tool shape compensation number (1 to the number of tool offset sets)
X : X axis compensation amount
Y : Y axis compensation amount
Z : Z axis compensation amount
R : Tool nose radius compensation amount
Q : Hypothetical tool nose point number
G10 L13 P__ X__ Y__ Z__ R__ Q__ ;
P : Wear compensation number (1 to the number of tool offset sets)
X : X axis compensation amount
Y : Y axis compensation amount
Z : Z axis compensation amount
R : Tool nose radius compensation amount
Q : Hypothetical tool nose point number
G11 ;

12.1.9.3 Tool/Material Shape Input by Program
Tool shape data on the tool management screen (M system) and workpiece shape data (L system) of the 3D solid program check (hereinafter referred to as 3D check) can be set with the machining program. There is no need to input the tool/workpiece shape on the screen for 3D check.
(1) L100 command format
Tool shape data on the tool management screen can be set by the machining program with this function.
(Note 1) Omitted addresses cannot be set.
(Note 2) Omitting address P or T causes the program error.
(Note 3) On graphic check of M800 series or M80W, only drawing is reflected to the graphic check. Tool shape data will not be rewritten.
(Note 4) On graphic check of M80/E80 series, tool shape data will be rewritten.
(Note 5) This function can be used only with the M system.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
G10 L100 ; Data setting start command
P__ T__ K__ D__ H__ I__ J__ C__ ; Data setting command
G11 ; Data setting end command
P : Data number (The maximum number varies depending on the number of tool management data sets.)

T : Tool number (0 to 99999999)
K : Type
D : Shape data 1 (decimal point allowed)
H : Shape data 2 (decimal point allowed)
I : Shape data 3 (decimal point allowed)
J : Shape data 4 (decimal point allowed)
C : Tool color

(2) L101 command format
Workpiece shape data can be set by the machining program for 3D solid program check with this function.
(Note 1) Omitted addresses cannot be set.
(Note 2) Omitting address C causes the program error.
(Note 3) On graphic check of M800 series or M80W, only drawing is reflected to the graphic check. Workpiece shape data will not be rewritten.
(Note 4) On graphic check of M80/E80 series, workpiece shape data will be rewritten.
(Note 5) This function can be used only with the L system.
G10 L101 ; Data setting start command
C__ R__ D__ E__ L__ A__ K__ W__ F__ P__ H__ I__ J__ ; Data setting command
G11 ; Data setting end command
C : Workpiece shape
R : Number of angles (3 to 99)
D : Outside diameter of workpiece (0.001 to 99999.999 mm, 0.0001 to 9999.9999 inch)
E : Inside diameter of workpiece (0.001 to 99999.999 mm, 0.0001 to 9999.9999 inch)
L : Workpiece length (0.001 to 99999.999 mm, 0.0001 to 9999.9999 inch)
A : Installation angle (0.000 to 359.999)
K : Front face workpiece zero point position Z (-1 or 0.000 to 99999.999 mm, -1 or 0.0000 to 9999.9999 inch)
W : Back face workpiece zero point position Z (-1 or 0.000 to 99999.999 mm, -1 or 0.0000 to 9999.9999 inch)
F : Workpiece color
P : Machining surface color
H : Tapping/Thread machining surface color
I : Interference surface color
J : Cross-section color

12.1.9.5 API Section and Sub-section Nos. Input/Output by Program
NC internal data can be read/written by specifying the section number, sub-section number, part system number and axis number using system variables.
12.1.9.6 R-Navi Data Input by Program
This function enables the R-Navi setup parameters to be configured from a machining program.
After the parameters have been configured from the program, you can check the values or select the machining surface from the setup screen.
Command format
Refer to "17.2.17 R-Navi" for details.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
G10 L110 ; Workpiece data setting
G10 L111 ; Machining surface data setting

12.1.10 Machining Modal
12.1.10.1 Tapping Mode
When tapping mode commands are issued, the NC system is set to the following internal control modes required for tapping.
1. Cutting override is fixed at 100%.
2. Deceleration commands at joints between blocks are invalid.
3. Feed hold is invalid.
4. Single block is invalid.
5. "In tapping mode" signal is output.
The tapping mode command will be canceled with the following commands:
- Exact stop check mode (G61)
- Automatic corner override (G62)
- Cutting mode (G64)
- High-accuracy control mode command (G61.1/G08P1) [M system]
The machine is in the cutting mode status when its power is turned ON.
12.1.10.2 Cutting Mode
When a cutting mode command is issued, the NC system is set to the cutting mode that enables smooth cutting surface

to be achieved. In this mode, the next block is executed continuously without the machine having to decelerate and stop between the cutting feed blocks: this is the opposite of what happens in the exact stop check mode (G61).
The cutting mode command will be canceled with the following commands:
- Exact stop check mode (G61)
- Automatic corner override (G62)
- Tapping mode (G63)
- High-accuracy control mode command (G61.1) [M system]
The machine is in the cutting mode status when its power is turned ON.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
G code Function
G63 Tapping mode ON
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
G code Function
G64 Cutting mode ON

12.1.11 High-speed Parts Machining
12.1.11.1 Rapid Traverse Block Overlap
This function enables the next block to start (overlap) without waiting for positioning (G00) or reference position return (G28/G30). Consequently, cycle time of machining including operation of positioning (G00) or reference position return (G28/G30) can be reduced.
Adjust the overlap amount with command by machining program or with the parameter, and specify it as in-position width for rapid traverse block overlap.
Also, the operation does not decelerate between blocks if the movement command continues in same direction.
The overlap is also valid when the block after G00 is G01 instead of G00 or G28/G30 and it is invalid when G00 or G28/G30 is commanded after G28 continuously.
This function has two modes. The modes can be selected with the parameter.
Mode 1: The cycle time can be reduced in normal acceleration/deceleration control.
Mode 2: It is also effective to reduce the cycle time in pre-interpolation acceleration/deceleration control.
(Recommended)
Example of application of rapid traverse block overlap in tool exchange operation
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
N2(G28)
N2(G28)
N1(G00)
N1
N1 N2 N3
N2
Program path
Command path from NC
Interim point
In-position width
Speed
Speed
Time
Time
Cycle time is reduced

Example of application of rapid traverse block overlap in continuous drilling operation
Command format
The command format to switch the rapid traverse block overlap function for G00 to valid/invalid is as follows:
G0.5 P1 J__ K__ ; Rapid traverse block overlap function for G00 ON
J : Liner axis in-position width (0.000 to 1000.000 (mm))
K : Rotary axis in-position width (0.000 to 1000.000 ())
G0.5 P1 J__ K__ ; Rapid traverse block overlap function for G00 OFF
N3(G00)
N4(G00)
N5(G01)

N2(G00)
N1(G01)
N1
N1 N2 N3 N4 N5
N2 N3 N4 N5
Program path
Command path from NC
In-position width
Speed
Speed
Time
Time
Cycle time is reduced

12.2 Machining Accuracy Support Functions
12.2.1 Automatic Corner Override
When cutting with tool radius compensation, this function applies feedrate override automatically to decrease cutting load at the inside corner cutting or the inside cutting of corner R.
There are automatic corner override (G62) and inside arc override as the automatic corner override.
Automatic corner override (G62) is valid until the tool radius compensation cancel (G40), exact stop check mode (G61), high-accuracy control mode (G61.1), tapping mode (G63), or cutting mode (G64) command is issued.
Inside arc override is valid without automatic corner override (G62) during tool radius compensation mode (G41/G42).
This can also be enabled with the parameter setting when the tool radius compensation mode (G41/G42) and the automatic corner override mode (G62) are active.
Automatic corner override (G62) inside corner
: Max. angle at inside corner
Ci : Deceleration range (IN)
Operation
(a) When G62 command is not given :
When the tool moves in the order of (1) -> (2) -> (3) in the figure above, the machining allowance at (3) is larger than that at (2) by an amount equivalent to the area of shaded section S and so the tool load increases.
(b) When G62 command is given :
When the inside corner angle in the figure above is less than the angle set in the parameter, the override set into the parameter is automatically applied in the deceleration range Ci.
Command format
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
G62; Automatic corner override

S

Ci
workpiece Machining allowance
Tool
Programmed path
(finished shape)
Workpiece surface
shape
Tool center path
Machining
allowance

12.2.2 Deceleration Check
This function leads the machine to decelerate and stop at the join between axis movement blocks before executing the next block. This is effective to alleviate the machine shock and prevent the corner rounding when the feed rate of the control axis changes suddenly.
There are three methods for deceleration check: command deceleration check method, smoothing check method and in position check method.
The conditions for executing deceleration check are described below.
(1) Deceleration check in the rapid traverse mode
In the rapid traverse mode, the deceleration check is always performed when block movement is completed before executing the next block.
(2) Deceleration check in the cutting feed mode
In the cutting feed mode, the deceleration check is performed at the end of block when any of the conditions below is applicable before executing the next block.
(a) When G61 (exact stop check mode) is selected.
(b) When the G09 (exact stop check) is issued in the same block.
(c) When the error detect switch (PLC signal) is ON.

Without deceleration check With deceleration check
N010 G01 X100 ;
N011 G01 Y-50 ;
Corner rounding occurs because
the N011 block is started before
the N010 command is completely
finished.
N010 G09 G01 X100 ;
N011 G01 Y-50 ;
A sharp edge is formed because
the N011 block is started after the
N010 command is decelerated and
stopped.

The following deceleration check methods can be selected with the parameter to each feed command during rapid traverse command and cutting feed command.
(1) Command deceleration check method
The deceleration is completed after the deceleration check time (Note) has passed after the interpolation.
(2) Smoothing check method
The deceleration is completed after the deceleration check time (Note) has passed after the interpolation and all axes smoothing has become zero.
(3) In-position check method
The deceleration is completed after the deceleration check time (Note) had passed after the interpolation, all axes smoothing has become zero and all axes have become in-position.
(Note) Deceleration check time: automatically calculated from the acceleration/deceleration mode and time constant.
NC command speed Deceleration check time
Interpolation is completed Block is completed
Speed
Block is completed
NC command speed Deceleration check time
Interpolation is completed
Speed
NC command speed
Actual motor
rotation speed
Deceleration check time
Interpolation is completed
Speed
Block is completed

12.2.2.1 Exact Stop Check Mode
A deceleration check is performed when the G61 (exact stop check mode) command has been selected.
G61 is a modal command. The deceleration is applied at the end points of each block to all the cutting commands (G01 to G03) subsequent to G61 and the in-position status is checked.
Refer to "12.2.2 Deceleration Check" for details on the deceleration check.
12.2.2.2 Exact Stop Check
A deceleration check is performed when the G09 (exact stop check) command has been designated in the same block.
The G09 command should be issued in the same block as the cutting command. It is an unmodal command.
Refer to "12.2.2 Deceleration Check" for details on the deceleration check.
12.2.2.3 Error Detection
To prevent rounding of a corner during cutting feed, the operation can be changed by turning an external signal switch ON so that the axis decelerates and stops once at the end of the block and then the next block is executed.
The deceleration stop at the end of the cutting feed block can also be commanded with a G code.
Refer to "12.2.2 Deceleration Check" for details on the deceleration check.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M

L
M800/M80/E80/C80 Series Specifications Manual (Function)
12 Program Support Functions
IB-1501505-N 334
12.2.2.4 Programmable In-position Check
",I" address is used to designate the in-position width for a linear interpolation command from the machining program.
The in-position width designated with a linear interpolation command is valid only in cases when the deceleration check is performed, such as:
- When the error detect switch is ON.
- When the G09 (exact stop check) command has been designated in the same block.
- When the G61 (exact stop check mode) command has been selected.
As with linear interpolation, ",I" address is used to designate the in-position width for a positioning command from the machining program.
In-position check operation
As for G01, after it is verified that the position error of the block in which the deceleration check is performed by the linear interpolation command (G01) is less than the in-position width of this command, the execution of the next block is commenced.
As for G00, after it is verified that the position error of the positioning command (G00: rapid traverse) is less than the in-position width of this command, the execution of the next block is commenced.
12.2.2.5 Automatic Error Detection
This function is effective to reduce the extension of cycle time for the cutting at the corner and realize the high edge accurate machining.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
G01 Xx1 Zz1 Ff1 ,Ii1 ;
Xx1, Zz1
Ff1
,Ii1
: Linear interpolation coordinate position of each axis
: Feed rate
: In-position width
G00 Xx1 Zz1 ,Ii1 ;
Xx1, Zz1
,Ii1
: Positioning coordinate position of each axis
: In-position width
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
M800/M80/E80/C80 Series Specifications Manual (Function)
12 Program Support Functions
335 IB-1501505-N
12.3 High-speed and High-accuracy Functions [kBPM: k Block per Minute]
12.3.1 High-speed Machining Mode
12.3.1.1 High-speed Machining Mode I (G05P1) Maximum [kBPM]
This function runs a machining program that approximates a free curve with fine segments at a high speed.
This is effective in increasing the speed of machining dies with a free curve.
The command format is as follows.
In addition to the G05P0 command, the high-speed machining mode I is canceled with the following commands.
- High-speed machining mode II (G05P2)
- High-speed high-accuracy control I (G05.1Q1)
- High-speed high-accuracy control II (G05P10000)
Fine segment capacity
G1 block fine segment capacity (unit: kBPM)
The above performance applies under the following conditions.
- 6-axis system (including spindle) or less
- 1-part system
- 3 axes or less commanded simultaneously in G01
- Block containing only axis name and movement amount (Does not contain macro or variable command)
- During G61.1 high-accuracy control mode or during cutting mode (G64)
It may not be possible to attain the specified feed rate if deviated from the above conditions.
(1) During the high-speed machining mode I, the blocks are pre-read. If the length of the block is sufficiently short in respect to the command speed, and enough to be completed with one interpolation calculation, several blocks may be combined and converted into a block length that can be completed with one interpolation.
(2) Override, maximum cutting speed clamp, single block operation, dry run, manual interruption, graphic trace and high-accuracy control mode are valid even during the high-speed machining mode I.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA

E80
TypeB C80
M 33.7 33.7 33.7 33.7 33.7 33.7 16.8 33.7
L 33.7 33.7 33.7 33.7 33.7 33.7 33.7
G05 P1 : High-speed machining mode I start
G05 P0 : High-speed machining mode I cancel
Mode Command Maximum feed rate when G1 block is executed
High-speed machining mode G05 P1 33.7 (M800W/M800S/M80W/M80 TypeA/C80)
16.8 (M80 TypeB)
: Program command
: Command when program commands are combined and converted
Command in high-speed machining mode I

12.3.1.2 High-speed Machining Mode II (G05P2) Maximum [kBPM]
This function runs a machining program that approximates a free curve with micro segments at a high speed.
Higher micro segment processing capacity can make the cutting speed faster, resulting in reducing the cycle time and improving the quality of the machining surface.
This function can be used simultaneously in up to two part systems.
Command format
In addition to the G05P0 command, the high-speed machining mode II is canceled with the following commands.
- High-speed machining mode I (G05P1)
- High-speed high-accuracy control I (G05.1Q1)
- High-speed high-accuracy control II (G05P10000)
- High-speed high-accuracy control III (G05P20000)
Micro segment capacity
The following is the micro segment capacity while high-speed machining mode II is valid.
Unit: kBPM
(*1) It will be 100 kBPM in the time constant expansion system or in the following modes.
- Tool center point control
- Inclined surface machining
- Workpiece installation error compensation
- Tolerance control
(Note) The above performance applies under the following conditions.
- Three axes or less commanded simultaneously in G01
- Block containing only axis name and movement amount (Does not contain macro or variable command)
- During tool radius compensation OFF (G40)
It may not be possible to attain the specified feed rate if deviated from the above conditions.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M 168 168 168 168 67.5 67.5 67.5 67.5
L 168 168 168 168 67.5 67.5 67.5
G05 P2 ; High-speed machining mode II start
G05 P0 ; High-speed machining mode II cancel
Number of part systems/Number of axes
Number of high-speed high accuracy control-enabled part systems
M850/M830 M80W/M80 TypeA M80 TypeB
MLMLML
1-part system (8 axes or less) 1 part system 168 (*1) 168 (*1) 67.5 67.5 67.5
1-part system (9 axes or more)
2-part system
1 part system 100 100 67.5 67.5
2 part systems 67.5 67.5 33.7 33.7
3-part system 1 part system 33.7 33.7 33.7
2 part systems 33.7 33.7 33.7
4-part system (16 axes or less) 1 part system 33.7 33.7
2 part systems 33.7 33.7
4-part system (17 axes or more)
5-part system or more
1 part system 16.8
2 part systems 16.8

12.3.2 High-accuracy Control
12.3.2.1 High-accuracy Control (G61.1/G08)
Machining errors caused by delays in control systems can be inhibited. This function is useful for machining which needs to make an edge at a corner or reduce an error from an inner route of curved shape. In high-accuracy control, acceleration/deceleration is performed not to cause machining error by pre-reading blocks and acceleration/deceleration is automatically performed according to a machining shape so that the machining error is inhibited with minimizing an extension of machining time.
High-accuracy control is valid in High-accuracy control command (G08P1/G61.1), High-speed high-accuracy control I command (G05.1Q1), High-speed high-accuracy control II command (G05P10000), High-speed high-accuracy control III command (G05P20000) and Spline interpolation command (G61.2).
One or more of the functions in the table below must be ON. Program error occurs if the high-accuracy control is commanded with all of functions OFF status.
M850W M830W M850S M830S M80W M80
TypeA

M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
Function name Details
High-accuracy control This function enables High-accuracy control.
High-speed high-accuracy control I This function enables High-speed high-accuracy control I.
High-speed high-accuracy control II This function enables High-speed high-accuracy control II.
High-speed high-accuracy control III This function enables High-speed high-accuracy control III.
Spline interpolation This function enables Spline interpolation.
High-accuracy control OFF
NC command NC command
Machining program
commanded shape
Machining program
commanded shape
Machining program
commanded shape
Machining program
commanded shape
Corner shape
Curve shape
High-accuracy control ON
NC
command
NC
command

Command format
High-accuracy control ON
High-accuracy control OFF
High-accuracy control can be cancelled with either command regardless of enabled high-accuracy control.
High-accuracy control inhibits machining errors with minimizing an extension of machining time using the following functions.
(1) Acceleration/deceleration before interpolation
(2) Optimum speed control
(3) Vector accuracy interpolation
(4) Feed forward control
(5) S-pattern filter control
(1) Acceleration/deceleration before interpolation
Velocity waveform is smoothed by performing acceleration/deceleration control on movement commands to inhibit shocks caused by rapid acceleration at the machine movement start/stop. However, if the high-accuracy control is OFF, a corner rounding may occur at the joint between blocks or a path error may occur for the commanded shape which has been described in machining program because the acceleration/deceleration process is performed after the interpolation.
If the high-accuracy control is ON, the acceleration/deceleration process is performed before the interpolation to solve the problems mentioned above. This acceleration/deceleration before interpolation enables machining with a faithful path to the commanded shape of machining program. Furthermore, the acceleration/deceleration time can be reduced because the constant-gradient acceleration/deceleration is performed for the acceleration/deceleration before interpolation.
(2) Optimum speed control
When the moving direction is changed on the corner, arc, etc., acceleration corresponding to the amount of change and the feedrate is generated. When the acceleration is large, there is a possibility of machine vibration and it may remain stripes on the machining surface.
In the high-accuracy control mode, the deceleration control (optimum speed control) is performed to keep the generated acceleration under the allowance which has been designed with the parameter so that the problem mentioned above can be solved. The optimum speed control suppresses the machine vibration and enables highly accurate machining while minimizing the extension of cycle time.
G61.1 ;
or, G08 P1;
G08 PO ;
or, G command in G code group 13 expect G61.1

(3) Vector accuracy interpolation
When a fine segment is commanded and the angle between the blocks is extremely small (when not using corner deceleration), interpolation can be carried out more smoothly using the vector accuracy interpolation.
(4) Feed forward control
This function reduces path errors caused by delay of servo systems. Path errors caused by acceleration/deceleration of NC can be eliminated by acceleration/deceleration before interpolation, however errors caused by delay of servo systems cannot be eliminated by acceleration/deceleration before interpolation. Therefore, when the arc shape of radius R (mm) is machined at speed F (mm/min) as the figure (a) below, for instance, the lag time occurs between the NC commanded speed and the actual tool speed in amount of the servo system time constant and the path error R (mm) occurs. Feed forward control generates the command value taking the delay of servo systems as shown in figure (b) below so that the path error caused by delay of servo systems can be inhibited.
(a) NC command and actual tool movement during Feed forward control OFF
(b) NC command and actual tool movement during Feed forward control ON
Commanded path
Vector accuracy interpolation
R R
F

NC commanded speed
NC commanded shape
Actual tool path
Actual tool speed
Delay of servo
Time
Speed
NC commanded
shape
Actual tool speed
(corresponding to original NC commanded speed)
Actual tool path
NC commanded speed is set forward
according to a expected delay.
(Feed forward control)
Time
Speed

(5) S-pattern filter control
S-pattern filter (soft acceleration/deceleration filter) is the function that inhibits the machine vibration by smoothing a velocity waveform. There are types of filters as follows:
- G1/G0 S-pattern filter
- Jerk filter
- S-pattern filter 2
Time
S-pattern
filter 2
Interpolation
(axis distribution)
inclination-constant
linear acceleration/
deceleration
Resultant
state
Resultant
state
Resultant
state
Time Time Time
Axis
speed
Time
Time
Axis
speed
Time
Axis
speed
Axis
speed
Jerk filter
Smoothing velocity waveform of
inclination-constant linear
acceleration/deceleration
Making velocity waveform of
S-pattern filter even smoother
Smoothing each axis speed
after interpolation
S-pattern
filter

12.3.2.2 Multi-part System Simultaneous High-accuracy Control
* Up to two part systems.
High-accuracy control and high-speed machining mode are available respectively in all part systems, however, the simultaneous usage of high-accuracy control and high-speed machining mode (including High-speed high-accuracy control I/II/III) are available only in part systems which are limited by the parameter "High-speed high-accuracy enabled part system". The high-accuracy control and high-speed machining mode can be used simultaneously in the part system which is set to "1" for "High-speed high-accuracy enabled part system". The program error (P129) occurs when the high accuracy control and high-speed machining mode are used simultaneously in the part system which is set to "0" for "High-speed high-accuracy enabled part system".
Note that up to 2 part systems can be set to "1" for "High-speed high-accuracy enabled part system". If 3 or more part systems are set to "1", MCP alarm (Y51) occurs. If all part systems are set to "0" for "High-speed high-accuracy enabled part system", only the first part system is handled as the one with the parameter set to "1".
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
G28 X0 Y0;
G08 P1;

G05 P2;
G91 G01 F3000;
:
:
:
:
G05P0;
G08 P0;
M02;
G08P0
G08P1
G08P0
$1 $2
$3 $4
G05P0
G05P2
G05P0
G28 X0 Y0;
G08 P1;
:
G08 P0;
G05 P2;
:
G08 P1;
:
G08 P0;
G05 P0;
M02;
G08P0
G08P1
G08P0
G08P1
G05P0
G05P2
G28 X0 Y0;
G05 P10000;
G91 G01 F3000;
X1.;
:
:
:
:
:
G05P0;
M02;
G08P0
G08P1
G08P0
G05P0
G05P2
G05P0
G28 X0 Y0;
G05 P10000;
G91 G01 F3000;
X1.;
:
:
:
:
:
G05P0;
M02;
G08P0
G08P1
G05P0
G05P2
Up to 2 part systems can be set to "1"
High-speed high-accuracy enabled
part system = 1
High-speed high-accuracy enabled
part system = 1
High-speed high-accuracy enabled
part system = 0
High-speed
high-accuracy
High-speed
high-accuracy
High-speed high-accuracy enabled
part system = 0
(Note) It is limited also in G61.1 command.
Alarm
Alarm

12.3.2.3 SSS Control
(*1) eSSS
Machining programs that approximate a freely curved surface with fine segments are run at high speed and with high

accuracy. This function enables machining with less scratches and streaks on the cutting surface compared to the conventional high-accuracy control function.
When the speed control with reference to the angle between two blocks, such as the conventional high-accuracy control "Optimum corner deceleration", is applied, the acceleration and deceleration may be frequently repeated for local steps and errors, resulting in scratches and streaks on the cutting surface.
The SSS (Super Smooth Surface) control uses the global paths information in addition to the angle information between two blocks. Thus, optimum speed control that is not adversely affected by minute steps or waviness is possible. This reduces the parts which get scratch like marks and streaks on the cutting surface.
Multiple part systems simultaneous high-accuracy function is required to conduct the SSS control in the second or following part systems.
[Features of SSS control]
(1) This is valid for machining a mold with a smooth shape using a fine segment program.
(2) This speed control is not easily affected by the error found in the path.
(3) Even if corner deceleration is not required, the speed is clamped if the predicted acceleration is high.
(The clamp speed can be adjusted with the parameter "Clamp speed coefficient".)
The length of the path direction recognized with SSS control can be adjusted with the parameter. The range is increased as the setting value increases, and the effect of the error is reduced.
(Note 1) When using this function, one of the following SSS-controlled high-accuracy control functions is required, as well.
- High-accuracy control (G61.1)
- High-accuracy control (G08P1)
- High-speed high-accuracy control I (G05.1Q1)
- High-speed high-accuracy control II (G05P10000)
- High-speed high-accuracy control III (G05P20000)
(Note 2) The performance of fine-segment execution during SSS control differs depending on the type of high-accuracy control mode and machine model to be combined.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M (*1)
L (*1) (*1)

12.3.2.4 Tolerance Control
This function obtains the optimum clamp speed for corners or curves based on the designated tolerance to perform operations. It also ensures smooth passing in corner sections within the tolerance range, which suppresses machine vibrations.
This function allows the machine to operate with the optimum tool path and speed, simply by specifying the tolerance, so an operator can easily carry out high quality machining.
The tolerance refers to the allowable error amount between the path commanded in the machining program and the path output by NC.
This function requires the SSS control specifications because it can only be used under SSS control.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
Program command path
Path commanded by NC to drive unit
Tool path
Tolerance control: Invalid Tolerance control: Valid

12.3.2.5 Variable-acceleration Pre-interpolation Acceleration/Deceleration
This function is useful when each axis differs in the characteristics (responsiveness) during SSS control (4-axis/5-axis machine, etc.).
The normal acceleration/deceleration before interpolation performs the acceleration/deceleration by setting acceleration common to all axes. Therefore, if the high responsiveness and low responsiveness coexist in axes, the acceleration needs to be set to suit the axis with low responsiveness.
On the other hand, the variable-acceleration pre-interpolation acceleration/deceleration can perform the acceleration/ deceleration by setting diverse acceleration to each axis. This means that it is possible to set a higher acceleration for axes with high responsiveness than before. Therefore, the cycle time can be reduced especially in the indexing machining.
Shortening indexing machining time (when responsiveness of linear axis is higher than responsiveness of rotary axis)
12.3.2.6 High-accuracy Acceleration/Deceleration Time Constant Extension
* 1st part system only.
This extends the upper limit of cutting feed time constant from 5,000[ms] to 30,000[ms] for acceleration/ deceleration before interpolation.
In the multi-part system, this function cannot be used together as an alarm will occur.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80

TypeB C80
M
L
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
Variable-acceleration pre-interpolation
acceleration/deceleration
Acceleration/deceleration before interpolation
Time
Rotary axis
Shortened
Resultant
state
Linear axis

12.3.2.7 Axis-specific Acceleration Tolerance Control
* The first part system only.
The acceleration to be generated at a seam between blocks is evaluated for each axis to control deceleration so that the seam is passed at the optimum speed. This enables highly accurate edge machining. The optimum deceleration speed is calculated so that the acceleration of each axis to be generated at the seam is equal to or less than the tolerable acceleration for each axis, which is determined by maximum speed for each axis, time constant for each axis, and the accuracy coefficient. The machine decelerates to the speed in advance, and then accelerates back to the command speed after passing the corner.
This control enables deceleration at an appropriate speed for the characteristics of each axis even when machine vibrations may easily occur due to a low tolerable acceleration for a specific axis (rotary axis). This means that the deceleration speed can be raised at a corner where acceleration is generated only for an axis with a high tolerable acceleration, leading to a reduced cycle time.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L

12.3.3 High-speed High-accuracy Control
A machining program that approximates a free curve with fine segments can be run at a high speed and with a high accuracy. This function is effective in decreasing the cycle time of machining dies with free curves. This function is also useful in machining which needs to make an edge at a corner or reduce a path error from inner route of curved shape because the high-accuracy control mode is turned ON automatically.
12.3.3.1 High-speed High-accuracy Control I (G05.1Q1) Maximum [kBPM]
Command format
Micro segment capacity
The following is the micro segment capacity while high-speed high-accuracy control I is valid.
Unit: kBPM
(Note) The above performance applies under the following conditions.
- Three axes or less commanded simultaneously in G01
- Block containing only axis name and movement amount (Does not contain macro or variable command)
- During tool radius compensation OFF (G40)
It may not be possible to attain the specified feed rate if deviated from the above conditions.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M 67.5 67.5 67.5 67.5 33.7 33.7 33.7 33.7
L 67.5 67.5 67.5 67.5 33.7 33.7 33.7
G05.1 Q1 ; High-speed high-accuracy control I ON
G05.1 Q0 ; High-speed high-accuracy control I OFF
Number of part systems/Number
of axes
Number of high-speed high accuracy control-enabled
part systems
M850/M830 M80W/M80 TypeA M80 TypeB
MLMLML
1-part system (8 axes or less) 1 part system 67.5 67.5 33.7 33.7 33.7
1-part system (9 axes or more)
2-part system
1 part system 67.5 67.5 33.7 33.7

2 part systems 33.7 33.7 16.8 16.8
3-part system 1 part system 33.7 33.7 16.8
2 part systems 33.7 33.7 16.8
4-part system (16 axes or less) 1 part system 33.7 16.8
2 part systems 33.7 16.8
4-part system (17 axes or more)
5-part system or more
1 part system 16.8
2 part systems 16.8

12.3.3.2 High-speed High-accuracy Control II (G05P10000) Maximum [kBPM]
Command format
Micro segment capacity
The following is the micro segment capacity while high-speed high-accuracy control II is valid.
Unit: kBPM
(*1) It will be 100 kBPM in the time constant expansion system or in the following modes.
- Tool center point control
- Inclined surface machining
- Workpiece installation error compensation
- Tolerance control
(Time constant expansion system can be used in a system configured with a single part system when the specification is valid.)
(Note) The above performance applies under the following conditions.
- Three axes or less commanded simultaneously in G01
- Block containing only axis name and movement amount (Does not contain macro or variable command)
- During tool radius compensation OFF (G40)
It may not be possible to attain the specified feed rate if deviated from the above conditions.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M 168 168 168 168 67.5 67.5 67.5 67.5
L 168 168 168 168 67.5 67.5 67.5
G05 P10000 ; High-speed high-accuracy control II ON
G05 P0 ; High-speed high-accuracy control II OFF
Number of part systems/Number
of axes
Number of high-speed high accuracy control-enabled
part systems
M850/M830 M80W/M80 TypeA M80 TypeB
MLMLML
1-part system (8 axes or less) 1 part system 168 (*1) 168 (*1) 67.5 67.5 67.5
1-part system (9 axes or more)
2-part system
1 part system 100 100 67.5 67.5
2 part systems 67.5 67.5 33.7 33.7
3-part system 1 part system 33.7 33.7 33.7
2 part systems 33.7 33.7 33.7
4-part system (16 axes or less) 1 part system 33.7 33.7
2 part systems 33.7 33.7
4-part system (17 axes or more)
5-part system or more
1 part system 16.8
2 part systems 16.8

Additional functions when high-speed high-accuracy control II/III mode is ON
(1) Fairing
If the protruding path (zigzagging path) is shorter than the parameter setting values in the machining program generated with a CAM, etc., this function can be used to eliminate the protruding paths smaller than the setting value so that the front and back paths are smoothly connected.
This function is valid only for continuous linear commands (G1).
If there is any protruding path after fairing, fairing is repeated.
There is the smooth fairing function in addition to the fairing function.
When a minute step exists on a commanded path, for instance, the path after compensation differs between fairing and smooth fairing as follows:
G1
G1
G1
Before fairing After fairing
Before fairing After first fairing After final fairing
G90 G00 X0 Y0;
G01;
N01 X0.100 Y0.000;
N02 X0.200 Y0.000;
N03 X0.300 Y0.000;
N04 X0.400 Y0.000;
N05 X0.500 Y0.000;
N06 X0.500 Y0.010;
N07 X0.600 Y0.010;

N08 X0.700 Y0.010;
N09 X0.800 Y0.010;
N10 X0.900 Y0.010;
N01 N02 N03 N04 N05
N07 N08 N09 N10
N06
Commanded position
Path after
compensation
Eliminating blocks shorter
than designated length
Compensating commanded
positions in blocks around a step
Commanded path
Path after compensation by fairing
Path after compensation by smooth fairing

(2) Smooth fairing
This function interpolates the command position of machining program so that the movement path becomes smooth. This function is useful when executing a micro segment program to machine smoothly at low speed or a rough machining program with long segment to machine smoothly.
Refer to "12.3.3.4 Smooth Fairing" for details.
(3) Acceleration clamp speed
With the cutting feed clamp speed during the high-speed high-accuracy control II mode, when the parameter is set, the speed is clamped so that the acceleration generated by each block movement does not exceed the tolerable value. This function clamps the speed optimally even at a section where "angle change at each block is small but entire curvature is large" such as shown below. The tolerable acceleration value is calculated from the parameter setting values.
(4) High-speed mode corner deceleration
Conventionally during high-accuracy control, if the angle is large between the adjacent blocks in the machining program, this function automatically decelerates so that the acceleration generated when passing through the corner is within the tolerable value.
If a small block is inserted at the corner section with the machining program generated with the CAM, etc., the corner passing speed will not match the periphery. This can affect the machining surface.
If this type of small block is inserted when using high-speed mode corner deceleration, the corner will be largely judged by the parameter settings.
The small block is excluded when the angle is judged, but it not excluded from the actual movement command.
R If the tool moves along the large curvature
section without deceleration, a large
acceleration is generated resulting in a path
error from the inner route.
If this function is valid, the axis
decelerates at the corner without being
affected by the small block.

12.3.3.3 High-speed High-accuracy Control III (G05P20000) Maximum [kBPM]
Command format
(1) Setting to enable the function by G code
High-speed high-accuracy control III can be enabled by the following G code command. If the following G code is commanded, the high-speed high-accuracy control III mode will be ON even the parameter "High speed/accu 3" is OFF.
(2) Setting to enable the function by parameter
The high-speed high-accuracy control II command can be treated as the high-speed high-accuracy control III command by enabling the parameter "High speed/accu 3".
G05P2 command in high-accuracy control mode can also be treated as the high-speed high-accuracy control III command.
Micro segment capacity
The following is the micro segment capacity while high-speed high-accuracy control III is valid.
Unit: kBPM
(*1) It will be 100 kBPM in the time constant expansion system, or during tool center point control, inclined surface machining or workpiece installation error compensation.
(*2) It will be 67.5 kBPM in the time constant expansion system, or during tool center point control, inclined surface machining or workpiece installation error compensation.
(Time constant expansion system can be used in a system configured with a single part system when the specification is valid.)
(Note) The above performance applies under the following conditions.
- Three axes or less commanded simultaneously in G01
- Block containing only axis name and movement amount (Does not contain macro or variable command)
- During tool radius compensation OFF (G40)
It may not be possible to attain the specified feed rate if deviated from the above conditions.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M 270 270 270 270 135 135 135
L
G05 P20000 ; High-speed high-accuracy control III ON
G05 P0 ; High-speed high-accuracy control III OFF
G05 P10000 ; High-speed high-accuracy control III ON

G05 P0 ; High-speed high-accuracy control III OFF
Number of part systems/Number
of axes
Number of high-speed high accuracy control-enabled
part systems
M850/M830 M80W/M80 TypeA M80 TypeB
MLMLML
1-part system (8 axes or less) 1 part system 270 (*1) 135 (*2)
1-part system (9 axes or more)
2-part system
1 part system 168 (*1) 135 (*2)
2 part systems 100 67.5
3-part system 1 part system 33.7
2 part systems 33.7
4-part system (16 axes or less) 1 part system
2 part systems
4-part system (17 axes or more)
5-part system or more
1 part system
2 part systems

12.3.3.4 Smooth Fairing
A path can be smoothen by compensating commanded positions of a machining program. This function is useful when
executing a fine segment program to machine smoothly at low speed or a rough machining program with long segment
to machine smoothly.
This function is enabled while high-speed high-accuracy control II is ON or while high-accuracy control is ON in high speed machining mode II/III, and performs compensation in consecutive G01 command during the time.
Refer to "12.3.3.2 High-speed High-accuracy Control II (G05P10000) Maximum [kBPM]" for the differences between
fairing and smooth fairing.
(Note) While smooth fairing is valid, the high-speed high-accuracy control III operates as high-speed high-accuracy
control II.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
G90 G00 X0.271 Y0.161;
G01;
N01 X0.319 Y0.249;
N02 X0.415 Y0.220;
N03 X0.475 Y0.299;
N04 X0.566 Y0.256;
N05 X0.638 Y0.325;
N06 X0.720 Y0.268;
N07 X0.803 Y0.325;
N08 X0.875 Y0.256;
N09 X0.965 Y0.299;
N10 X1.026 Y0.220;
N11 X1.122 Y0.249;
N12 X1.169 Y0.161;
N01
N03
N11
N05 N09 N07
N02
N04 N06 N08
N10
N12
Commanded position
Commanded position
Tool path Tool path Commanded position
Compensated position
Commanded path
Smooth fairing OFF Smooth fairing ON

12.3.4 Machining Condition Selection I
The machining condition parameter set which is consists of parameters related to the high-accuracy control can be
configured in advance for each machining application (such as part machining or die machining) or machining process
(such as rough or finishing), and it can be switched according to the purpose.
This can easily perform the machining which meets the conditions for the intended machining.
Multiple part systems simultaneous high-accuracy function is required to apply the machining conditions to the second or
following part systems.
The machine condition commanded by G code command will reflect only to commanded part system.
12.3.5 Direct Command Mode
This function reduces the loads of NC machining program analysis and interpolations as much as possible so that
machining programs composed of fine segments are executed at high-speed with a processing speed.
Compared to normal machining modes, this function is effective for accelerating 3-dimensional machining of curved
surface such as variable cam machining.
M850W M830W M850S M830S M80W M80
TypeA

M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L

12.4 Programming Support Functions
12.4.1 Playback
This function enables creation of a program while proceeding with sample machining by manual (handle or job) feed or mechanical handle feed. A machining program can be edited by using the playback movement amount obtained by manual operation as the program command values.
Playback edit is disabled for the machining program in the mass-editing mode.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L

12.4.3 Interactive Cycle Insertion
This function enables to interactively insert a cycle to assist in the machining and setup for the program opening on the edit screen.
The programming time can be reduced by using this function.
The cycle can easily be inserted by editing data in an interactive window.
[Operation image to insert a cycle]
The program of the cycle block inserted once can directly be edited on the edit screen, and can be re-edited in the cycle edit window if the cycle format is not changed.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
Move the cursor to
the position to insert
the cycle.
Select the cycle to be
inserted in the cycle list.
Edit the cycle data
interactively.
The cycle is inserted to
the cursor position.
Edit screen Cycle list window Cycle edit window Edit screen
Press the
menu
Press the
menu

;
1
100.000
200.000
100
200
G1 Z-100.000;
G1 Z-200.000;
Cycle edit window Program
Modification
Cycle edit window
Machining width

Machining width
Insert a new cycle by
setting a data
Reflect the modification Re-edit
Behavior of cycle
Behavior of the cycle changes
according to the modification
After the
modification
Before the
modification
New
insertion
G180 P1 A_ (turning - front face - rough);
G180 P1 A_ (turning - front face - rough);
Opera
tion

[Types of Cycle]
Machining cycle can be inserted.
In accordance with the NC system set by the parameter, either cycle for lathe or cycle for machining center can be selected.
For cycle types, there are "Standard type" and "Extend type" of MITSUBISHI cycle and arbitrary cycle type "Custom type" prepared by MTB.
For "Standard type", there are normal format and special format, which is set with the parameter.
Press the menu [Standard type], [Extend type] or [Custom type] to be selected on the interactive cycle screen. Select a cycle type to be changed on the displayed cycle list window to switch the cycle.
(Note 1) For standard type, there are conventional format and MITSUBISHI CNC special format. Which format to be used depends on the setting of the parameter.
(Note 2) Fixed cycle is used for "Tapping" and "Deep-hole tapping" of "Extend type". The format to be used is the same as "Standard type", which depends on the setting of the parameter.
Cycle for Lathe system
: Cycle insertion available - : No specification
Hierarchy 1 Hierarchy 2 Hierarchy 3 Standard type Extend type Cycle type Machining cycle Machining portion
Turning hole Drilling Front
Back

Deep-hole drilling
Tapping
Deep-hole tapping
Reaming -
Boring
Turning Turning Outer diameter
Inner diameter
Front
Back

Turning (compound)
Copying
Grooving
Cutting-off
Thread cutting Outer diameter
Inner diameter

Thread cutting (compound)
Thread recutting
Thread recutting (compound)
Milling hole Drilling Periphery
Side
Front
Back

Deep-hole drilling
Step drilling
Tapping
Deep-hole tapping
Reaming -
Boring
Milling Pocketing Side
Front
Back
-
Grooving -

(Note) Fixed cycle is used for "Tapping" and "Deep-hole tapping" of "Extend type".
Display of cycle list window
The cycle list window is displayed in the area opposite to the editing area. There are two display types for cycle list window, "image display type" and "tree display type", which can be switched Change list button.
Cycle for Machining center system
: Cycle insertion available - : No specification
Hierarchy 1 Hierarchy 2 Standard type Extend type Cycle type Machining cycle
Hole Drilling
Deep-hole drilling
Step drilling

Tapping
Deep-hole tapping
Reaming -
Boring
Milling Plane -
Pocketing -
Grooving -
Contour -
Image display type Tree display type
Change list button

12.4.4 Simple Programming (NAVI MILL/LATHE)
Create a part program by using NAVI MILL (for machining center system) or NAVI LATHE (for lathe system).
(1) The following machining processes can be edited.
(2) Cutting conditions are automatically determined from tool management data and cutting condition file.
(3) The operation screen consists of the list view area and the operation view area. In the list view area, the entire part program can be seen at all time. In the operation view area, there are guide drawings related to each input item, which allows an easy data input.
(4) Program Checker enables the tool paths of a part program to be graphically traced. With this function, an input error can be detected at an earlier stage.
(5) Guidance function provides an operator with error recovery information.
(6) Part program is a macro-program-based NC program. Process commands can be added in the edit screen.
(7) The macro program above can be customized by the machine tool builder.
12.4.5 G code Guidance
G code guidance is a function to display illustration of the contents or movements of the commanded format for the G code currently under editing. This is used when creating or editing a machining program.
With this function, the G code contents under the editing process can be checked on the spot.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
M system L system
- Hole drilling (Drilling, deep hole drilling, step, boring, tapping)
- Surface cutting (Circle, square)
- Contour cutting (Circle, square, arbitrary shape)
- Pocket machining (Circle, square, L pattern, U pattern)
- EIA
<Turning machining>
- Turning (Outside dia., inside dia., front face)
- Copying (Outside dia., inside dia., front face)
- Threading (Outside dia., inside dia., front face)
- Grooving (Outside dia., inside dia., front face)
- Trapezoid grooving (Outside dia., inside dia., front face)
- Hole drilling (Drilling, deep hole drilling, step, tapping)
- EIA
- Cutting-off
<Milling machining>
- Milling hole machining (Drilling, deep hole drilling, boring, tapping)
[Hole pattern]
- Random (Front face, outer periphery, side face)
- Line (Front face, outer periphery, side face)
- Arc (Front face, side face)
- Circle (Front face, side face)
- Square (Front face, side face)
- Lattice (Front face, side face)
- Key groove (Front face, outer periphery, side face)
- Contour machining (Front face, outer periphery, side face)
<Auxiliary operation>
- Delivery
<Balance cut>
- Turning balance cut
- Copying balance cut
- Two-part system simultaneous thread cutting
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L

12.4.7 DXF Data Input
This function is a support for the interactive cycle insert function.

This function allows you to import a DXF drawing file from an external I/O device through DXF data input window, extract the figure element data from the drawing, and add them as arbitrary shape data or as hole position data to the cycle being edited using the interactive cycle insertion function.
DXF data input function requires FCU8-MU542 or -MA542 for M800S, or FCU8-MU512 for M80.
The supported devices are as follows:
- HD
- Memory card (front-side SD card)
- DS (back-side SD card)
- USB memory
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
Use CAD software on an external PC to create a
drawing file in the DXF format.
Load the drawing file from
HD, SD or USB memory.
By determining the selected figure element, you set the element type and
coordinate value of the extracted element directly as arbitrary shape data.
You can add each element and input the coordinate values through the
drawing operation.
DXF format
drawing file

13 Machine Accuracy Compensation

13.1 Static Accuracy Compensation
13.1.1 Backlash Compensation
This function compensates for the error (backlash) produced when the direction of the machine system is reversed.
The backlash compensation can be set in the cutting feed mode or rapid traverse mode.
The amount of backlash compensation can be set separately for each axis. It is set using a number of pulses in increments of one-half of the least command increments. The output follows the output unit system. The "output unit system" is the unit system of the machine system (ball screw unit system).
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L

13.1.2 Memory-type Pitch Error Compensation [sets]
With the reference position defined as the base, set the compensation amount in the division points obtained by equally dividing the machine coordinates.
According to the specified parameters, this method compensates an axis feed error caused by a ball screw pitch error, etc.
The compensation amount can be set by either the absolute or incremental system. Select the desired method with the parameter.
Machine position between division points n and n+1 is smoothly compensated by the linear approximation of the compensation amount.
Up to 32 sets of axes can be set for the compensation for M800 Series, or up to 16 sets of axes for M80/E80 Series.
Up to 1899 points can be set for the compensation for M800 and M80/E80 Series.
PLC axes and PLC indexing axes can be also compensated.
[Relationship between the compensation amount and machine position]
(Note 1) Compensation points 1899 is a total including the points for memory-type relative position error compensation.
(Note 2) A scale of 0 to 99-fold is applied on the compensation amount.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M 32 32 32 32 16 16 16 16 16 10
L 32 32 32 32 16 16 16 16 16 10
n n+1 n+2
:

Command machine
position
Division point
Command machine
position

Actual machine
position for which
no compensation
has been made
Ideal machine
position
Actual machine
position
Compensation
amount
Reference position Compensation
amount
between
division points

13.1.3 Memory-type Relative Position Error Compensation
This method, according to the parameters specified in advance, compensates the relative position error between two orthogonal axes caused by deflection of the moving stand.
Specify the compensation amount in the compensation axis direction in the division points obtained by equally dividing the machine coordinates of the base axis.
The base axis is one of the two orthogonal axes to which relative position compensation applies. This axis is used as the criterion for relative-error measurement. The compensation axis is the coordinate axis that is orthogonal to the base axis. The compensation is actually made for this coordinate axis.
Machine position between division points n and n+1 is smoothly compensated by the linear approximation of the compensation amount.
Up to 32 sets of axes can be set for the compensation for M800 Series, or up to 16 sets of axes for M80/E80 Series.
Up to 1899 points can be set for the compensation for M800 and M80/E80 Series.
PLC axes and PLC indexing axes can be also compensated.
[Relationship between the compensation amount and machine position]
(Note 1) Compensation points 1899 is a total including the points for memory-type pitch error compensation.
(Note 2) A scale of 0 to 99-fold is applied on the compensation amount.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
n n+1 n+2
:

Actual machine
position of
compensation axis
Compensation
amount
Reference position
Actual machine position for
which no compensation has
been made
Division point
Command machine
position along base
axis
Command machine
position
Compensation
amount between
division points

13.1.4 External Machine Coordinate System Compensation
The coordinate system can be shifted by inputting a compensation amount from the PLC. This compensation amount will not appear on the counter (all counters including machine position). If the machine's displacement value caused by heat is input for example, this can be used for thermal displacement compensation.
13.1.5 Circular Radius Error Compensation
With commands designated during arc cutting, this function compensates for movement toward the inside of the arcs caused by a factor such as servo delay.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
M850W M830W M850S M830S M80W M80
TypeA
M80

TypeB
E80
TypeA
E80
TypeB C80
M
L
Compensation vector according to external machine coordinate
Machine coordinate zero point when the external machine
coordinate system offset amount is 0.
Machine coordinate zero point

13.1.6 Ball Screw Thermal Expansion Compensation
This compensates the axis feed error caused by the ball screw thermal expansion, etc. using the values set in the R register's thermal displacement compensation parameter.
The compensation amount at the end of the machine error compensation range (mdvno to pdvno) is set. The compensation line is obtained from the set compensation amount, and is linearly distributed in the machine error compensation range to attain smooth compensation. A compensation amount that changes during operation can also be compensated.
(1) Conditions under which thermal displacement compensation is valid
- When function is valid.
- When axis No. and parameter (offset, maxcmp) is set in R register.
- When pitch error compensation parameter is set correctly.
(2) Compensation operation
- The machine error compensation range is compensated with the thermal displacement compensation amount (absolute position compensation amount) obtained with the compensation line.
- The compensation amount is immediately calculated when thermal displacement compensation is validated.
- When the compensation amount is changed, the new compensation line is immediately obtained, and the range is compensated again with that compensation amount.
- Thermal displacement compensation can be used with machine error compensation. In this case, the sum of the machine error compensation amount and the thermal displacement compensation amount is added to the machine position and issued as the NC command.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
mdvno pdvno
offset (with sign)
Motor Hold
Compensation amount
Ball screw
maxcmp (with sign) Referring
to "offset" position
Compensation line
Compensa tion amount
(legcmp)
Machine position
Machine error compensation range
(= thermal expansion compensation
range)
Reference position

13.1.7 Rotation Center Error Compensation
In the machine having a rotary axis, the rotation center deviates due to the assembly error of the rotary axis. Thus, if a machining is carried out with the rotary axis, the machining accuracy is impaired because an error is caused in the relative position between the tool and workpiece.
There are two types of rotation center deviation. One is "position deviation", in which the rotation center is shifted in the planar direction, and the other is "angle deviation", in which the rotation center inclines.
Higher-accuracy machining is realized by compensating for these two types of deviation.
[Position deviation and angle deviation]
[Compensation for the deviation of the rotation center]
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
Position deviation
Angle deviation Machine design rotation center line
Actual rotation center line
X
Y
: Machine design rotation center

: Actual rotation center
C axis
rotation Error
Compensation
enabled
Compensation
amount
<No deviation> <With deviation> <When this function is enabled>
Machining accuracy is
impaired because an error
is caused in the position
between the tool and
workpiece.
C axis
rotation
C axis
rotation
The error between the tool
and workpiece is compen sated for by using the
measurement result
(parameter) of the deviation.

This function can be used on the machine whose rotary axis is installed with ISO polarity and the machine whose axis isinstalled with non-ISO polarity. However, the orthogonal axis needs to be installed with ISO polarity. (*1)
(*1) In the machine coordinate system (right-hand orthogonal coordinate system) defined in ISO standard, the rotation turning to the right-handed screw is handled as ISO polarity and the one turning to the left-handed screw is handles as non-ISO polarity.
This function is compatible with the following axis configurations of the machines.
Machine Machine type Axis configuration
M system
4-axis machine
Table tilt
Configured in right-handed orthogonal coordinate system + 1 rotary axis Tool tilt
5-axis machine
Table tilt
Combined Configured in right-handed orthogonal coordinate system + 2 rotary axes
Tool tilt
L system
4-axis machine
Table tilt
Configured in right-handed orthogonal coordinate system + 1 rotary axis Tool tilt
5-axis machine
Combined
Configured in right-handed orthogonal coordinate system + 2 rotary axes Tool tilt

13.1.8 Position-dependent Gradually Increasing-type Backlash Compensation
Usually, minute bumps are generated when the machine movement direction is reversed. (Lost motion) However, due to various mechanical system factors, there may be cases where the bumps do not change in steps but gradually change after the direction reversal. (Gradually increasing-type lost motion)
Depending on the mechanical structure, the gradually increasing-type lost motion includes the type where the bump amount depends on "duration of time" from when the machine movement direction is reversed and the type where the bump amount depends on "distance". When the bump amount depends on "duration of time", compensation is possible with the OMR-II function. (13.2.4 OMR II(Backlash with Filter)).
With this function, the gradually increasing-type lost motion which depends on the distance from the point where the machine movement direction is reversed can be compensated by controlling the variation of backlash compensation amount according to the distance from the direction reversal point.
<When the bump amount changes according to speed>
<When the bump amount does not change according to speed>
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
F500
F1000
F2000
F5000
Shapes at rising edge of bumps are steep when
the speed is low. Bumps depend on time.
Compensation with OMR-II function
Basic circle
Measurement
result
F500
F1000
F2000
F5000
Shapes at rising edge of bumps do not change even
when the speed changes. Bumps depend on

position
Compensation with this function
Basic circle
Measurement
result

13.1.9 Bidirectional Pitch Error Compensation
Bidirectional pitch error compensation function is used to compensate the pitch error in each direction by setting the pitch error compensation amount when moving in the positive and negative direction.
This function reduces the difference of tool path between the positive and negative direction.
13.1.10 Cyclic Error Compensation
When the machine operation induces certain cyclic errors, this function compensates a series of cyclic errors by setting the compensation amount for a single cycle.
Short-pitched compensation is possible for the errors occurring due to the tooth shape of the encoder.
You can set the period of the error cycle, the number of steps in the cycle, and the compensation amount at each step by the parameter.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L

0.005
- 0.005
0.005
- 0.005
Repeats the compensation cycle
Sets the compensation
amount for one cycle in
each step
1st cycle 2nd cycle 3rd cycle
1st cycle 2nd cycle 3rd cycle
1 cycle
Tooth shape
Tooth shape
Error amount
Errors after applying
compensation
Encoder tooth
Errors occur in cycles.

13.1.11 Spatial Error Compensation
This function can compensate for three-dimensional errors of a machine tool due to its linear and rotary axes. This measures the spatial errors caused by the linear and rotary axes with a measuring device, and inputs the measurement results to the NC to make an error data file. The function calculates the compensation amount based on the error data file and adds the calculated compensation amount of the linear and rotary axes to the drive command position to perform the compensation. The function can reduce deterioration of machining accuracy due to mechanical errors, which will lead to high-accuracy machining.
This function is enabled for a machine where three linear axes form a right-handed orthogonal coordinate system.
This function is compatible with the following axis configurations of the machines.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
Machine Machine type Axis configuration
3-axis machine 3 orthogonal axes Configured in right-handed orthogonal coordinate system
4-axis machine
Table tilt
Configured in right-handed orthogonal coordinate system + 1 rotary axis Tool tilt
5-axis machine
Table tilt
Combined Configured in right-handed orthogonal coordinate system + 2 rotary axes

Tool tilt
Error due to linear axis/
Error resulting from rotary axis motion
Rotary-axis angle deviation
Measurement result
Measuring device:
Laser tracker, etc.
Measures error
File input/output
screen
NC
Error data file
Compensation
amount
Calculates
compensation
amount
Position command to drive
Commanded position
Adds compensation
amount

13.1.12 Backlash Compensation II
This function reduces quadrant error caused by the backlash when the traversing direction is reversed in machines where semi-closed loop control is implemented.
Compensation based on the acceleration rate at a direction reversal improves machining accuracy. For the range between the acceleration rates defined in parameters, the error is compensated using the compensation amount obtained through linear interpolation.
Backlash compensation II allows up to four compensation amounts for different acceleration rates to be set for each axis.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
[Before the compensation] [After the compensation]
Compensation
amount "c"
Compensation
amount "d"
d
a b
c
Compensation amount
according to acceleration rate
Compensation amount
Acceleration rate
Preset compensation
amount/acceleration rate
a
b

13.2 Dynamic Accuracy Compensation
13.2.1 Smooth High-gain (SHG) Control
This is a high-response and stable position control method using the servo system. This SHG control achieves an approximately three-fold position loop gain equally compared to the conventional control method.
The features of the SHG control are as follows.
(1) The acceleration/deceleration becomes smoother, and the mechanical vibration can be suppressed (approx. 1/2) during acceleration/deceleration. (In other words, the acceleration/deceleration time constant can be shortened.)
(2) The shape error is approx. 1/9 of the conventional control.
(3) The positioning time is approx. 1/3 of the conventional control.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
6.0
3.0
Conventional control (position loop gain
= 33rad/S)
SHG control (position loop gain = 50rad/S)
Speed
Current
Machine

vibration
Step response
Time Time
Conventional
control
SHG control
Machine vibration
amount (m)
Y
X
22.5
2.5
1.0
Feed rate 3000mm/min.
Radius 50mm
Conventional
control
SHG control
SHG control + FF (Feed forward)
Conventional
control
SHG control
SHG control
+ FF
Roundness error (m)
200
60
70
Conventional control
SHG control
SHG control + FF (Feed forward)
Time
Droop
Droop during rapid traverse deceleration
Conventional
control
SHG control
SHG control +
FF (Feed
forward)
Positioning time (ms)

13.2.2 Dual Feedback
If the motor and machine coupling or machine system's rigidity is low (ex. large machine, etc.) when using a closed loop system, the response during acceleration/deceleration will vibrate and cause overshooting. This can cause the position loop gain from increasing. The dual feedback function is effective in this case.
To validate the dual feedback function, use position feedback with a motor side detector in ranges with high acceleration to enable stable control. In ranges with low acceleration, use position feedback with the machine side detector (scale). This will make it possible to increase the position loop gain.
The machine side detector (scale) is required separately.
The state will approach the semi-closed loop system as the primary delay filter's time constant increases, so the position loop gain limit will increase. Note that the limit of the position loop gain increased with the dual feedback function is the same as the position loop gain limit for a semi-closed system that does not use a machine side detector (scale, etc.). In addition, the positioning time will increase as the primary delay filter time constant increases.
13.2.3 Lost Motion Compensation
This function compensates the error in the protrusion shape caused by lost motion at the arc quadrant changeover section during circular cutting.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
+
-
+
-
- +
ENC
Dual feedback control
Position
command Position control

Position droop Servo
motor
Linear scale
Table
Speed command
Position FB
Position FB
Primary
delay filter
High frequency FB element
Low frequency
FB element
dead band

13.2.4 OMR II (Backlash with Filter)
The OMR (Optimal Machine Response) control function estimates the machine or motor model (moment of inertia, clone friction, viscosity coefficient, etc.) that can cause a path error (error in actual tool path in respect to the path commanded with the program). High-accuracy machining is achieved by carrying out feed forward control based on that model. This allows error cased by quadrant protrusions during circular interpolation or quadrants on the inner side of the path to be greatly reduced.
OMR-II is a function that focuses on the quadrant protrusions, and improves the path error with this. Quadrant path compensation is included in OMR-II.
The quadrant protrusion compensation function improves quadrant protrusions by issuing compensation to the backlash compensation amount to compensate the error when the machine system direction is reversed.
By adding the compensated backlash compensation amount to the position command and sending it to the servo, the gradually increasing-type lost motion which occurs at quadrant changeover can be compensated.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
+
+
Servo
Position command (Fdt)
Backlash compensation
amount
Interpolation
process
Machine error
compensation
Quadrant
protrusion
compensation

13.2.6 OMR-FF
The OMR (Optimal Machine Response) control estimates the causes (moment of inertia, clone friction, viscosity coefficient, etc.) of the path error (error in actual tool path in respect to the path commanded with the program) by making a model of the control target. Feed forward control is carried out based on that model.
With the OMR-FF control method, highly accurate machining can be achieved by using the command filter function to suppress vibration in addition to the reverse model feed forward function.
The reverse model feed forward function estimates the control target's vibration characteristics using a reverse model. The feed forward command for the appropriate position, speed and current can be obtained from this estimation. This allows the machine position to be tracked to the commanded position without causing vibration when using machine tools with low rigidity.
When the command filter function is also used, the high-range vibration elements in the command can also be suppressed.
New control method to bring out the full potential of a high-speed high-acceleration machine
- High tracking ability for the command (Smaller path error)
- Suppression of the machine vibration (Suppress low-range vibration without losing tracking ability)
Set parameters:
(1) Scale model time constant
(2) Machine system resonance frequency p, anti-resonance frequency z, attenuation rate ,
inertia J
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
s
J . s2
Target
path Scale
model

Scale model
position
Determine response
characteristics of
machine end position
Trace load position to scale
model position without causing
vibration
OMR-FF control
Machine system
reverse model
Notch
filter
Torque FF
Speed FF
Position
command
F/B controller
Motor
torque
Motor position
Machine
system
Machine end
position

13.2.7 Distance-coded Reference Position Detection
This is the function where the scale with absolute address reference mark is used to establish the reference point in the relative position detection system.
When the reference point has not been established, it is necessary to move the axis to the reference point. On the other hand, with this function, the reference point is established by moving the axis only for several reference marks, resulting in a significant reduction of the axis movement amount.
No dog is used as the position is calculated using reference marks.
<Reference point establishment process>
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
R

Ordinary method
This function
Reference mark Dog
Reference point established
Reference point established

13.2.9 Variable Torsion Compensation
When the direction of the machine movement is reversed, a response delay (*1) causes protrusion on the path.
(*1) The response delay occurs due to dead band, such as friction, torsion, and backlash.
The lost motion compensation and OMR-II provide uniform compensation using the set compensation parameters regardless of the acceleration rate at the direction reversal to suppress the protrusion. However, the characteristics of the response delay at the reversal differs depending on the acceleration rate at the reversal; therefore, when the arc radius or command speed is changed, the compensation cannot be performed sufficiently.
The variable torsion compensation enables compensation based on the acceleration rate at the reversal and machining with high accuracy by setting the compensation parameters for each acceleration rate at the reversal.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
The compensation parameters are adjusted to provide uniform compensation.
When the arc
radius or
command speed
is changed
Quadrant protrusion
can be reduced.
Quadrant protrusion
may not be reduced
completely.
The compensation parameters are adjusted for each acceleration rate at the
reversal to provide compensation based on the acceleration rate.
Variable torsion compensation

Lost motion compensation, OMR-II
Quadrant protrusion
can be reduced.
Circular command
Position FB
Quadrant protrusion can be
reduced even when the arc
radius or command speed is
changed.

13.2.10 Cogging Torque Compensation
This function compensates the torque ripple (cogging torque).
Ensure to adjust this function before adjusting the machine.
As cogging torque varies with the characteristics of the motors used, machines need to be adjusted individually.
This function is designed for servo motors, and cannot be used for spindle motors.
This function is valid for the axes in the rotary axis spindle mode during spindle-mode rotary axis control.
This function is invalid for the axes under spindle-mode servo motor control.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L

379 IB-1501505-N
14
Automation Support Functions

14.1 Measurement
14.1.1 Skip
14.1.1.1 Skip
When the external skip signal is input during linear interpolation with the G31 command, the machine feed is stopped immediately, the remaining distance is discarded and the commands in the next block are executed.
[M system]
[L system]
(1) The cutting feed override and dry run are enabled or disabled by the respective parameters.
(2) The feedrate switches as follows according to the parameter setting.
- The value of address F given in the G31 block, or if F is not commanded, the value set by the parameter.
- The F modal value commanded in the program.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
G31 X__ Y__ Z__ __ R__ F__ ; (is the additional axis.)
X,Y,Z, : Coordinate values of each axis. Use absolute or incremental command.
R : Acceleration/deceleration command
F : Feed rate (mm/min)
G31 X/U__ Z/W__ R__ F__ ;
X,Z,U,W : Command values
R : Acceleration/deceleration command
F : Feed rate (mm/min)
Position
Programmed end
point
Feed rate
Skip signal input
Remaining
Actual movement distance distance
Command value

(3) Command by G31 command basis for acceleration/deceleration command (R0/R1).
When R0 command is issued or R command is omitted, automatic acceleration/deceleration is not performed but step acceleration/deceleration is performed after interpolation in G31 block.
If R1 command is issued, automatic acceleration/deceleration is performed after interpolation even when skip signal is input.
A command is not issued or a command other than R0/R1 is issued, it will be the operation of acceleration/deceleration time constant=0(R0) and automatic acceleration/deceleration is not performed after interpolation.
(4) The approximate coasting distance up to feed stop based on the detection delay in the skip signal input is calculated as below.
: Coasting distance (mm)

F : G31 rate (mm/min)
Tp : Position loop time constant (s) = (position loop gain)-1
t1 : Response delay time (s) = (A period of time from when the skip signal is detected until it reaches the control device.)
t2 : Response error time 0.001 (s)
(Note 1) Skipping during machine lock is not valid.
F
F
Changeover of acceleration/deceleration type with R command
Skip time constant
Acceleration/deceleration when R1 command is issued Skip signal
Skip time constant
Time
Time
Speed
Speed
Skip signal
Acceleration/deceleration when R0 command is issued or R command is omitted
0 = Tp+ (t1 t2) 60
F
60
F
60
F
60
F = (Tp+t1) t2
1 2

14.1.1.2 Multiple-step Skip
This function realizes skipping by designating a combination of skip signals for each skip command.
(1) G31.n method
This function carries out skipping by designating a combination of skip signals for each skip command (G31.1, G31.2, G31.3).
The combination of the skip signals are designated with parameters for each G code (G31.1, 31.2, 31.3), and the skip operation is executed when all signals in the combination are input.
(2) G31Pn method
As with the G31.n method, the valid skip signal is designated and skip is executed. However, the method of designating the valid skip signal differs.
The skip signals that can be used are 1 to 8. Which is to be used is designated with P in the program. Refer to Table 1 for the relation of the P values and valid signals.
Skip can be executed on dwell, allowing the remaining dwell time to be canceled during the dwell command (G04) and the next block executed under the skip conditions (to distinguish external skip signals 1 to 8) set with the parameters.
(a) Specify the skip rate in command feedrate F. However, F modal is not updated.
(b) Specify skip signal command in skip signal command P. Specify the P value in the range of 1 to 255. If it exceeds the specified range, a program error occurs.
(c) When the skip signals are commanded in combination, the skip operation takes place with OR result of those signals.
Table 1 Valid skip signals
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
G31.n Xx1 Yy1 Zz1 Ff1 ;
G31.n
Xx1,Yy1,Zz1
Ff1
: Skip command (n=1, 2, 3)
: Axis address and target position
: Feedrate (mm/min)
G31 Xx1 Yy1 Zz1 Pp Ff1 ;
G31
Xx1,Yy1,Zz1
Pp
Ff1
: Skip command
: Axis address and target position
: Skip signal command
: Feedrate (mm/min)
Skip signal command P Valid skip signal
87654321
1
2
3
4
5
: ::::::::
253
254
255

14.1.1.4 PLC Skip
This function enables skip operations to be performed by signals which are input from the user PLC.
14.1.1.5 Speed Change Skip
This function is used to change the feed rate or to stop the movement by inputting the skip signal during the linear interpolation.
After stopping the movement with skipping, the remaining movement command is canceled and the next block is executed.
In addition to the speed change skip function, the high-speed skip option and multiple-step skip function are required to use this function.
Operation example
G31 X100. Ff F1 = 0 F2 = f2 F3 = f3 F4 = f4 ;
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
G31 Xx Yy Zz Ff F1 = f1 ... Fn = fn ; (n is the skip signal 1 to 8.)
G31
Xx, Yy, Zz
Ff
fn
: Skip command
: Command position
: Feed rate when starting the cutting feed (mm/min)
: Feed rate after detecting the skip signal (mm/min)
fn = 0 : Movement stop
fn 0 : Changing the feed rate to fn
F1 = Feed rate after inputting the skip signal 1
:
F8 = Feed rate after inputting the skip signal 8
f4
f
f3
f2
0
f1
Time
Skip time constant
Skip signal 4
Skip signal 3
Skip signal 2
Skip signal 1
Position loop time constant
(position loop gain-1)
Speed

14.1.1.6 Torque Limitation Skip
Axis movement is performed in the torque limited status, and the axis movement command is suspended to proceed to the next block when the current command value reaches the designated torque skip value and the torque skip turns ON.
In addition to the torque, the droop value can be add to the condition of the skip ON. (Droop skip)
This function enables measurement without a sensor.
Command format
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
Workpiece radius measurement tool
:
G0 X50. Z100. T0101; Tool selection for measurement
G160 X40. Q80 F20; Torque skip command
#100=#5061; : Coordinate position (workpiece value) read
:

G160 X/U/Z/W/ Q D F ;
X/U/Z/W/ : Axis address (range of coordinate position command (mm, inch), decimal point command is possible)
Q : Torque skip value (0 to 500 (%))
D : Droop skip value (0 to 99999.999 (mm, inch))
F : Skip speed (range of feedrate (mm/min, inch/min, mm/rev, inch/rev))
G0 X50. Z100. T0101;
G160 X40. Q80 F20;

14.1.2 Automatic Tool Length Measurement
This function moves the tool in the direction of the tool measurement position by assigning a distance between the measurement start position to the measurement position. The machine stops when the tool reaches the sensor and automatically calculates the difference between the coordinate position where the tool stopped and measurement position. It registers this difference as the tool length compensation amount for that tool.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L

(1) Automatic Tool Length Measurement (M system)
This function moves the tool in the direction of the tool measurement position by commanding a distance between the measurement start position to the measurement position, it stops the tool as soon as it contacts the sensor and calculates the difference between the coordinate position when the tool has stopped and commanded coordinate position. It registers this difference as the tool length compensation amount for that tool.
If compensation has already been applied to the tool, it is moved in the direction of the measurement position with the compensation still applied, and when the measurement and calculation results are such that a further compensation amount is to be provided, the current compensation amount is further corrected.
If the compensation amount at this time is one type, the compensation amount is automatically corrected; if there is a distinction between the tool length compensation amount and wear compensation amount, the wear amount is automatically corrected.
G37 Zz1 Rr1 Dd1 Ff1 ;
G37 ;
Zz1
Rr1
Dd1
Ff1
: Measurement command
: Measurement axis address and measurement position X, Y, Z, (= optional axis)
: The distance between the point at which tool movement is to start at the measurement speed and the measurement position
: The range in which the tool is to stop
: The measurement rate
When Rr1_, Dd1_ and Ff1_ have been omitted, the values set in the parameters are used.
At this time, the tool length compensation amount has a minus ("-") value.
Example of program
G28 Z0 ;
T01 ;
M06 T02 ;
G43 G00 Z0 H01 ;
G37 Z-300. R10. D2. F10 ;
:
In this case, the distance (H01 = Za1 - z0) from the tool T01 tip to the top of the measurement sensor is calculated as the tool length compensation amount which is then registered in the tool compensation table.
Area A : Moves with rapid traverse feed rate.
Areas B1, B2 : Moves with the measurement speed (f1 or parameter setting)
If a sensor signal is input in area B1, an error will occur.
If a sensor signal is not input in the area B2, an error will occur.
Tool change position
Tool
Sensor
Reference position (In case of machine coordinate system zero point.)
Amount of movement based on tool length measurement
Tool length measurement position (Za1)
A
B1
r 1

d 1
d 1
B 2 z1
Start point
Measurement
position
r1, d1, and f1 can also be
set in parameters.

(2) Automatic tool length measurement (L series)
This function moves the tool in the direction of the tool measurement position by commanding a distance between the measurement start position to the measurement position, it stops the tool as soon as it contacts the sensor and calculates the difference between the coordinate position when the tool has stopped and commanded coordinate position. It registers this difference as the tool length compensation amount for that tool.
If compensation has already been applied to the tool, it is moved in the direction of the measurement position with the compensation still applied, and when the measurement and calculation results are such that a further compensation amount is to be provided, the current wear compensation amount is further corrected.
When the tool moves from the measurement start position to the measurement position specified in G37 x1 (z1), it passes through the A area at rapid traverse. Then, it moves at the measurement rate set in F command or parameter from the position specified in r1. If the measurement position arrival signal (sensor signal) turns ON during the tool is moving in the B area, an error occurs. If the measurement position arrival signal (sensor signal) does not turn ON although the tool passes through the measurement position x1 (z1) and moves by d1, an error occurs.
G37 1 Rr1 Dd1 Ff1 ;
G37
1
: Measurement command
: Measurement axis address and measurement position coordinate ... X,Z
Rr1
Dd1
Ff1
: The distance between the point at which tool movement is to start at the measurement speed and the measurement position (Radial value fixed / incremental position)
: The range in which the tool is to stop (Radial value fixed: incremental position)
: The measurement rate
When Rr1_, Dd1_ and Ff1_ have been omitted, the values set in the parameters are used.
d1
d1
B
r1
A
F feed
Measuring
instrument
Measurement position
Start position
r1, d1, and f1 can also be
set in parameters.
Compensation
amount Sensor ON
Rapid traverse feed

14.1.3 Manual Tool Length Measurement 1
Simple measurement of the tool length is done without a sensor.
(1) Manual tool length measurement I [M system]
When the tool is at the reference position, this function enables the distance from the tool tip to the measurement position (top of workpiece) to be measured and registered as the tool length compensation amount.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
M
Manual movement
amount
(tool length
compensation
amount)
Workpiece
Table

(2) Manual tool length measurement I [L system]
This is the function to calculate the tool length compensation amount automatically by moving the tool to the measurement point with manual feed. There are two types of measurement methods in manual tool length measurement I: the basic point method and the measurement value input method. The method is selected by

setting parameter. For key operation there are normal operation mode/simple operation mode.
(a) Basic point method
Obtain the tool length with the tool nose placed on the measurement point.
To carry out the basic point method, a point to place the tool nose on (measurement point) is required.
When measurement position is set to parameter or workpiece coordinate offset (modal).
<Parameter designation method>
The tool length is automatically calculated using the following formula.
Tool length = Machine coordinates - Measurement point (#2015 tlml-)
(Note) Always set the measurement point with a radius value, regardless of the diameter/radius
command.
<Workpiece coordinate offset designation method>
Tool length is the coordinate value on the workpiece coordinate system.
Measurement
point
Tool length basic
point
Z-axis tool
length
Z-axis machine position
Parameter setting value
Measurement
position(Workpi
ece coordinate
origin (modal))
Tool length basic point
Workpiece coordinate position
= Z-axis tool length

(b) Measurement value input method
Actually cut the workpiece. Measure its dimensions, and obtain the tool length from the measured values.
The measurement basic point is characteristic for each machine (the center of the chuck face, etc.
designated by parameter),or workpiece coordinate offset (modal).
<Parameter designation method>
The tool length is automatically calculated by the equation below.
Tool length = Machine coordinate values - Measurement basic point (#2015 tlml-) - Measured value
(Note) Always set the measurement point with a radius value, regardless of the diameter/radius
command.
<Workpiece coordinate offset designation method>
The tool length is automatically calculated by the equation below.
Tool length = Workpiece coordinate position . Measured value
Measurement
basic point
Tool length basic point
X-axis tool lenght
X-axis measured value
X-axis machine position
Parameter setting value
Measurement basic point (Wk.
coordinate origin (modal))
Tool length basic point
X-axis tool length
X-axis measured value
X axis WK. coordinate position

14.1.4 Manual Tool Length Measurement 2
(1) Manual tool length measurement II [M system]
When the tool is positioned at the reference position, this function enables the distance from the reference position to the tool tip to be measured and registered as the tool length compensation amount. In this case, the position of the gauge block used as a reference must be set as the basic height.
If the height axis designation parameter is ON, the axis designated for plane selection basic axis K is the axis targeted for measurement as the height axis.
Furthermore, if the tool length measurement check parameter is ON, an input OK/cancel confirmation message appears after input key has been pressed.
(2) Manual tool length measurement II [L system]
A device in which a touch probe is built is used. Simply by causing the tool nose to touch the touch probe in manual feed, the tool compensation amount can be calculated and stored in tool length compensation amount memory. If you set the tool compensation values of each tool, cut the workpiece end face manually, and then input the workpiece measurement signal, you can set the external workpiece coordinate offset data of Z axis.
Preset the machine coordinate position of the touch probe touch face in parameter as the measurement basic position.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
M Tool length
compensation
Manual movement
amount

Basic height
Table
Gauge block
TLM basic length
(setup parameter)
X
Z
X
Z Z
X
M
Tool length
Tool length
- touch face
+ touch face - touch face
+ touch face

14.1.5 Workpiece Coordinate Offset Measurement
The external workpiece coordinate offset data for the Z axis can be set by cutting the workpiece face by means of manual operations and inputting the workpiece measurement signal.
By pressing the menu key, data can be set in the Z axis of an arbitrary coordinate offset.
Coordinate offset setting for the Z axis (2nd axis) of the part system 1 to 4 is possible.
Note that the workpiece coordinate offsets for multiple part systems cannot be measured at the same time.
(Note) Measurement is disabled for the part system with one-axis structure.
Example of measurement of external workpiece coordinate offset data for Z axis
(1) Measurement method with workpiece measurement signal
(a) Select the tool, and cut the workpiece face.
(b) When the workpiece measurement signal is input, the external workpiece coordinate offset data for the Z axis is calculated from the machine coordinate position, length of the tool used and tool nose wear compensation amount, and stored in the memory.
(2) Measurement method with "MeasVal take in" menu
(a) Select a tool, and cut the workpiece face.
(b) When the "MeasVal take in" menu is pressed, workpiece coordinate offset data is calculated from the machine coordinate position, tool length and tool nose wear compensation amount of a used tool, and external workpiece coordinate offset. The workpiece coordinate offset data is stored in the Z-axis of the selected coordinate system offset.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
Z
X
Machine zero point
Tool post
Workpiece
Workpiece coordinate zero point

14.1.6 Workpiece Position Measurement
The workpiece position measurement function is used to measure each axis' coordinate point by installing a sensor on the spindle and the sensor contacting the workpiece with the manual feed or handle feed.
The surface, hole center and width center coordinates are calculated from the measured coordinates, and those calculated results are set in the workpiece coordinate offset.
The axis to be measured is designated with parameter.
The workpiece position measurement is available for all the part systems.
Here the measurement axes are explained as "X", "Y" and "Z".
(1) Surface workpiece offset measurement
The workpiece position measurement coordinates are calculated from the skip machine position of the X, Y and Z axes.
Measurement position coordinate X = X axis' skip machine position + sensor diameter/2 center compensation amount (horizontal) skip flow amount (horizontal)
Measurement position coordinate Y = Y axis' skip machine position + sensor diameter/2 center compensation amount (vertical) skip flow amount (vertical)
Measurement position coordinate Z = Z axis' skip machine position - sensor length
The sensor diameter/2 and skip flow amount change between +/- with the tool movement direction during the measurement.
The X and Y axes use the sensor diameter, center compensation amount (horizontal/vertical) and skip flow amount (horizontal/vertical).
The Z axis uses the sensor length.
The measurement position coordinate of the X axis, Y axis or Z axis is set in the specified workpiece coordinate offset.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80

M
L
To set the workpiece coordinate offset, the X axis
is measured and the X axis' offset coordinate is
set. Then, the Y axis' offset is measured and set.
Finally, the Z axis' offset is measured and set.
X
Y
Workpiece coordinate
zero point
Y axis measurement
constant position
X axis measure ment constant
position

(2) Hole center workpiece offset measurement
The measurement position coordinates of two axes (X, Y) are measured at three points, and the hole center is calculated. The calculated result is set in the specified workpiece coordinate offset.
The workpiece position measurement coordinates are calculated from the skip machine position of the X and Y axes.
Measurement position coordinate X = X axis' skip machine position + center compensation amount
(horizontal) skip flow amount (horizontal
Measurement position coordinate Y = Y axis' skip machine position + center compensation amount (vertical)
skip flow amount (vertical)
The +/- of the skip flow amount changes according to the tool movement amount during measurement.
(3) Width center workpiece offset measurement
The two points among the measurement position coordinate of the X axis, Y axis or Z axis are measured, and each axis' groove center is calculated. The calculated result is set in the specified workpiece coordinate offset.
The workpiece position measurement coordinates are calculated from the skip machine position of the X, Y and Z axes.
Measurement position coordinate X = X axis' skip machine position + center compensation amount
(horizontal) skip flow amount (horizontal)
Measurement position coordinate Y = Y axis' skip machine position + center compensation amount (vertical)
skip flow amount (vertical)
Measurement position coordinate Z = Z axis' skip machine position - Sensor length
The +/- of the skip flow amount changes according to the tool movement amount during measurement
To set the workpiece coordinate offset, the
position X and Y of the measurement A point are
measured, and the measured values are set in
the measurement A point. In the same manner as
the measurement A point, the measurement B
point and then C point are measured and set.
The hole center coordinate is calculated by
setting the workpiece coordinate system after
setting three points, and the calculated result is
set in the workpiece coordinate offset.
To set the workpiece coordinate offset, the position
X (position Y, position Z) of the measurement A
point is measured, and the measured value is set in
the measurement A point. In the same manner as
the measurement A point, the measurement B point
is measured and set.
The groove width center coordinate of the X axis (Y
axis, Z axis) is calculated by setting the workpiece
coordinate system after setting two points, and the
calculated result is set in the workpiece coordinate
offset
X
Y
Workpiece coordinate
zero point
Measure ment A point
Measure ment B point
Measurement C point
X
Y
Measure ment A
point
Measurement B point

14.1.7 Rotation Measurement
The offset (rotation center and rotation angle) of the rotary coordinate system is measured, and the results are set to the workpiece coordinate system offset (rotation center) and the parameters.
<Measurement using touch probe>
Measurement counter X = X axis skip position (Machine position)
Measurement counter Y = Y axis skip position (Machine position)
<Simple measurement (measurement without using touch probe)>
Measurement counter X = X axis machine position + center compensation (H) + skip past amount (Horizontal axis)
(Note)
Measurement counter Y = Y axis machine position + center compensation (V) + skip past amount (Vertical axis) (Note)
(Note) The skip past amount is added for only the axis that moved last.
The sign (+ or -) of the skip past amount depends on the movement direction of the axis.
M850W M830W M850S M830S M80W M80
TypeA

M80
TypeB
E80
TypeA
E80
TypeB C80
M
L

14.1.8 Rotation Center Error Measurement
This function executes automatic measurement with the touch probe on the reference sphere to calculate the rotation center error compensation amount.
As the movement of the touch probe, the rotation of the axis, the reading of the coordinate and the calculation of the error are performed automatically, the rotation center error compensation amount can be easily calculated. The calculated error compensation amount can be confirmed on the rotation center error measurement screen and set to the parameter.
In order to perform the rotation center error measurement, you need to execute the rotation center error macro initialization in advance and input the rotation center error measurement macro program to the memory.
This function supports the following machine configurations only:
- AC table tilt
- BC table tilt
If the rotation center error measurement is attempted with the configuration which is not subject, the alarm occurs when the automatic start button is pressed.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L

14.1.9 Workpiece Installation Error Measurement
This function executes automatic measurement with the touch probe to calculate the workpiece installation error compensation amount.
As the movement of the touch probe, the reading of the coordinate and the calculation of the error are performed automatically, the workpiece installation error compensation amount can be easily calculated. The calculated error compensation amount can be confirmed on the workpiece installation error measurement screen and set to the error compensation amount.
In order to perform the workpiece installation error measurement, you need to execute the workpiece installation error macro initialization in advance and input the workpiece installation error measurement macro program to the memory.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
X(+)
Y(+)
Z(+)
Touch probe
Workpiece

14.2 Tool Life Management
14.2.1 Tool Life Management
Tool life management is a function to monitor the usage of the programmed tool based on the cumulative cutting hours or the cumulative number of cuttings.
The function enables appropriate exchange of tools, which leads to consistent quality of machining.
For multi-part system, the number of tools for tool life management can be set individually for each part system.
14.2.1.1 Tool Life Management I
The following two method can be selected.
- Management by the cutting hours
The cutting time (such as G01, G02, or G33) after tool selection (T) command is added to the cumulative cutting hours for the specified tool.
- Management by the number of cuttings
The cumulative number of cuttings of the specified tool is incremented each time a tool selection (T) command is issued for the tool.
(1) M system
The "Tool life over" signal will turn ON when the cumulative tool usage data has reached the end of tool life.
(2) L system
The "Tool life over" signal will turn ON when a T command is issued after the cumulative tool usage data has reached the end of tool life.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB

E80
TypeA
E80
TypeB C80
M
L

14.2.1.2 Tool Life Management II
(1) M system
A spare tool change function is added to tool life management I. This function selects a usable tool out of the spare tools of the group determined by the value specified by the user PLC, then outputs data of such usable spare tool. The spare tool can be selected in two ways: the tools are selected in order they were registered in the group, or the tool whose remaining period of the tool life is the longest of all in the group is selected.
(2) L system
The tool life of each tool (cutting hours or number of cuttings) is controlled, and when the usage data has reached the end of tool life, a spare tool of the same type is selected from the group where the tool belongs to. By setting the remaining tool life value prediction value (hours or the number of times) in advance, when the remaining tool life of the tool in use is below the set value, the "Tool life prediction" signal can be output. (Tool life prediction function) (M8 series)
14.2.1.3 Tool Life Management III
For the tools designated by user PLC, tools' cumulative cutting hours (0 to 4000 minutes) or cumulative number of cuttings (0 to 65000 times) is accumulated, and the tool usage state is monitored. The tool life data for up to 1000 tools can be managed.
This function does not support the management by the group No.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L

14.2.2 Number of Tool Life Management Sets
[M system]
[L system]
Number of tool life management tools M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
Number of tool life management tools
(99 sets)
Number of tool life management tools
(128 sets)
Number of tool life management tools
(200 sets)
Number of tool life management tools
(256 sets)
Number of tool life management tools
(400 sets)
Number of tool life management tools
(999 sets)
Number of tool life management tools M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
Number of tool life management tools
(99 sets)
Number of tool life management tools
(128 sets)
Number of tool life management tools
(200 sets)
Number of tool life management tools
(256 sets)

Number of tool life management tools
(400 sets)
Number of tool life management tools
(999 sets)

The number of tools that can be managed for their lives in the case of fixed allocation are shown below. Refer to "14.2.3 Tool Life Management Set Allocation to Part Systems" for details on the arbitrary allocation.
[M system]
[L system]
Function name Common for part systems or
1-part system
Independent for systems and
multi-part system
Number of tool life management tools
(200 sets) 200 tools Divide the number of tools in the system
by the number of part systems to
calculate the number of tools in each
part system(If there is the remainder,
the remainder is allocated to the first
part system.)
Number of tool life management tools
(400 sets) 400 tools
Number of tool life management tools
(999 sets) 999 tools
Function name Common for part systems or
1-part system
Independent for systems and
multi-part system
Number of tool life management tools
(99 sets) 99 tools
Divide the number of tools in the system
by the number of part systems to
calculate the number of tools in each
part system(If there is the remainder,
the remainder is allocated to the first
part system.)
Number of tool life management tools
(128 sets) 128 tools
Number of tool life management tools
(256 sets) 256 tools
Number of tool life management tools
(400 sets) 400 tools
Number of tool life management tools
(999 sets) 999 tools

14.2.3 Tool Life Management Set Allocation to Part Systems
* Variable number of management tools
The number of tool life management tools can be set per part system.
There are two types of the allocation: "Arbitrary allocation" which allocates the number of tool life management tools to each part system arbitrarily and "Fixed allocation" which automatically allocates the number of tool life management tools to each part system equally, and the type can be selected using the parameter.
The arbitrary allocation enables the efficient allocation because when a certain part system needs only a small number of tool life management tools, the rest can be allocated to another part system. If an auxiliary-axis part system does not need the tool life management at all, the number of tool life management tools can be set 0 in the auxiliary-axis part system.
"Number of tool life management tools in system" is the total number of tool life management tools of all part systems.
(1) Arbitrary allocation
(a) When the number of tool life management tools is increased in the 1st part system of 4-part system
(b) When the number of tool life management tools is set "0" to the 3rd part system of 3-part system for use of the 3rd part system as auxiliary-axis part system
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
Number of tool life management tools in
system [1000 tools]
Number of tool life management tools in
system [1000 tools]
Number of tool life management tools in
system [1000 tools]
Number of tool life management tools in
system [1000 tools]
250
250
250
250
200
200

200
400
1st part system
2nd part system
3rd part system
4th part system
1st part system
2nd part system
3rd part system
4th part system
334
333
333 500
0
500
1st part system 1st part system
2nd part system
3rd part system
2nd part system
3rd part system

(2) Fixed allocation
Number of tool life management tools in system [1000 tools]
(Note 1) The maximum number of tool life management tools per part system is 999.
(Note 2) If there is any remainder, the remainder is allocated to the 1st part system.
1-part system 2-part system 3-part system 4-part system
250
250
250
250
1st part
system
2nd part
system
3rd part
system
4th part
system
999
(Note 1)
1st part
system
500
500
1st part
system
2nd part
system
333
333
334
(Note 2)
1st part
system
2nd part
system
3rd part
system

14.3 Others
14.3.1 Programmable Current Limitation
This function allows the current limit value of the NC axis to be changed to a desired value in the program, and is used for the workpiece stopper, etc.
The commanded current limit value is designated with a ratio of the limit current to the rated current. The current limit value can also be set from the setting and display unit.
The validity of the current limit can be selected with the external signal input.
However, the current limit value of the PLC axis cannot be rewritten.
(1) If the current limit is reached when the current limit is valid, the current limit reached signal is output.
(2) The following two modes can be used with external signals as the operation after the current limit is reached.
- Normal mode
The movement command is executed in the current state.
During automatic operation, the movement command is executed to the end, and then the next block is moved to with the droops still accumulated.
- Interlock mode
The movement command is blocked (internal interlock).
During automatic operation, the operation stops at the corresponding block, and the next block is not moved to.
During manual operation, the following same direction commands are ignored.
(3) During the current limit, the droop generated by the current limit can be canceled with external signals.
(Note that the axis must not be moving.)
(4) The setting range of the current limit value is 1% to 999%. Commands that exceed this range will cause a program error.
(5) If a decimal point is designated with the G10 command, only the integer will be valid.
(Example) G10 L14 X10.123 ; The current limit value will be set to 10%.

(6) For the axis name "C", the current limit value cannot be set from the program (G10 command). To set from the program, set the axis address with an incremental axis name, or set the axis name to one other than "C".

14.3.2 Auto Power OFF

This can notify that the control unit's power can be turned OFF after shutting the display unit down (Do not turn the power OFF.) by entering "automatic power OFF request" signal from user PLC to NC.

(Note) The Mitsubishi Electric-supplied display unit is required.

M850W M830W M850S M830S M80W M80

TypeA

M80

TypeB

E80

TypeA

E80

TypeB C80

M

L

G10 L14 X dn ;

G10

L14

X

dn

: Current limit input command

: Current limit value setting (+ side/- side)

: Axis address

: Current limit value 1% to 999%

M850W M830W M850S M830S M80W M80

TypeA

M80

TypeB

E80

TypeA

E80

TypeB C80

M

L

14.3.4 Load Monitoring I

This function aims at detecting tool wear or degradation by detecting and monitoring the actual load (current value) on spindle and NC axes on a real time basis.

The effective torques and estimated disturbance torques on the spindle and NC axes are output to the predetermined R registers in real time. Sampling of the estimated disturbance torque can be performed with this function.

Up to 8 servo axes in each part system (maximum 4 part systems) are supported with this function.

14.3.5 Power ON/OFF Sequence

* Specifications of separated-type display are classified with "Windows-based" and "non-Windows-based"

This function turns the power supply ON/OFF, synchronizing the NC control unit and the HMI screen. This enables the following:

- The relay which synchronizes the control unit and the personal computer unit when the power supply is turned ON becomes unnecessary.
- The control unit and the personal computer unit are configured with the same power supply and can be started up at optimum timing even when they are turned ON at the same time.
- By using the power ON/OFF button of the operation panel side, both the control unit and the personal computer unit can be started up and their power supply can be turned ON again.
- When the automatic power OFF is performed, NC starts the end processing right after the end processing of the personal computer unit is completed to reduce the wasteful standby time.

14.3.6 PLC Axis Current Limit

This function can set a current limit to the PLC axis as with NC axis. This can be used for the stopper control, etc.

M850W M830W M850S M830S M80W M80

TypeA

M80

TypeB

E80

TypeA

E80

TypeB C80

M

L

M850W M830W M850S M830S M80W M80

TypeA

M80

TypeB

E80

TypeA

E80

TypeB C80

M / / /

L / / /

M850W M830W M850S M830S M80W M80

TypeA

M80

TypeB

E80

TypeA

E80

TypeB C80

M

L

14.3.7 Direct Robot Control
This function enables a robot to be connected to and directly operated by an NC.
A robot-dedicated screen is provided to display the status of the robot on the NC screen. Some of the possible operations are as follows:
- Automatic operation using robot-dedicated G code commands in NC machining programs
- Manual operation of the robot using a handle on the NC
- Digital I/O control to open and close the robot hand
As in the following example, this function enables the NC to control the machining of workpieces with the robot loading and unloading workpieces in coordination with the machining, as well as deburring through the robot concurrent with the machining of workpieces.
<Example of system configuration>
1st part system ($1) : X, Z
2nd part system ($2) : - (The part system has no axes because only a robot is controlled.)
A part system to be used exclusively for robot operation (robot-dedicated part system) can be set. Even when the robot dedicated part system is not used, robot operation is possible; however, when the robot-dedicated part system is used, robot operation is possible with the same command (program) as the NC axis control.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
Robot Robot controller
Deburring tool
(External tool)
Temporal
depot
Finished products
(4) Deburring
$1
$2
Machine tool
(1) Loading workpiece
Unmachined workpieces
(3)Unloading
workpiece
(2) Machining by NC

15.1 Safety Switches
15.1.1 Emergency Stop
All operations are stopped by the emergency stop signal input and, at the same time, the drive section is stopped and the movement of the machine is stopped.
At this time, the READY lamp on the setting and display unit goes OFF and the servo ready signal is turned OFF.
When the emergency stop is cancelled, the reset will be performed. The reset type can be selected in the parameter.
15.1.2 Data Protection Key
The editing functions such as setting and deleting of data can be prohibited by the data protection key. There are 5 types of data protection keys, and each data protection key and the data to be protected are as follows:
The data protection keys prohibit the editing functions such as setting and deleting when the keys are OFF (0).
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
Data protection key type Description
Data protection key 1 For protecting the overall tool data and the coordinate system presettings as based on origin setting.
Data protection key 2 For protecting the user parameters and common variables.
Data protection key 3 For protecting the machining programs of NC memory.
Data protection key (memory card) For protecting the data on the front-side SD (memory card).
Data protection key (DS) For protecting the data on the back-side SD (DS).

15.2 Display for Ensuring Safety
15.2.1 NC Warning
The warnings which are output by the NC system are listed below. When one of these warnings has occurred, a warning number is output to the PLC and a description of the warning appears on the screen. Operation can be continued without taking further action.
15.2.2 NC Alarm
When an alarm has occurred, an alarm number is output to the PLC, and a description of the alarm appears on the screen. Operation cannot be continued without taking remedial action.
For NC alarm display and alarm signals, refer to "Alarm/Parameter Manual" and "PLC Interface Manual" for details.
In addition, the NC alarm has the following functions.
(1) Display delay function of an operation alarm
This function can be used to postpone only alarm display (including alarm signal ON and alarm history record) when an operation error has occurred.
By removing the causes of the operation error while alarm display is being postponed, unnecessary alarm display is not displayed and also unnecessary alarm history is not recorded.
(2) 7-segment LED alarm/status display
The 7-segment LED mounted on the operation board I/O can display NC status.
When alarms occur, an alarm with the highest priority within each part system is displayed.
(3) Alarm/warning on PLC output of servo/spindle drive unit
When an alarm or a warning has occurred in the servo drive unit or spindle drive unit, alarm No. and warning No. of each drive unit is output to the R register.
When a warning has occurred in the servo drive unit or spindle drive unit, the signal is output to indicate that a warning has occurred.
(4) Multiple keys cannot be input (M8 Series only)
This function is used to display an operation error when multiple keys are input with the keyboard or the menu buttons on the display unit.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
Type of warning Description
Servo warning The servo warning is displayed.
Spindle warning The spindle warning is displayed.
System warning The system warning is displayed. (State such as temperature rise, battery voltage low, etc.)
Absolute position
warning A warning in the absolute position detection system is displayed.
Auxiliary axis warning The auxiliary axis warning is displayed.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L

15.2.3 Operation Stop Cause
The stop cause of automatic operation is displayed on the setting and display unit.
15.2.4 Emergency Stop Cause
When "EMG" (emergency stop) message is displayed in the operation status display area of the setting and display unit, the emergency stop cause can be confirmed.
15.2.5 Thermal Detection
When overheating is detected in the control unit, an overheat signal is output at the same time as the alarm is displayed.
If the system is in automatic run at the time, run is continued, but it cannot be started after reset or completion by M02/M30. (It can be started after block stop or feed hold.)
When the temperature falls below the specified temperature, the alarm is released and the overheat signal is turned OFF.
The overheat alarm occurs at 80 C or more in the control unit.
(Note 1) If the parameter is used to set the temperature rise detection function to invalid, overheating may occur, thereby disabling control and possibly resulting in the axes running out of control, which in turn may result in machine damage and/or bodily injury or destruction of the unit. It is for this reason that the detection function is normally left "valid" for operation.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80

TypeA
E80
TypeB C80
M
L
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
Overheat detection
Control unit
Parameter
Temperature
alarm
User PLC
Message display
Cooling fan rotation
Lamp alarm
Emergency stop
Others
(a temperature of 80 C) Bit device
(Default: valid)

15.2.6 Battery Alarm/Warning
When it is time for changing batteries, alarm or warning is displayed.
When a warning is displayed, immediately backup all the necessary data and change batteries.
When an alarm is displayed, there is a possibility that memory has been lost.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
0
Nominal voltage Battery warning output
Battery warning detection level
Battery alarm detection level
Battery alarm output

15.3 Protection
15.3.1 Stroke End (Over Travel)
When limit switches and dogs have been attached to the machine and a limit switch has kicked a dog, the movement of the machine is stopped by the signal input from the limit switch.
At the same time, the alarm output is sent to the machine.
The stroke end state is maintained and the alarm state is released by feeding the machine in the reverse direction in the manual mode to disengage the dog.
15.3.2 Stored Stroke Limit
The areas where tool entry is prohibited can be set with parameters or program commands.
The maximum value and the minimum value of the prohibited area are set for each axis with coordinate value (radius value) on the basic machine coordinate system.
This function is enabled only for the axis whose reference position has been established. (*1)
When the tool entered the prohibited area, an operation error occurs and the machine stops moving.
The alarm can be reset by moving the erroneous axis in the opposite direction.
During automatic operation, if an alarm occurs with even one axis, all axes will decelerate to a stop.
During manual operation, only the axis that caused the alarm will decelerate to a stop. The axis will always stop at a position before the prohibited area.
The distance between the prohibited area and stop position will depend on the feedrate.
(*1) For the absolute position detection system, if the zero point initial setting has already completed, this function is enabled immediately after the power is turned ON.
The stored stroke limits I, II, IIB, IB and IC are handled as follows.
When the same data is set for the maximum value and the minimum value of prohibited area of the stored stroke limit, note the following points:
[Stored stroke limit I and II]
- When "0" is set for both the maximum value and the minimum value, the entire area will be the prohibited area.
- When the same data other than "0" is set for both the maximum value and the minimum value, the entire area will be the movable area.
[Stored stroke limit IB and IC]
- When the same data is set for the maximum value and the minimum value, the entire area will be the movable area.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA

E80
TypeB C80
M
L
Type Prohibited
area Explanation
I Outside - Set by the machine tool builder.
- When used with II, the narrow range designated by the two types becomes the movable area.
II Outside - Set by the user.
- By using the program command, the parameter can be changed and the function can be switched to ON/
OFF.
- Select II or IIB with the parameters.
IIB Inside
IB Inside - Set by the machine tool builder.
IC Outside - Set by the machine tool builder.

15.3.2.1 Stored Stroke Limit I/II
(1) Stored Stroke Limit I
This is the stroke limit function used by the machine tool builder, and the outside of the boundary is defined as the entrance prohibited area.
The maximum and minimum values for each axis can be set by parameters. The function itself is used together with the stored stroke limit II function described in the following section, and the tolerable area of both functions is the movable area.
The setting range is -99999.999 to +99999.999 mm.
The range of the stored stroke limit I can be changed to the value set to R register for each axis. When "Stored stroke limit I change request" signal is turned ON, the area of stored stroke limit changes. Changing the area for the stored stroke limit I is also possible during automatic operation. Also, the current settings for the stored stroke limit I can be checked by with the R register values.
This feature allows an operator to switch the area of the stored stroke limit I during axis movement for the purpose of tool exchange, for example.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
The position of points 1 and 2 are
set using the machine coordinate.
: Prohibited area
M
P2
P1
Machine movable area
Machine coordinate system
"-" setting "+" setting

(2) Stored Stroke Limit II
This is the stroke limit function which can be set by the user, and the area outside the set limits is the prohibited area.
The maximum and minimum values for each axis can be set by parameters. The function itself is used together with the stored stroke limit I function described in the foregoing section, and the tolerable area of both functions is the movable area.
The setting range is -99999.999 to +99999.999 mm.
The stored stroke limit II function can also be invalidated with the parameter settings.
The position of points 3 and 4 are set
with the machine coordinate.
The area determined by points 1 and
2 is the prohibited area set with
stored stroke limit I.
: Prohibited area
M
P2
P4
P3
P1
Machine movable area
Area
prohibited
by stored
stroke limit
function II
Machine coordinate
system
"-" setting "+" setting

15.3.2.2 Stored Stroke Limit IB
The boundary is set for each axis with parameters. The inside of the set boundary is defined as the prohibited area.
Three areas where tool entry is prohibited can be set using the stored stroke limit I, stored stroke limit II, IIB and stored

stroke limit IB functions.
When an attempt is made to move the tool beyond the set range, an alarm is displayed, and the tool decelerates and stops.
If the tool has entered into the prohibited area and an alarm has occurred, it is possible to move the tool only in the opposite direction to the direction in which the tool has just moved.
15.3.2.3 Stored Stroke Limit IIB
A parameter is used to switch between this function and stored stroke limit II. With stored stroke limit IIB, the inside of the set boundary is defined as the prohibited area.
An area other than the area specified with stored stroke limit I is set as the movement prohibited area.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
The area determined by points 5 and 6 is
the prohibited area set with stored stroke
limit IB.
The area determined by points 1 and 2 is
the prohibited area set with stored stroke
limit I.
The area determined by points 3 and 4 is
the prohibited area set with stored stroke
limit IIB.
: Prohibited area
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
M
P1
P2
P3
P4
P5
P6
"-" setting
Machine movable area
Machine coordinate system
"+" setting
M800/M80/E80/C80 Series Specifications Manual (Function)
15 Safety and Maintenance
IB-1501505-N 416
15.3.2.4 Stored Stroke Limit IC
The boundary is set for each axis with the parameters. The inside of the set boundary is the additional movement range.
This cannot be used with stored stroke limit IB.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
The position of points 3 and 4 are set
with the machine coordinate.
The area determined by points 1 and
2 is the prohibited area set with stored
stroke limit I.
: Prohibited area
M
P2
P1
P4
P3
"-" setting "+" setting
Machine movable area
Additional
movable area
Machine coordinate system
M800/M80/E80/C80 Series Specifications Manual (Function)
15 Safety and Maintenance
417 IB-1501505-N
15.3.3 Stroke Check before Travel
This function detects an error of the program command which causes the machine to enter the prohibited area where machine entry is prohibited.

Whereas normal stored stroke limit stops the machine just before the set prohibited area, this function causes the program error to occur in a block where the said command is given, and stops the machine before movement. This facilitates review of program paths as well as continuous operation.

There are two methods for stroke check before travel, which can be selected with a parameter.

(1) Stroke check before travel (G22/G23)

G22 allows you to set the entry prohibited area (X, Y and Z) and enable the stroke check before travel.

The program error occurs in a command block whose start or end point of travel, or linear or circular path enters the prohibited area.

G23 turns OFF the check function.

This method can be used for machining center specification only.

Command format

Stroke check before travel ON

(*1) In the command format, the basic axes are X, Y and Z. Command the basic axis set in the parameter.

Stroke check before travel cancel

M850W M830W M850S M830S M80W M80

TypeA

M80

TypeB

E80

TypeA

E80

TypeB C80

M

L

G22 X__ Y__ Z__ I__ J__ K__ ;

X,Y,Z (*1) : Coordinates of upper point (basic axis name and its coordinate position)

I,J,K : Coordinates of lower point (I,J,K address and its coordinate position)

G23 ;

Y

0 X

The program error stops

the operation before start

of the travel command

block.

Traveling path enters

the prohibited area.

Entry prohibited area specified by G22

Basic machine

coordinate system

(2) Stroke check before travel in the stored stroke limit area

The block in which the end point of the movement command enters the entrance prohibited area set with the stored stroke limit I, IB, IC II or IIB function becomes a program error.

Y

0 X

End point enters the

prohibited area.

The program error stops the

operation before start of the

travel command block.

Basic machine

coordinate system

Entry prohibited area specified by stored stroke limit I

15.3.4 Chuck/Tailstock Barrier Check

By limiting the tool nose point move range, this function prevents the tool from colliding with the chuck or tailstock because of a programming error. When a move command exceeding the area set in a given parameter is programmed, the tool is stopped at the barrier boundaries.

Program format

(1) When the machine is about to exceed the area, the machine is stopped and an alarm is displayed. To cancel the alarm, execute reset.

(2) The function is also effective when the machine is locked.

(3) This function is valid when all axes for which a barrier has been set have completed reference position return.

(4) The chuck barrier/tailstock barrier can be set per each part system.

(5) Chuck barrier/tailstock barrier setting.

The chuck barrier and tailstock barrier are both set with the machine coordinate by inputting one set of three-point data in the parameter. Points P1, P2 and P3 are the chuck barrier, and points P4, P5 and P6 are the tailstock barrier. The X axis is set with the coordinate position (radius value) from the workpiece center, and the Z axis is set with the basic machine coordinate system coordinate.

Point P0 is the chuck barrier and tailstock barrier's basic X coordinates, and the workpiece center coordinate in the basic machine coordinate system is set.

The barrier area is assumed to be symmetrical for the Z axis, and if the X axis coordinate of barrier point P_ is minus, the sign is inverted to plus and the coordinate is converted for a check.

Set the absolute positions of the X axis coordinates of the barrier points as shown below:

P1 >= P2 >= P3, P4 >= P5 >= P6

(However, this need not apply to the Z axis coordinates.)

M850W M830W M850S M830S M80W M80

TypeA

M80

TypeB

E80

TypeA

E80

TypeB C80

M
L
G22 ; ..... Barrier ON
G23 ; ..... Barrier OFF (cancel)
P6
P5
Z
P4
(P0)
P0
P3
P2
P1
X
(Form 1)
P6
P5
Z
P4
(P0)
P0
P3
P2
P1
X
(Form 2)

15.3.5 Interlock
The machine movement will decelerate and stop as soon as the interlock signal, serving as the external input, is turned ON.
When the interlock signal is turned OFF, the machine starts moving again.
(1) In the manual mode, only that axis for which the interlock signal is input will stop.
(2) In the automatic mode, all axes will stop when the interlock signal is input to even one axis which coincides with the moving axis.
(3) Block start interlock
While the block start interlock signal (*BSL) is OFF (valid), the execution of the next block during automatic operation will not be started. The block whose execution has already commenced is executed until its end.
Automatic operation is not suspended. The commands in the next block are placed on standby, and their execution is started as soon as the signal is turned ON.
(Note 1) This signal is valid for all blocks including internal operation blocks such as fixed cycles.
(Note 2) This signal (*BSL) is set ON (invalid) when the power is turned ON. If it is not used, there is no need to make a program with the PLC.
(4) Cutting start interlock
While the cutting start interlock signal (*CSL) is OFF (valid), the execution of all movement command blocks except positioning during automatic operation will not be started. The block whose execution has already commenced is executed until its end. Automatic operation is not suspended. The commands in the next block are placed on standby, and their execution is started as soon as the signal is turned ON.
(Note 1) The signal is valid for all blocks including internal operation block such as fixed cycles.
(Note 2) This signal (*CSL) is set ON (invalid) when the power is turned ON. If it is not used, there is no need to make a program with the PLC.
15.3.6 External Deceleration
This function reduces the feed rate to the deceleration speed set by the parameter when the external deceleration input signal, which is the external input from the user PLC, has been set to ON. External deceleration input signals are provided for each axis and for each movement direction ("+" and "-"), and a signal is valid when the signal in the direction coinciding with the direction of the current movement has been input. When an axis is to be returned in the opposite direction, its speed is returned immediately to the regular speed assigned by the command.
When non-interpolation positioning is performed during manual operation or automatic operation, only the axis for which the signal that coincides with the direction of the current movement has been input will decelerate.
However, with interpolation during automatic operation, the feed rate of the axis will be reduced to the deceleration rate if there is even one axis for which the signal that coincides with the direction of current movement has been input.
The external deceleration input signal can be canceled using a parameter for the cutting feed only.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L

15.3.7 Interference Check III
By checking the relative relation between interference objects, the interference can be prevented from occurring.

One interference object is defined by one to sixteen tridimensional objects.
The maximum definable number is 128 for the interference objects and is 256 for the tridimensional objects.
Up to 16 interference objects out of 128 can be selected for the interference check. The number of solids which can be used in the selected interference object is 42 in total.
Select 16 interference objects to be checked by the R register or the system variable.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
Solids/interference objects Number
Solid interference objects 256
Number of defined interference objects 128
Number of solids which can be used for one interference object 16
Solids/interference objects to be checked Number
Number of interference objects which can be checked 16
The total of solids which can be used in the interference object to be checked 42

For the solids, two kinds of shapes, cuboids and cylinders, can be defined.
It is also possible to define the rotated solid for one of the I J K axes of the solid.
For the interfering object, up to 2 axes can be defined as rotary axes.
You are able to define more than one interfering object with one-rotary axis, and one interfering object with two-rotary axis within 16 interfering objects to perform the interference check.
You are not able to define the interfering object with one-rotary axis and interfering object with two-rotary axis at the same time.
2 kinds of areas can be defined for an interference area defined as the interfering object: an area where interference must be avoided surely (interference alarm area) and an area where interference should be mitigated (interference warning area)
The schematic view of interfering object definition
2nd interfering object I axis 2nd part system
Configured solid
offset
1st interfering object
1st part system
Configured solid
offset
Solid
dimension
Solid
dimension
I axis
J axis
K axis K axis
Rotation
2nd interfering center offset
model
Coordinate system
offset
1st interfering model
Coordinate system
offset
J axis
2nd part system
machine coordinate 1st part system
machine coordinate
2nd part system
Machine coordinate
system zero point
1st part system
Machine coordinate
system zero point
2nd part system
Machine coordinate system
zero point offset
1st part system
Machine coordinate system
zero point offset
Base machine coordinate zero point

15.3.8 3D Machine Interference Check
The machine pre-reads the position to be moved during the operation to check the interference by the 3D model (machine, tool and jig) registered in advance. When an interference is predicted, the an alarm will be shown immediately and all the axes will be decelerated to stop.
The actual positional relation between the tool position and the interference check position
Also, since the 3D model is shown on the 3D monitor screen in real time, the actual positional relation of the machine can be figured out. When the interference occurs, the interference part in the 3D model will be shown in yellow or red. The interference check is performed between the following:
- machine and machine
- machine and tool

- machine and jig
- tool and jig

The interference check is not performed between the machine and the workpiece. This function is dedicated to the machining center in single part system.

(Note) The software sold separately is required to create the 3D model.

M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
Before machine
interference
Movement direction
Current tool position
Pre-read position
Interference
Decelerate and stop
Pre-read position
Movement direction
At the time of machine Current tool position interference

15.3.9 Door Interlock

15.3.9.1 Door Interlock I

(Outline of function)

Under the CE marking scheme of the European safety standards (machine directive), the opening of any protection doors while a machine is actually moving is prohibited.

When the door open signal is input from the PLC, this function first decelerates and stops all the control axes, establishes the ready OFF status, and then shuts off the drive power inside the servo drive unit so that the motors are no longer driven.

When the door open signal has been input during automatic operation, the suspended machining can be resumed by first closing the door concerned and then initiating cycle start again.

(Description of operation)

When a door is open

The NC system operates as follows when the door open signal is input:

(1) It stops operations.

(a) When automatic operation was underway

The machine is set to the feed hold mode, and all the axes decelerate and stop.

The spindle also stops.

(b) When manual operation was underway

All the axes decelerate and stop immediately.

The spindle also stops.

(2) The complete standby status is established.

(3) After all the NC axes and the spindle have stopped, the ready OFF status is established.

(4) The door open enable signal is output.

Release the door lock using this signals at the PLC.

When a door is closed

After the PLC has confirmed that the door has been closed and locked, the NC system operates as follows when the door open signal is set to OFF.

(5) All the axes are set to ready ON.

(6) The door open enable signal is set to OFF.

M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L

Resuming operation

(7) When automatic operation was underway

Press the cycle start button.

Operation now resumes from the block in which machining was suspended when the door open signal was input.

(8) When manual operation was underway

Axis movement is commenced when the axis movement signals are input again.

(9) Spindle rotation

Restore the spindle rotation by inputting the forward rotation or reverse rotation signal again: this can be done either by operations performed by the operator or by using the user PLC.

(10) Chopping operation

Input the chopping signal again after returning the chopping axis to the basic point.

If the axis is not returned to the basic point, chopping operation will be resumed from the position where the chopping signal is input again.

(11) When the spindle/C axis exists

If the switching method of the spindle/C axis is PLC signal method and the "Door open signal" is input in the C axis mode, the mode shifts to the spindle mode. Operations when the "Door open signal" is set to OFF differ depending on the parameter setting value.

15.3.9.2 Door Interlock II
(Outline of function)
Under the CE marking scheme of the European safety standards (machine directive), the opening of any protection doors while a machine is actually moving is prohibited.
When the door open signal is input from the PLC, this function first decelerates and stops all the control axes, establishes the ready OFF status, and then shuts off the drive power inside the servo amplifiers so that the motors are no longer driven.
With the door interlock function established by the door open II signal, cycle start can be enabled even when the door open signal has been input. However, the axes will be set to the interlock status.
(Description of operation)
When a door is open
The NC system operates as follows when the door open II signal is input:
(1) It stops operations.
All the axes decelerate and stop.
The spindle also stops.
(2) The complete standby status is established.
(3) After all the NC axes and the spindle have stopped, the ready OFF status is established.
However, the servo ready finish signal (SA) is not set to OFF.
When a door is closed
After the PLC has confirmed that the door has been closed and locked, the NC system operates as follows when the door open signal is set to OFF.
(4) All the axes are set to ready ON.
(5) The door open enable signal is set to OFF.
Resuming operation
(6) When automatic operation was underway
The door open signal is set to OFF, and after the ready ON status has been established for all the axes, operation is resumed.
(7) When manual operation was underway
Axis movement is commenced when the axis movement signals are input again.
(8) Spindle rotation
Restore the spindle rotation by inputting the forward rotation or reverse rotation signal again: this can be done either by operations performed by the operator or by using the user PLC.
(Note) Concerning the handling of an analog spindle
The signals described in this section are valid in a system with bus connections for the NC control unit and drive units. When an analog spindle is connected, the NC system cannot verify that the spindle has come to a complete stop. This means that the door should be opened after the PLC has verified that the spindle has come to a complete stop. Since the spindle may resume its rotation immediately after the door has been closed, set the forward and reverse rotation signals to OFF when opening the door so as to ensure safety.
(9) Chopping operation
The door open signal is turned OFF, and after the ready ON status has been established, operation is resumed.
The basic point when resuming the operation is the same as where the chopping signal is turned ON.
(10) When the spindle/C axis exists
If the switching method of the Spindle/C axis is PLC signal method and the "Door open II signal" is input in the C axis mode, the mode shifts to the spindle mode. Operations when the "Door open II signal" is set to OFF differ depending on the parameter setting value.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L

(Note) When emergency stop occurs with the spindle forward run start signal or spindle reverse run start signal ON, the spindle rotation does not restart even if the emergency stop is cancelled.
Note, however, that if you turn ON the door open II signal during emergency stop (or if emergency stop occurs with the door open II signal ON), and then you cancel the emergency stop before turning OFF the said signal, the spindle rotation restarts. (When the door open II signal is turned OFF first, the rotation does not restart.)
Differences from door interlock I
(1) The method used to stop the machine during automatic operation is the same as with the axis interlock function.
(2) The servo ready finish signal (SE) is not set to OFF.
(3) Cycle start is valid during door interlock. However, the interlock takes effect for the axis movements.
(4) When the door interlock function (door open signal ON) is initiated during axis movement, the axes decelerate and stop.
(5) When the door interlock function (door open signal) is set to OFF, the axis movement resumes.
(6) When the door interlock function (door open signal) is set to ON and OFF in the chopping operation, the chopping operation resumes.

15.3.10 Parameter Lock
This function is used to prohibit changing the machine parameter.
15.3.11 Program Protection (Edit Lock B, C)
The edit lock function B or C inhibits machining program B or C (group with machining program numbers) from being edited or erased when these programs require to be protected.
15.3.12 Program Display Lock
This function allows the display of only a target program (label address 9000) to be invalidated for the program display in the monitor screen, etc.

The operation search of a target program can also be invalidated.
The validity of the display is selected with the parameters. The setting will be handled as follows according to the value.
0: Display and search are possible.
1: Display of the program details is prohibited.
2: Display and operation search of the program details are prohibited.
15.3.13 Data Protection by User's Level
Up to 8 levels of access permission helps to prevent you from dispatching defective works.
On the protection setting screen, the current operation level can be displayed and changed, and the password for the operation level and the protection level for each data can be changed.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
1 ~ 7999
8000 ~ 8999
9000 ~ 9999
10000 ~ 99999999
Machining program A
Machining program B (User-prepared
standard subprogram)
Machining program C (Machine tool
builder customized program)
Machining program A
Editing is inhibited
by edit lock C.
Editing is inhibited
by edit lock B.
Editing is inhibited by data
protect.

15.3.15 Vertical Axis Pull-up
When emergency stop or power interruption occurs, motor brake and vertical axis drop prevention function is supposed to work to prevent vertical axis (such as Z axis of vertical machining center) from dropping. However, there might be a case that the vertical axis drops by several m because of decrepitude of motor brake.
Therefore, emergency stop or the power interruption during finish machining at low speed might cause damage to the cutting tool in operation.
Vertical axis pull-up function prevents the tool from breakage, through pulling up the cutting tool during emergency stop or instantaneous power interruption at low cutting speed.
15.3.16 Machine Group-based Alarm Stop
When an alarm occurs for an axis, this function performs an alarm stop only for the axes in a machine group to which the axis belongs. When this function is used in a lathe system, even though an alarm occurs for the loader axis, the operation can be continued if the servo axis and the spindle have been set in a different machine group from the loader axis as illustrated below. Without this function, the alarm stop is performed for all the axes when an alarm occurs.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80

TypeB C80
M
L
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
Group 1
Without
this
function
With
this
function
Group 2
NC Servo axis Spindle Loader
Group 1 Group 2
NC Servo axis Spindle Loader
Alarm
Alarm
Stop Stop
Stop
Stop

Likewise, when this function is used in a machining center system, the axes belonging to a different machine group from the axis for which an alarm has occurred can continue the operation as illustrated below. Without this function, the alarm stop is performed for all the axes when an alarm occurs.
(Note) The machining group number can be set for each servo axis and spindle in this function, and incorrect setting may lead to accidents. Set the machine group number with enough care.
Group 1 Group 2
NC Servo axis Spindle Servo axis Spindle
Group 1 Group 2
NC Servo axis Spindle Servo axis Spindle
Alarm
Alarm
Stop
Stop
Stop
Stop
Stop
Stop
Without
this
function
With
this
function

15.3.17 Interference Check Between Part Systems
* Maximum 4 part systems
This function checks the relative position of up to six cuboids (referred to as interfering objects) all the time, and if a command which causes the interfering objects to collide with each other is issued, the function stops the axis movement to prevent the interference in advance.
Such interference can be prevented by covering the tool post, etc. with cuboids. Because the check is performed for axis movement of all part systems, interference between tool posts which are positioned in difference part systems can be prevented.
This is valid for the L-system configured with two or more part systems.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
<Interference check between part systems OFF> <Interference check between part systems ON>
Collision
1st interfering object
2nd interfering object
Detects interfering movement
Stops the axis movement

15.3.18 Spindle Protection
By setting the temperature to start/cancel the spindle protection, acceleration/deceleration time constant of the spindle is

changed automatically when the spindle is overloaded and the operation is continued while suppressing overheating of the spindle.
This is effective in protecting the spindle when the spindle is overloaded by repeated acceleration/deceleration of the spindle.
Protection state of the spindle is output to the "Spindle protection is active" signal (for each spindle). When acceleration/deceleration time constant of the spindle has been changed to protect the spindle, this signal can be used to notify users that the spindle is protected.
The equivalent load ratio of spindle motor is determined by calculating the average output of spindle motor from the start of cycle operation to the next cycle operation and showing the average output as a percentage of the continuous rated output. The ratio is output to the ZR register and the drive monitor (item name: Duty value).
The equivalent load ratio and temperature of spindle motor can be output to a log file.
The log file can be used to analyze the operating environment of spindle motor and to detect a decrease in cooling capacity caused by dirt or clogging of spindle motor cooling fan.
While the same machining program is operated continuously, if the equivalent load ratio of last operation exceeds the threshold at the start of cycle operation, a warning is displayed.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
M800/M80/E80/C80 Series Specifications Manual (Function)
15 Safety and Maintenance
433 IB-1501505-N
15.4 Maintenance and Troubleshooting
15.4.1 Operation History
This is a maintenance function which is useful for tracing down the history and NC operation information and analyzing trouble, etc. This information is saved in the history data file, and can be displayed on the screen and output to a file.
The machine tool builder password is required to use this function.
The following of history data files are used.
The following contents can be viewed on the edit screen.
- All history:
The key history, touchscreen history, alarm/warning history, PLC signal history, tool offset change history (M8 Series), workpiece offset change history (M8 Series), program No. history (C80 Series), sequence No. history (C80 Series) and AC input power OFF history is recorded in date/time order.
- Key history:
Only the key history is recorded in date/time order.
- Touchscreen history:
Only the touchscreen history is recorded in date/time order.
- Detailed alarm history information:
Separately from the existing alarm history, the alarm information, modal information and coordinate information at the time of the alarm occurrence are recorded in date/time order.
The data sorting order of the all history data files can be changed by the parameter.
- In chronologically ascending order for each log type
- In chronologically ascending order for all the log types
(Note) If the date and time are the same, the history will be displayed in the following order.Key history
Key history
Touchscreen history
Alarm history
PLC signal history
Tool offset change history (M8 Series)
Workpiece offset change history (M8 Series)
Program No. history (C80 Series)
Sequence No. history (C80 Series)
AC input power OFF history
When a servo alarm or a spindle alarm occurs, all history is backed up for three times at most. (M8 Series)
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
M800/M80/E80/C80 Series Specifications Manual (Function)
15 Safety and Maintenance
IB-1501505-N 434
15.4.2 Data Sampling
The NC internal data (speed output from NC to drive unit, feedback data from the drive unit, etc.) can be sampled and the data can be output as text data.
The type of sampling NC internal data and sampling conditions are input on the screen as the sampling parameter. The sampling parameter can be input/output with the sampling data as the header information of the sampling data.The parameter can be used to set whether the sampling starts when the power is turned ON.
[M8 Series]
Sampling data can be displayed in waveform by channel. (This function requires FCU8-MU542 or FCU8-MA542 for M800S, or FCU8-MU511 or FCU8-MU512 for M80.)
[C80 Series]
During the sampling, the sampling data can be output to the inter-CPU communication area on a real time basis, and sequential data can be monitored with the sequencer CPU.
15.4.3 NC Data Backup
The NC data back up function backs up the NC parameters, etc., on a built-in disk of display (HD) unit or SD card.
The data can also be restored.

M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
Item Specifications
Sampling cycle
M8 Series 1.777 ms setting value
C80 Series
0.888 ms (For three or more part systems, 1.777 ms)
1.777 ms setting value (For three or more part systems,
3.555 ms setting value)
Number of sampled axes NC axis: The maximum number of axes usable for specifications
Spindle: The maximum number of spindles usable for specifications
Number of sampled channels 1 to 16 points
1 to 8 points for displayed in waveform [M8]
Sampling data size
M800WM800S Maximum 2,620,416 points
M80WM80E80 Maximum 655,360 points
C80 Maximum 1,310,720 points
(Note 1) This is the entire data size. The data size per channel will decrease when the
number of sampled channels increases.
Output to inter-CPU communication area
[C80]
Sampling data of 16 times 16 channels
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
M800/M80/E80/C80 Series Specifications Manual (Function)
15 Safety and Maintenance
435 IB-1501505-N
15.4.4 Servo Tuning Support
15.4.4.1 NC Analyzer2
(Note) The software sold separately is necessary.
Servo parameters can be automatically adjusted by measuring/analyzing the machine characteristics. The
measurement/analysis is conducted by activating the motor using machining programs for adjustment or vibration
signals. Various data can be sampled.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
NC Analyzer2
Control unit Drive unit
M800/M80/E80/C80 Series Specifications Manual (Function)
15 Safety and Maintenance
IB-1501505-N 436
<Functions>
(*1) For the measurement, create a program by the program creation function or use an arbitrary machining program.
(*2) Two or more NC axes in the same system are needed.
Adjustment wizard Description
Velocity loop gain adjustment Automatically adjusts velocity loop gain and resonance filters.
Lost motion adjustment Adjusts the lost motion automatically for the delay in response caused when the direction of
the machine rotates is reversed.
Measurement and adjustment Description
Frequency response measurement Measures the frequency response of speed loop for the designated axis. The result will be
output as frequency response waveform.
Reciprocation acceleration/
deceleration measurement
Measures the reciprocation acceleration/deceleration for the designated axis. The result will
be output as time-series waveform. (*1)
Roundness measurement Measures the roundness for the designated axis. The result will be output as roundness
waveform. (*1)
Synch tap error measurement Measures the synchronous tap error for the designated axis. The result will be output as time series waveform. (*1)
Spindle acceleration/deceleration
measurement
Measures the spindle acceleration/deceleration for the designated axis. The result will be
output as time-series waveform. (*1)
Spindle orientation measurement Measures the spindle orientation for the designated axis. The result will be output as time series waveform. (*1)
Spindle C-axis measurement Executes the reciprocation acceleration/deceleration measurement of spindle C axis with
specified axis. The result will be output as time-series waveform. (*1)

Spindle synchronization
measurement
Executes an arbitrary machining program with specified axis, and measures spindle
synchronization by using that data. The result will be output as time-series waveform.
PLC axis acceleration/deceleration
measurement
Executes an arbitrary machining program with specified axis, and measures PLC axis
acceleration/deceleration by using that data. The result will be output as time-series
waveform.
Arbitrary path measurement (*2) Executes an arbitrary machining program with specified two axes. The result will be output as
arbitrary path measurement waveform. (*1)

15.4.5 Automatic Backup
With this function, system data, ladder program and custom software can be automatically backed up in case of system
failure. Up to the three most recent backup data can be stored.
The backup execution timing can be set with parameters.
15.4.8 Application Error Detection
* Specifications of separated-type display are classified with "Windows-based" and "non-Windows-based"
Application error detection function observes applications such as MITSUBISHI standard screen or custom screen.
When an error such as screen lock is detected, this function saves information and data in the log to investigate the
causes easily.
(1) Response from the application and a change of I/O is observed on a periodical basis.
(2) When an application with no response and no change of I/O for a certain period is detected, it is determined
that there is an error.
(3) When an error is detected, the log which is useful for the investigation of the causes will be saved.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M (GOT)
L (GOT)
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M / / /
L / / /
1. The application name which
an error is detected
2. Error occurrence time
3. The communication state
between the PC and NC
4. Key and touch panel history
(3) Saving the log which is useful
for the investigation of the causes
Application error
detection function
(1) Response and
I/O observation (2) Error detection
MITSUBISHI
standard
screen
Custom screen
Application
Control unit
Custom API library
Some
cause

15.4.9 Email Notification to Operator
This function enables NC to transmit emails to network-connected email servers (SMTP servers). The transmitted emails
can be received by means of email software in PC or mobile phone via email servers. With this function, the NC can
send emails to PCs and mobile terminals away from machines. You are able to know machining conditions (such as
machining completion, stop and failure) even if you are in remote places.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
NC E-mail server E-mail server Terminals that receive
emails

15.4.10 NC Configurator2
NC Configurator2 achieves the following functions for the multiple NCs connected to the network, or a file in the SD card or the local disk. Data from up to 8 machines can be handled at a time.
(1) NC Data: Transmit, display, edit and control the data related to the NC machine and parameters for NC control module side, and transmit, display the machining programs, tools and work.
(2) Function parameter: Support Parameter settings for individual NC function for the users.
(3) RS232C communication function: Offer various functions using the tape mode and serial communication.
Please contact us to purchase a full function version. A limited function version is also available free of charge.
15.4.11 Diagnosis Data Output
With this function, the information indicating the replacement cycle of the service parts used in NC, drive or motor can be output to the ZR registers. This information can be used for the preventive maintenance including life prediction.
15.4.12 Backup/Restore
This function stores the setting information (sequence programs, parameters and the setting values, etc.) of a connected device to the installed data storage in GOT, and restores those data to the device as needed.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L

15.4.14 Field Network Diagnostics
This function displays the statistical information of packet transmission and reception (transmission/reception frequency, number of errors, etc.), which is necessary when the communication status of the communication function expansion unit (the field network expansion unit) is diagnosed.
The function is useful to figure out the causes, for example, in the following cases.
- Communication is disconnected
- Communication is not carried out properly
The communication function expansion units in the table below are available with this function.
The statistical information of communication packets can be checked on the I/F diagnostic screen of NC.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
Unit No. Protocol
FCU8-EX564 CC-Link IE Field
FCU8-EX565 EtherNet/IP
FCU8-EX568 FL-net

15.4.15 Remote service iQ Care Remote4U
This function is a remote service to support remote maintenance of machine tools using IoT technology. Operation monitoring of machine tools and remote diagnostics of CNC are available.
(Note 1) The license agreement is required.
(Note 2) Remote service gateway unit is required for connection with RGU.
15.4.15.1 Connection with RGU
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA

E80
TypeB C80
M
L
Connection with RGU
Remote service
gateway unit
Transmit NC
operation
status and data for
machine diagnosis

15.4.16 Brake Wear Diagnostics
This function diagnoses the wear state of a brake installed on each axis of the machine tool.
When a machine runs for a long time, the brake body and the fitting hub are gradually worn. The degree of brake wear is diag nosed by measuring the amounts of rattling and slipping which increase as the wear progresses.
The three levels of Normal, Caution and Warning are output as the diagnosis result.
By executing this function periodically, the amounts of rattling and slipping caused by the brake wear can be maintained within
the proper range.
All the diagnosis results are output to PLC. By combination with PLC program, it is possible to inform users of the time to
change the brake before it is broken.
This function has a timer function. After a certain period of time has passed since the diagnosis, a signal prompting the next
diagnosis is output to PLC. This makes periodic brake wear diagnosis by combination with PLC program.
[Wear state and diagnosis result of brake fitting hub]
[Wear state and diagnosis result of brake rotor and armature]
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
Normal state The rattling of the brake is within the normal range.
Caution state PLC is informed that the brake is in the caution state. Automatic operation is possible.
Warning state PLC is informed that the brake is in the warning state. Automatic operation is not possible.
Normal state Caution state Warning state
Normal state Caution state Warning state
Brake hub Rotary hub
Rattling The corners are rounded, and
the hubs are almost slipping.
Armature Brake rotor
The surface is
worn and
slippery.
The surface is
more worn and
the amount of
slipping exceeds
the allowable
range.

15.5 Functional Safety
15.5.1 Safety Observation
This function can be available in the system consisting of the NC control unit and drive unit, and various communication
cables, sensors and contactors.
The followings are available.
- Opens the door without shutting off the drive power of motor.
- Operates at safety speed or lower while the door is opened.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
Function Description
Dual emergency stop
The NC control unit and the drive unit separately observe the input of emergency stop. In case of an
emergency stop, both the NC control unit and the drive unit (power supply unit) will independently control the
contactors to shut the drive power OFF.
Speed monitor
The NC control unit and the drive unit (servo/spindle drive unit) separately observe the following. When an
error is detected during observation, the main power for the drive will be shut OFF.
(1) That the command speed should not exceed the speed set by the parameter (the "safety speed").
(2) That the motor rotation speed should not exceed the rotation speed set by the parameter (the "safety
rotation speed").
Door state signal monitor This observes the door state signal (open or closed) detected with different circuit.
Door open/close check sensor
NC-side door state signal

External emergency
stop A
NC
Door state
signal
monitor
Speed
monitor
NC-side door
state signal
Door state
signal
monitor
Speed
monitor
Drive-side door state signal
Drive-side door
state signal
Commanded
position
Feedbacked
position
Feedbacked
rotation speed
Contactor control
Contactor control
MC
Contactor
Main power
Drive
External emergency
stop B

15.5.2 Smart Safety Observation
The smart safety observation function achieves smart and high safety with the following features.
(1) The redundant observation is enabled not only for the door signal but for various signals that require the safety.
(2) Eight new functions including the position observation are added.
(3) Signal wiring is simplified by having redundant PLC signal. (With the conventional safety observation, the signal wiring is needed for NC and drive units.)
(4) Redundant safety ladder eliminates the need for MTB to prepare the safety unit. (M800/M80 Series)
(5) It is possible to make only one ladder of the redundant safety ladder when they serve as the equivalent role. (It is also possible to make two ladders to have different roles.)
(6) The I/O board equipped with safety signal input terminal is available, which is mounted on the back of the operation panel. This eliminates the need to mount the safety I/O unit additionally in the operation panel. (M800/M80 Series)
(Note 1) Safety I/O devices (safety RIO unit, operation panel with safety I/O) are required for inputting/outputting safety signals. Of the I/O device connection channels on NC unit, the channels which input/output safety signals need to be composed only of safety I/O devices and RIO2.0 units. (RIO1.0 units cannot be connected to I/O channels which input/output safety signals.) (M800/M80 Series)
(Note 2) In order to input/output the safety signals, the safety signal unit needs to be used. The NC unit and the safety signal unit need to be connected with the RIO cable. (C80 Series)
(Note 3) For user safety sequence, machine tool builders need to create safety signal process logic and write it to NC unit.
(Note 4) Of connection channels for each drive unit in NC unit, channels with axes which use "Safety function S" need to be composed only of drive units of MSD-E Series.
15.5.2.1 Safety-related I/O Observation
* Functional safety expansion unit is required for M80
Using the dual circuits for processing signals input/output to/from the machine (safety signal compare sequence) and dual execution of safety signal process logic made by users (safety PLC), if one circuit has broken down, the other circuit can detect errors, which improves the safety of signal process.
15.5.2.2 Emergency Stop Observation
* Functional safety expansion unit is required for M80
Emergency stop signal is doubled and observed to see whether there is any error. When one emergency stop signal is in open state, the whole system can be set in emergency stop condition.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L

15.5.2.3 Drive Safety Function

15.5.2.3.1 SLS (Safely-Limited Speed)

* Functional safety expansion unit is required for M80

Axis speed (command speed, FB speed) is observed doubly to see whether the speed exceeds the safe speed. Four steps of safe speed and 16 steps of override can be selected. (64 ways of safe speed can be created in total.)

15.5.2.3.2 SLP (Safely-Limited Position)

* Functional safety expansion unit is required for M80

Axis absolute position (command position, FB position) is observed doubly to see whether the position exceeds the safe position range. Safe position range can be selected from 4 levels.

15.5.2.3.3 SOS (Safe Operating Stop)

* Functional safety expansion unit is required for M80

SOS is made by performing the following operations simultaneously.

(1) Axis stop speed (command speed, FB speed) is observed doubly whether the speed exceeds the safe stop speed.

(2) Axis stop position (command position, FB position) is observed doubly whether the position exceeds the safe stop position range.

(3) Axis stop position deviation (difference between command position and FB position) is observed doubly to make sure that the deviation does not exceed the safe stop position deviation.

15.5.2.3.4 SSM (Safe Speed Monitor)

* Functional safety expansion unit is required for M80

This function uses the safety signals to inform that the axis speed (command speed, FB speed) is equal to or below the safe speed. Up to 4 safe speeds can be set.

M850W M830W M850S M830S M80W M80

TypeA

M80

TypeB

E80

TypeA

E80

TypeB C80

M

L

M850W M830W M850S M830S M80W M80

TypeA

M80

TypeB

E80

TypeA

E80

TypeB C80

M

L

M850W M830W M850S M830S M80W M80

TypeA

M80

TypeB

E80

TypeA

E80

TypeB C80

M

L

M850W M830W M850S M830S M80W M80

TypeA

M80

TypeB

E80

TypeA

E80

TypeB C80

M

L

15.5.2.3.5 SBC/SBT (Safe Brake Control/Safe Brake Test)

* Functional safety expansion unit is required for M80

The brakes connected to motors are activated by this function. Because there are two circuits for activating the brakes, one circuit can activate the brakes even when the other circuit is broken down. Furthermore, Safe Brake Test (SBT) can diagnose the circuits for activating the breaks and the effectiveness of the brakes (deterioration due to abrasion, etc.).

15.5.2.3.6 SCA (Safe Cam)

* Functional safety expansion unit is required for M80

This function uses the safety signals to inform that the axis absolute position (command position, FB position) is within the range of safe position. Up to 16 sets (16 each for pulse side and minus side) can be set for the safe position range.

15.5.2.3.7 SS1/SS2 (Safe Stop)

* Functional safety expansion unit is required for M80

(1) Safe stop 1 (SS1)

STO function is activated after an axis is decelerated and the speed (command speed, FB speed) becomes equal to or below the safe stop speed. STO function is also activated when the speed does not reach the safe stop speed within a specified time from the start of deceleration.

(2) Safe stop 2 (SS2)

SOS function is activated after an axis is decelerated and the speed (command speed, FB speed) becomes equal to or below the safe stop speed. SOS function is also activated when the speed does not reach the safe stop speed within a specified time from the start of deceleration.

15.5.2.3.8 STO (Safe Torque Off)

* Functional safety expansion unit is required for M80

This function shuts OFF power supply to axes. Because there are two power shutoff circuits, one circuit can shut OFF the power supply even when the other circuit is broken down. STO also performs fault diagnosis of the shutoff circuits.

M850W M830W M850S M830S M80W M80

TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
M800/M80/E80/C80 Series Specifications Manual (Function)
15 Safety and Maintenance
447 IB-1501505-N
15.5.2.3.9 SCN (Safety Communication Network)
This function performs safety communication between master station and local station using CC-Link IE field network.
The safety communication transfers and receives 32-bit safety data between the safety CPU and the NC CPU.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
M800/M80/E80/C80 Series Specifications Manual (Function)
15 Safety and Maintenance
IB-1501505-N 448
449 IB-1501505-N
16
Drive System
M800/M80/E80/C80 Series Specifications Manual (Function)
16 Drive System
IB-1501505-N 450
16.1 Servo/Spindle
Refer to "Mitsubishi Electric CNC M800W/M800S/M80W Series Specifications List" "Mitsubishi Electric CNC M80/E80/
C80 Series Specifications List".
Refer to the following manuals for details on the servo and spindle system.
DRIVE SYSTEM DATA BOOK (IB-1501252(ENG))
MDS-E/EH Series Specifications Manual (IB-1501226(ENG))
MDS-EJ/EJH Series Specifications Manual (IB-1501232(ENG))
MDS-EM/EMH Series Specifications Manual (IB-1501238(ENG))
451 IB-1501505-N
17
Machine Support Functions
M800/M80/E80/C80 Series Specifications Manual (Function)
17 Machine Support Functions
IB-1501505-N 452
17.1 PLC
17.1.1 Built-in PLC Processing Mode
An exclusive sequence program that controls the various signals between the controller and machine to realize operation
applicable to each machine can be created and built in.
The sequence execution modes include high-speed processing and main processing.
(1) High-speed processing
This mode provides repeated execution at constant cycles. It is used to process signals requiring high speeds.
The max. number of program steps for high-speed processing (1 period) is 1000 steps when using basic
instructions.
(2) Main processing

This mode provides normal sequence processing. The processing cycle depends on the number of sequence steps.

17.1.2 PLC Functions

17.1.2.1 Built-in PLC Basic Function

(*1) MELSEC

[M8 series]

(1) Ladder instructions

Basic instructions (bit processing instructions)

LD, LDI, OR, ORI, AND, ANI, OUT, PLS, etc.

Function instructions

Data transfer, 4 basic arithmetic operations, logic arithmetic operations, large/small identification, binary/BCD conversion, branching, conditional branching, decoding, encoding, etc.

M850W M830W M850S M830S M80W M80

TypeA

M80

TypeB

E80

TypeA

E80

TypeB C80

M

L

M850W M830W M850S M830S M80W M80

TypeA

M80

TypeB

E80

TypeA

E80

TypeB C80

M (*1)

L (*1)

M800/M80/E80/C80 Series Specifications Manual (Function)

17 Machine Support Functions

453 IB-1501505-N

(2) Devices

The device range in the following table is the default number of device points set in the project 1 when the multi-project setting or the setting of the number of device points is not performed.

(Note 1) Devices marked with * in the device column have designated applications. Do not use devices other than those corresponding to the input/output signals with the machine side (input/output signals of the remote I/O unit), even if it is an undefined vacant device.

(Note 2) Distinction of 10ms timer and 100ms timer is performed by command. (10ms timer is performed by OUTH command, 100ms timer is performed by OUT command.)

Device Device No. Unit Details

X* X0 X1FFF (8192 points) 1 bit Input signal to PLC: Machine input, etc.

Y* Y0 Y1FFF (8192 points) 1 bit Output signal from PLC: Machine output, etc.

M M0 M61439 (61440 points) 1 bit Temporary memory

F F0 F2047 (2048 points) 1 bit Temporary memory.

Alarm message interface

L L0 L1023 (1024 points) 1 bit Latch relay (back up memory)

SM SM0 SM2047 (2048 points) 1 bit Special relay

V V0 V511 (512 points) 1 bit Edge relay

SB SB0 SB3FF (1024 points) 1 bit Special relay

B B0 BDFFF (57344 points) 1 bit Link relay

SW SW0 SW3FF (1024 points) 1 bit Special register

SD SD0 SD204 (2048 points) 16 bit Special register

T T0 T2047 (2048 points) 1 bit/

16 bit

Timer

(The variable/fixed boundary is set with a parameter.)

(Note 2)

ST ST0 ST127 (128 points) 1 bit/

16 bit Integrated timer (100ms unit)

C C0 C511 (512 points) 1 bit/

16 bit

Counter (The variable/fixed boundary is set with a parameter.)

D D0 D4095 (4096 points) 16 bit/

32 bit Data register. Register for calculation

R* R0 R32767 (32768 points) 16 bit/

32 bit File register. CNC word interface

ZR* ZR0 ZR13311 (13312 points) 16 bit/

32 bit

File register, input/output signals with the PLC, machine input/output, etc.

W W0 W2FFF (12288 points) 16 bit/

32 bit Link register

Z Z0 Z13 (14 points) 16 bit Address index

N N0 N7 (8 points) Master controller nesting level

P* P0 P4095 (4096 points) Label for conditional jump, subroutine call command

K

K-32768 K32767 Decimal constant for 16-bit command

K-2147483648

K2147483647 Decimal constant for 32-bit command

H

H0 HFFFF Hexadecimal constant for 16-bit command

H0 HFFFFFFFF Hexadecimal constant for 32-bit command

M800/M80/E80/C80 Series Specifications Manual (Function)

(3) Timer / counter setting display
(a) PLC timer
The setting value of the timer used by the built-in PLC can be set from the screen on the setting and display unit.
The timer types include the 10ms, 100ms and 100ms integral types.
Whether to validate the timer in the PLC program or to validate the setting value from the screen can be selected with the parameters.
Whether to hold the integral timer when the power is turned OFF can also be selected.
(b) PLC counter
The setting value of the counter used by the built-in PLC can be set from this screen.
Whether to validate the constants in the PLC program or to validate the setting value from the screen can be selected with the parameters.
Whether to hold the counter value when the power is turned OFF can also be selected.
(4) External key input
By inputting the key data from the built-in PLC, the same operation as when the operator operates the operation board can be done.
(5) Real spindle speed output
The real spindle speed is converted by the signals of the encoder installed on the spindle and is output to the PLC. The output increment is 0.001r/min.
(6) High speed input/output signal
There are signals that can be input and output at a 3.5ms cycle for high-speed processing.
(a) Input signal ON time
(b) After the signal output is set in the interface, it can be output to the machine side with a max. 3.5ms delay.
The input also appears on the interface with a 3.5ms delay.
(c) The signals used for high-speed processing are assigned with the parameters. Assignment is possible in a continuous 16-point unit.
tson tson 3.5ms

(7) PLC analog voltage control
(a) Analog output
When the specified data is put in the file register, the corresponding analog voltage is output from the analog output external connector.
(Note) For analog output, the hardware corresponding to analog output is required.
Refer to the PLC Programming Manual for details.
[C80 series]
For the details of C80 series, refer to the manual of MITSUBISHI Programmable Controller "MELSEC iQ-R Series".
17.1.2.1.1 Index Modification
(*1) MELSEC
17.1.2.1.2 Multi-program [Number of Programs]
(*1) MELSEC
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M (*1)
L (*1)
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M 120 120 120 120 60 60 60 60 60 60 (*1)
L 120 120 120 120 60 60 60 60 60 60 (*1)
Analog output (V)
-4095
4095
-1000 0
10
-2.44
10
File register details
Output voltage : -10V to +10V (5%)
Resolution : 2-12 (1/4095) x Fullscale (10V)
Load conditions : 10kohm resistance load
(standard)
Output impedance : 220ohm
Output voltage = x 10V = -2.44V -1000
4095
<Relation of file register details and analog output voltage>

17.1.2.1.3 Multi-project [Number of Projects Stored]
[M system]
[L system]
17.1.2.1.4 Function Block (FB)
(*1) MELSEC

17.1.2.1.5 Label Programming
(*1) MELSEC
PLC project M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
Number of PLC projects: 2
Number of PLC projects: 3
Number of PLC projects: 6
PLC project M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
Number of PLC projects: 2
Number of PLC projects: 3
Number of PLC projects: 6
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M (*1)
L (*1)
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M (*1)
L (*1)

17.1.2.2 PLC Exclusive Instruction
(*1) MELSEC
PLC exclusive instruction is provided for certain limited applications, enabling a complex machining process, which is difficult to carry out only by the basic instructions and function instructions.
[M800/M80 series]
PLC exclusive instructions include:
(1) ATC exclusive instruction (ATC)
This is an instruction to function ATC, or magazine index control, tool exchange with arm, etc.
ATC exclusive instructions are as follows.
- Tool No. search
- Tool change
- Tool table forward/reverse run
- Pointer (which indicates magazine index position) forward/reverse run
- Tool data read/write
(2) Rotary body control instruction (ROT)
This is an instruction to determine the rotary body's target position or rotation direction, or to function as a ring counter.
This is used when calculating the rotation direction or number of index steps of the magazine or turret based on the output data figured from ATC exclusive instruction tool No. search processing, or when controlling the rotary body position.
Using the ATC and ROT instructions
The order for using the ATC and ROT instructions when T is commanded or tool exchange is commanded is shown below.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M (*1)
L (*1)
ATC K1
ATC K2
ROT K1 ROT K3
ATC K5, K6
ATC K7, K8
ATC K3
ATC K4
T command Tool No. search

Tool No. logical search
Matching place No.
Number of
matches
Error process
Rotary body
index
Turning
direction
Number of
steps, etc.
Magazine turn
Variable pointer
method
Fixed pointer method
Ring counter control
Pointer forward run/reverse
run
Tool table forward run/reverse run
Magazine stop
Tool change
command
Tool change
Arbitrary position tool change
Pointer or ring
counter value

[C80 series]
PLC exclusive instructions include:
(1) Other device write instruction (DDWR)
This is an instruction to write the data to the device in other machine from the PLC CPU.
(2) Other device read instruction (DDRD)
This is an instruction to read the device data in other machine to the PLC CPU.
PLC exclusive instructions enable to access the device data of NC CPU from the PLC CPU.
PLC exclusive instructions are transferred via the exclusive instruction transmission between CPUs area provided in the
system area on the CPU multi-buffer memory (fixed period communication area).
Also, "D (P)." or "M (P)." can be added before each instruction.
The non-periodic instruction "M (P)." is recommended as it can be used regardless of the setting.
For the details of C80 series, refer to the manual of MITSUBISHI Programmable Controller "MELSEC iQ-R Series".
Periodic instruction, D (P).
The setting needs to be changed to use the periodic connection function on GX Works3, but since
the periodic instruction is compatible with the old models, it can use the program of the old
models.
Non-periodic instruction, M (P).
This can be used regardless of the setting of the periodic connection function, but since non periodic instruction is not compatible, the correction needs to be done in order to use the program
of the old model.

17.1.2.3 Enhanced PLC Security Mode
This function restricts connections to the built-in PLC from applications such as PLC on-board and GX Developer/GX
Works2. This function helps to protect the assets in the built-in PLC.
Two modes are available in this function:
(1) PLC write protect mode (inhibits only write operations by applications)
PLC write protect mode prevents users from accidentally overwriting sequence programs and modifying device
values when a sequence program is monitored.
(2) PLC read/write protect mode (inhibits write and monitoring operations by applications)
PLC read/write protect mode protects sequence programs from being overwritten or read out by an unauthorized
user.
While this function is used, one of the multi projects is available as the "end user project". (End user mode (or E/U
mode))
Using this project, the end users can create sequence programs to add a new jig and sensor. Restrictions are imposed
on the other projects; therefore, there is no risk of modifying or deleting sequence programs created by the machine tool
builder.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
(*)
(*) Read/write operations between the application and the machine tool builder project depend
on the enhanced PLC security mode settings.
Built-in PLC Machine tool builder project
End user project
- PLC on-board
- GX Developer/GX Works2
E/U mode
PLC write protect mode
PLC read/write protect mode
Project 1
Project 2 Project 3

Applications
Write to PLC
Read from PLC
Write to PLC
Read from PLC
Read from
PLC
Write to
PLC
Read from
PLC
Write to
PLC

17.1.3 PLC Support Functions
17.1.3.1 Alarm Message Display
The contents of the alarms which have occurred during sequence (user PLC) processing can be displayed on the setting and display unit.
Up to four alarm message displays can be displayed simultaneously on the alarm diagnosis screen. The maximum length of one message is 46 characters.
17.1.3.2 Operator Message Display
(*1) Only macro alarm messages are displayed.
When a condition has arisen in which a message is to be relayed to the operator, an operator message can be displayed separately from the alarm message.
The maximum length of an operator message on PLC message screen is 60 characters. The maximum number of characters per line is 55, and the message more than 56 characters is displayed on two lines. The number of messages displayed at the same time are up to four.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M (*1)
L (*1)

17.1.3.3 Memory Switch (PLC Switch)
The function equivalent to the machine operation switches can be implemented by using the setting display unit of controller. Switches can be turned ON/OFF from PLC switch screen and user PLC. Each switch can be named arbitrarily.
By the PLC switch for reverse, the valid switches by the additional specifications will be reversed.
Even when turning on the PLC switch for reverse, the invalid switches without the additional specification will not be reversed.
17.1.3.3.1 Memory Switch (PLC Switch) 32 Points
32 points of PLC switches can be set on the setting and display unit screen, and the ON/OFF control executed.
17.1.3.3.2 Memory Switch (PLC Switch) 64 Points
64 points of PLC switches can be set on the setting and display unit screen, and the ON/OFF control executed.
17.1.3.3.3 Memory Switch (PLC Switch) 96 points
96 points of PLC switches can be set on the setting and display unit screen, and the ON/OFF control executed.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
M850W M830W M850S M830S M80W M80
TypeA
M80

TypeB
E80
TypeA
E80
TypeB C80
M
L
M800/M80/E80/C80 Series Specifications Manual (Function)
17 Machine Support Functions
IB-1501505-N 462
17.1.3.4 Load Meter Display
A load meter can be displayed on the setting and display unit.
Up to two axes designated with the built-in PLC such as the spindle load and Z axis load can be displayed as bar graphs on the screen.
17.1.3.5 User PLC Version Display
The user PLC version can be displayed in the software list on the Software Configuration screen.
17.1.3.6 Ladder Program Writing during RUN
(*1) MELSEC
Ladder program can be edited while PLC is running. This function is available, either by GX Developer or PLC onboard edit. (Only M8)
17.1.3.7 PLC Program Protection
(*1) Each file
(*2) MELSEC
[M8 series]
For PLC data protection, the file password can be set to each file of PLC data.
The file password of the PLC data stored in NC can be released temporarily with PLC on-board.
(Note 1) The file password registration/change or cancellation can not be made with PLC on-board. Use GX Developer/ GX Works2 for these operation.
The file password has the writing attribute (write protection/permission) and the reading attribute (read protection/ permission), and the following operation is prohibited for these attributes.
Write protection: PLC data overwrite and deletion, conversion after editing the ladder
Read/write protection: PLC data overwrite, deletion, read and verification, conversion after editing the ladder
[C80 series]
For the details of C80 series, refer to the manual of MITSUBISHI Programmable Controller "MELSEC iQ-R Series".
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M (*1)
L (*1)
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M (*1) (*1) (*1) (*1) (*1) (*1) (*1) (*1) (*1) (*1) (*2)
L (*1) (*1) (*1) (*1) (*1) (*1) (*1) (*1) (*1) (*1) (*2)
M800/M80/E80/C80 Series Specifications Manual (Function)
17 Machine Support Functions
463 IB-1501505-N
17.1.4 Built-in PLC Capacity
17.1.4.1 Standard PLC Capacity [Number of Steps]
(*1) MELSEC
For the details of C80 series, refer to the manual of MITSUBISHI Programmable Controller "MELSEC iQ-R Series".
17.1.4.2 Large PLC Capacity: 256 Ksteps
17.1.4.3 Large PLC Capacity: 512 Ksteps
17.1.5 Machine Contact Input/Output I/F
(*1) MELSEC
[M8 series]
Refer to the "Specifications Manual (Hardware)" for details.
[C80 series]

Selecting from within the input/output unit of MITSUBISHI Programmable Controller "MELSEC iQ-R Series". Refer to the manual of input/output unit for details.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M 128K 128K 128K 128K 64K 64K 32K 20K 20K (*1)
L 128K 128K 128K 128K 64K 64K 32K 20K 20K (*1)
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M (*1)
L (*1)
CAUTION
Follow the remote type machine contact input/output interface described in this manual. (Connect a diode in parallel with the inductive load or connect a protective resistor in serial with the capacitive load, etc.)

17.1.6 Ladder Monitor
[M8 series]
This function enables the operating status of the sequence circuit to be checked on the controller's setting and display unit.
The ladder monitor functions include the following.
(1) Circuit monitoring
(2) Screen stop by monitor stop trigger point
(3) Entry monitoring
(4) Decimal-hexadecimal conversion present value monitoring
[C80 series]
The operation state of sequence circuit can be confirmed on the screen of Mitsubishi Graphic Operation Terminal (GOT).
The ladder monitor functions include the following.
(1) Sequence program monitoring (circuit)
(2) Sequence program monitoring (R circuit)
(3) Sequence program monitoring (SFC)
Refer to the manual of Mitsubishi Graphic Operation Terminal (GOT) for details.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M (GOT)
L (GOT)

17.1.7 PLC Development
17.1.7.1 On-board Development
[M8 series]
On-board refers generically to the PLC related operations carried out with the CNC unit.
This is the easy-to-use on-board with the enhanced ladder monitoring functions and improved ladder edit usability by enhancing the linkage with the MELSEC series sequencer development tool (GX Developer/GX Woks2).
When this function is started on the NC system version D1 or later where "smart safety observation function" is enabled, the user safety sequence "SafePLC1" and "SafePLC2" are displayed in the project list on the main screen. Select the project or the user safety sequence to switch the operation target.
Refer to "15.5.2 Smart Safety Observation" for details on the smart safety observation function.
[C80 series]

The sequence program can be monitored and edited by the sequence program monitoring of Mitsubishi Graphic Operation Terminal (GOT).
Refer to the manual of Graphic Operation Terminal (GOT) for details.
17.1.7.2 MELSEC Development Tool (GX Developer)
This CNC supports the user PLC development environment which uses the Mitsubishi Electric FA engineering software MELSOFT Series (GX Developer), which is the PLC development tool for the Mitsubishi PLC MELSEC Series.
This is used to create the machine sequence and user safety sequence of MITSUBISHI CNC.
Machine sequence: Control circuit created to control the machine tools (ladder circuit)
User safety sequence: Control circuit of the safety-related I/O observation created with the smart safety observation function (ladder circuit)
For the smart safety observation function, refer to "M800/M80 Series Smart safety observation Specification manual".
17.1.7.3 MELSEC Development Tool (GX Works2)
This CNC supports the user PLC development environment using the Mitsubishi Electric FA engineering software MELSOFT Series (GX Works2) which is the PLC development tool for MITSUBISHI PLC MELSEC Series.
GX Works2 is a programming software package (model name:SW1DND-GXW2) for Mitsubishi Electric programmable controller MELSEC series. It enables sequence programs for MITSUBISHI CNC series to be developed using similar operations to those for MELSEC series. Some of the functions are exclusively for MELSEC series and cannot be used in developing sequence programs for CNC.
GX Works2 Version 1.570U or newer version is recommended for developing sequence programs for MITSUBISHI CNC series. For details of the functions, refer to each of GX Works2 Operating Manuals.
(Note) The software sold separately is necessary.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M (GOT)
L (GOT)
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
M800/M80/E80/C80 Series Specifications Manual (Function)
17 Machine Support Functions
IB-1501505-N 466
17.1.7.4 MELSEC Development Tool (GX Works3)
Using GX Works3, the sequence programs of the MELSEC CPU can be developed and debugged.
(Note) The software sold separately is necessary.
17.1.8 PLC Parameter
The PLC constants set with the data type and the bit selection parameters set with bit types can be set from the screen as parameters used by the built-in PLC.
17.1.8.1 PLC Constant (150 Points)
17.1.8.2 PLC Constant Extension (Up to 750 Points)
There are PLC constants that can be set with data types as parameters used by the built-in PLC. The set data is set in the R register of the PLC and backed up. If data is set in the R register corresponding to the PLC constant with sequence program MOV commands, etc., the data will be backed up in the PLC constant parameter. However, the display will not change, so enter another screen, and then select this screen again.
The number of PLC constants is 150 points in the basic area and 750 points at the maximum in the extended area.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
M850W M830W M850S M830S M80W M80

TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
M800/M80/E80/C80 Series Specifications Manual (Function)
17 Machine Support Functions
467 IB-1501505-N
17.1.9 GOT Connection
This function connects and communicates between Mitsubishi Graphic Operation Terminal (GOT) and MITSUBISHI CNC.
Only GOT2000 series can be connected. Soft GOT 2000 can be connected, too.
There are two connection methods for GOT connection, Ethernet connection and CC-Link connection.
For details, refer to each manual of GOT.
[M8 series]
Operation and monitoring from GOT to PLC device of the NC can be performed, and GOT can be used as a sub monitor of peripheral operation panel or NC operation panel.
[C80 series]
To display the dedicated screen for CNC (CNC monitor2 function), connect the DISPLAY interface of NC CPU.
In addition, the size of GTO supports SVGA and VGA.
17.1.9.1 Ethernet Connection
17.1.9.2 CC-Link Connection
(*1) MELSEC
17.1.9.3 CC-Link IE Field Connection
(*1) MELSEC
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M (*1)
L (*1)
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M (*1)
L (*1)
Operation of PLC device
Monitoring PLC device
M8 series GOT2000 series
M800/M80/E80/C80 Series Specifications Manual (Function)
17 Machine Support Functions
IB-1501505-N 468
17.1.10 Pallet Program Registration
Pallet program function allows machining program to be registered for each pallet of the auto pallet changer (hereinafter referred to as APC) and assists in the machining setups.
Operation search for the registered program will be executed by PLC using the external search function.
Machining program for each pallet is registered at "Pallet program registration" screen in the setup screen group.
Registered program is output to PLC device.
If necessary, execute an external search on PLC ladder by referring to the program No. registered for each pallet.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
NC
PLC
.
.
.
HMI system

Pallet program
registration
screen
PLC device
Pallet program
registration interface
Pallet 1
Pallet 2
Machining
program No.
Operation
program No.
External search
interface
Device 1
Program No.
main system

17.2 Machine Construction
17.2.1 Servo OFF
When the servo OFF signal (per axis) is input, the corresponding axis is set in the servo OFF state.
When the moving axis is mechanically clamped, this function is designed to prevent the servomotor from being overloaded by the clamping force.
Even if the motor shaft should move because of some reason in the servo OFF state, the movement amount will be compensated in the next servo ON state by one of the following two methods. (You can select the compensation method using a parameter.)
(1) The counter is corrected according to the movement amount (follow up function).
(2) The motor is moved according to the counter and compensated.
When follow up function is designated, the movement amount will be compensated even in the emergency stop state.
The axis is simultaneously set to servo OFF state and the interlock state.
Mechanical handle
Even if the servo OFF axis is moved with the mechanical handle with the application of the servo OFF function and follow up function, the position data can be constantly read in and the machine position updated. Thus, even if the axis is moved with the mechanical handle, the coordinate position display will not deviate.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L

17.2.2 Axis Detachment
This function enables the control axis to be freed from control. Conversely, an axis which has been freed from control can be returned to the control status.
This function enables the rotary table or attachments to be removed and replaced. Automatic operation is disabled until the axis for which the axis detachment command has been released completes its dog-type reference position return.
(Note) Axis detachment can be executed even for the absolute position detection specifications axis, but when the axis is reinstalled, the zero point must be set.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
This shows the configuration of
a machine for which switching
between the C axis and turning
table is performed. When the
spindle motor is connected, the
C axis is placed in the detached
status.
As a result, the position
feedback of the detector is
ignored.
POSITION
X 123.456
Z 0.000#1
C 345.678><
The detached status > < is indicated on the right of the POSITION display on the POSITION screen and at the same time the servo ready for the controller output signal is set to OFF. The POSITION counter retains the value applying when detach was assigned.
C-axis/turning table
Rotary magnetic
scale (Position feedback)
(OFF with C-axis

control)
(Coupled with C-axis control)
Spindle
motor
C-axis
motor
Spindle
drive
unit
C-axis
drive
unit

17.2.3 Synchronous Control
The synchronous control is a control method that both master and slave axes are controlled with the same movement command by designated the movement command for the master axis also to the slave axis. This function is assumed to be used in the large machine tool, etc. which drives one axis with two servo motors.
The axis for the base of the synchronization is called the master axis, and the axis according to the master axis is called the slave axis.
(Note 1) The axis detachment function cannot be added to the axes used in the synchronous control.
(Note 2) The control axis synchronization between part systems and the synchronous control cannot be used simultaneously. (L system)
- The slave axis is controlled with the movement command for the master axis.
- One slave axis can be set to one master axis.
- Up to the following sets of the master axes/slave axes can be set for all the part systems in total.
8 sets for M800 Series, 3 sets for M80/C80 Series
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
Y V
X
Z
Master axis Slave axis

There are 3 types of synchronous control as follows:
(1) Position command synchronous control
This is used when the machine's rigidity is low.
This conforms the position command of the master axis to that of the slave axis using the synchronous control function of NC and drive those axes in parallel.
This can be used only by changing the NC setting, without changing the settings in the servo drive unit.
Position command synchronous control diagram
The position command synchronous control has the following configuration:
CNC
M
M
Compensation
Position
command
Drive unit
Master axis
Slave axis
Encoder
Compensation
Drive unit
Encoder
Position command synchronous Synchronous operation
control
Synchronous
control mode
Correction mode
Independent operation

(2) Speed command synchronous control
This is used when reducing the scale of the full-closed system or when the machine's rigidity, etc. cause the mutual interference to the axes positions.
This drives the master axis and the slave axis in parallel using the common position feedback. Since the feedrate of each axis is controlled by the speed feedback of each axis, the stable control is available.
This can be used when the settings of the NC and the servo drive unit are changed.
Speed command synchronous control diagram
(3) Current command synchronous control
This drives the master and slave axes in parallel by reference to the speed feedback from the encoder onto the master axis side on the slave axis. Since that speed feedback is not the slave axis's itself, the slave axis easily vibrates.
Also, as the slave axis is easily influenced by the disturbance, this is not appropriate for the machine tools which need the positioning accuracy or the interpolation accuracy.

This can be used when the setting of the NC and the servo drive unit are changed.
Current command synchronous control diagram
The "compensation" in the (1), (2) and (3) diagrams indicates the pitch error compensation, the thermal expansion compensation, the backlash compensation and the external machine coordinate compensation.
The axes which can set the compensation during the synchronous control differ according to the synchronous control type.
CNC
M
M
Drive unit
Master axis
Slave axis
Encoder
Encoder
Drive unit
Compensation
Position
command
Position
encoder Compensation
CNC
M
M
Drive unit
Master axis
Slave axis
Encoder
Drive unit
Encoder
Position
command
Compensation
Compensation

There are 2 types of modes as follows:
(1) Synchronous control mode
The following two operation methods are available in the synchronous control mode.
(a) Synchronous operation
This is a method that both master and slave axes are moved simultaneously with the movement command for the master axis.
(b) Independent operation
This is a method that either the master or slave axis is moved with the movement command for the master axis.
(2) Correction mode
The synchronization is temporary canceled to adjust the balance of the master and slave axes during the synchronous control mode in the machine adjustment. Each axis can be moved separately with the manual handle feed or the arbitrary feed in manual mode. If the operation mode other than the manual handle feed and arbitrary feed in manual mode is applied during the correction mode, the operation error will occur.

17.2.4 Inclined Axis Control
Even when the control axes configuring that machine are mounted at an angle other than 90 degrees, this function enables it to be controlled by the same program as that for an orthogonal axis.
The inclination angle is set using a parameter, and axes are controlled using the movement amounts of the axes which are obtained through conversion and compensation using this angle.
<Example of use> When the X axis serves as the basic axis and the Y axis serves as the inclined axis
X: Actual X axis
Y: Actual Y axis
y: Programmed Y axis
: Inclination angle
Yp, the Y-axis position on the programmed coordinates (on the orthogonal coordinates), is the position of Xa and Ya which are produced by synthesis of X axis and Y axis.
Therefore, the Y-axis (inclined axis) movement amount is expressed by the following formula:
Ya=Yp/cos (1)
The X-axis (basic axis) movement amount is compensated by the inclined movement of the Y axis, and it is expressed as follows:
Xa=Xp-Yp*tan (2)
The Y-axis (inclined axis) speed is as follows:
Fa=Fp/cos
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
Xa, Ya and Fa are the actual movement amounts and speed.
Xp, Yp and Fp are the movement amounts and speed on the program coordinates.
X
Y
y

Xa
Ya

Yp*tan
Yp/cos
Yp

17.2.5 Position Switch
(*1) 24 points for each part system and 32 points for the whole PLC axes.
The position switch (PSW) function provides hypothetical dog switches in place of the dog switches provided on the machine axes by setting the axis names and coordinate positions indicating the hypothetical dog positions (dog1, dog2) as parameters beforehand so that signals are output to the PLC interface when the machine has reached these hypothetical dog range. The hypothetical dog switches are known as position switches (PSW).
24 points of the position switches can be set to the NC axis for each part system.
Position switch area checking can be performed at high-speed by parameter setting.
In high-speed checking, the parameter determines which is used between the command type machine position or detector feedback position for area checking by each position switch.
Example of dog1, dog2 settings and execution
[Only for C80 series]
32 points of the position switches (PSW) in total can be set to the PLC axis.
Also, the position switch interlock function is in the axis interlock state outside of the position switch (PSW) by PLC signal, and prohibits the movement of the PSW target axis.
This function can be set only to the NC axis, cannot be set to the PLC axis.
The PLC axis position switch cannot be set to the axis which is used for either NC axis or PLC axis indexing.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M 24 24 24 24 24 24 24 24 24 (*1)
L 24 24 24 24 24 24 24 24 24 (*1)
dog1, dog2 settings dog1, dog2 positions Description
dog1 < dog2 Signal is output between dog1 and dog2
dog1 > dog2 Signal is output between dog2 and dog1
dog1 = dog2 Signal is output at the dog1 (dog2) position
dog1 dog2
dog2 dog1
dog1 = dog2
dog1
dog2
Basic machine coordinate system zero point
Hypothetical
dog Position switch area
(PSW width)

17.2.7 Index Table Indexing
The indexing of the index table can be performed by setting the index axes.
Programming is facilitated because, in terms of the index commands, only the indexing angle need to be designated using the address of the programmed axis serving as the index setting axis, and there is no need to designate special M codes for clamping and unclamping the table.
Clamp operation is performed by setting the unclamp command signal to OFF (type A) or is performed with the clamp signal (type B).
(1) Type A
(a) Designate the movement commands (absolute or incremental) for the selected axis using a program.
(b) The unclamp command signal is now output prior to the axis movement.
(c) When the axes are unclamped, set the unclamp finish signal to ON with the PLC. (Set the signal to ON after performing required process such as servo ON or the unclamp process.)
(d) After checking the unclamp finish signal, the designated axis starts moving.
(e) Upon completion of the movement, the unclamp command signal is set to OFF.
(f) Clamp the axes and set the unclamp finish signal to OFF with the PLC. (Set the signal to OFF after performing required process such as in-position check, servo OFF or the clamp process.)
(g) After checking that the unclamp finish signal is OFF, processing of the next block is initiated.
[Operation timing chart for type A]
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
G00 B90.;
Standing by for completion Standing by for completion
Axis movement
Unclamp finish
(PLCCNC)
Unclamp command
(CNCPLC)

Programmed
command

(2) Type B
(a) Designate the movement commands (absolute or incremental) for the selected axis using a program.
(b) The unclamp command signal is now output prior to the axis movement.
(c) When the axes are unclamped, set the unclamp finish signal to ON with the PLC.
(Set the signal to ON after performing required process such as servo ON or the unclamp process.)
(d) After checking the unclamp finish signal, set the unclamp command signal to OFF and the designated axis starts moving.
(e) Set the unclamp finish signal to OFF with the PLC.
(f) Upon completion of the movement, the clamp command signal is set to ON.
(g) Clamp the axes and set the clamp finish signal to ON with the PLC.
(Set the signal to ON after performing required process such as in-position check, servo OFF or the clamp process.)
(h) After checking that the clamp finish signal is ON, set the clamp command signal to OFF and processing of the next block is initiated.
(i) Set the clamp finish signal to OFF with the PLC.
[Operation timing chart for type B]
G00 B90.;
Standing by for completion Standing by for completion
Axis movement
Unclamp finish
(PLC to CNC)
Unclamp command
(CNC to PLC)
Programmed
command
Clamp finish
(PLC to CNC)
Clamp command
(CNC to PLC)

17.2.8 Tool Length Compensation along the Tool Axis
(*1) This function is available during program format switch.
(1) Changing the tool length compensation in tool axis direction and compensation amount
Even if the tool axis direction is not the Z axis direction because the rotary axis is rotated, the tool can be compensated in the tool axis direction. By setting the deviation of the tool length value set when the program was created and the actual tool length as a compensation amount, the program can be made more flexible.
This is especially effective for programs with many rotary axis movement commands.
The tool length compensation amount in the tool axis direction can be changed by rotating the manual pulse generator when the tool length compensation along tool axis mode and tool length compensation amount along the tool axis change mode are valid.
(2) Machine configuration
The tool length compensation in tool axis direction is carried out in respect to the direction of the tool nose axis (rotary axis).
The axis which determines the compensation direction is designated with the parameters as a combination of the Z-axis rotation C axis (spindle) and X-axis rotation A axis or Y-axis rotation B axis.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L (*1) (*1) (*1) (*1)
Y
Z
X
A
B
C
A/C B/C A/B
C
A/B
A
B
Rotation center
Tool
Axis direction
(compensation direction)
Workpiece
Rotation center
Tool
Axis direction
(compensation direction)
Workpiece

17.2.9 Tool Handle Feed & Interruption
The tool handle feed & interrupt function makes it possible to move the axis with the manual pulse generator in the tool

axis direction, tool diameter direction X and tool diameter direction Y within the hypothetical coordinate system over the tool axis.
Normal handle feed and interrupt is applied when this function is not provided.
This is also effective for a machine configuration having the tool tilt 1 axis and table tilt 1 axis.
17.2.10 Tool Center Coordinate Display
The tool center coordinates, handle interrupt amount (tool axis movement) , table/workpiece installation, machine position coordinates in the inclined surface coordinate system, mechanical axis angle and tool center point speed are displayed during the tool center point control function, tool length compensation along tool axis function, and tool handle feed & interrupt function (tool axis direction handle feed, tool handle interrupt, tool diameter direction handle feed, nose center rotation handle feed).
The path using the tool center coordinate position is drawn on the Graphic Trace screen.
One of the functions below is required to validate this function.
- Tool length compensation along tool axis
- Tool handle feed & interrupt
- Tool center point control
- Workpiece installation error compensation
- Inclined surface machining command
- Simple inclined surface machining command
- 3-dimensional tool radius compensation (tool's vertical-direction compensation)
- 3-dimensional manual feed
- R-Navi
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
X(-)
Y(-) Z(-)
C(+)
A(+)
<A-C>
X(-)
Y(-)
Z(-)
C(+)
B(+)
<B-C>
X(-)
Y(-) Z(-)
A(+)
<A-B>
B(+)
M800/M80/E80/C80 Series Specifications Manual (Function)
17 Machine Support Functions
481 IB-1501505-N
17.2.11 Tool Center Point Control
17.2.11.1 Tool Center Point Control (G43.4/G43.5)
(*1) Restrained to 4-axis simultaneous contouring
The tool center point control function controls so that the position command in the machining program is at the tool center point on the coordinate system (table coordinate system) which rotates together with the workpiece. This function can be applied with the machine including the tool tilt type with two rotary axes on the head (1), the table title type with two rotary axes on the table (2), and the combined type with rotary axes on the tool and table (3).
(1) Tool tilt type
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M (*1) (*1) (*1) (*1)
L
When tool center point control is OFF and tool length
compensation along tool axis is ON When tool center point control is ON
Controls so that the holder center point moves straight. Controls so that the tool center point moves straight.
Rotation center
Program
path
Tool center point path
Rotation center
Program
path

Tool center point path

(2) Table tilt type
(3) Combined type
When tool center point control is OFF and tool length
compensation along tool axis is ON When tool center point control is ON
Controls so that the holder center point is at the workpiece
coordinate system's position
Controls so that the tool center point is at the table
coordinate system's position.
When tool center point control is OFF and tool length
compensation along tool axis is ON When tool center point control is ON
Controls so that the holder center point is at the workpiece
coordinate system's position.
Controls so that the tool center point is at the table
coordinate system's position.
Z(+)
X(+)
B(-)
Rotation center
Tool center
point path Z(+)
X(+)
X'(+)
Z"(+)
X"(+)
B(-)
Rotation
center
Tool center
point path
Z(+)
X(+)
B(-)
Rotation center
Tool center
point path Z(+)
X(+)
X'(+)
Z"(+)
X"(+)
Z'(+)
B(-)
Rotation
center
Tool center
point path

[Axis configuration of applicable machines]
This function can be used on the machine whose rotary axis is installed with ISO polarity and the machine whose axis is installed with non-ISO polarity. However, the orthogonal axis needs to be installed with ISO polarity. (*1)
Note that this function can be also used on the machine with a tilted rotary axis.
(*1) In the machine coordinate system (right-hand orthogonal coordinate system) defined in ISO standard, the rotation turning to the right-handed screw is handled as ISO polarity and the one turning to the left-handed screw is handles as non-ISO polarity.
This function is not applicable to machines as in the table below:
Description Example of machines
A machine whose direction of the tool axis (from the tool tip to
the tool base) is not parallel to Z axis (Z axis positive direction)
when machine positions of the rotary axes are all 0
(The arrow shown in the figure at the right indicates the direction
of the tool axis.)
0

17.2.12 Inclined Surface Machining Command
This function is to define the new coordinate system (called the "feature coordinate system") which was created by rotation and reference position translation of the X, Y, Z axes of the original one (before the inclined surface machining command was applied). By using this function, an arbitrary spatial plane can be defined, and machining on that plane can be carried out with normal program commands.
Also, the tool axis can automatically be controlled to the + Z direction of the newly defined feature coordinate system. Since the feature coordinate system will be re-created in accordance with the tool axis direction, machining programs can be developed without the need to consider the direction of the feature coordinate system and rotation of the tool axis.
The feature coordinate system is defined in the following method.
- Designation with Euler angle.
- Designation with the roll angle, pitch and yaw angle.
- Designation with the three points on the plane.
- Designation with two vectors.
- Designation with a projection angle.
- Designation with the registered machining surface selection
- Designation with the tool axis direction.
M850W M830W M850S M830S M80W M80

TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
Original coordinate system
Feature coordinate system
Z
Y
X
Y Z
X

The orthogonal axes must be installed with ISO polarity, while the rotary axes can be installed with either ISO polarity or non-ISO polarity.
This function is compatible with the following types of machine.
(Note 1) This function is not applicable to machine configuration of the following types:
- A machine whose direction from the tool tip to the tool base is not parallel to Z axis (Z axis positive direction) when machine positions of the rotary axes are all 0
(Note 2) Only one rotary axis can be tilted. When you attempt to tilt two or more rotary axes, an operation error occurs.
(Note 3) The inclined surface machining cannot be performed on a machine where the primary rotary axis rotates around the K axis or where the primary and secondary rotary axes rotate around the same axis. A program error occurs when the command is issued.
Type Tool tilt type Table tilt type Combined type
Description Two rotary axes on the tool side Two rotary axes on the table side One rotary axis on each of the tool side and table side
Example of machine

Primary rotary axis
The 2nd rotary axis on the tool side The 1st rotary axis on the table side Rotary axis on the tool side
The 1st rotary axis on the tool side
The 2nd rotary axis on the tool side
The 2nd rotary axis on the table side
The 1st rotary axis on the table side
Rotary axis on the table side
Rotary axis on the tool side

17.2.13 Simple Inclined Surface Machining Command
In a lathe with three orthogonal axes and one rotary axis on the tool side, this function enables simultaneous 4-axis control milling on an inclined surface along workpiece end face.
To facilitate machining on an inclined surface, this function uses three commands: simple inclined surface control (G176), simple tool center point control (G174), and tool axis direction control (G53.1) as follows. The tool axis direction can be turned at right angles to the inclined surface by issuing the tool axis direction control command (G53.1) after the simple inclined surface control command (G176). When G174 is given after G176, the direction of tool length is compensated in accordance with the tool angle.
For a machine configured with a turret, this function allows you to use any tool on the turret to carry out simple inclined surface machining.
(1) Simple inclined surface control (G176)
G176 enables a new coordinate system (called "feature coordinate system") to be defined. Feature coordinate system is obtained by rotating and parallel translating a plane using the X, Y and Z axes configuring the workpiece coordinate system as a rotary axis. Consequently, there is no need to calculate the coordinate position in accordance with the inclined surface angle. This simplifies creation of a machining program.
(2) Simple tool center point control (G174)
G174 allows a tool length offset in the tool axis direction even when the tool axis direction is not parallel to the orthogonal coordinate system after rotation of the rotary axis. Consequently, the nose of the tool mounted on the rotary axis can be kept in the programmed position at all times. This simplifies creation of a complicated-shape machining program.
(3) Tool axis direction control (G53.1)
G53.1 aligns the tool with the + Z direction of the feature coordinate system. This eliminates the need for you to mind the feature coordinate system's direction or tool axis' rotation direction, resulting in greater ease of programming.
Feature coordinate system
M850W M830W M850S M830S M80W M80
TypeA

M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
X
Y
Y
Z
X
Z
(X, Y, Z)
(X,Y,Z) = (0.0, 0.0, 100.0)
(X, Y, Z)
Workpiece
coordinate system
Rotation center coordinate = Feature coordinate zero point
Rotation angle 45
Feature coordinate
system

Command format
Simple inclined surface control start
Simple inclined surface control cancel
Tool axis direction control
Simple tool center point control start
Simple tool center point control cancel command
G176 X__Z__D__ ; When rotating K-I plane about the axis parallel to the J axis
G176 X__Y__D__ ; When rotating I-J plane about the axis parallel to the K axis
G176 Y__Z__D__ ; When rotating J-K plane about the axis parallel to the I axis
X,Y,Z : Feature coordinate system zero point (Rotation center position)
(-99999.999 to 99999.999 (mm)) (-9999.9999 to 9999.9999 (inch))
D : Rotation angle (-359.999 to 359.999 ( ))
G69.1;
G53.1 R__ ;
R : Tool axis rotation angle compensation amount (-359.999 to 359.999 ( ))
G174 R__ ;
R : Tool axis rotation angle compensation amount (-359.999 to 359.999 ( ))
G174 (X__Y__Z__B__) ; The axis movement command in ( ) can be omitted.
G175;

17.2.14 3-dimensional Tool Radius Compensation (Tool's Vertical-direction Compensation)
(*1) This function is available during program format switch.
This function is to compensate the tool radius of the machine with two rotary axes, in accordance with the change of the workpiece direction and inclination of the tool due to the movement of the rotary axis. The 3-dimensional tool radius compensation was realized by searching the tool path on the workpiece by the program command and calculating the compensation vector on the plane (compensation plane) which is vertical to the path in the tool direction.
When the 3-dimensional tool radius compensation (tool's vertical-direction compensation) is commanded while the specification is not added, an alarm will occur.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L (*1) (*1) (*1) (*1)
r : Compensation amount
: Tool center path
: Program path
r
r
X
Y
Z
Tool
direction
Compensation
plane

17.2.15 Workpiece Installation Error Compensation
(*1) This function is available during program format switch.
This function is for the 5-axis machine. This compensates the error when a workpiece is placed off the workpiece coordinate system to enable machining according to the program. In this function, a new coordinate system with the workpiece as its reference position will be defined (called "workpiece installation coordinate system) and the program will be executed in this new coordinate system.
This function is compatible with the same types of machine as listed in the inclined surface machining command.

M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L (*1) (*1)
Error at the workpiece
installation

17.2.16 3-dimensional Manual Feed
By selecting the hypothetical coordinate system to be machined, axis can be moved with manual feed (JOG, HANDLE or INCREMENTAL) in the coordinate system with this function.
If a movement command on the hypothetical coordinate is issued, it can be easy to setup because multiple axes is moved by NC according to the tool angle or the inclination of the table.
This function consists of the hypothetical coordinate feed and tool center point rotation.
Movement command for the linear axis operates as the hypothetical coordinate feed and manual feed will be carried out on the hypothetical coordinate.
Movement command for the rotary axis operates as the tool center point rotation and manual feed will be carried out with the rotary axis and 3 linear axes which are issued a movement command to keep position relations of the workpiece and tool tip.
This function can be used on the machine whose rotary axis is installed with ISO polarity and the machine whose axis is installed with non-ISO polarity. However, the orthogonal axis needs to be installed with ISO polarity.(*1)
Note that this function can be also used on the machine with a tilted rotary axis.
(*1) In the machine coordinate system (right-hand orthogonal coordinate system) defined in ISO standard, the rotation turning to the right-handed screw is handled as ISO polarity and the one turning to the left-handed screw is handles as non-ISO polarity.
Standard manual feed is applied when this function is not provided.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
<Tool tilt B-C axis> <Table tilt A-C axis>
Linear axis:
hypothetical
coordinate
feed
Rotary axis:
tool center
point
rotation
*1 Keep the position of the workpiece and tool tip along C axis
rotation.
Original coordinate system
Hypothetical coordinate system
Y(+)
Y(+)
X(+)
X(+)
Z(+)
Z(+)
Y(+)
X(+)
Z(+)
Y(+)
Z(+)
X(+)
Y(+)
X(+)
Z(+)
X(+)
Y(+) Z(+)
Y(+)
C(+)
Z(+)
X(+)
*1

17.2.17 R-Navi
This function allows you to perform index machining (including inclined surface and multiple-surface machining) simply and smoothly using a rotary axis.
To enable index machining, register a feature coordinate system (coordinate origin and coordinate axial direction) along the machining surface in advance, and select the registered surface from the operation screen. Then the tool is able to move along the coordinate system to perform index machining.
As shown below, the machining surface selected from the screen is not affected by whether the surface indexing is

complete or not.
The function is effective for the machine configuration with the right-hand orthogonal coordinate system defined in ISO standard.
The R-Navi function enables you to use "Inclined machining surface" and "3-dimensional manual feed".
Features of this function are as follows;
(1) Various and simple machining surface registration (Feature coordinate system registration)
- Possible to register multiple surfaces (Up to 16 surfaces per workpiece, and up to 10 workpieces)
- Guide drawing which helps to set the coordinate system along the machining surface
- Feature coordinate system setting without dependence on the workpiece installation position.
- 3D workpiece graphics which enables a visual check of the registered surface.
(2) Easy-to-understand machining surface selection
- An operator is able to select a surface while observing the 3D workpiece graphics.
(3) Automatic indexing and manual indexing of the selected machining surface
- R-Navi automatically executes surface indexing to set the tool to be perpendicular to the selected surface.
- Manual indexing is also available.
- The coordinate system is linked with rotation of the rotary axis (no need to calculate the coordinate origin after the rotation).
(4) A program for 3-axis machining can be used without modification (G68.2 command-less inclined surface machining).
- Able to work on the coordinate system defined along the selected surface (by automatic or manual operation)
- The coordinate system is held even when NC reset is input (no need to re-define the coordinate system).
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
Inclined
coordinate system
Register surface Select a surface Index the surface 3-axis machining
Register
Select
3 axis
machining
program
Manual
Automatic
M800/M80/E80/C80 Series Specifications Manual (Function)
17 Machine Support Functions
IB-1501505-N 492
Command format
The R-Navi setup parameters can be configured from a machining program.
(1) Workpiece registration and setting
(2) Machining surface registration and setting
Command address of machining surface registration
Command address of coordinate axial direction designation
G69 ; Cancel the selected machining surface
G10 L110 ; Start setting workpiece data
Q__ <__> F__ C__ R__ X__ Y__ Z__ I__ J__ K__ ; Data setting
G11 ; End data setting
Q : Workpiece registration No. (1 to 10)
< > : Workpiece name (max. 20 characters)
F : Workpiece shape
C : Basic coordinate system
R : Basic No. (0 to 8)
X/Y/Z : Workpiece size (0.000 to 99999.999)
I/J/K : Workpiece shift (-99999.999 to 99999.999)
G69 ; Cancel the selected machining surface
G10 L111 ; Start setting machining surface data
P0 Q__ D__ <__> X__ Y__ Z__ A__ ; Machining surface setting
P1 M__ B__ C__ E__ F__ H__ I__ ; Designate coordinate axial direction for 1st axis
P2 M__ B__ C__ E__ F__ H__ I__ ; Designate coordinate axial direction for 2nd axis
G11 ; End data setting
G68.2 P10 Q__ D__; Select the registered machining surface
P : Machining surface registration
Q : Workpiece registration No. (1 to 10)
D : Machining surface registration No. (2 to 17)
< > : Machining surface name (max. 15 characters)
X/Y/Z : Feature coordinate origin (-99999.999 to 99999.999)
A : Coordinate axis selection
P : Coordinate axial direction axis designation
M : Coordinate axial direction designation method
B/C/E/F/H/I : Coordinate axial direction setting (-99999.999 to 99999.999)
M800/M80/E80/C80 Series Specifications Manual (Function)
17 Machine Support Functions
493 IB-1501505-N
17.2.18 Simple Synchronous Control
This function is an extension of the synchronous control function. This function enables an axis to be synchronized with the axis previously defined as master axis for the synchronous control, and another axis to be synchronized with the slave axis. Backlash can be restrained by distributing load torque imposed on one axis to two servo motors. When the synchronous control and the simple synchronous control are combined, one axis can be driven with four servo motors.
An axis to be synchronized with is referred to as a "main axis" and an axis which follows the main axis is referred to as a "sub axis".
This is a control method in which the main axis and the sub axis are controlled in the same position by executing a position command for the main axis to the sub axis as well. The main points of the method are as follows:

- The sub axes can be set only for the master axis and the slave axis for the synchronous control.
- The sub axis is controlled with the movement command for the main axis.
- Only one sub axis can be set for the main axis.
- The main axis and the sub axis are controlled at the same position. Therefore, the main axis and the sub axis can only be used together, while either of the axes can be used singly for single operation and correction mode for the synchronous control.
- For simple synchronous control, synchronization error between the main axis and the sub axis is not monitored.
- For the main axis and the sub axis, specify the speed command synchronous control or the current command synchronous control.

(Example) Example of use of the simple synchronous control

M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
U X
V
W
Drive unit
Movement
commands
Synchronous control
Simple synchronous
control
Master axis
(Main axis)
Slave axis
(Main axis)
Sub axis Sub axis
Servo motor
Table
Simple synchronous
control

17.2.20 Real-time Tuning

17.2.20.1 Real-time Tuning 1 (Speed Gain)

This function estimates the inertia (or workpiece weight) of mechanical system and changes the speed control gain automatically according to the estimation results to suppress mechanical vibration.

For example, this suppresses vibration caused when a large workpiece becomes smaller in turning machining as illustrated in Example 1 below. This function also suppresses vibration caused when a workpiece that is relatively small for the table is replaced by a larger one as illustrated in Example 2 below.

Using this function, users can expect suppression of vibration caused by inertia fluctuation, as well as reduction of machining time through adaptation of appropriate speed control gain.

This function also commands a stop of speed control gain change and displays the estimated inertia ratio and magnification of speed control gain (ratio of the changed speed control gain to the initially set gain).

M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
Existing Real-time tuning 1
Machining
Replacement
Time
Speed
Time
Speed
Example1: Turning machining
Example2: Workpiece replacement
Speed waveform
Time
Speed
Machining
Replacement
Time
Speed
Example1: Turning machining
Example2: Workpiece replacement
Speed waveform

17.2.20.2 Real-time Tuning 2 (Rapid Traverse Time Constant)

This function estimates the inertia of workpiece and optimizes the operation acceleration/deceleration time constant automatically according to the estimation results.

This allows the cycle time to be reduced when the inertia of workpiece fluctuates considerably.

This function is useful when the inertia of workpiece fluctuates considerably during machining as illustrated in Example 1: Indexing machining and Example 2: Workpiece replacement on the rotary table below.
In Example 1, the inertia of workpiece is reduced gradually as machining progresses. In Example 2, the inertia of workpiece on the rotary table is reduced by workpiece replacement. When the inertia of workpiece is large in Example 1 or Example 2, the machine tool is required to be operated at a low acceleration to suppress the vibration for the workpiece and overload for the motor. On the other hand, when the inertia of workpiece is smaller, the operation at a higher acceleration is available. In other words, acceleration/deceleration time constant can be reduced when the inertia of workpiece is smaller.
In the existing specifications, the operation acceleration/deceleration time constant is fixed regardless of the inertia of workpiece, which wastes time because a large time constant is applied even if the inertia of workpiece is small.
On the other hand, this function enables the operation with optimum acceleration/deceleration time constant according to the inertia of the workpiece. Therefore, machining is performed while reducing the acceleration/deceleration time constant in Example 1 or Example 2, which leads to a shorter tact time.
Furthermore, the large inertia workpiece is not machined with small acceleration/deceleration time constant since the optimum time constant is adjusted automatically. This enables suppression of vibration and overload.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
Machining
Replacement
Speed
Time
Example1: Indexing machining
Example2: Workpiece replacement
Speed waveform
Current waveform
Current
Time
Varying load
Existing Real-time tuning 2
Time is wasted because
acceleration/deceleration time constant is fixed
Cycle time can be reduced because
acceleration/deceleration time constant is
Machining
Replacement
Speed
Time
Example1: Indexing machining
Example2: Workpiece replacement
Speed waveform
Current waveform
Current
Time
Constant load
Time can be reduced
M800/M80/E80/C80 Series Specifications Manual (Function)
17 Machine Support Functions
IB-1501505-N 496
17.2.21 Constant Torque Control
(1) Constant torque control
By setting "Constant torque control request axis" signal to ON from PLC, the servo motor of the designated axis outputs torque set by the parameter in a constant direction. By using this function for a servo motor which drives a bar feeder, the bar feeder can press the workpiece with constant torque regardless of whether it is during movement, stop, or acceleration/deceleration.
By setting "Proportional torque stopper control request axis" signal to ON from PLC, proportional torque stopper control enables a servo motor of the designated axis to generate torque set by the parameter in the stopper direction. When position droop is generated, the motor generates torque in proportion to the position droop in the stopper direction to keep the stopper position.
(Note) Do not cancel the constant torque control or the proportional torque stopper control for an axis moving under manual or automatic operation. Otherwise the fixed workpiece, fixed turret, etc., may get loose, and it is dangerous.
Example of constant torque control
(2) Droop cancel under constant torque control
Droop cancel under constant torque control cancels the position droop generated during constant torque control without moving an axis.
Note that the droop cancel under constant torque control must be commanded while the axis is pressed against the workpiece, etc.
(3) Proportional constant torque control
Proportional torque stopper control generates constant torque in the stopper direction according to the value designated to the parameter. When position droop is generated, the motor generates torque in proportion to the position droop in the stopper direction and to keep the stopper position.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M

L
Cutting-off tool
Retraction
Z axis
Spindle
Bar feeder pressing arrow
Constant torque stopper
Constant torque stopper
Movement command tracking
constant torque stopper
Workpiece
Constant torque control axis
Chuck
(closed)
Chuck (opened)
Chuck (closed)

17.2.22 External Encoder Position Output I/F
* Encoder I/F expansion unit is required for M800W/M80W
This function outputs the position (angle) of external encoder to PLC device based on the input pulses from the encoder.
This function can be used to monitor the position of angular head which the external encoder is connected to.
The position to output to PLC device can be cleared to 0 with PLC signal.
M800W/M80W connection diagram
(Note) Encoder I/F expansion unit can be used for ENC1 only.
M800S/M80/E80 connection diagram
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
EXT1
ENC1
CNC unit
Encoder I/F
expansion unit
External encoder
ENC
CNC unit
External encoder

17.2.23 Multiple-axis Synchronization Control
Multiple-axis synchronization control is the function that enables multiple slave axes to be synchronized with commands to the master axis. This function can be used, for example, in multi-head machine configurations.
The axis that serves as the reference of synchronization is called "master axis", whereas the axis that follows the master axis is called "slave axis".
- The synchronized axes are controlled with travel commands to the master axis.
- For one master axis, two or more slave axes can be set.
- Up to three combinations of master axis and slave axes can be set for all the part systems.
Configuration example of multiple-axis synchronization control
The "compensation" in the figure indicates the pitch error compensation, the thermal expansion compensation, the backlash compensation and the external machine coordinate compensation. Even under the multiple-axis synchronization control, the compensation is performed independently for each axis.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
CNC
M
M
M

Position
command
Compensation
Compensation
Compensation
Drive unit
Drive unit

Drive unit
Master axis
Encoder
Encoder
Encoder
Slave axis 1
Slave axis n

17.2.24 Hypothetical Linear Axis Control
Using one linear axis and one rotary axis, this function composes a hypothetical linear axis which orthogonally intersects the real linear axis. 3-dimensional positioning and interpolation operation can be executed by configuring two linear axes and one rotary axis.
This function reduces actual linear axes, so the machine configuration can be simplified. In the figure below, the movement mechanism of X axis direction which intersects with V axis is not required. However, a linear movement is performed by the rotary axis and linear axis; therefore, the machining accuracy may not be as high as when movement is performed by the actual axis.
Although a hypothetical linear axis is a linear axis (hypothetical axis) without an actual axis, it needs setting as CNC control axis. There are three actual axes and two hypothetical axes, so total of five CNC control axes are required for the figure below. A mode to control a hypothetical linear axis is called hypothetical axis command mode and a mode to control actual axis is called actual axis command mode. Each mode can be switched with a control signal from PLC I/F.
This function is valid in both automatic operation and manual feed.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
V axis (Actual axis)
X axis
(Hypothetical axis)
Center of rotation
C axis
(Actual axis)
Y axis
(Hypothetical axis)
Z axis (Actual axis)
Tool
Movement range

17.2.25 BiSS Encoder I/F
This function outputs input data from the encoder compatible with BiSS-C (hereinafter referred to BiSS encoder) to the PLC device (ZR register).
This function can be used to monitor the position of the turret rotary axis by connecting the BiSS encoder.
Data length and data bit arrangement of the BiSS encoder differ depending on the encoder specifications.
Create a sequence program according to the specifications of the data sent from the encoder to calculate the encoder angle. The figure below is an example of connection structure for 3-axis tapping center.
(Note) This function supports both BiSS-C and BiSS-C (unidirectional), but does not support access to the register in the device on the slave side of the BiSS-C.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
CNC drive unit CNC spindle motor
Sequence program
(Created by MTB)
ZR register
NC control unit
General-purpose
drive unit General-purpose
servo motor
Turret
BiSS encoder
CNC servo motor
(X/Y/Z)
ATC
Connected to ENC
connector and RIO2
connector
Command
Feedback

17.2.26 Tool Head Hot Swapping

This is a function to perform machining by detaching the tool head connected to the machine temporarily and attaching another tool head.
When the tool head side includes the drive sections of the rotary axis and the spindle, the tool head can be changed without turning off the NC and the drive units. In that case, the servo parameter of the rotary axis and the spindle parameter of the spindle can be changed according to the tool head to be used. When the rotary axis configuration differs depending on the tool head, the rotary axis configuration parameter can be changed.
This function is used by commanding a combination of the following three types of PLC signals. The combination of the signals needs to be selected according to the specifications of the machine head.
- NC axis switch
- Spindle switch
- Rotary axis configuration parameter switch (available only for the first part system)
[Image of tool head change including two rotary axes and spindle]
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
CNC
. . .
. . .
Refer to the servo parameter and spindle parameter for switch.
Transfer the switch
parameters.
Head change command (signals)
4. Rotary axis configuration parameter
switch (tool tilt AC tool tilt BC)
3. Spindle switch
2. NC axis switch (A axis B axis)
1. NC axis switch (C axis C axis)
C axis
A axis
Spindle
C axis
B axis
Spindle
User PLC
NC axis switch parameter
1st set 2nd set 16th set
Servo drive unit
Spindle switch parameter
1st set 2nd set 8th set
Spindle drive unit

17.3 PLC Operation
17.3.1 Arbitrary Feed in Manual Mode
This is a function to control the NC control axis with command from the PLC in addition to the normal automatic operation command on the NC.
This function can be primarily used for axis control for ATC. This function enables positioning of the axes from the PLC.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L

17.3.2 Circular Feed in Manual Mode
By specifying a hypothetical coordinate on the machine coordinate system from the user PLC, oblique linear interpolation or circular interpolation is executed with jog feed, handle feed, manual rapid traverse or incremental feed of the two axes designated by plane selection.
This function is valid only in the jog mode, handle mode, manual rapid traverse mode or incremental mode. This function cannot be used in the other manual modes and automatic operation modes.
This function operates for the horizontal axis (H axis) and vertical axes (V axis) determined by the parameters and PLC device settings. This function cannot be used for the other NC axes and PLC axis. When this function is valid, all the axes other than H axis and V axis move as usual.
(1) Oblique linear interpolation
Operation example:
- Handle feed of the H axis in the "+" direction at the current position (point "A") results in the movement to the point "B". Then handle feed of the H axis in the "-" direction at the current position (point "B") results in the movement to the point "A".
- Handle feed of the V axis in the "+" direction at the current position (point "A") results in the movement to the point "C". Then handle feed of the V axis in the "-" direction at the current position (point "C") results in the movement to the point "A".
These are set in the R registers.
a : Gradient angle
h,v : Basic point coordinate

h' : H' travel range
v' : V' travel range
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
A
B
h
v
H
V
a
C
V' H'
- h'
+ h' + v'
- v'
Reference point
When the circular feed in manual mode (oblique linear interpolation) is valid:
- Jog/handle feed of H axis results in the movement in parallel with H' axis (see above).
- Jog/handle feed of V axis results in the movement in parallel with V' axis (see above).

(2) Circular interpolation
By specifying a hypothetical coordinate on the machine coordinate as shown in the figure below, jog/handle feed can be executed on the hypothetical coordinate.
Operation example:
- Handle feed of the H axis in the "+" direction at the current position (point "A") results in the movement to the point "B". Then handle feed of the H axis in the "-" direction at the current position (point "B") results in the movement to the point "A". The movement is done along the circumference of the arc whose radius is the distance from the arc center to the current position (point "A").
- Handle feed of the V axis in the "+" direction at the current position (point "A") results in the movement to the point "C". Then handle feed of the V axis in the "-" direction at the current position (point "C") results in the movement to the point "A".
These are set in the R registers.
h1, v1 : Basic point coordinate
h2, v2 : Arc center coordinate
h' : H' travel range
v' : V' travel range
A B
H
V
C
v1
v2
h1 h2
- H'
+ H' + v'
- v'
+ H'
- V'
+ V'
Reference point
Arc center
When the circular feed in manual mode (circular interpolation) is valid:
- Jog/handle feed of H axis results in the movement along the arc whose radius is the distance from the arc center to the current position.
- Jog/handle feed of V axis results in the movement on the line connecting the current position and the arc center.

17.3.3 PLC Axis Control
Over and above the NC control axes, this function enables axes to be controlled independently by commands based on the PLC.
Specifications
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
Item Description
Number of control axes Refer to "Max. Number of PLC Axes"
Simultaneously controlled axes PLC control axis is controlled independently from NC control axes.
A multiple number of PLC axes can be started simultaneously.
Command increment

Least command increment
0.001 mm (0.0001 inch)
0.0001 mm (0.00001 inch)
0.00001 mm (0.000001 inch)
0.000001 mm (0.0000001 inch)
(The command increment depends on the parameter setting.)
Feed rate 0 to 1000000mm/min (0 to 100000 inch/min)
(Speed is fixed regardless of the unit system.)
Movement commands
Incremental commands from current position
Absolute commands for machine coordinate system
0 to 99999999
(The command increment depends on the parameter setting.)
Operation modes Rapid traverse, cutting feed, jog feed (+) (-), reference position return feed (+) (-), handle feed,
Automatic initial setting (C80 series)
Backlash compensation Available
Stroke end Device arbitrary allocation is available
Soft limit Available
Rotary axis command
Available
For absolute commandsamount within 1 rotation
(rotation by amount remaining after division into the division number of rotary axis)
For incremental commandsrotation by assigned amount
Inch/mm changeover None
Set to the command that corresponds to the feedback unit.
Position detector Encoder (Absolute position can also be detected.)

17.3.5 PLC Axis Indexing
PLC axis indexing allows a PLC axis to function as an auxiliary axis with no need for changing the user ladder used conventionally for an auxiliary axis. (The position of R register will be changed.)
(1) Command methods
(2) Feed functions
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
Station method (for rotary axis) : One rotation (360) of the rotary axis is equally divided to determine the stations (positioning destinations). The maximum number of divisions is 360.
Setting 8 stations (8 divisions)
Station method (for linear axis) : A valid stroke is equally divided to determine the stations (positioning destinations). The maximum number of stations is 360.
Setting 5 stations
The zero point is station 1, and the final end of the valid stroke is station 5.
When using a linear axis, the No. of equal divisions is "number of stations - 1".
Unequal station method : When the positioning stations are not at equal intervals, this method allows you to set up to 20 coordinate points arbitrarily to determine the station coordinates. This method is available for a rotary or linear axis.
Arbitrary coordinate designation
method
: This method allows you to transfer arbitrary coordinates (the absolute coordinates based on the zero point) from PLC to perform positioning.
Feed rate selection : Four different feeds per minute are set in the unit of " /min" (rotary axis) or "mm/min" (linear axis). Which of the four is used is switched by the PLC I/F.
Acceleration/deceleration method : The constant-gradient acceleration/deceleration is automatically controlled. The linear or soft acceleration/deceleration is selectable.
Acceleration/deceleration pattern
designation method
: Four different acceleration/deceleration patterns are set to be selected by switching with PLC I/F.
Short-cut control : A least movement distance is automatically judged when a rotary axis is rotated. Also the rotation direction can be designated by the command.
1
2
3
4
5
6
7
8
Station
12 34 5
Zero
point Valid stroke length
Station
Station No.

(3) Operation functions
The following operation modes are available. Send a command from PLC to change the operation mode.

(4) Operation support function
Automatic mode : The axis is positioned at the station No. designated by the start signal. When the start signal has turned OFF before the positioning is completed, the axis is positioned at the nearest station position.
The arbitrary position command operation is also available: the positioning can be carried out to any position other than a station by directly commanding the positioning coordinates from the PLC.
Manual mode : While the start signal is ON, the axis is rotated at a constant speed in the designated direction. When the start signal has turned OFF, the axis is positioned at the nearest station position.
JOG mode : While the start signal is ON, the axis is rotated at a constant speed in the designated direction.
Incremental feed mode : This mode is to feed the axis by the designated distance at each activation.
Manual handle mode : The axis is moved by using a pulse generator.
Reference position return mode : This mode is to position at the reference position. The reference position return by the dog switch is not available.
Position switch : A signal is output to the PLC interface when the machine has reached within the specified range.

17.3.6 NC Axis/PLC Axis Switchover
This function is to use one drive unit by switching the control from the NC or the PLC dynamically.
The function of the NC axis can be used during the NC axis control and the function of the PLC axis can be used during the PLC axis control respectively.
A part of function or signal of the NC axis can also be used during the PLC axis control.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
X YZ 1 A
NC axis
Switch NC axis with PLC
axis with PLC signal (NC
axis/PLC axis switchover
request) NC axis command
PLC axis command
NC axis
(Switching axis)
PLC axis

17.4 PLC Interface
17.4.1 CNC Control Signal
Control commands to the CNC system are assigned from the PLC. Input signals with an A/D conversion function and skip inputs that respond at high speed can also be used.
(1) Control signals
- Control signals for operations in automatic operation mode
- Control signals for operations in manual operation mode
- Control signals for program execution
- Control signals for interrupt operations
- Control signals for servo
- Control signals for spindle
- Control signals for mode selection
- Control signals for axis selection
- Control signals for feed rates
(2) Analog voltage control [M system]
When an analog voltage is input to an external connector used to connect CNC analog inputs, the data corresponding to the input voltage can be read out in the prescribed file register. This data can be used for load meter displays, thermal deformation compensation, etc. (Maximum 4 points)
(3) Skip signals
When signals are input to the skip input interface, they are processed by interrupt processing. This enables functions requiring a high response speed to be implemented. (Maximum 8 points)
For further details, refer to the PLC Interface Manual.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L

17.4.2 CNC Status Signal
The status signals are output from the CNC system. They can be utilized by referencing them from the PLC.
These signals can also be output as analog data by setting the data from the PLC in the R register.
Status output functions

(1) Controller operation ready
When the controller power is turned ON and the controller enters the operation ready status, the "Ready" signal is output to the machine.
Refer to the PLC Interface Manual for details of the sequences from when the controller power is supplied to when the controller ready status is entered.
(2) Servo operation ready
When the controller power is turned ON and the servo system enters the operation ready status, the "Servo ready" signal is output to the machine.
Refer to the PLC Interface Manual for details of the sequences from when the power is supplied to when the "Servo ready" signal is turned ON.
(3) In automatic operation
Generally, if the "cycle start" switch is turned ON in the automatic operation mode (memory, MDI), this signal is output until the reset state or emergency stop state is entered by the M02, M30 execution or the reset & rewind input to the controller using the reset button.
(4) In cycle start
The signal that denotes that the controller is operating in the automatic mode is output from the time when the cycle start button is pressed in the memory or MDI mode and the cycle start status has been entered until the time when the automatic operation is terminated in the automatic operation pause status entered by the "feed hold" function, block completion stop entered by the block stop function or resetting.
(5) In automatic pause
An automatic operation pause occurs and this signal is output during automatic operation from when the automatic pause switch is pressed ON until the cycle start switch is pressed ON, or during automatic operation when the mode select switch is changed from the automatic mode to the manual mode.
(6) In rapid traverse
The "In rapid traverse" signal is output when the command now being executed is moving an axis by rapid traverse during automatic operation.
(7) In cutting feed
The "In cutting feed" signal is output when the command now being executed is moving an axis by cutting feed during automatic operation.
(8) In tapping
The "In tapping" signal is output when the command now being executed is in a tapping modal which means that one of the statuses below is entered during automatic operation.
(a) G84, G88 (fixed cycle: tapping cycle)
(b) G84.1, G88.1 (fixed cycle: reverse tapping cycle)
(c) G63 (tapping mode)

(9) In thread cutting
The "In thread cutting" signal is output when the command now being executed is moving an axis by thread cutting feed during automatic operation.
(10) In rewinding
The "In rewinding" signal is output when the reset & rewind signal is input by M02/M30, etc., during memory operation and the program currently being executed is being indexed.
The rewinding time is short, so there may be cases when it cannot be confirmed with the sequence program (ladder).
(11) Axis selection output
The "Axis selection output" signal for each axis is output to the machine during machine axis movement.
(a) Automatic mode
The signal is output in the movement command of each axis. It is output until the machine stops during stop based on feed hold or block stop.
(b) Manual mode (including incremental feed)
The signal is output while the axis is moving from the time when the jog feed signal is turned ON until the time when it is turned OFF and the machine feed stops.
(c) Handle feed mode
The signal is output at all times when the axis selection input is on.
(12) Axis movement direction
This output signal denotes the direction of the axis now moving, and for each axis a "+" (plus) signal and a "-" (minus) signal are output respectively.
(13) Alarm
This signal indicates the various alarm statuses that arise during controller operation. It is divided into the following types and output.
(a) System errors
(b) Servo alarms
(c) Program errors
(d) Operation errors
(14) In resetting
The "Reset" signal is output during the reset process when the reset & rewind command is input to the controller with the "reset" button on the setting and display unit is pressed or when the "Reset" signal is input from the machine operation panel, etc.
This signal will also be output when the controller READY status is OFF, when the Emergency stop signal is input or when a servo alarm is occurring, etc.
(15) Movement command finish
In the memory or MDI automatic operation, the "Movement command finish" signal is output when the command block in the machining program features a movement command and when that block command has been completed.
When the movement command and M, S, T or B command have been assigned in the same block, then the movement command signal can be used as a sync signal for either executing the processing of the M, S, T or

B command at the same time as the command or executing it upon completion of the movement command.

17.4.3 PLC Window
[M8 series]
Using the "read window" or "write window" that are arbitrarily allocated to the R register's user area, it is possible to read and write the CNC operation status, axis information, parameters and tool data etc.
The area used for the "read window" and "write window" has 1500 points for the backup area and 100 points for the non backup area.
Up to three window areas can be specified simultaneously for both "read window" area and "write window" area. 16 R registers (18 R registers when an extended interface is used) are used for one read window or write window.
The read window is further divided into the "read control window" and "read data window". The write window is also divided into the "write control window" and "write data window".
Up to four data items can be successively read or written from the data designated in one read window or write window.
[C80 series]
The operation status of NC CPU, the axis information, the parameters, and the tool data, etc. can be read and written by using "Read control window" or the "write control window".
The "read control window" and "write control window" are available by 50 sets each.
(1) PLC turns control signal ON.
(2) NC receives control signal, and reads designated data in control window.
(3) Results of NC read are set in read control window and read data window.
(4) PLC turns control signal ON.
(5) NC receives control signal, and writes contents of write data window corresponding to designated data in control window.
(6) Results of NC write are set in write control window.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
NC PLC
(1)
(2)
(2)
(3)
(3)
NC
PLC
(4)
(5)
(5)
(5) (6)
<Reading>
<Writing>
Operation
status
Axis
information
Parameters
Tool data
Operation
status
Axis
information
Parameters
Tool data
R register (user area) (M8)
D register (C80)
Read window
R register (user area) (M8)
D register (C80)
Read control
window
Read data
window
Designate arbitrary position with parameter
(R register) (M8)
Write window
Write control
window
Write data
window

17.4.4 External Search
Machining program can be searched from user PLC by specifying the storage device of machining program, program No., sequence No. or block No.
17.4.5 Direct Screen Selection
This function enables automatic transition to an arbitrary screen by setting the screen selection information to the file registers from user PLC.
The screens that can be selected as the transition destination are Monitr, Setup, Edit, Diagn, Mainte and custom release screens.

This function is used to move to the custom screen being set by the MTB.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
NC
Automatic
transition
File register
(R356 to R359)
Automatic
transition
User PLC
Screen
processing
Screen selection
information
M800/M80/E80/C80 Series Specifications Manual (Function)
17 Machine Support Functions
IB-1501505-N 514
17.4.6 Buzzer Sound Control
This function gives a buzzer mounted on the NC keyboard by operating the PLC device.
The buzzer will be activated when the PLC device is turned ON, and be deactivated when the PLC device is turned OFF.
This is effective in applications of sounding a buzzer such as during the alarm occurrence, or for the program operation
end notification.
This function also gives a buzzer when the operation sound disable has set.
This can be used when the NC keyboard is mounted.
The buzzer sound image by the buzzer ON operation:
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
Buzzer ON state
Buzzer ON signal
Sound OFF Sound ON Sound OFF
M800/M80/E80/C80 Series Specifications Manual (Function)
17 Machine Support Functions
515 IB-1501505-N
17.5 Machine Contact I/O
17.5.1 Operation Panel I/O
17.5.1.1 DI:64/DO:64
* Specifications of separated-type display are classified with "Windows-based" and "non-Windows-based"
17.5.1.2 DI:64/DO:64 + SDI:8
* Specifications of separated-type display are classified with "Windows-based" and "non-Windows-based"
17.5.1.3 DI:96/DO:64
* Specifications of separated-type display are classified with "Windows-based" and "non-Windows-based"
17.5.1.5 DI:64/DO:48/AO:1
* Specifications of separated-type display are classified with "Windows-based" and "non-Windows-based"
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M / / /
L / / /
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80

M / / /
L / / /
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M / / /
L / / /
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M / / /
L / / /
M800/M80/E80/C80 Series Specifications Manual (Function)
17 Machine Support Functions
IB-1501505-N 516
17.5.2 Remote I/O
17.5.2.1 DI:32/DO:32
17.5.2.2 DI:64/DO:48
17.5.2.3 DI:64/DO:48 + AO:1
17.5.2.5 DI:16/DO:8
17.5.2.6 DI:32/DO:32 + SDI:8/SDO:4
* Functional safety expansion unit is required for M80
17.5.2.7 SDI:8/SDO:4
* Functional safety expansion unit is required for M80
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB

E80
TypeA
E80
TypeB C80
M
L

17.6 External PLC Link
17.6.1 CC-Link (Master/Local)
(*1) MELSEC
[M8 series]
NC unit can be directly connected to the network to serve as the master/local station of the MELSEC CC-Link.
CC-Link unit is required for this connection.
(1) Outline of CC-Link
- Distributing and installing each unit to the equipments such as conveyor line and mechanical device can simplify the wiring of the whole system.
- The ON/OFF data and numerical data such as input/output treated by each unit can be communicated easily and at high speed.
- The simple distribution system can be established by connecting several PLC CPUs or NCs.
- Connecting the device equipments made by the partner manufacturer can flexibly support various systems.
(2) Outline drawing (M800W Series)
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M (*1)
L (*1)
Master station This station controls the remote station and local station.
One master station is required for one system.
Local station This station contains the CPU and can communicate with the master and the other local stations.
Remote I/O station Remote station that handles only bit information.
Remote device station Remote station that handles bit information and word information.
Intelligent device station This station allows the transient transmission. (Including local station)
Local station
(NC control unit)
Remote I/O
CC - Link Expansion unit
FCU8-EX561
CC - Link
Partner manufacturer
product
or Local station
Master station
Master station (NC control unit) or
Remote device
PLC
CPU
PLC
CPU
Remote I/O

(3) Performance specifications
MITSUBISHI CNC M8 Series is compliant with CC-Link Ver.2.00.
<CC-Link Ver.2.00 specification>
Item CC-Link master/local unit
Max. number of link points per
one system (Note 1)
Remote input/output (RX,RY) 8192 points each
Remote register (RWw)
(Master St. Remote/Local St.) 2048 points
Remote register (RWr)
(Remote/Local St. Master St.) 2048 points
Extended cyclic setting 1 time setting 2 times setting 4 times setting 8 times setting
Number of link
points per one
remote/local
station
1 station
occupied
Remote input/output (RX,RY) 32 points each 32 points each 64 points each 128 points
each
Remote register (RWw)
(Master St. Remote/Local St.) 4 words 8 words 16 words 32 words
Remote register (RWr)
(Remote/Local St. Master St.) 4 words 8 words 16 words 32 words
2 stations
occupied
Remote input/output (RX,RY) 64 points each 96 points each 192 points

each
384 points
each
Remote register (RWw)
(Master St. Remote/Local St.) 8 words 16 words 32 words 64 words
Remote register (RWr)
(Remote/Local St. Master St.) 8 words 16 words 32 words 64 words
3 stations
occupied
Remote input/output (RX,RY) 96 points each 160 points
each
320 points
each
640 points
each
Remote register (RWw)
(Master St. Remote/Local St.) 12 words 24 words 48 words 96 words
Remote register (RWr)
(Remote/Local St. Master St.) 12 words 24 words 48 words 96 words
4 stations
occupied
Remote input/output (RX,RY) 128 points
each
224 points
each
448 points
each
896 points
each
Remote register (RWw)
(Master St. Remote/Local St.) 16 words 32 words 64 words 128 words
Remote register (RWr)
(Remote/Local St. Master St.) 16 words 32 words 64 words 128 words
Number of occupied stations
(Number of local stations) Station 1 to station 4 (The station No. can be switched with parameters.)
Baud rates 156kbps / 625kbps / 2.5Mbps / 5Mbps / 10Mbps can be selected.
(Baud rate can be selected with parameters.)
Communication method Polling method
Synchronization method Flame synchronization method
Encode method NRZI method
Transmission path method Bus (EIA RS485 compliant)
Transmission format HDLC compliant
Illegal control method CRC(X16 X12 X5 1)
M800/M80/E80/C80 Series Specifications Manual (Function)
17 Machine Support Functions
519 IB-1501505-N
(Note 1) If the points which can be reserved as the device for the CC-Link in the NC side does not reach 8192 points,
the number of points which can be reserved in the NC side is the max. number of link points per one system.
This applies for the remote register (RWw, RWr), as well.
(Note 2) When CC-Link Ver.1.00 compliant cables are mixed, the cable length between stations and the maximum total
length of the cable should follow the specifications for CC-Link Ver.1.00.
(Note 3) This can be used with the cables made by different manufacturers as long as they are Ver.1.10 compliant
cables.
(Note 4) "RAS" is short for "Reliability", "Availability" and "Serviceability".
Item CC-Link master/local unit
Max. number of connection
units
64 units
Note that the following two conditions must be satisfied.
Condition 1:
- (a+a2+a4+a8)+(b+b2+b4+b8)2+(c+c2+c4+c8)3+(d+d2+d4+d8)4 64
-
(a32+a232+a464+a8128)+(b64+b296+b4192+b8384)+(c96+c2160+c4320+c8640)+(
d128+d2224+d4448+d8896) 8192
-
(a4+a28+a416+a832)+(b8+b216+b432+b864)+(c12+c224+c448+c896)+(d16+d23
2+d464+d8128) 2048
a : Number of units when 1 station is occupied in 1 time extended cyclic setting
b : Number of units when 2 stations are occupied in 1 time extended cyclic setting
c : Number of units when 3 stations are occupied in 1 time extended cyclic setting
d : Number of units when 4 stations are occupied in 1 time extended cyclic setting
a2: Number of units when 1 station is occupied in 2 times extended cyclic setting
b2: Number of units when 2 stations are occupied in 2 times extended cyclic setting
c2: Number of units when 3 stations are occupied in 2 times extended cyclic setting
d2: Number of units when 4 stations are occupied in 2 times extended cyclic setting
a4: Number of units when 1 station is occupied in 4 times extended cyclic setting
b4: Number of units when 2 stations are occupied in 4 times extended cyclic setting
c4: Number of units when 3 stations are occupied in 4 times extended cyclic setting
d4: Number of units when 4 stations are occupied in 4 times extended cyclic setting
a8: Number of units when 1 station is occupied in 8 times extended cyclic setting
b8: Number of units when 2 stations are occupied in 8 times extended cyclic setting
c8: Number of units when 3 stations are occupied in 8 times extended cyclic setting
d8: Number of units when 4 stations are occupied in 8 times extended cyclic setting
Condition 2:
- {(16A)+(54B)+(88C)} 2304
- A:Number of remote I/O stations 64 units
- B:Number of remote device stations 42 units
- C:Number of local stations, standby master stations and intelligent device stations 26 units

Remote station No. 1 to 64
Max. total cable length and each
cable length between stations
CC-Link Ver.1.10 compliant cable (When a 110 of terminating resistance is used.) (Note 2)
Baud rates Cable length between stations Max. total cable length
156kbps 1200m
625kbps 900m
2.5Mbps 20cm or more 400m
5Mbps 160m
10Mbps 100m
Connection cable CC-Link Ver.1.10 compliant cable (3-core twisted pair cable with shield) (Note 3)
RAS function (Note 4)
- Automatic link refresh function
- Sub-station isolation function
- Link special relay/error detection by register

(4) Usable functions
Of all the CC-Link functions, the following functions can be used with the NC.
(: Available : Not available - : Not relevant)
(Note 1) The transient instruction cannot be used.
(Note 2) The parameter for the CC-Link is set with the GX Developer.
(Note 3) With this function, when an error occurs in the master station, switch to the standby master station so that data
link can be continued.
Function item
MELSEC NC unit
Master station Local station Master station Local station
Method
Ver.1.00
Ver.2.00
Master
function
Communication between master station and remote I/O
station - -
Communication between master station and remote
device station - -
Communication between master station and local station
Mixed system communication
Reserved station function - -
Error cancel station function - -
Setting of data link status when trouble occurs in CPU of
master station
Registration of parameters in E2PROM - (Note 2) -
Setting of input data status from data link trouble station
Unit resetting by sequence program
Data link stop/restart
Parameter registration function (Note 2) (Note 2)
Automatic refresh function
Scan synchronization function
Synchronous
mode - -
Asynchronous
mode
Setting &
display
function
LED diagnosis status 16-point display
(A1SJ61QBT11) 16-point display
Station number setting
Unit front panel switches Baud rate setting Parameters (Note 2)
Mode setting switch
Condition setting H/W switches
RAS
function
Automatic link refresh function
Sub-station isolation function - -
Data link status check (SB/SW)
Off-line test
On-line test
Monitor diagnosis
Standby master function (Note 3) - -
Temporary error cancel station designation function - -
exclusive
instructio
n
READ instruction / SREAD instruction (Note 1)
WRITE instruction / SWRITE instruction (Note 1)
RIRD instruction / RIWT instruction (Note 1)

(5) Communication data flow
The flow of data communicated by the CC-Link's link scan is as follows.
(The master station and local station of MELSEC CPU can be also mixed.)
RX
RY
RWr

RY
RX
RWw
RWr
RX
RY
RWr
RWw
RY
RX RY
RX
RWw
RWr RWw

(1)
(2)
(3)
(4)
(1)
(2)
(3)
(4)
(1)
(2)
(3)
(4)
(1)
(2)
(3)
(4)
Devices
X device, etc.
Built-in PLC
Y device, etc.
R register, etc.
R register, etc.
NC
(Master station)
Local station
Remote
device station
Remote I/O
station
NC (Local station)
Transmission
data
<Flow of data>
Risk scan
Automatic refresh
(When master station/local station is NC.)
Devices
Built-in PLC
Y device, etc.
X device, etc.
R register, etc.
R register, etc.
M800/M80/E80/C80 Series Specifications Manual (Function)
17 Machine Support Functions
IB-1501505-N 522
(1) By executing a link scan, data in the remote I/O station and remote device station's remote input (RX) and in the local station's remote output (RY) is transmitted to the master station's remote input (RX) and the local station's remote output (RY).
(2) By executing a link scan, data in the master station's remote output (RY) is transmitted to the remote I/O station and remote device station's remote output (RY) and the local station's remote input (RX).
(3) By executing a link scan, data in the remote device station's remote register (RWr) and the local station's remote register (RWw) is transmitted to the master station's remote register (RWr) and the local station's remote register (RWw).
(4) By executing a link scan, data in the master station's remote register (RWw) is transmitted to the remote device station's remote register (RWw) and the local station's remote register (RWr).
[C80 series]
For the details of C80 series, refer to the manual of each unit of MITSUBISHI PLC "MELSEC iQ-R series".
M800/M80/E80/C80 Series Specifications Manual (Function)
17 Machine Support Functions
523 IB-1501505-N
17.6.2 PROFIBUS-DP (Master)
(*1) MELSEC
On MITSUBISHI CNC M8 Series, by mounting the PROFIBUS-DP master unit on the expansion slot or option relay unit

and by connecting the unit with the slave stations compatible with PROFIBUS-DP communication, NC can input/output the devices to/from the slave stations as the master station for PROFIBUS-DP communication. CNC can be connected to up to 125 slave stations.
For the I/O data communication function (Cyclic communication), the maximum number of device I/O points is 8192 each. The CNC handles all the devices input/output to/from the PLC as bit device data. At this time, the maximum number of device I/O points of CNC's remote I/O is 768 each.
Using the aperiodic data communication function (Acyclic communication) with the slave station, data exchange can be performed to the slave station via PLC word device. Aperiodic data communication function can be performed with the I/O data communication function simultaneously.
Also, an error that occurred in the slave station can be acquired or responded via PLC word device as diagnosis data or alarm information.
There are two types of PLC I/O device assignment method for PROFIBUS-DP, fixed or arbitrary assignment, which you can select with the parameter. According to the assignment method, the number of available device points differs as follows:
Hilscher's Fieldbus communication control circuit (COMX module) is mounted on PROFIBUS-DP master unit and the parameter setting is carried out using Hilscher's configurator "SYCON.net".
However, two PROFIBUS-DP master units cannot be mounted at a time. If these are mounted at the same time, both units stop their operations and the error occurs.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M (*1)
L (*1)
Fixed device assignment Arbitrary device assignment
Maximum number of input device points 512 bits 8192 bits
Maximum number of output device points 512 bits 8192 bits
EXT1 EXT2 EXT3 EXT4
PROFIBUS-DP master unit
CNC CPU control unit
RIO communication
PROFIBUS-DP communication
PROFIBUS cable
USB cable
Slave station: up to 125 stations
Terminator
Terminator
Tapping
Slot for expansion unit
MITSUBISHI CNC M800 series
Windows-based PC for parameter setting

Hilschers configurator
M800/M80/E80/C80 Series Specifications Manual (Function)
17 Machine Support Functions
IB-1501505-N 524
17.6.3 CC-Link IE Field (Master/Local)
(*1) MELSEC
[M8 series]
CC-Link IE Field is high-speed and large capacity open field network using Ethernet (1000BASE-T).
By mounting CC-Link IE Field expansion unit on the expansion slot of NC control unit, NC can be operated as master or local station of CC-Link IE Field. By connecting CC-Link IE Field expansion unit with CC-Link IE Field unit, data communication with the connected unit can be performed.
NC can be set as master or local station, but cannot be set as sub master station.
When CC-Link IE Field expansion unit is not mounted on the expansion slot, CC-Link IE Field cannot be used. CC-Link IE Field related parameter screen is not displayed on NC screen, either.
(1) Data communication
High-speed and large-capacity data communication is available between a master station and device stations on CC-Link IE Field Network.
The network supports cyclic transmission (periodic communication) and transient transmission (non-periodic communication).
(a) Cyclic transmission (periodic communication)
Data are periodically transmitted between stations on the same network.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M (*1)
L (*1)
X
Y
W
RX
RY
RWw
RWr
RX
RY
RWw
RWr

RX
RY
RWw
RWr
X
Y
W
RX
RY
RWw
RWr
NC
Master station
Master
station
Intelligent device
station
Remote device
station
Local device station
Intelligent
device station
Remote
device station
Local station PLC CPU
Switching hub

(b) Transient transmission (non-periodic communication)
Data are transmitted upon request.
(2) 1Gbps communication speed
1Gbps communication speed allows high-speed communication.
(3) Use of Ethernet cable
A 1000BASE-T-compliant Ethernet is used for the connection interface.
The wiring cost can be reduced because 1000BASE-T-compliant Ethernet cables are commercially available.
(4) Flexible wiring for system arrangements
The network can be wired into star topology, line topology and ring topology.
For star topology, a 1000BASE-T-compliant switching hub can be used.
Wiring is highly flexible because a network can consist of a combination of star and line topologies.
For example, the machine tools can be connected through a line topology whereas star and line topologies can be used within each machine.
[C80 series]
For the details of C80 series, refer to the manual of each unit of MITSUBISHI Programmable Controller "MELSEC iQ-R Series".
17.6.4 PROFINET
(*1) MELSEC
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M (*1)
L (*1)
NC Master station
Intelligent device
station
Local station PLC CPU
PLC device Device
1234H 1234H
Write request
Command
Instruction

17.6.5 EtherNet/IP
(*1) MELSEC
EtherNet/IP is the Ethernet for industry which ODVA (Open DeviceNet Vendor Association) suggests.
It communicates using TCP/IP which is the standard Ethernet technology and the communication protocol which is called CIP (Common Industrial Protocol). EtherNet/IP can be used as not only field network but also the network between controllers. Also, as the standard Ethernet technology is used as lower protocol at the same time, it can be used mixing various general purpose Ethernet devices.
By mounting EtherNet/IP scanner/adapter unit on the expansion slot or option relay unit of NC control unit to connect EtherNet/IP-compatible equipment, PLC devices can be input/output using NC control unit as a scanner or an adapter for EtherNet/IP communication.
When EtherNet/IP scanner/adapter unit is not mounted on the expansion slot or option relay unit, EtherNet/IP cannot be used. Ethernet/IP related parameter screen is not displayed, either.
Two EtherNet/IP scanner/adapter units cannot be mounted on the expansion slot or option relay unit. When two of them are mounted at the same time, both units stop operating and an alarm is output.
EtherNet/IP has two communication functions: Implicit message communication which communicates at regular intervals and Explicit message communication which communicates at arbitrary timing.
Connection Diagram
M850W M830W M850S M830S M80W M80
TypeA

M80
TypeB
E80
TypeA
E80
TypeB C80
M (*1)
L (*1)
Message type Outline
Explicit Message
Communication based on TCP/IP. Communication method which sends and receives data at 1:1 at arbitrary timing.
(Example) Parameter communication, reading diagnostic data, etc.
Implicit Message
Communication based on UDP/IP. Communication method which sends and receives data at regular intervals (Cyclic).
(Example) Transferring periodic data
NC control unit
LAN hub
NC control unitscanner device
Explicit Message
Scanner device
LAN hub NC control unitadapters
Implicit Message
Ethernet cable
EtherNet/IP scanner/adapter unit
EtherNet/IP configuration tool
Windows computer
(For checking diagnostic information) Adapters
(Up to 64)

17.6.8 FL-net
(*1) MELSEC
FL-net is a network capable of interconnecting various FA controllers such as the programmable controllers (PLC) and the CNC from many manufacturers, and personal computers for control and monitoring.
FL-net communication is made available by mounting an FL-net expansion unit on the expansion slot or option relay unit of NC control unit.
FL-net expansion unit of the NC control unit supports the following FL-net (OPCN-2) version.
17.6.9 DeviceNet (Master)
(*1) MELSEC
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M (*1)
L (*1)
FL-net version Class
FL-net Version 3.01 Class 1
(*) Controller level network (Version 2.00 of FL-net) is available.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M (*1)
L (*1)
PC PC PC EWS
Server
WAN
PLC PLC PLC CNC RC
Computer
Controller
Device Sensors and actuators
Field network
Host LAN Ethernet (TCP/IP, UDP/IP)
FL-net (Ethernet based control network)
Panel
computer

17.6.10 CC-Link IE Field Basic
CC-Link IE field network Basic is an FA network taking advantage of general Ethernet. This function is used to perform cyclic transmission between the master station and remote station using link devices.
The MITSUBISHI CNC M8 Series enables periodic (cyclic transmission) data communication between the master station and remote station by connecting the machine to the device conforming to CC-Link IE field network Basic communication through the built-in Ethernet port. The data communicated is assigned to built-in PLC devices and can be referred to from the ladder program.
The M8 CNC can function as a master station or as a remote station of CC-Link IE field network Basic communication.

The two functions cannot be used concurrently. Whether to use the CNC as the master station or as the remote station is determined by NC parameters.
The parameters are used to set CC-Link IE field network Basic communication, to specify the communication device, and to assign the link refresh devices.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L

The advantages of using CC-Link field network Basic are described below.
(1) Cyclic transmission (periodic communication)
Data communications can be made periodically between stations of the same network.
(2) Reduction in system costs
The NC communicates through its built-in Ethernet port. This eliminates the need for a dedicated network unit, and therefore contributes to reduction in system costs.
(3) Mixture of protocols
CC-Link IE field network Basic can be used concurrently with other general Ethernet protocols. Therefore, the network can be configured using FTP, HTTP, SLMP, etc. However, a link scan time for cyclic transmission may increase due to those Ethernet protocols.
(4) Easy-to-configure system
All the settings of CC-Link IE field network Basic are made on the master station. Cyclic transmission is enabled by setting the IP address and the subnet mask on the remote station. There is no need for setting the information of the master station on the remote station.
In addition, there is no restriction on the connection order nor connecting locations of the devices as they are connected via a star network. It is therefore easy to connect an additional remote device.
NC
RX,RWr
RY,RWw
RX,RWr
RX,RWr
RX,RWr
RY,RWw
RY,RWw
RY,RWw
Remote station
Switching hub
Master station Remote station Remote station
Remote
station
Master
station
Device
Device
Remote
station
Remote
station

17.7 Installing S/W for Machine Tools
17.7.1 Customization (NC Designer2)
"Customization" is a function which allows to display a user-created screen or user-created window as an HMI screen or as a screen of another application.
(Note) The software sold separately is necessary.
"Customization" function has four types of assignment, "F0 assignment", "Menu assignment", "Partial-screen customization" and "Selectable-screen customization". Each customized screen can be created and registered with "NC Designer2 interpreter method", "NC Designer2 compilation method" or "EXE file registration method".
F0 assignment:
Customized screen (Note 1) can be assigned to the function keys (F0, SFP, window display or window selection).
When the function key is pressed, the customized screen assigned is displayed.
Menu assignment:
Customized window (Note 2) can be assigned to a main menu of the monitor screen, setup screen, edit screen, diagnosis screen, or maintenance screen.
For the monitor screen, setup screen, edit screen, diagnosis screen, or maintenance screen, the display order of main menus can be changed.
When the registered menu is pressed, the customized window is displayed.
Also, display/non-display of the customized menu can be changed depending on the conditions.
Partial-screen customization:
Customized window created with "NC Designer2 interpreter method" or "NC Designer2 compilation method" can be displayed as a part of the standard screen.
Selectable-screen customization:
Customized window created with "NC Designer2 interpreter method" or "NC Designer2 compilation method" can be displayed in the selectable display area on the monitor screen. Designated customized window (menu assignment) opens by pressing the INPUT key in the same manner as the selectable display of the standard screen.
G-code guidance open, M-code guidance open:
In the G code guidance display area of the edit screen, the guidance of the original G code (G code macro) and M code (M code macro) created by the MTB can be displayed. By creating a guidance file for G code macro (or M code macro) in HTML format and storing it in a custom folder by the MTB, the corresponding G code (or M code) guidance can be displayed. If there is both a standard G code guidance file and a G code guidance file created by

the MTB, the G code guidance created by the MTB is displayed with priority.
(Note 1) A user-created HMI screen with NC Designer2 or an executable file prepared by a user.
(Note that the executable file cannot be used with M800S/M80/E80.)
(Note 2) A user-created HMI window with NC Designer2 or an executable file prepared by a user.
(Note that the executable file cannot be used with M800S/M80/E80.)
(Note 3) "EXE file registration method" can not be used with M800S/M80/E80.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
M800/M80/E80/C80 Series Specifications Manual (Function)
17 Machine Support Functions
531 IB-1501505-N
NC Designer2
Automatic generation of
source code
Commercially available
application development to ol
(VB, VC, etc .)
Commercially available
application
NC Designer2 Inte rpreter method
NC Designer2 compilation method
Executable file registration method
Automatic
generation of
interpretation
data Project file
(*GRP)
Source code (C++) Original
source code
(C++)
Compilation
link
Compilation
link
Source code Original
source code
Macro
Data
M800/M80/E80/C80 Series Specifications Manual (Function)
17 Machine Support Functions
IB-1501505-N 532
17.7.1.1 Customization Data Storage Capacity [MB]
(*1) Depending on display unit-side memory space. The number indicates the maximum size of the custom screen module (.o).
17.7.1.2 Customization Working Memory Size [MB]
17.7.2 User-defined Key
This function allows an arbitrary character string to be assigned to one key and makes it easy to input the fixed phrases.
Register correspondences between SHIFT keys and character strings in a configuration file (keydef.txt).
The maximum number of registerable key types is 8 for ABC layout and 10 for QWERTY layout.
The maximum number of characters used per definition is 256. The definition is disregarded when it is set exceeding the number.
In the configuration file (Keydef.txt), a character string should be defined as follows:
Example:
0[G28X0Y0]; When SHIFT+A and a key is input, a character string "G28X0Y0" is input.
1[G28Z0]; When SHIFT+B and a key is input, a character string "G28Z0" is input.
17.7.3 EZSocket I/F
(Note) The software sold separately is necessary.
This middleware makes it easy to develop applications having a Windows interface.
The various functions of the NC unit can be used from a Windows application using VC++ language, VB language and VBA macro language.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M (*1) (*1) 6 6 (*1) 6611
L (*1) (*1) 6 6 (*1) 6611
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M 6 6 6 6 3 3 3 1 1
L 6 6 6 6 3 3 3 1 1

M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
n [character string] ;
n(Registration No.) : 0 to 7 (SHIFT+A to SHIFT+H (ABC layout))
: 0 to 9 (SHIFT+Q to SHIFT+G (QWERTY layout))
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L

17.7.4 APLC Release
(Note) The software sold separately is necessary.
APLC (Advanced Programmable Logic Controller) release is a function that allows the user-generated C language module to be called from NC.
Control operations that are difficult to express in ladder language can be created with C language.
PLC ladder can easily be customized by converting a part of PLC ladder that has grown complex and bulky into C language module.
There are three methods where APLC is executed. It is possible to use the three in combination.
- Type 1 : By registering the start address of the module to be processed asynchronously with PLC, C language module will be executed in a constant frequency.
- Type 2 (M8 series) : By registering the start address of the module to be processed synchronously with PLC, C language module will be started synchronizing with PLC. Note that C language will not be called if PLC is incorrect, even if the process has been registered.
- Type 3 (M8 series) : By registering the start address of the module to be called from the sequence program and processed, C language module will be started from the sequence program upon S.CALL instruction.
(Note) C language module needs to be generated by NC compiler2.
[Hardware configuration]
This function is activated by installing the C language module into the following memory devices.
- SD memory card (Only for M8 Series)
- Built-in memory of the control unit
When the module is to be installed into an SD memory card, insert the card into the control unit-side SD card I/F for M800W/M80W Series, or do so into the front-side SD card I/F of the display unit for M800S/M80/E80 Series.
Up to 120KB data can be stored in built-in memory.
When the C language module is installed into an SD memory card, C language inside the SD memory card is executed. (The module inside the built-in memory is not executed.)
[Software configuration]
The names of directory, file and initialize function, where C language modules are stored, are fixed.
(Note) Incorrect hardware or software configuration disables operations.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L

17.7.5 Custom API Library
This function is designed to interface an NC with an application developed by a user.
You can set and refer the data for NC using this function.
Please contact us for details.
17.7.6 MES Interface Library
[M8 series]
This function enables to link the CNC internal data and the database of information system (manufacturing execution system). Production control and traceability can be ensured with the registered information by registering at machining completion, alarm occurrence, or user's arbitrary timing as needed. The data registered in the database can also be operated with CNC.
Conventionally, data was obtained by constantly monitoring CNC from an external computer (information system). However, by using MES interface library function, it is possible to connect without a communication gateway and it allows the communication between CNC and the database at a necessary timing.
This function is supported on CNC and the function range is from obtaining the information at the time of machining completion, alarm occurrence, and user's arbitrary timing to transmitting to the database. Screen application of database and external computer must be prepared by user side.
[C80 series]
For the details of C80 series, refer to the manual of MITSUBISHI Programmable Controller "MELSEC iQ-R Series".
M850W M830W M850S M830S M80W M80
TypeA

M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L

17.7.7 SLMP Server
SLMP server is a function that transfers data using the SLMP between an NC and an external device.
SLMP (Seamless Message Protocol) is a general-purpose protocol to transfer information between the NC and an SLMP-compatible external device through the Ethernet cable and the SLMP is applied to many external devices because it can be easily utilized only by applying S/W.
This function enables easy connection with external devices and read/write NC data through the Ethernet cable, improving productivity by utilizing external devices and meeting broad automation needs.
The specifications of SLMP transmitted by an external device are shown below.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
Item Specification
Supported protocols TCP/IP (UDP is not supported.)
SLMP data code Binary code (ASCII code is not supported.)
TCP/IP connection waiting port number 30000
Number of TCP/IP connections
(Number of external devices connected at the
same time)
Up to 4 connections
(When multiple connections are made from a single external device, each one is
counted as one connection in the total number of connections.)
XXXXX XXXXX
XXXXX
X-XXXXXX-XX-X
SLMP
SLMP SLMP SLMP
DB
NC
Utilization for production control and traceability by linking
workpiece ID with machining information and alarm information
as database management
Utilization for a compensation function by measuring deviation
and inclination to the reference workpiece
Utilization for development of application linked with NC
data
Reference workpiece
Actual workpiece
Switching hub
Workpiece ID
Bar code reader Vision sensor
Ethernet cable
Workpiece shape
information
Data
input/output
PC (SLMP-compatible application)

17.7.8 Numerical Control (CNC) Communication Software FCSB1224W000
(Note) The software sold separately is required.
The Numerical Control (CNC) communication software FCSB1224W000 is designed to help development of an application with Windows interface for Mitsubishi Electric computerized numerical controller.
The product can accelerate development by using OLE interface common to computerized numerical controller without knowing internal processing of the machine.
17.7.10 GOT2000 Screen Design Tool GT Works3
(Note) The software sold separately is necessary.
This software provides comprehensive support for the screen design of a display unit.
M850W M830W M850S M830S M80W M80
TypeA

M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
M800/M80/E80/C80 Series Specifications Manual (Function)
17 Machine Support Functions
537 IB-1501505-N
17.8 Others
17.8.1 System Lock
System lock is a function that allows machine tool builders to set the expiration date for use of their machines.
If the cancel code is not entered by the specified deadline, the system forcibly turns OFF the Servo ready completion signal to place the machine in an inoperable status.
(Note) We do not compensate for any detriment that may be caused when the lock is cancelled illegally.
17.8.2 CNC Remote Operation Tool
17.8.2.1 NC Monitor2
(Note) The software sold separately is necessary.
NC Monitor2 is the software tool that monitors the condition of NC remotely with a personal computer using a intranet of a plant. Multiple NCs can be connected and their conditions can be monitored simultaneously.
17.8.2.2 NC Explorer
(Note) This tool is free of charge. Please contact us.
NC Explorer is a software tool to operate the machining data files of each NC unit connected with a host personal computer by Ethernet connection from the Explorer on the host personal computer.
17.8.3 Automatic Operation Lock
Automatic operation lock function prevents the falsification of APLC(C language module: herein after called APLC) by a third party.
Automatic operation will be prohibited when illegal APLC is installed by authenticating APLC with the password for APLC authentication which is registered to NC unit beforehand using this function.
Refer to "17.7.4 APLC Release" for details on the APLC.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
M800/M80/E80/C80 Series Specifications Manual (Function)
17 Machine Support Functions
IB-1501505-N 538
17.8.4 Power Consumption Computation
Present power consumption, accumulated power consumption, and accumulated power consumption history can be acquired with this function.

The total amount of the drive section power consumption (power consumed by the operation of the spindles and servo axes) and the non-drive section power consumption (power consumed by the electrical equipment of the machine tool) is informed to the PLC device.
The instantaneous power consumption is informed as "present power consumption". The integrated value of the present power consumption is informed as "accumulated power consumption".
The "accumulated power consumption" can be recorded at the specified time, and the history data "accumulated power consumption history" can be extracted.
17.8.5 EcoMonitorLight Connection
(Note) EcoMonitorLight sold separately is required.
NC system can collect and manage the electric power of the machine tool which is measured by the energy measuring unit "EcoMonitorLight".
The electric power (mainly consumed and regenerated power) of entire machine tool and peripheral devices can be measured by connecting EcoMonitorLight to the main breaker of the machine tool or the breaker of the peripheral devices (motor, coolant, etc.) which configure the machine tool.
By establishing serial communication (Modbus) between the NC unit and EcoMonitorLight using a serial cable, the NC system can collect the power values of the entire machine tool and peripheral devices measured by EcoMonitorLight. Consequently, the electric power in the machine tool can be finely managed, which enables energy-saving operation.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L

17.8.6 GOT Window
This is the interface to display the variety of NC data on GOT connected to the CNC CPU.
This reads out the running machining program No., the running machining program and the coordinate values, etc. by the device read command.
Setting the command from the GOT or sequence program for the CNC CPU, then the CNC CPU generates the data corresponding to the command.
Because there are up to ten command areas, you can designate up to 10 kinds of commands at the same time.
Additionally, there is also an interface which can refer the often used commands without the sequence programs by automatically setting them up at the time of power ON.
Examples of a screen display and used commands
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
O 1 N 10 O 2 N 110
X - 123.456
Y - 123.456
Z 0. 000
X - 26.544
Y - 76. 544
Z 0. 000
F 500.00 S 6000 T 5
GOT
N100G91G28X0.Y0.Z0.;
N110G00X-150.Y-200.;
N120G00Z-500.;
N130G01Z-50.F500.;
N140G00Z50.
N150G00X50.Y50.;
Machine
position
Main program Subprogram
Running program
Remaining
distance

17.8.7 Log Viewer
This function enables the recorded data by the data sampling function of the NC to display with a graph on the GOT, and to store the data as a file.
The data acquired by the GOT can be stored in an external memory, and also can be read to display with the peripheral

tool "GX LogViewer".
This function uses the "Data Sampling function" of NC, and the "Log viewer function" of GOT for displaying and controlling the logging data.
The connectable log viewer to one NC is one GOT only . The second or subsequent units cannot connect the log viewer.
The NC and the GOT are connected through the Ethernet, and the logging data sampled with the NC is displayed on the GOT.
M850W M830W M850S M830S M80W M80
TypeA
M80
TypeB
E80
TypeA
E80
TypeB C80
M
L
NC GOT2000
Displays logging data with
GX LogViewer on PC
External memory
Logging data
Ethernet
Logging data
Revision History
Date of
revision Manual No. Revision details
Aug. 2017 IB(NA)1501505-A The first edition was created excerpting from functional specifications pages in "M800/M80/C80 Series Specifications Manual" (IB-1501267(ENG)-G).
The descriptions of C80 Series were revised in response to S/W version A2.
The following chapter numbers and chapter titles were changed.
- 15.4.12 Backup/Restore
- 17.3.6 NC Axis/PLC Axis Switchover
The following chapter numbers were changed.
- 4.5.3.4 Multiple Spindle Synchronous Tapping
- 6.1.11 GOT (GOT2000 Series GT27/GT25 12.1/10.4/8.4/5.7)
- 7.2.6 USB I/F (GOT Front-side USB I/F)
- 7.2.7 SD I/F (GOT Back-side SD Card I/F)
- 14.3.6 PLC Axis Current Limit
- 17.7.10 GOT2000 Screen Design Tool GT Works3
- 17.8.6 GOT Window
- 17.8.7 Log Viewer
The following chapter titles were changed.
- 17.1.9.1 Ethernet Connection
- 17.1.9.2 CC-Link Connection
Other contents were added/revised/deleted according to specification.
Dec. 2017 IB(NA)1501505-B The descriptions of M800 Series/M80 Series were revised in response to S/W version C7.
The following chapters were added.
- 2.4.4 Diameter/Radius Designation Switch
- 6.2.21 VNC Server
- 12.3.2.7 Axis-specific Acceleration Tolerance Control
- 12.4.7 DXF Data Input
- 14.1.8 Rotation Center Error Measurement
- 14.1.9 Workpiece Installation Error Measurement
Other contents were added/revised/deleted according to the specifications.
Mar. 2018 IB(NA)1501505-C The descriptions were revised corresponding to Mitsubishi CNC E80 series.
The following chapters were added.
- 4.5.3.5 Synchronous Tapping with Analog I/F Spindle
- 17.2.23 Multiple-axis Synchronization Control
- 17.5.1.5 DI:64/DO:48/AO:1
- 17.6.5 EtherNet/IP
Other contents were added/revised/deleted according to the specifications.
Aug. 2018 IB(NA)1501505-D The descriptions of M800 Series/M80 Series were revised in response to S/W version D1.
The descriptions of C80 Series were revised in response to S/W version B0.
The following chapters were added.
- 1.3.4.3 FTP High-speed Program Server Mode
- 11.4.16 Machining interruption
Other contents were added/revised/deleted according to the specifications.
Mar. 2019 IB(NA)1501505-E The descriptions of M800 Series/M80 Series/E80 Series were revised in response to S/W version E0.
The following chapters were added.
- 4.2.8 Selection of Axis (Axes) for Feedrate Command
- 7.4.3 IP Filter Setting
- 10.1.12 Workpiece Position Offset for Rotary Axis
- 13.2.10 Cogging Torque Compensation
- 14.3.7 Direct Robot Control
- 15.4.14 Field Network Diagnostics
- 15.5.2.3.9 SCN (Safety Communication Network)
- 17.1.7.3 MELSEC Development Tool (GX Works2)
- 17.6.10 CC-Link IE Field (Master/Local)
Other contents were added/revised/deleted according to the specifications.
Aug. 2019 IB(NA)1501505-F The descriptions of M800 Series/M80 Series/E80 Series were revised in response to S/W version E1.
The following chapters were added.
- 6.3.10.17 Indonesian
- 8.1.1.9 Spindle Control with Pulse Train Output
- 8.1.17 Spindle Motor Temperature Output to PLC

- 13.1.12 Backlash Compensation II
- 17.1.2.3 Enhanced PLC Security Mode
- 17.2.18 Simple Synchronous Control
- 17.6.8 FL-net
Other contents were added/revised/deleted according to the specifications.
Feb. 2020 IB(NA)1501505-G The descriptions were revised in response to S/W version F0 of Mitsubishi Electric CNC
M800/M80/E80 Series.
The descriptions were revised in response to S/W version B5 of Mitsubishi Electric
CNC C80 Series.
The following chapter was added.
- 13.1.10 Cyclic Error Compensation
Other contents were added/revised/deleted according to the specifications.
Jun. 2020 IB(NA)1501505-H The descriptions were revised in response to S/W version F1 of Mitsubishi Electric CNC
M800/M80/E80 Series.
The following chapter titles were changed.
- 17.1.4.2 Large PLC Capacity: 256 Ksteps
- 17.1.4.3 Large PLC Capacity: 512 Ksteps
Other contents were added/revised/deleted according to the specifications.
Mar. 2021 IB(NA)1501505-J The descriptions were revised in response to S/W version F4 of Mitsubishi Electric CNC
M800/M80/E80 Series.
The descriptions were revised in response to S/W version B8 of Mitsubishi Electric
CNC C80 Series.
The following chapters were added.
- 6.3.10.18 Vietnamese
- 12.1.7.4 Vibration Cutting Control
- 17.6.4 PROFINET
- 17.6.9 DeviceNet (Master)
Other contents were added/revised/deleted according to the specifications.
Date of
revision Manual No. Revision details
Jul. 2022 IB(NA)1501505-K The descriptions were revised in response to S/W version F8 of Mitsubishi Electric CNC
M800/M80/E80 Series.
The descriptions were revised in response to S/W version BB of Mitsubishi Electric
CNC C80 Series.
The following chapters were added.
- 12.1.8.13 Loader Control Part System
- 13.2.9 Variable Torsion Compensation
- 15.4.15 Remote service iQ Care Remote4U
- 15.4.15.1 Connection with RGU
- 17.2.24 Hypothetical Linear Axis Control
- 17.2.25 BiSS Encoder I/F
Other contents were added/revised/deleted according to the specifications.
Aug. 2023 IB(NA)1501505-L The descriptions were revised in response to S/W version FB of Mitsubishi Electric
CNC M800/M80/E80 Series.
The descriptions were revised in response to S/W version BE of Mitsubishi Electric
CNC C80 Series.
The following chapter was added.
- 17.2.6 Tool Head Hot Swapping
Other contents were added/revised/deleted according to the specifications.
Jan. 2024 IB(NA)1501505-M The descriptions were revised in response to S/W version FC of Mitsubishi Electric
CNC M800/M80/E80 Series.
The following chapters were changed.
- 9.2.1 Tool Radius Compensation
- 9.2.3 Tool Nose Radius Compensation (G40/41/42)
- 12.1.7.4 Vibration Cutting Control
- 12.3.3.1 High-speed High-accuracy Control I (G05.1Q1) Maximum [kBPM]
- 12.3.3.2 High-speed High-accuracy Control II (G05P10000) Maximum [kBPM]
- 12.3.3.3 High-speed High-accuracy Control III (G05P20000) Maximum [kBPM]
- 17.6.2 PROFIBUS-DP (Master)
- 17.6.5 EtherNet/IP
Other contents were added/revised/deleted according to the specifications.
Jun. 2024 IB(NA)1501505-N The descriptions were revised in response to S/W version FD of Mitsubishi Electric
CNC M800/M80/E80 Series.
The descriptions were revised in response to S/W version BH of Mitsubishi Electric
CNC C80 Series.
The following chapter was added.
- 15.4.16 Brake Wear Diagnostics
The following chapters were changed.
- 12.1.7.4 Vibration Cutting Control
- 12.1.8.5 Control Axis Synchronization between Part Systems
- 12.3.1.2 High-speed Machining Mode II (G05P2) Maximum [kBPM]
- 12.3.3.1 High-speed High-accuracy Control I (G05.1Q1) Maximum [kBPM]
- 12.3.3.2 High-speed High-accuracy Control II (G05P10000) Maximum [kBPM]
- 12.3.3.3 High-speed High-accuracy Control III (G05P20000) Maximum [kBPM]
Other contents were added/revised/deleted according to the specifications.
Date of
revision Manual No. Revision details
Global Service Network
AMERICA EUROPE
)RETNEC AF ACIREMA(.CNI NOITAMOTUA CIRTCELE IHSIBUSTIM .V.B EPORUE CIRTCELE IHSIBUSTIM
)ogacihC(retneC ecivreS noigeR lartneC dna QH)YNAMREG ,frodlessuD(sretrauqdaeH ecivreS naeporuE
.A.S.U ,16006 SIONILLI ,SLLIH NONREV ,YAWKRAP SDOOW ETAROPROC 005 YNAMREG ,NEGNITAR 28804 1 ztalP-cirtcelE-ihsibustiM
0562-874-748-1+ :XAF / 0052-874-748-1+ :LET 0195-684-2012-94+ :XAF / 0005-684-2012-94+ :LET
Minneapolis, MN Service Satellite
Detroit, MI Service Satellite South Germany Service Center (Stuttgart)
Grand Rapids, MI Service Satellite SCHELMENWASENSTRASSE 16-20, 70567 STUTTGART, GERMANY
Cleveland, OH Service Satellite TEL: + 49-711-770598-123 / FAX: +49-711-770598-141
St. Louis, MO Service Satellite

Indianapolis, IN Service Saltellite France Service Center (Paris)
2 RUE DE LUNION, 92565 RUEIL-MALMAISON CEDEX, FRANCE
TEL: +33-1-41-02-83-13 / FAX: +33-1-49-01-07-25
South/East Region Service Center (Georgia)
1845 SATELLITE BOULEVARD STE. 450, DULUTH, GEORGIA 30097, U.S.A. France Service Satellite (Lyon)
LET 9154-852-876-1+ XAF / 9254-852-876-1+ ECNARF TSEIRP TNIAS 00896 DONOM SEUQCAJ EELLA ,042
Charleston, SC Service Satellite TEL: +33-1-41-02-83-13 / FAX: +33-1-49-01-07-25
Charlotte, NC Service Satellite
Raleigh, NC Service Satellite Italy Service Center (Milan)
Dallas, TX Service Satellite VIA ENERGY PARK 14, VIMERCATE 20871 (MB) ITALY
Houston, TX Service Satellite TEL: +39-039-6053-342 / FAX: +39-039-6053-206
Hartford, CT Service Satellite
Knoxville, TN Service Satellite Italy Service Satellite (Padova)
Nashville, TN Service Satellite VIA G. SAVELLI, 24 - 35129 PADOVA, ITALY
Huntsville, AL Satellite TEL: +39-039-6053-342 / FAX: +39-039-6053-206
Pittsburg, PA Service Satellite
Tampa, FL Service Satellite U.K. Service Center
Miami, FL Satelite TRAVELLERS LANE, HATFIELD, HERTFORDSHIRE, AL10 8XB, U.K.
Lafayette, LA Service Satellite TEL: +44-1707-288-780 / FAX: +44-1707-278-695
Allentown, PA Satelite
Spain Service Center
CTRA. RUBI, 76-80 8174 SAINT CUGAT DEL VALLES, BARCELONA, SPAIN
Western Region Service Center (California) TEL: +34-935-65-2236 / FAX: +34-935-89-1579
5900-B KATELLA AVE. - 5900-A KATELLA AVE. CYPRESS, CALIFORNIA 90630, U.S.A.
TEL: +1-714-699-2625 / FAX: +1-847-478-2650 Poland Service Center
San Francisco, CA Satelite UL.KRAKOWSKA 50, 32-083 BALICE, POLAND
Seattle, WA Service Satellite TEL: +48-12-347-6500 / FAX: +48-12-630-4701
Denver, CO Service Satellite
Hungary Service Center
Canada Region Service Center (Toronto) MITSUBISHI ELECTRIC EUROPE B.V. HUNGARIAN BRANCH
NO ,MAHKRAM EUNEVA HT41 9924 ADANAC ,2JO R3L OIRAT YRAGNUH ,SRADUB 0402 ,.711 T GSDABAZS ,KRAP ECIFFO SRADUB
5397-574-509-1+ :XAF / 8277-574-509-1+ :LET 3622-334-07-63+ :LET
Edmonton, AB Service Satellite
Montreal, QC Service Satellite Turkey Service Center
MITSUBISHI ELECTRIC TURKEY ELEKTRK RNLER A.
Mexico Region Service Center (Queretaro) SERIFALI MAHALLESI KALE SOKAK. NO.41 34775
Parque Tecnolgico Innovacin Quertaro, Lateral Carretera Estatal 431, Km 2+200, Lote 91 Modulos 1 y 2 UMRANIYE, ISTANBUL, TURKEY
ocixM ,oratreuQ ,suqraM lE ,64267 PC ,arrohcaM al adneicaH 74-44-166-612-09+ :XAF / 0052-969-612-09+ :LET
TEL: +52-442-153-6050
Monterrey, NL Service Satellite Czech Republic Service Center
Mexico City, DF Service Satellite MITSUBISHI ELECTRIC EUROPE B.V. PRAGUE OFFICE
Pekask 621/7, 155 00 PRAHA 5, CZECH REPUBLIC
TEL: +420-734-402-587
BRAZIL
Sweden Service Center
MITSUBISHI ELECTRIC DO BRASIL COMRCIO E SERVIOS LTDA. HAMMARBACKEN 14, P.O.BOX 750 SE-19127, SOLLENTUNA, SWEDEN
Votorantim Office TEL: +46-8-6251200 / FAX: +46-8-6251014
AV. GISELE CONSTANTINO,1578, PARQUE BELA VISTA, VOTORANTIM-SP, BRAZIL CEP:18.110-650
TEL: +55-15-3023-9000 Bulgaria Service Center
Blumenau, Santa Catarina Office AKHNATON Ltd. (Service Partner)
4 ANDREJ LJAPCHEV BLVD. POB 21, BG-1756 SOFIA, BULGARIA
TEL: +359-2-8176009 / FAX: +359-2-9744061
Ukraine Service Center (Kiev)
CSC Automation Ltd. (Service Partner)
4 B, YEVHENA SVERSTYUKA STR., 02002 KIEV, UKRAINE
TEL: +380-44-494-3344 / FAX: +380-44-494-3366
South Africa Service Center
Adroit Technologies (Service Partner)
20 WATERFORD OFFICE PARK, WATERFORD DRIVE, CNR OF WITKOPPEN ROAD,
FOURWAYS JOHANNESBURG SOUTH AFRICA
TEL: +27-11-658-8100 / FAX: +27-11-658-8101
ASEAN CHINA
)RETNEC AF NAESA(.DTL .ETP AISA CIRTCELE IHSIBUSTIM)RETNEC AF ANIHC(.DTL)ANIHC(NOITAMOTUA CIRTCELE IHSIBUSTIM
Singapore Service Center CNC Call Center
349951 EROPAGNIS GNIDLIUB CIRTCELE IHSIBUSTIM DAOR ARDNAXELA 703 0315-129-004-68+ :LET
TEL: +65-6473-2308 / FAX: +65-6476-7439
Shanghai Service Center
NO.1386 HONG QIAO ROAD, CHANG NING QU, SHANGHAI 200336, CHINA
PHILIPPINES TEL: +86-21-2322-3030 / FAX: +86-21-2322-3000*8422
Qingdao Service Center
MELCO FACTORY AUTOMATION PHILIPPINES INC. Suzhou Service Center
Head Office Wuhan Service Center
128 LOPEZ RIZAL STREET, BRGY., HIGHWAY HILLS, MANDALUYONG CITY , MM PHILIPPINES 1550 Ningbo Service Center
TEL: +63-2-8256-8042 / FAX: +632-8637-2294 Hefei Service Center
Beijing Service Center
Philippines Service Center Tianjin Service Center
KM.23 WEST SERVICE ROAD SSH, CUPANG ,MUNTINLUPA CITY, PHILIPPINES Xian Service Center
TEL: +63-2-8807-0420 / FAX: +63-2-8842-5202 Dalian Service Center
Chengdu Service Center
VIETNAM Shenzhen Service Center
LEVEL8, GALAXY WORLD TOWER B, 1 YABAO ROAD, LONGGANG DISTRICT,
MITSUBISHI ELECTRIC VIETNAM CO., LTD. SHENZHEN 518129, CHINA
Vietnam Ho Chi Minh Service Center TEL: +86-755-2399-8272 / FAX: +86-755-8229-3686
11TH & 12TH FLOOR, VIETTEL TOWER B, 285 CACH MANG THANG 8 STREET, WARD 12, DISTRICT 10, Dongguan Service Center
HO CHI MINH CITY, VIETNAM Xiamen Service Center
TEL: +84-28-3910-5945 / FAX: +84-28-3910-5947
Vietnam Hanoi Service Center KOREA
14TH FLOOR, CAPITAL TOWER, 109 TRAN HUNG DAO STREET, CUA NAM WARD,

HOAN KIEM DISTRICT, HA NOI CITY, VIETNAM MITSUBISHI ELECTRIC AUTOMATION KOREA CO., LTD. (KOREA FA CENTER)
TEL: +84-24-3937-8075 / FAX: +84-24-3937-8076 Korea Seoul Service Center
8F GANGSEO HANGANG XI-TOWER A, 401 YANGCHEON-RO, GANGSEO-GU,
SEOUL 07528 KOREA
INDONESIA TEL: +82-2-3660-9631 / FAX: +82-2-3664-8668
PT. MITSUBISHI ELECTRIC INDONESIA Korea Daegu Service Center
Indonesia Service Center (Cikarang) 2F KT BLDG. 8, HOGUK-RO, BUK-GU, DAEGU 41518, KOREA
JL. KENARI RAYA BLOK G2-07A, DELTA SILICON 5, LIPPO CIKARANG - BEKASI 17550, INDONESIA TEL: +82-53-382-7401 / FAX: +82-53-382-7412
TEL: +62-21-2961-7797 / FAX: +62-21-2961-7794
Korea Changwon Technical Center
#205, 888, CHANGWON-DAERO, SEONGSAN-GU, CHANGWON-SI,
MALAYSIA GYEONGSANGNAM-DO, 51532, KOREA
TEL: +82-55-261-5559 / FAX: +82-55-261-5558
MITSUBISHI ELECTRIC SALES MALAYSIA SDN. BHD.
Malaysia Service Center (Kuala Lumpur Service Center)
LOT 11, JALAN 219, P.O BOX 1036, 46860 PETALING JAYA, SELANGOR DARUL EHSAN, MALAYSIA TAIWAN
TEL: +60-3-7626-5032
MITSUBISHI ELECTRIC TAIWAN CO., LTD. (TAIWAN FA CENTER)
Johor Bahru Service Center Taiwan Taichung Service Center
.rohoJ 00118 ,nnO otaD radnaB ,6/4 nanarijreP nalaJ ,9 WIAT , 86704 YTIC GNUHCIAT ,.TSID NUTIX ,.DR HT61 UQEYGNOG ,1-8 .ON AN
TEL: 07-3642250 / 2256 TEL: +886-4-2359-0688 / FAX: +886-4-2359-0689
Pulau Pinang Service Center Taiwan Taipei Service Center
25-G, Pusat Perniagaan Perdana Jaya, Jalan Permatang Rawa, 14000 Bukit Mertajam, Pulau Pinang 11F, NO.88, SEC.6, ZHONGSHAN N. RD., SHILIN DIST., TAIPEI CITY 11155, TAIWAN
5381-015-4-06+ :xaF / 8381-015-4-06+ :LET 3345-3382-2-688+ :XAF / 0345-3382-2-688+ :LET
Taiwan Tainan Service Center
THAILAND 11F-1, NO.30, ZHONGZHENG S. RD., YONGKANG DIST., TAINAN CITY 71067, TAIWAN
TEL: +886-6-252-5030 / FAX: +886-6-252-5031
MITSUBISHI ELECTRIC FACTORY AUTOMATION (THAILAND) CO., LTD.
Thailand Service Center (Bangkok)
101, TRUE DIGITAL PARK OFFICE, 5TH FLOOR, SUKHUMVIT ROAD, BANGCHAK, PHRA KHANONG, OCEANIA
BANGKOK, 10260 THAILAND
TEL: +66-2-092-8600 / FAX: +66-2-043-1231-33 MITSUBISHI ELECTRIC AUSTRALIA PTY. LTD.
Oceania Service Center
348 VICTORIA ROAD, RYDALMERE, N.S.W. 2116 AUSTRALIA
INDIA TEL: +61-2-9684-7269/ FAX: +61-2-9684-7245
MITSUBISHI ELECTRIC INDIA PVT., LTD.
Service Head office and South India Service Center (Bangalore)
CNC eXPerience Park, PLOT NO. 57/A, PEENYA PHASE 3,
PEENYA INDUSTRIAL AREA, BANGALORE 560058, KARNATAKA, INDIA
TEL : +91-80-4655-2121
Chennai Service Satellite
Coimbatore Service Satellite
Hyderabad Service Satellite
North India Service Center (Gurgaon)
PLOT 517, GROUND FLOOR, UDYOG VIHAR PHASE-III, GURUGRAM 122008, HARYANA, INDIA
TEL : +91-124-463-0300
Ludhiana Service Satellite
Panthnagar Service Satellite
Delhi Service Satellite
Jamshedpur Service Satellite
Manesar Service Satellite
West India Service Center (Pune)
ICC-Devi GAURAV TECHNOLOGY PARK, UNIT NO.402, FOURTH FLOOR, NORTH WING,
SURVEY NUMBER 191-192 (P), NEXT to INDIAN CARD CLOTHING COMPANY Ltd,
OPP. VALLABH NAGAR, PIMPRI, PUNE- 411 018, MAHARASHTRA, INDIA
TEL : +91-20-6819-2274
Kolhapur Service Satellite
Aurangabad Service Satellite
Mumbai Service Satellite
West India Service Center (Ahmedabad)
204-209, 2ND FLOOR, 31FIVE, CORPORATE ROAD PRAHLADNAGAR,
AHMEDABAD -380015, GUJARAT, INDIA
TEL : + 91-79-6777-7888
Rajkot Service Satellite

Notice

Every effort has been made to keep up with software and hardware revisions in the contents described in this manual. However, please understand that in some unavoidable cases simultaneous revision is not possible. Please contact your Mitsubishi Electric dealer with any questions or comments regarding the use of this product.

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IB(NA)1501505(ENG)-N(2406)MEE
Made in JAPAN
IB-1501505
M800/M80/E80/C80 Series
100-623
Specifications are subject to change without notice.
MODEL
Manual No.
MODEL
CODE
HEAD OFFICE : TOKYO BLDG.,2-7-3 MARUNOUCHI,CHIYODA-KU,TOKYO 100-8310,JAPAN

Introduction

This manual describes the specifications of Mitsubishi Electric CNC.

Supported models are as follows:
Abbreviations in this manual are as follows:
To safely use this CNC unit, thoroughly study the "Precautions for Safety" on the next page before use.
Be sure to keep this manual always at hand.
Notes on reading this manual
(1) The characteristic values and numerical values without tolerances mentioned in this manual are representative values.
The items that are not described in this manual must be interpreted as "not possible".
This manual is written on the assumption that all the applicable functions are included. Some of them, however, may not be available for your NC system.
Refer to the specifications issued by the machine tool builder before use.
Some screens and functions may differ depending on each NC system (or version), and some functions may not be possible. Please confirm the specifications before starting to use.
To protect the availability, integrity and confidentiality of the NC system against cyber-attacks including unauthorized access, denial-of-service (Dos) (*1) attack, and computer virus from external sources via a network, take security measures such as firewall, VPN, and anti-virus software.
(*1) Denial-of-service (Dos): refers to a type of cyber-attack that disrupts services by overloading the system or by exploiting a vulnerability of the system.
Mitsubishi Electric assumes no responsibility for any problems caused to the NC system by any type of cyber-attacks including DoS attack, unauthorized access and computer virus.
General precautions
(1) When the contents of this manual is updated, the version (A, B, ...) on the cover will be incremented.
Also refer to the manuals on "Manual List" as necessary.
Supported models Abbreviations in this manual
M800W Series M850W, M830W
M800S Series M850S, M830S
M80W Series M80W
M80 Series M80 TypeA, M80 TypeB
E80 Series E80 TypeA, E80 TypeB
C80 Series C80
Abbreviations Supported models
M800, M800 Series M800W Series/M800S Series
M80, M80 Series M80W Series/M80 Series
M800/M80, M800/M80 Series M800W Series/M800S Series/M80W Series/M80 Series
M8, M8 Series M800W Series/M800S Series/M80W Series/M80 Series/E80 Series
CAUTION
Manual List
Manuals related to M800/M80/E80/C80 Series are listed as follows.
These manuals are written on the assumption that all optional functions are added to the targeted model.
Some functions or screens may not be available depending on the machine or specifications set by MTB. (Confirm the specifications before use.)
The manuals issued by MTB take precedence over these manuals.
Manual IB No. Purpose and Contents
M800/M80/E80 Series
Instruction Manual IB-1501274 Operation guide for NC
Explanation for screen operation, etc.
C80 Series
Instruction Manual IB-1501453 Operation guide for NC
Explanation for screen operation, etc.
M800/M80/E80/C80 Series
Programming Manual
(Lathe System) (1/2)
IB-1501275 G code programming for lathe system
Basic functions, etc.
M800/M80/E80/C80 Series
Programming Manual
(Lathe System) (2/2)
IB-1501276 G code programming for lathe system
Functions for multi-part system, high-accuracy function, etc.
M800/M80/E80/C80 Series
Programming Manual
(Machining Center System) (1/2)
IB-1501277 G code programming for machining center system
Basic functions, etc.
M800/M80/E80/C80 Series
Programming Manual
(Machining Center System) (2/2)
IB-1501278 G code programming for machining center system
Functions for multi-part system, high-accuracy function, etc.
M800/M80/E80 Series
Alarm/Parameter Manual IB-1501279 Alarms
Parameters
C80 Series
Alarm/Parameter Manual IB-1501560 Alarms
Parameters
Manuals for MTBs (NC)
Manuals for MTBs (drive section)
Manual IB No. Purpose and Contents
M800/M80/E80/C80 Series
Specifications Manual (Function) IB-1501505 Model selection
Outline of various functions
M800/M80/E80/C80 Series
Specifications Manual (Hardware) IB-1501506 Model selection
Specifications of hardware unit
M800W/M80W Series
Connection and Setup Manual IB-1501268 Detailed specifications of hardware unit
Installation, connection, wiring, setup (startup/adjustment)
M800S/M80/E80 Series

Connection and Setup Manual IB-1501269 Detailed specifications of hardware unit
 Installation, connection, wiring, setup (startup/adjustment)
C80 Series
Connection and Setup Manual IB-1501452 Detailed specifications of hardware unit
 Installation, connection, wiring, setup (startup/adjustment)
M800/M80/E80 Series
PLC Development Manual IB-1501270
 Electrical design
 I/O relation (assignment, setting, connection), field network
 Development environment (PLC on-board, peripheral
development environment), etc.
M800/M80/E80 Series
PLC Programming Manual IB-1501271
 Electrical design
 Sequence programming
 PLC support functions, etc.
M800/M80/E80/C80 Series
PLC Interface Manual IB-1501272 Electrical design
 Interface signals between NC and PLC
M800/M80/E80 Series
Maintenance Manual IB-1501273 Cleaning and replacement for each unit
 Other items related to maintenance
C80 Series
Maintenance Manual IB-1501454 Cleaning and replacement for each unit
 Other items related to maintenance
Manual IB No. Contents
MDS-E/EH Series
Specifications Manual IB-1501226 Specifications for power supply regeneration type
MDS-E/EH Series
Instruction Manual IB-1501229 Instruction for power supply regeneration type
MDS-EJ/EJH Series
Specifications Manual IB-1501232 Specifications for regenerative resistor type
MDS-EJ/EJH Series
Instruction Manual IB-1501235 Instruction for regenerative resistor type
MDS-EM/EMH Series
Specifications Manual IB-1501238 Specifications for multi-hybrid, power supply regeneration
type
MDS-EM/EMH Series
Instruction Manual IB-1501241 Instruction for multi-hybrid, power supply regeneration type
DATA BOOK IB-1501252 Specifications of servo drive unit, spindle drive unit, motor, etc.
Manuals for MTBs (Others)
 For M800/M80/E80 Series
Manual No. Purpose and Contents
GOT2000 Series Users Manual
(Hardware) SH-081194ENG Outline of hardware such as part names, external dimensions,
installation, wiring, maintenance, etc. of GOTs
GOT2000 Series Users Manual
(Utility) SH-081195ENG Outline of utilities such as screen display setting, operation
method, etc. of GOTs
GOT2000 Series Users Manual
(Monitor) SH-081196ENG Outline of each monitor function of GOTs
GOT2000 Series Connection
Manual (Mitsubishi Electric
Products)
SH-081197ENG Outline of connection types and connection method between
GOT and Mitsubishi Electric connection devices
GT Designer3 (GOT2000) Screen
Design Manual SH-081220ENG Outline of screen design method using screen creation
software GT Designer3
Manual No. Purpose and Contents
GOT2000 Series Connection
Manual (Non-Mitsubishi Electric
Products 1)
SH-081198ENG
 Explanation for connection types and connection method
GOT2000 Series Connection between GOT and other company's devices
Manual (Non-Mitsubishi Electric
Products 2)
SH-081199ENG
GOT2000 Series Connection
Manual (Microcomputers, MODBUS/
Fieldbus Products, Peripherals)
SH-081200ENG
 Explanation for connection types and connection method
between GOT and microcomputers, MODBUS/fieldbus
products, peripherals
GT SoftGOT2000 Version1
Operating Manual SH-081201ENG
 Explanation for system configuration, screen configuration
and operation method of monitoring software GT
SoftGOT2000
GOT2000/GOT1000 Series CC-Link
Communication Unit User's Manual IB-0800351 Explanation for handling CC-Link communication unit (for
GOT2000 series/GOT1000 series)
GX Developer Version 8 Operating
Manual (Startup) SH-080372E Explanation for system configuration, installation, etc. of PLC
development tool GX Developer
GX Developer Version 8 Operating

Manual SH-080373E Explanation for operations using PLC development tool GX
Developer
GX Converter Version 1 Operating
Manual IB-0800004 Explanation for operations using data conversion tool GX
Converter
GX Works2 Installation Instructions BCN-P5999-0944 Explanation for the operating environment and installation
method of GX Works2
GX Works2 Version 1 Operating
Manual (Common) SH-080779ENG
 Explanation for the system configuration of GX Works2 and
the functions common to Simple project and Structured project
such as parameter setting, operation method for the online
function
GX Works2 Version 1 Operating
Manual (Simple Project) SH-080780ENG Explanation for methods for such as creating and monitoring
programs in Simple project of GX Works2
GX Works2 Version 1 Operating
Manual (Simple Project, Function
Block)
SH-080984ENG
 Explanation for methods for such as creating function blocks,
pasting function blocks to sequence programs, and operating
FB library in Simple project of GX Works2
GX Works2 Version 1 Operating
Manual (Structured Project) SH-080781ENG Explanation for methods for such as creating and monitoring
programs in Structured project of GX Works2
GX Works3 Installation Instructions BCN-P5999-0391 Explanation for the operating environment and installation
method of GX Works3
MELSEC-Q CC-Link System Master/
Local Module Users Manual SH-080394E Explanation for system configuration, installation, wiring, etc.
of master/local modules for CC-Link system
 For C80 Series
Reference Manual for MTBs
Manual No. Purpose and Contents
MELSEC iQ-R Module Configuration
Manual SH-081262 Outline of system configuration, specifications, installation,
wiring, maintenance, etc.
MELSEC iQ-R CPU Module Users
Manual (Startup) SH-081263 Outline of specifications, procedures before operation,
troubleshooting, etc. for CPU module
MELSEC iQ-R CPU Module Users
Manual (Application) SH-081264 Outline of memory, functions, devices, parameters, etc. for
CPU module
MELSEC iQ-R CC-Link IE Field
Network User's Manual (Application) SH-081259 Explanation for functions, parameter settings, programming,
troubleshooting, etc. of the CC-Link IE Field Network function
QCPU Users Manual (Hardware
Design, Maintenance and
Inspection)
SH-080483
 Outline of specifications, necessary knowledge to configure
the system and maintenance-related descriptions for Q series
CPU module, etc.
GX Works3 Operating Manual SH-081215 Outline of functions, programming, etc.
Manual No. Purpose and Contents
M800/M80 Series Smart safety
observation Specification manual BNP-C3072-022
 Explanation for smart safety observation function C80 Series Smart safety observation
Specification manual BNP-C3077-022
M800/M80 Series Interactive cycle
insertion (Customization)
Specification manual
BNP-C3072-121-
0003 Explanation for interactive cycle insertion
M800/M80 Series Synchronous
Control Specifications manual BNP-C3072-074 Explanation for synchronous control
M800/M80 Series Multiple-Axis
Synchronization Control
Specifications manual
BNP-C3072-339 Explanation for multiple-axis synchronization control
M800/M80 Series GOT Connection
Specifications manual BNP-C3072-314 Explanation for GOT connection
M800/M80 Series PROFIBUS-DP
Specification manual BNP-C3072-118 Explanation for PROFIBUS-DP communication function
M800/M80 Series EtherNet/IP
Specifications manual BNP-C3072-263 Explanation for EtherNet/IP
M800/M80 Series FL-net
Specifications manual BNP-C3072-368 Explanation for FL-net
M800/M80 Series CC-Link (Master/
Local) Specification manual BNP-C3072-089 Explanation for CC-Link
M800/M80 Series CC-Link IE Field
(Master/local) Specifications manual BNP-C3072-283 Explanation for CC-Link IE Field
M800/M80 Series CC-Link IE Field
Basic Specifications manual BNP-C3072-337 Explanation for CC-Link IE Field Basic
Precautions for Safety
Always read this manual, related manuals and attached documents before installation, operation, programming,
maintenance or inspection to ensure correct use. Understand all the conditions described in this manual before using the
unit. We rank the safety precautions into "DANGER", "WARNING" and "CAUTION" for the manuals issued by Mitsubishi,

including this manual.
Note that even items ranked as " CAUTION", may lead to major results depending on the situation. In any case, important information that must always be observed is described.
The following signs indicate prohibition and compulsory.
The meaning of each pictorial sign is as follows.
DANGER
When there is a great risk that the user could be subject to fatalities or serious injuries if handling is mistaken.
WARNING
When the user could be subject to fatalities or serious injuries if handling is mistaken.
CAUTION
When the user could be subject to injuries or when physical damage could occur if handling is mistaken.
This sign indicates prohibited behavior (must not do).
For example, indicates "Keep fire away".
This sign indicated a thing that is pompously (must do).
For example, indicates "it must be grounded".
CAUTION CAUTION rotated
object CAUTION HOT Danger Electric shock
risk Danger explosive
Prohibited Disassembly is
prohibited KEEP FIRE AWAY General instruction Earth ground
Not applicable in this manual.
Not applicable in this manual.
1. Items related to product and manual
The items that are not described in this manual must be interpreted as "not possible".
This manual is written on the assumption that all the applicable functions are included. Some of them, however, may not be available for your NC system.
Refer to the specifications issued by the machine tool builder before use.
Some screens and functions may differ depending on the NC system (or its version), and some functions may not be possible. Please confirm the specifications before use.
To protect the availability, integrity and confidentiality of the NC system against cyber-attacks including unauthorized access, denial-of-service (Dos) (*1) attack, and computer virus from external sources via a network, take security measures such as firewall, VPN, and anti-virus software.
(*1) Denial-of-service (Dos): refers to a type of cyber-attack that disrupts services by overloading the system or by exploiting a vulnerability of the system.
Mitsubishi Electric assumes no responsibility for any problems caused to the NC system by any type of cyber-attacks including DoS attack, unauthorized access and computer virus.
2. Items related to start up and maintenance
Follow the power specifications (input voltage range, frequency range, momentary power failure time range) described in this manual.
Follow the environment conditions (ambient temperature, humidity, vibration, atmosphere) described in this manual.
Follow the remote type machine contact input/output interface described in this manual. (Connect a diode in parallel with the inductive load or connect a protective resistor in serial with the capacitive load, etc.)
If the parameter is used to set the temperature rise detection function to invalid, overheating may occur, thereby disabling control and possibly resulting in the axes running out of control, which in turn may result in machine damage and/or bodily injury or destruction of the unit. It is for this reason that the detection function is normally left "valid" for operation.The parameter for the temperature rise detection function will be validated forcibly when the NC unit is turned ON.
DANGER
WARNING
CAUTION
Treatment of waste
The following two laws will apply when disposing of this product. Considerations must be made to each law. The following laws are in effect in Japan. Thus, when using this product overseas, the local laws will have a priority. If necessary, indicate or notify these laws to the final user of the product.
(1) Requirements for "Law for Promotion of Effective Utilization of Resources"
(a) Recycle as much of this product as possible when finished with use.
(b) When recycling, often parts are sorted into steel scraps and electric parts, etc., and sold to scrap contractors. Mitsubishi Electric recommends sorting the product and selling the members to appropriate contractors.
(2) Requirements for "Law for Treatment of Waste and Cleaning"
(a) Mitsubishi Electric recommends recycling and selling the product when no longer needed according to item (1) above. The user should make an effort to reduce waste in this manner.
(b) When disposing a product that cannot be resold, it shall be treated as a waste product.
(c) The treatment of industrial waste must be commissioned to a licensed industrial waste treatment contractor, and appropriate measures, including a manifest control, must be taken.
(d) Batteries correspond to "primary batteries", and must be disposed of according to local disposal laws.
Disposal
(Note) This symbol mark is for EU countries only.
This symbol mark is according to the directive 2006/66/EC Article 20 Information for end-users and Annex II.
Your MITSUBISHI ELECTRIC product is designed and manufactured with high quality materials and components which can be recycled and/or reused.
This symbol means that batteries and accumulators, at their end-of-life, should be disposed of separately from your household waste.
If a chemical symbol is printed beneath the symbol shown above, this chemical symbol means that the battery or accumulator contains a heavy metal at a certain concentration. This will be indicated as follows:
Hg: mercury (0.0005%), Cd: cadmium (0.002%), Pb: lead (0.004%)
In the European Union there are separate collection systems for used batteries and accumulators.
Please, dispose of batteries and accumulators correctly at your local community waste collection/recycling centre.
Please, help us to conserve the environment we live in!
Trademarks
MELDAS, MELSEC, EZSocket, EZMotion, iQ Platform, MELSEC iQ-R, MELSOFT, GOT, CC-Link, CC-Link/LT, CC-Link IE, CC-Link IE/field, EcoMonitorLight and SLMP are either trademarks or registered trademarks of Mitsubishi Electric Corporation in Japan and/or other countries.
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BiSS is a registered trademark of iC-Haus GmbH.
Other company and product names that appear in this manual are trademarks or registered trademarks of the respective companies.

(/Japanese)
(A)

Handling of our product
(English)
This is a class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

(/Korean)
(A)
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WARRANTY
Please confirm the following product warranty details before using Mitsubishi Electric CNC.
1. Warranty Period and Coverage
Should any fault or defect (hereafter called "failure") for which we are liable occur in this product during the warranty period, repair services shall be provided at no cost through the distributor from which the product was purchased or through a Mitsubishi Electric service provider. Note, however, that this does not apply if the customer was informed prior to purchasing the product that the product is not covered under warranty. Also note that we are not responsible for any on-site readjustment and/or trial run that may be required after a defective unit is replaced.
[Warranty Term]
The term of warranty for this product shall be twenty-four (24) months from the date of delivery of the product to the end user, provided the product purchased from Mitsubishi Electric or a distributor in Japan is installed in Japan (but in no event longer than thirty (30) months, including distribution time after shipment from Mitsubishi Electric or a distributor).
Note that, in the case where the product purchased from Mitsubishi Electric or a distributor in or outside Japan is exported and installed in any country other than where it was purchased, please refer to "2. Service in Overseas Countries" below.
[Limitations]
(1) The machine tool builder is requested to conduct an initial failure diagnosis, as a general rule. The diagnosis may also be carried out by Mitsubishi Electric or our service provider for a fee at the machine tool builder's request.
(2) This warranty applies only when the conditions, method, environment, etc., of use are in compliance with the terms, conditions and instructions that are set forth in the instruction manual, users manual, and the caution label affixed to the product, etc.
(3) Even during the term of warranty, repair costs will be charged to the customer in the following cases:
(a) a failure caused by improper storage or handling, carelessness or negligence, etc., or a failure caused by a problem with the customer's hardware or software
(b) a failure caused by any alteration, etc., to the product made by the customer without Mitsubishi Electrics approval
(c) a failure which may be regarded as avoidable, if the customers equipment in which this product is incorporated is equipped with a safety device required by applicable laws or has any function or structure considered to be indispensable in the light of common sense in the industry
(d) a failure which could have been avoided if consumable parts designated in the instruction manual, etc. had been duly maintained and replaced
(e) any replacement of consumable parts (including the battery, relay and fuse)
(f) a failure caused by external factors such as inevitable accidents, including without limitation fire and abnormal fluctuation of voltage, and acts of God, including without limitation earthquakes, lightning, and natural disasters
(g) a failure which could not have been foreseen under technologies available at the time of shipment of this product from Mitsubishi Electric
(h) any other failures which are not attributable to Mitsubishi Electric or which the customer acknowledges are not attributable to Mitsubishi Electric
2. Service in Overseas Countries
If the customer installs a product purchased from Mitsubishi Electric in a machine or equipment and exports it to any country other than where it was purchased, the customer may sign a paid warranty contract with our local FA center.
This applies in the case where the product purchased from us in or outside Japan is exported and installed in any country other than where it was purchased.
For details please contact the distributor from which the product was purchased.
3. Exclusion of Responsibility for Compensation against Loss of Opportunity, Secondary Loss, etc.
Regardless of the gratis warranty term, Mitsubishi Electric shall not be liable for compensation for:
(1) Damage arising from any cause found not to be the responsibility of Mitsubishi Electric.
(2) Lost opportunity or lost profit incurred by the user due to a failure of a Mitsubishi Electric product.
(3) Special damage or secondary damage, whether foreseeable or not, compensation for accidents, and compensation for damages to products other than Mitsubishi Electric products.
(4) Replacement by the user, maintenance of on-site equipment, start-up test run and other tasks.
4. Changes in Product Specifications
Specifications shown in our catalogs, manuals or technical documents are subject to change without notice.
5. Product Application
(1) For use of this product, applications should be those that will not result in a serious damage even if a failure or malfunction occurs in the product, and a backup or failsafe function should operate on an external system when any failure or malfunction occurs to the product.
(2) Mitsubishi Electric CNC is designed and manufactured solely for applications to machine tools for industrial purposes. Do not use this product in applications other than those specified above, especially those which have substantial influence on public interest or which are expected to have significant influence on human lives or properties.
CONTENTS
M800W/M80W Series Hardware..... 1
1 System Basic Configuration (M800W/M80W Series) 3

1.1 System Basic Configuration Drawing.... 4
2 General Connection Diagram (M800W/M80W Series).... 5
2.1 General Connection Diagram [M800W] 6
2.1.1 M800W, Windows-based Display (15-type) 6
2.1.2 M800W, Windows-based Display (19-type) 7
2.1.3 M800W, Non-Windows-based Display (10.4-type / 15-type).... 8
2.2 General Connection Diagram [M80W] 9
2.2.1 M80W, Windows-based Display (15-type) 9
2.2.2 M80W, Windows-based Display (19-type) 10
2.2.3 M80W, Non-Windows-based Display (8.4-type /10.4-type /15-type).... 11
2.3 Difference in Connection Depending on the Display Unit 12
2.3.1 Windows-based Display 12
2.3.2 Non-Windows-based Display 13
3 List of Configuration (M800W/M80W Series).... 15
3.1 Control Unit [M800W].... 16
3.2 Control Unit [M80W].... 16
3.3 Display Unit [M800W].... 17
3.4 Display Unit [M80W].... 17
3.5 Personal Computer Unit.... 18
3.6 Graphic Control Unit.... 18
3.7 Keyboard Unit [M800W].... 18
3.8 Keyboard Unit [M80W].... 18
3.9 Operation Panel I/O Unit.... 19
3.10 Remote I/O Unit 20
3.11 Function Expansion Unit 20
3.12 Side Memory I/F Unit 21
3.13 Manual Pulse Generator 21
3.14 Synchronous Feed Encoder.... 21
3.15 Machine Operation Panel.... 21
3.16 Handy Terminal.... 21
3.17 Cable Connector Sets.... 22
3.18 Thermistor Sets.... 22
3.19 Genuine Memory Card.... 22
3.20 Durable Parts 22
3.21 Replacements 22
3.22 List of Cables 23
3.23 System Type 24
4 General Specifications (M800W/M80W Series) 25
4.1 Environment Conditions [M800W].... 26
4.1.1 Environment Conditions inside the Operation Panel.... 26
4.1.2 Environment Conditions inside the Control Panel 28
4.1.3 24VDC Stabilized Power Supply Selecting Conditions 30
4.2 Environment Conditions [M80W].... 31
4.2.1 Environment Conditions inside the Operation Panel.... 31
4.2.2 Environment Conditions inside the Control Panel 33
4.2.3 24VDC Stabilized Power Supply Selecting Conditions 35
4.3 Control Unit [M800W].... 36
4.3.1 M830W(FCU8-MU042) / M850W(FCU8-MA041).... 36
4.4 Control Unit [M80W].... 38
4.4.1 FCU8-MU044 38
4.5 Display Unit [M800W].... 40
4.5.1 10.4-type (FCU8-DU142-31 / FCU8-DU141-31) 40
4.5.2 15-type (FCU8-DU182-31 / FCU8-DU181-31) 41
4.5.3 15-type (FCU8-DU182-34 / FCU8-DU181-34) 44
4.5.4 19-type (FCU8-DU191-75) 46
4.5.5 19-type (FCU8-DU192-75) 48
4.6 Display Unit [M80W] 50
4.6.1 8.4-type (FCU8-DU121-12).... 50
4.6.2 10.4-type (FCU8-DU142-32 / FCU8-DU141-32).... 51
4.6.3 15-type (FCU8-DU182-32 / FCU8-DU181-32).... 52
4.6.4 15-type (FCU8-DU182-36 / FCU8-DU181-36).... 55
4.6.5 19-type (FCU8-DU191-77).... 57
4.6.6 19-type (FCU8-DU192-77).... 59
4.7 Personal Computer Unit 61
4.7.1 Personal Computer Unit (FCU8-PC231).... 61
4.7.2 Built-in Disk of the Display Unit (FCU8-CF032G-1) 61
4.8 Graphic Control Unit 62
4.8.1 FCU8-GC211 62
4.9 Keyboard Unit 63
4.9.1 Keyboard for 8.4-type Display Unit (FCU8-KB026).... 63
4.9.2 Keyboard for 8.4-type Display Unit (FCU8-KB028).... 64
4.9.3 Keyboard for 8.4-type Display Unit (FCU8-KB029).... 65
4.9.4 Keyboard for 10.4-type Display Unit (FCU8-KB041).... 66
4.9.5 Keyboard for 10.4-type Display Unit (FCU8-KB046).... 67
4.9.6 Keyboard for 10.4-type Display Unit (FCU8-KB047).... 68
4.9.7 Keyboard for 10.4-type Display Unit (FCU8-KB048).... 69
4.9.8 Keyboard for 15-type Display Unit (FCU8-KB083).... 70
4.10 Operation Panel I/O Unit.... 71
4.10.1 List of Units 71
4.10.2 FCU8-DX830 / FCU8-DX834 / FCU8-DX837 / FCU8-DX730.... 72
4.11 Remote I/O Unit 75
4.11.1 List of Units 75
4.11.2 FCU8-DX220 / FCU8-DX230 / FCU8-DX231 / FCU8-DX202 / FCU8-DX213 /
FCU8-DX213-1 / FCU8-DX654 / FCU8-DX654-1 / FCU8-DX651/ FCU8-DX408 / FCU8-DX409 76
4.12 Function Expansion Unit.... 83
4.12.1 Encoder (Manual Pulse Generator) I/F Expansion (FCU8-EX544).... 83
4.12.2 CC-Link (FCU8-EX561) 84
4.12.3 PROFIBUS-DP (FCU8-EX563).... 85

4.12.4 CC-Link IE Field (FCU8-EX564) 86
4.12.5 EtherNet/IP (FCU8-EX565)..... 87
4.12.6 FL-net (FCU8-EX568)..... 88
4.12.7 Vibration Cutting Expansion Unit (FCU8-EX744)..... 89
4.13 Side Memory I/F Unit 90
4.14 Manual Pulse Generator..... 91
4.14.1 5V Manual Pulse Generator (UFO-01-2Z9) 91
4.14.2 12V Manual Pulse Generator (HD60C)..... 92
4.15 Synchronous Feed Encoder 93
4.15.1 Synchronous Feed Encoder (OSE-1024-3-15-68)..... 93
4.16 Machine Operation Panel 95
4.16.1 Main Panel A , B
(FCU8-KB921 / FCU8-KB922 / FCU8-KB925 , FCU8-KB923 / FCU8-KB924 / FCU8-KB926) 95
4.16.2 Sub Panel A (FCU8-KB931 / FCU8-KB941)..... 99
4.17 Handy Terminal 100
4.18 Thermistor..... 102
4.18.1 Thermistor(PT3C-51F-M2)..... 102
4.19 Exclusive SD Cards 103
4.20 Specifications and Precautions of USB/SD/LAN Interface 104
4.20.1 USB Interface (Personal Computer Unit, Side Memory I/F Unit) 104
4.20.2 SD Interface (Control Unit, Side Memory I/F Unit)..... 105
4.20.3 LAN Interface (Control Unit, Personal Computer Unit) 105
M800S/M80/E80 Series Hardware..... 107
1 System Basic Configuration (M800S/M80/E80 Series) 109
1.1 System Basic Configuration Drawing..... 110
2 General Connection Diagram (M800S/M80/E80 Series)..... 111
2.1 General Connection Diagram [M800S] 112
2.2 General Connection Diagram [M80]..... 113
2.3 General Connection Diagram [E80] 114
2.4 Difference in Connection Depending on the Display Unit 115
2.5 Connecting an Operation Panel I/O Unit (FCU8-DX834)..... 116
2.6 Connecting a Pulse-controlled Inverter [M80/E80]..... 117
2.7 Connecting a BiSS Encoder..... 117
2.8 Connecting an EcoMonitorLight..... 118
3 List of Configuration (M800S/M80/E80 Series)..... 119
3.1 Control Unit [M800S]..... 120
3.2 Control Unit [M80] 120
3.3 Control Unit [E80]..... 120
3.4 Display Unit [M800S]..... 121
3.5 Display Unit [M80]..... 121
3.6 Display Unit [E80]..... 121
3.7 Keyboard Unit [M800S]..... 121
3.8 Keyboard Unit [M80] 122
3.9 Keyboard Unit [E80]..... 122
3.10 Operation Panel I/O Unit..... 123
3.11 Remote I/O Unit [M800S/M80]..... 124
3.12 Remote I/O Unit [E80]..... 125
3.13 Functional Safety Expansion Unit [M80] 125
3.14 Function Expansion Unit [M800S/M80]..... 125
3.15 Function Expansion Unit [E80]..... 125
3.16 Manual Pulse Generator 126
3.17 Synchronous Feed Encoder..... 126
3.18 Machine Operation Panel [M800S/M80] 126
3.19 Machine Operation Panel [E80] 127
3.20 Handy Terminal..... 127
3.21 Cable Connector Sets..... 127
3.22 Thermistor Sets..... 128
3.23 Genuine Memory Card..... 128
3.24 Durable Parts 128
3.25 Replacements 128
3.26 List of Cables 129
3.27 System Type 130
4 General Specifications (M800S/M80/E80 Series) 131
4.1 Environment Conditions [M800S]..... 132
4.1.1 Installation Environment Conditions 132
4.1.2 24VDC Stabilized Power Supply Selecting Conditions 135
4.2 Environment Conditions [M80]..... 136
4.2.1 Installation Environment Conditions 136
4.2.2 24VDC Stabilized Power Supply Selecting Conditions 139
4.3 Environment Conditions [E80]..... 140
4.3.1 Installation Environment Conditions 140
4.3.2 24VDC Stabilized Power Supply Selecting Conditions 143
4.4 Control Unit [M800S]..... 144
4.4.1 FCU8-MU542 / FCU8-MA542 / FCU8-MU541 / FCU8-MA541 144
4.5 Control Unit [M80] 145
4.5.1 FCU8-MU511 / FCU8-MU512 / FCU8-MU501 / FCU8-MU502..... 145
4.6 Control Unit [E80]..... 146
4.6.1 FCU8-MU513 / FCU8-MU514 146
4.7 Display Unit [M800S]..... 147
4.7.1 10.4-type (FCU8-DU142-31/FCU8-DU141-31) 147
4.7.2 15-type (FCU8-DU182-31/FCU8-DU181-31) 149
4.8 Display Unit [M80]..... 152
4.8.1 8.4-type (FCU8-DU121-12) 152
4.8.2 10.4-type (FCU8-DU142-32/FCU8-DU141-32)..... 154
4.8.3 15-type (FCU8-DU182-32/FCU8-DU181-32)..... 156
4.9 Display Unit [E80] 159
4.9.1 8.4-type (FCU8-DU121-13)..... 159
4.10 Keyboard Unit 161

4.10.1 Keyboard for 8.4-type Display Unit (FCU8-KB026)..... 161
4.10.2 Keyboard for 8.4-type Display Unit (FCU8-KB028)..... 162
4.10.3 Keyboard for 8.4-type Display Unit (FCU8-KB029)..... 163
4.10.4 Keyboard for 10.4-type Display Unit (FCU8-KB041)..... 164
4.10.5 Keyboard for 10.4-type Display Unit (FCU8-KB046)..... 165
4.10.6 Keyboard for 10.4-type Display Unit (FCU8-KB047)..... 166
4.10.7 Keyboard for 10.4-type Display Unit (FCU8-KB048)..... 167
4.10.8 Keyboard for 15-type Display Unit (FCU8-KB083)..... 168
4.10.9 Keyboard for 8.4-type Display Unit (FCU8-KB024)..... 169
4.10.10 Keyboard for 8.4-type Display Unit (FCU8-KB025)..... 170
4.11 Operation Panel I/O Unit..... 171
4.11.1 List of Units 171
4.11.2 FCU8-DX731 / FCU8-DX750 / FCU8-DX760 / FCU8-DX761 / FCU8-DX834 172
4.12 Remote I/O Unit 176
4.12.1 List of Units 176
4.12.2 FCU8-DX220 / FCU8-DX230 / FCU8-DX231 / FCU8-DX202 / FCU8-DX213 /
FCU8-DX213-1 / FCU8-DX654 / FCU8-DX654-1 / FCU8-DX651/ FCU8-DX408 / FCU8-DX409 177
4.13 Functional Safety Expansion Unit..... 184
4.13.1 Functional Safety Expansion Unit (FCU8-EX133) 184
4.14 Function Expansion Unit..... 185
4.14.1 CC-Link (FCU8-EX561) 185
4.14.2 PROFIBUS-DP (FCU8-EX563)..... 186
4.14.3 CC-Link IE Field (FCU8-EX564) 187
4.14.4 EtherNet/IP (FCU8-EX565)..... 188
4.14.5 FL-net (FCU8-EX568)..... 189
4.14.6 Vibration Cutting Expansion Unit (FCU8-EX744)..... 190
4.14.7 Option Relay Unit (FCU8-EX702) 191
4.14.8 Option Relay Unit (FCU8-EX703) 192
4.15 Manual Pulse Generator..... 193
4.15.1 5V Manual Pulse Generator (UFO-01-2Z9) 193
4.15.2 12V Manual Pulse Generator (HD60C)..... 194
4.16 Synchronous Feed Encoder 195
4.16.1 Synchronous Feed Encoder (OSE-1024-3-15-68)..... 195
4.17 Machine Operation Panel 197
4.17.1 Main Panel A , B
(FCU8-KB921 / FCU8-KB922 / FCU8-KB925 , FCU8-KB923 / FCU8-KB924 / FCU8-KB926) 197
4.17.2 Sub Panel A (FCU8-KB931 / FCU8-KB941)..... 201
4.18 Handy Terminal 202
4.19 Thermistor..... 204
4.19.1 Thermistor(PT3C-51F-M2)..... 204
4.20 Exclusive SD Cards 205
4.21 Specifications and Precautions of USB/SD/LAN Interface 206
4.21.1 USB Interface (Memory I/F card) 206
4.21.2 SD Interface (Memory I/F card)..... 207
4.21.3 LAN Interface (Control Unit)..... 207
C80 Series Hardware..... 209
1 System Basic Configuration (C80 Series) 211
1.1 System Basic Configuration Drawing..... 212
2 General Connection Diagram (C80 Series)..... 213
3 List of Configuration (C80 Series)..... 215
3.1 CNC Control Unit 216
3.2 GOT 226
3.2.1 GT27 226
3.2.2 GT25 228
3.3 Peripheral Device..... 229
3.4 Dual Signal Module..... 229
3.5 List of Q Series Units (for RQ extension base unit) 230
4 General Specifications (C80 Series)..... 233
4.1 Installation Environment Conditions..... 234
4.2 Base Unit..... 235
4.2.1 Basic Base Unit 235
4.2.2 Extension Base Unit 236
4.2.3 RQ Extension Base Unit..... 238
4.3 Power Supply..... 239
4.3.1 R61P/R62P/R63P/R64P 239
4.3.2 Q61P/Q63P/Q64PN 243
4.4 PLC CPU..... 248
4.5 CNC CPU Module..... 253
4.6 Dual Signal Module..... 257
4.7 Signal Splitter..... 262
4.8 Manual Pulse Generator 264
4.8.1 5V Manual Pulse Generator (UFO-01-2Z9) 264
4.8.2 12V Manual Pulse Generator (HD60C)..... 265
4.9 Recommended Terminal Block for Dual Signal Module..... 265
4.10 GOT (Panel Cut Dimensions) 266

1.1 System Basic Configuration Drawing

(Note) For the drive unit configuration, refer to the Instruction Manual of the drive unit you use.
M800W M80W
Windows-based display non-Windows-based display
Motor group
Servo/Spindle
drive unit
Manual pulse generator
Manual pulse penerator
Remote I/O unit
Remote I/O unit
Display unit
Operation panel
I/O unit
Keyboard unit
Synchronous
feed encoder
Personal
computer unit
Control unit
Grahpic
control unit
5 IB-1501506-M
2
General Connection Diagram (M800W/M80W Series)
M800/M80/E80/C80 Series Specifications Manual (Hardware)
2 General Connection Diagram (M800W/M80W Series)
IB-1501506-M 6
2.1 General Connection Diagram [M800W]
2.1.1 M800W, Windows-based Display (15-type)
When the display unit is FCU8-DU182-34, refer to "2.3.1 Windows-based Display" for connection of the display unit.
(Note 1) For information on how to connect the drive unit, refer to the drive unit's manual.
(Note 2) When using a keyboard unit, install the operation panel I/O unit on the back of the keyboard unit.
SIO
1chJ030
2chJ031 2ch
RS232C
SKIP
RIO2
SD
RIO3
GDI
LAN J303 Network
FCU8-EX56x/EX744
J100
SD
FCU8-DX2xx/DX6xx/DX4xx
RIO1
DCIN J070/071
EcoMonitorLight
OPTH1
OPTH2
J395/J396
J395/J396
EMG J120
Max. 8 points
J070/071 J070/071
J210
DI:CJ31/33
DO:CJ32/34
RIO1
DCIN
RIO2
DI:CJ31/33
DO:CJ32/34
RIO1
DCIN
RIO2
J350/351
J350/351
J070/071 J070/071
J210
DI:CJ31/33
DO:CJ32/34
RIO1
DCIN
RIO2
DI:CJ31/33
DO:CJ32/34
RIO1
DCIN
RIO2
J350/351
J350/351
(R2-TM)
(R2-TM)
FG
5VJ023/J024/J025
12VJ020/J021/J022

L1 L2 L3
(NFB)
DCOUT
FG
ACIN
CP
MC
ON OFF
MC
MC
J350/351
J350/351
J350/351
J350/351
FCU8-EX54x
EXT1
EXT3
G430
device
Skip signal input
Control unit
Max. 32 units for each port
Remote I/O unit
Remote I/O unit
Remote I/O unit
Remote I/O unit
24VDC
Drive units
Stored in control unit
To the next
remote I/O or
terminator
connector
To the next
remote I/O or
terminator
connector
Emergency
stop switch
SD
memory
card
24VDC 24VDC
24VDC 24VDC
Machine
control
relay/contact
Machine
control
relay/contact
24VDC
Manual pulse
generator (5V/12V)
Machine operation panel made by the machine tool builder
Dotted lines indicate the sections prepared by the machine tool builder.
<> Angle brackets indicates attached cable of unit.
No-fuse breaker
24VDC stabilized
power supply
(Note 1)
Handy terminal
Function expansion unit
Function expansion unit
FCU8-EX56x/EX744
FCU8-EX54x
FCU8-MA041/MU042
MA041M850W
MU042M830W
RIO8 AIO
J026/J027
J220
EXT2
EXT4
RIO4
RIO6
RIO7
RIO5
Function expansion unit
Function expansion unit
Analog input : 4 points
Analog output : 2 points
Manual pulse
generator (5V)
J120
ON/OFF
CFast CFAST
LVDS1
USB2-2

USB2-1
FCU8-PC231
LAN J303
MENUKEY
RIO3EXT
ON
OFF
G170
MPG
INV
RS232C
USB-RS232C
GDI
KEYUSB
RIO3
J303
NCKB KEYUSB
J210
J291
J210
LVDS2 SD
DCIN J070/071
EMG
USB
USB3-2
USB3-1
USB2-4
USB2-3
USB2-6
USB2-5
FCU8-DX2xx/DX6xx/DX4xx
CJ71
FCU8-CF032G-1
DCIN J070/071
Network
CG31
CG32
FCU8-DX830/834/837
CG33
CG34
SDI Max. 8 points
DI:CJ31/33
DO:CJ32/34
RIO1
DCIN
RIO2
J350/351
J350/351
(R2-TM)
J210
FCU8-KB92x FCU8-KB941/KB931
G460
DX834:
DX837:
OPKB J460/461
24VDC
Machine operation panel manufactured by Mitsubishi Electric
Emergency
stop switch
Personal computer unit
device
conversion
24VDC
USB memory
24VDC
Remote I/O unit
24VDC
Operation panel I/O unit
Safety signal input
Stored in
personal computer unit
CFast unit
(Safety signal input is
DX837 only.)
To the next remote I/O
or terminator connector
Added onto back of
display unit
SD
memory
card
24VDC Machine
control
relay/contact
Backlight
I/F PCB
With scan input/output
With safety signal input

Scan input /
Scan output
(Scan input/output is
DX834 only.)
FCU8-KB04x/KB083
<G402>
<J09x>
USB
SD
<J292>
<J190>
<J290>
<J081>
<J420>
Keyboard unit
(Note 2)
15-type LCD
with touch panel
Display unit
Menu key
FCU8-DU181-34

2.1.2 M800W, Windows-based Display (19-type)
(Note 1) For information on how to connect the drive unit, refer to the drive unit's manual.
SIO
1chJ030
2chJ031 2ch
RS232C
SKIP
RIO2
SD
RIO3
GDI
LAN J303 Network
FCU8-EX56x/EX744
J100
SD
FCU8-DX2xx/DX6xx/DX4xx
RIO1
DCIN J070/071
EcoMonitorLight
OPTH1
OPTH2
J395/J396
J395/J396
EMG J120
Max. 8 points
J070/071 J070/071
J210
DI:CJ31/33
DO:CJ32/34
RIO1
DCIN
RIO2
DI:CJ31/33
DO:CJ32/34
RIO1
DCIN
RIO2
J350/351
J350/351
J070/071 J070/071
J210
DI:CJ31/33
DO:CJ32/34
RIO1
DCIN
RIO2
DI:CJ31/33
DO:CJ32/34
RIO1
DCIN
RIO2
J350/351
J350/351
(R2-TM)
(R2-TM)
FG
5VJ023/J024/J025
12VJ020/J021/J022
L1 L2 L3
(NFB)
DCOUT
FG
ACIN
CP

MC
ON OFF
MC
MC
J350/351
J350/351
J350/351
J350/351
FCU8-EX54x
EXT1
EXT3
G430
device
Skip signal input
Control unit
Max. 32 units for each port
Remote I/O unit
Remote I/O unit
Remote I/O unit
Remote I/O unit
24VDC
Drive units
Stored in control unit
To the next
remote I/O or
terminator
connector
To the next
remote I/O or
terminator
connector
Emergency
stop switch
SD
memory
card
24VDC 24VDC
24VDC 24VDC
Machine
control
relay/contact
Machine
control
relay/contact
24VDC
Manual pulse
generator (5V/12V)
Machine operation panel made by the machine tool builder
Dotted lines indicate the sections prepared by the machine tool builder.
<> Angle brackets indicates attached cable of unit.
No-fuse breaker
24VDC stabilized
power supply
(Note 1)
Handy terminal
Function expansion unit
Function expansion unit
FCU8-EX56x/EX744
FCU8-EX54x
FCU8-MA041/MU042
MA041M850W
MU042M830W
RIO8 AIO
J026/J027
J220
EXT2
EXT4
RIO4
RIO6
RIO7
RIO5
Function expansion unit
Function expansion unit
Analog input : 4 points
Analog output : 2 points
Manual pulse
generator (5V)
J120
ON/OFF
CFast CFAST
LVDS1
USB2-2
USB2-1
FCU8-PC231
LAN J303
MENUKEY
RIO3EXT
ON

OFF
G170
MPG
INV
RS232C
USB-RS232C
GDI
KEYUSB
RIO3
J303
NCKB KEYUSB
J210
J291
J210
LVDS2 SD
DCIN J070/071
EMG
USB
USB3-2
USB3-1
USB2-4
USB2-3
USB2-6
USB2-5
FCU8-DX2xx/DX6xx/DX4xx
CJ71
FCU8-CF032G-1
DCIN J070/071
Network
CG31
CG32
FCU8-DX830/834/837
CG33
CG34
SDI Max. 8 points
DI:CJ31/33
DO:CJ32/34
RIO1
DCIN
RIO2
J350/351
J350/351
(R2-TM)
J210
FCU8-KB92x FCU8-KB941/KB931
G460
DX834:
DX837:
OPKB J460/461
24VDC
Machine operation panel manufactured by Mitsubishi Electric
Emergency
stop switch
Personal computer unit
device
conversion
24VDC
USB memory
24VDC
Remote I/O unit
24VDC
Operation panel I/O unit
Safety signal input
Stored in
personal computer unit
CFast unit
(Safety signal input is
DX837 only.)
To the next remote I/O
or terminator connector
Added onto back of
display unit
SD
memory
card
24VDC Machine
control
relay/contact
Backlight
I/F PCB
With scan input/output
With safety signal input
Scan input /
Scan output
(Scan input/output is
DX834 only.)
<J09x>
<J292>

<J190>
<J290>
<G195>
<J420>
FCU8-EP201-2
USB
SD
PCUSB
19-type LCD
Side memory I/F unit
wth touch panel
Display unit
FCU8-DU191-75
FCU8-DU192-75
M800/M80/E80/C80 Series Specifications Manual (Hardware)
2 General Connection Diagram (M800W/M80W Series)
IB-1501506-M 8
2.1.3 M800W, Non-Windows-based Display (10.4-type / 15-type)
When the display unit is FCU8-DU142-31/FCU8-DU182-31, refer to "2.3.2 Non-Windows-based Display" for connection of the display unit.
(Note 1) For information on how to connect the drive unit, refer to the drive unit's manual.
(Note 2) When connecting a remote I/O unit to the 3rd RIO channel, insert it between the control unit and operation panel I/O unit.
(Note 3) There is no need to connect a terminator R2-TM to the graphic control unit.
SIO
1chJ030
2chJ031 2ch
RS232C
SKIP
RIO2
SD
RIO3
GDI
LAN J303 Network
FCU8-EX56x/EX744
J100
SD
FCU8-DX2xx/DX6xx/DX4xx
RIO1
DCIN J070/071
EcoMonitorLight
OPTH1
OPTH2
J395/J396
J395/J396
EMG J120
Max. 8 points
J070/071 J070/071
J210
DI:CJ31/33
DO:CJ32/34
RIO1
DCIN
RIO2
DI:CJ31/33
DO:CJ32/34
RIO1
DCIN
RIO2
J350/351
J350/351
J070/071 J070/071
J210
DI:CJ31/33
DO:CJ32/34
RIO1
DCIN
RIO2
DI:CJ31/33
DO:CJ32/34
RIO1
DCIN
RIO2
J350/351
J350/351
(R2-TM)
(R2-TM)
FG
5VJ023/J024/J025
12VJ020/J021/J022
L1 L2 L3
(NFB)
DCOUT
FG
ACIN
CP
MC
ON OFF

MC
MC
J350/351
J350/351
J350/351
J350/351
FCU8-EX54x
EXT1
EXT3
G430
device
Skip signal input
Control unit
Max. 32 units for each port
Remote I/O unit
Remote I/O unit
Remote I/O unit
Remote I/O unit
24VDC
Drive units
Stored in control unit
To the next
remote I/O or
terminator
connector
To the next
remote I/O or
terminator
connector
Emergency
stop switch
SD
memory
card
24VDC 24VDC
24VDC 24VDC
Machine
control
relay/contact
Machine
control
relay/contact
24VDC
Manual pulse
generator (5V/12V)
Machine operation panel made by the machine tool builder
Dotted lines indicate the sections prepared by the machine tool builder.
<> Angle brackets indicates attached cable of unit.
No-fuse breaker
24VDC stabilized
power supply
(Note 1)
Handy terminal
Function expansion unit
Function expansion unit
FCU8-EX56x/EX744
FCU8-EX54x
FCU8-MA041/MU042
MA041M850W
MU042M830W
RIO8 AIO
J026/J027
J220
EXT2
EXT4
RIO4
RIO6
RIO7
RIO5
Function expansion unit
Function expansion unit
Analog input : 4 points
Analog output : 2 points
Manual pulse
generator (5V)
J070/071
DI:CJ31/33
DO:CJ32/34
RIO1
DCIN
RIO2
<J09x>
USB_F
SDC_F
USB_B
SDC_B
<J08x>
FCU8-GC211

RIO3EXT
CJ71
FCU8-DX730
CG31
MPG
CG32
NCKB
CG33
CG34
LAN1 J303 Network
LAN2 J303
J210
<G402>
J210
EMG
DCIN J070/071
LCD
MENUKEY
TP
BL
FRONT
ENC ON
OFF
CJ71
J010
SIO
FCU8-DX2xx/DX6xx/DX4xx
max. 29 units
J170
<J421>
RIO1
J210
FCU8-KB92x FCU8-KB941/KB931
G460
24VDC
24VDC Machine operation panel manufactured by Mitsubishi Electric
Remote I/O unit
(Note 2)
Emergency
stop switch
Graphic control unit
24VDC
24VDC
Operation panel I/O unit
Menu key
Display unit
Memory mediums
Front memory I/F card
Keyboard unit
(Note 3)
FCU8-KB04x/083
<J421>
10.4-type:FCU8-DU141-31
15-type:FCU8-DU181-31
M800/M80/E80/C80 Series Specifications Manual (Hardware)
2 General Connection Diagram (M800W/M80W Series)
9 IB-1501506-M
2.2 General Connection Diagram [M80W]
2.2.1 M80W, Windows-based Display (15-type)
When the display unit is FCU8-DU182-36, refer to "2.3.1 Windows-based Display" for connection of the display unit.
(Note 1) For information on how to connect the drive unit, refer to the drive unit's manual.
(Note 2) When using a keyboard unit, install the operation panel I/O unit on the back of the keyboard unit.
(Note 3) When the handle of handy terminal is used, connect ENC connector of G430 cable to MPG connector of the
operation panel I/O unit.
Because the pin assignment of ENC connector of G430 is different from that of MPG connector of the
operation panel I/O unit, conversion is required.
The conversion cable needs to be prepared by the MTB.
SIO
1chJ030
2chJ031 2ch
RS232C
SKIP
RIO2
SD
RIO3
GDI
LAN J303 Network
FCU8-EX56x/EX744
J100
SD
FCU8-DX2xx/DX6xx/DX4xx
RIO1
DCIN J070/071
EcoMonitorLight
OPTH1
OPTH2
J395/J396
J395/J396

EMG J120
Max. 8 points
J070/071 J070/071
J210
DI:CJ31/33
DO:CJ32/34
RIO1
DCIN
RIO2
DI:CJ31/33
DO:CJ32/34
RIO1
DCIN
RIO2
J350/351
J350/351
J070/071 J070/071
J210
DI:CJ31/33
DO:CJ32/34
RIO1
DCIN
RIO2
DI:CJ31/33
DO:CJ32/34
RIO1
DCIN
RIO2
J350/351
J350/351
(R2-TM)
(R2-TM)
FG
5VJ023/J024/J025
12VJ020/J021/J022
L1 L2 L3
(NFB)
DCOUT
FG
ACIN
CP
MC
ON OFF
MC
MC
J350/351
J350/351
J350/351
J350/351
FCU8-EX54x
EXT1
EXT3
G430
device
Skip signal input
Control unit
Max. 32 units for each port
Remote I/O unit
Remote I/O unit
Remote I/O unit
Remote I/O unit
24VDC
Drive units
Stored in control unit
To the next
remote I/O or
terminator
connector
To the next
remote I/O or
terminator
connector
Emergency
stop switch
SD
memory
card
24VDC 24VDC
24VDC 24VDC
Machine
control
relay/contact
Machine
control
relay/contact
24VDC
Manual pulse
generator (5V/12V)

Machine operation panel made by the machine tool builder
Dotted lines indicate the sections prepared by the machine tool builder.
<> Angle brackets indicates attached cable of unit.
No-fuse breaker
24VDC stabilized
power supply
(Note 1)
Handy terminal
Function expansion unit
Function expansion unit
FCU8-MU044
RIO4/M
BTBOX
J120
ON/OFF
CFast CFAST
LVDS1
USB2-2
USB2-1
FCU8-PC231
LAN J303
MENUKEY
RIO3EXT
ON
OFF
G170
MPG
INV
RS232C
USB-RS232C
GDI
KEYUSB
RIO3
J303
NCKB KEYUSB
J210
J291
J210
LVDS2 SD
DCIN J070/071
EMG
USB
USB3-2
USB3-1
USB2-4
USB2-3
USB2-6
USB2-5
FCU8-DX2xx/DX6xx/DX4xx
CJ71
FCU8-CF032G-1
DCIN J070/071
Network
CG31
CG32
FCU8-DX830/834/837
CG33
CG34
SDI Max. 8 points
DI:CJ31/33
DO:CJ32/34
RIO1
DCIN
RIO2
J350/351
J350/351
(R2-TM)
J210
FCU8-KB92x FCU8-KB941/KB931
G460
DX834:
DX837:
OPKB J460/461
24VDC
Machine operation panel manufactured by Mitsubishi Electric
Emergency
stop switch
Personal computer unit
device
conversion
24VDC
USB memory
24VDC
Remote I/O unit
24VDC
Operation panel I/O unit
Safety signal input
Stored in

personal computer unit
CFast unit
(Safety signal input is
DX837 only.)
To the next remote I/O
or terminator connector
Added onto back of
display unit
SD
memory
card
24VDC Machine
control
relay/contact
Backlight
I/F PCB
With scan input/output
With safety signal input
Scan input /
Scan output
(Scan input/output is
DX834 only.)
FCU8-KB04x/KB083
<G402>
<J09x>
USB
SD
<J292>
<J190>
<J290>
<J081>
<J420>
Keyboard unit
(Note 2)
15-type LCD
with touch panel
Display unit
Menu key
FCU8-DU181-36
M800/M80/E80/C80 Series Specifications Manual (Hardware)
2 General Connection Diagram (M800W/M80W Series)
IB-1501506-M 10
2.2.2 M80W, Windows-based Display (19-type)
(Note 1) For information on how to connect the drive unit, refer to the drive unit's manual.
(Note 2) When the handle of handy terminal is used, connect ENC connector of G430 cable to MPG connector of the
operation panel I/O unit.
Because the pin assignment of ENC connector of G430 is different from that of MPG connector of the
operation panel I/O unit, conversion is required.
The conversion cable needs to be prepared by the MTB.
SIO
1chJ030
2chJ031 2ch
RS232C
SKIP
RIO2
SD
RIO3
GDI
LAN J303 Network
FCU8-EX56x/EX744
J100
SD
FCU8-DX2xx/DX6xx/DX4xx
RIO1
DCIN J070/071
EcoMonitorLight
OPTH1
OPTH2
J395/J396
J395/J396
EMG J120
Max. 8 points
J070/071 J070/071
J210
DI:CJ31/33
DO:CJ32/34
RIO1
DCIN
RIO2
DI:CJ31/33
DO:CJ32/34
RIO1
DCIN
RIO2
J350/351
J350/351
J070/071 J070/071
J210

DI:CJ31/33
DO:CJ32/34
RIO1
DCIN
RIO2
DI:CJ31/33
DO:CJ32/34
RIO1
DCIN
RIO2
J350/351
J350/351
(R2-TM)
(R2-TM)
FG
5VJ023/J024/J025
12VJ020/J021/J022
L1 L2 L3
(NFB)
DCOUT
FG
ACIN
CP
MC
ON OFF
MC
MC
J350/351
J350/351
J350/351
J350/351
FCU8-EX54x
EXT1
EXT3
G430
device
Skip signal input
Control unit
Max. 32 units for each port
Remote I/O unit
Remote I/O unit
Remote I/O unit
Remote I/O unit
24VDC
Drive units
Stored in control unit
To the next
remote I/O or
terminator
connector
To the next
remote I/O or
terminator
connector
Emergency
stop switch
SD
memory
card
24VDC 24VDC
24VDC 24VDC
Machine
control
relay/contact
Machine
control
relay/contact
24VDC
Manual pulse
generator (5V/12V)
Machine operation panel made by the machine tool builder
Dotted lines indicate the sections prepared by the machine tool builder.
<> Angle brackets indicates attached cable of unit.
No-fuse breaker
24VDC stabilized
power supply
(Note 1)
Handy terminal
Function expansion unit
Function expansion unit
FCU8-MU044
RIO4/M
BTBOX
J120
ON/OFF
CFast CFAST
LVDS1
USB2-2

USB2-1
FCU8-PC231
LAN J303
MENUKEY
RIO3EXT
ON
OFF
G170
MPG
INV
RS232C
USB-RS232C
GDI
KEYUSB
RIO3
J303
NCKB KEYUSB
J210
J291
J210
LVDS2 SD
DCIN J070/071
EMG
USB
USB3-2
USB3-1
USB2-4
USB2-3
USB2-6
USB2-5
FCU8-DX2xx/DX6xx/DX4xx
CJ71
FCU8-CF032G-1
DCIN J070/071
Network
CG31
CG32
FCU8-DX830/834/837
CG33
CG34
SDI Max. 8 points
DI:CJ31/33
DO:CJ32/34
RIO1
DCIN
RIO2
J350/351
J350/351
(R2-TM)
J210
FCU8-KB92x FCU8-KB941/KB931
G460
DX834:
DX837:
OPKB J460/461
24VDC
Machine operation panel manufactured by Mitsubishi Electric
Emergency
stop switch
Personal computer unit
device
conversion
24VDC
USB memory
24VDC
Remote I/O unit
24VDC
Operation panel I/O unit
Safety signal input
Stored in
personal computer unit
CFast unit
(Safety signal input is
DX837 only.)
To the next remote I/O
or terminator connector
Added onto back of
display unit
SD
memory
card
24VDC Machine
control
relay/contact
Backlight
I/F PCB
With scan input/output
With safety signal input

Scan input /
Scan output
(Scan input/output is
DX834 only.)
<J09x>
<J292>
<J190>
<J290>
<G195>
<J420>
FCU8-EP201-2
USB
SD
PCUSB
19-type LCD
Side memory I/F unit
wth touch panel
Display unit
FCU8-DU191-77
FCU8-DU192-77

2.2.3 M80W, Non-Windows-based Display (8.4-type /10.4-type /15-type)
When the display unit is FCU8-DU142-32/FCU8-DU182-32, refer to "2.3.2 Non-Windows-based Display" for connection
of the display unit.
(Note 1) For information on how to connect the drive unit, refer to the drive unit's manual.
(Note 2) When connecting a remote I/O unit to the 3rd RIO channel, insert it between the control unit and operation
panel I/O unit.
(Note 3) There is no need to connect a terminator R2-TM to the graphic control unit.
(Note 4) For the 8.4-type display unit, TP connector is not used.
(Note 5) When the handle of handy terminal is used, connect ENC connector of G430 cable to MPG connector of the
operation panel I/O unit.
Because the pin assignment of ENC connector of G430 is different from that of MPG connector of the
operation panel I/O unit, conversion is required.
The conversion cable needs to be prepared by the MTB.
SIO
1chJ030
2chJ031 2ch
RS232C
SKIP
RIO2
SD
RIO3
GDI
LAN J303 Network
FCU8-EX56x/EX744
J100
SD
FCU8-DX2xx/DX6xx/DX4xx
RIO1
DCIN J070/071
EcoMonitorLight
OPTH1
OPTH2
J395/J396
J395/J396
EMG J120
Max. 8 points
J070/071 J070/071
J210
DI:CJ31/33
DO:CJ32/34
RIO1
DCIN
RIO2
DI:CJ31/33
DO:CJ32/34
RIO1
DCIN
RIO2
J350/351
J350/351
J070/071 J070/071
J210
DI:CJ31/33
DO:CJ32/34
RIO1
DCIN
RIO2
DI:CJ31/33
DO:CJ32/34
RIO1
DCIN
RIO2
J350/351
J350/351
(R2-TM)

(R2-TM)
FG
5VJ023/J024/J025
12VJ020/J021/J022
L1 L2 L3
(NFB)
DCOUT
FG
ACIN
CP
MC
ON OFF
MC
MC
J350/351
J350/351
J350/351
J350/351
FCU8-EX54x
EXT1
EXT3
G430
device
Skip signal input
Control unit
Max. 32 units for each port
Remote I/O unit
Remote I/O unit
Remote I/O unit
Remote I/O unit
24VDC
Drive units
Stored in control unit
To the next
remote I/O or
terminator
connector
To the next
remote I/O or
terminator
connector
Emergency
stop switch
SD
memory
card
24VDC 24VDC
24VDC 24VDC
Machine
control
relay/contact
Machine
control
relay/contact
24VDC
Manual pulse
generator (5V/12V)
Machine operation panel made by the machine tool builder
Dotted lines indicate the sections prepared by the machine tool builder.
<> Angle brackets indicates attached cable of unit.
No-fuse breaker
24VDC stabilized
power supply
(Note 1)
Handy terminal
Function expansion unit
Function expansion unit
FCU8-MU044
RIO4/M
BTBOX
J070/071
DI:CJ31/33
DO:CJ32/34
RIO1
DCIN
RIO2
<J09x>
USB_F
SDC_F
USB_B
SDC_B
<J08x>
FCU8-GC211
RIO3EXT
CJ71
FCU8-DX730
CG31
MPG

CG32
NCKB
CG33
CG34
LAN1 J303 Network
LAN2 J303
J210
<G402>
J210
EMG
DCIN J070/071
LCD
MENUKEY
TP
BL
FRONT
ENC ON
OFF
CJ71
J010
SIO
FCU8-DX2xx/DX6xx/DX4xx
max. 29 units
J170
<J421>
RIO1
J210
FCU8-KB92x FCU8-KB941/KB931
G460
24VDC
24VDC Machine operation panel manufactured by Mitsubishi Electric
Remote I/O unit
(Note 2)
Emergency
stop switch
Graphic control unit
24VDC
24VDC
Operation panel I/O unit
Menu key
Display unit
Memory mediums
Front memory I/F card
Keyboard unit
(Note 3)
(Note 4)
8.4-type:FCU8-DU121-12
FCU8-KB02x/04x/083
10.4-type:FCU8-DU141-32
15-type:FCU8-DU181-32
M800/M80/E80/C80 Series Specifications Manual (Hardware)
2 General Connection Diagram (M800W/M80W Series)
IB-1501506-M 12
2.3 Difference in Connection Depending on the Display Unit
Some connections and cables are different depending on the display unit.
2.3.1 Windows-based Display
The parts surrounded by the dotted lines in the figures below are different.
[FCU8-DU182-34 / FCU8-DU182-36]
[FCU8-DU181-34 / FCU8-DU181-36]
LVDS1
USB2-2
USB2-1
MENUKEY
INV
LVDS2
<J292>
<J190>
<J290>
Personal computer unit
Backlight
I/F PCB
Display unit
LCD
with touch panel USB
SD
FCU8-DU182-34
FCU8-DU182-36
<J491>
<J423>
Menu key
LVDS1
USB2-2
USB2-1
MENUKEY
INV
LVDS2
<J292>
<J190>

<J290>
Personal computer unit
Backlight
I/F PCB
Display unit
LCD
with touch panel USB
SD
FCU8-DU181-34
FCU8-DU181-36
<J09x>
<J081>
<J420>
Menu key

2.3.2 Non-Windows-based Display
The parts surrounded by the dotted lines in the figures below are different.
[FCU8-DU142-31 / FCU8-DU142-32 / FCU8-DU182-31 / FCU8-DU182-32]
[FCU8-DU141-31 / FCU8-DU141-32 / FCU8-DU181-31 / FCU8-DU181-32]
LCD
MENUKEY
TP
BL
<J50x/J991>
<J473>
<J424>
FCU8-DU182-31 / FCU8-DU182-32
FCU8-DU142-31 / FCU8-DU142-32
LCD
with touch panel
Graphic control unit
Menu key
Display unit
LCD
MENUKEY
TP
BL
<J09x>
<J08x>
<J421>
FCU8-DU181-31 / FCU8-DU181-32
FCU8-DU141-31 / FCU8-DU141-32
LCD
with touch panel
Graphic control unit
Menu key
Display unit

15 IB-1501506-M
3
List of Configuration (M800W/M80W Series)

3.1 Control Unit [M800W]
3.2 Control Unit [M80W]
Classification Type Components Remarks
NC functions
For M830W FCU8-MU042
Main CPU card
7SEG card
SDHC: 1ch
Back panel card
Unit lid (Resin molded article) etc.
This unit is not compliant with both Export Trade
Control Order and Foreign Exchange Order.
G123 cable for EMG is supplied.
NC functions
For M850W FCU8-MA041
Main CPU card
7SEG card
SDHC: 1ch
Back panel card
Unit lid (Resin molded article) etc.
This unit is not compliant with Export Trade
Control Order, and it is compliant with Foreign
Exchange Order.
G123 cable for EMG is supplied.
Classification Type Components Remarks
NC functions
For M80W FCU8-MU044
Main CPU card
7SEG card
SDHC: 1ch

Back panel card
Unit lid (Resin molded article) etc.
This unit is not compliant with both Export Trade
Control Order and Foreign Exchange Order.
G123 cable for EMG is supplied.

3.3 Display Unit [M800W]
3.4 Display Unit [M80W]
Classification Type Components Remarks
10.4-type color TFT touch panel
(VGA:640*480)
FCU8-DU142-31 /
FCU8-DU141-31
LCD panel
Menu keys
Escutcheon
Base metal plate
Cable
Screw cap set
Front side memory I/F is normally equipped with
the control unit
(non-Windows-based display)
15-type color TFT touch panel
(XGA:1024*768)
FCU8-DU182-31 /
FCU8-DU181-31
LCD panel
Menu keys
Escutcheon
Base metal plate
Cable
Screw cap set
Front side memory I/F is normally equipped with
the control unit
(non-Windows-based display)
15-type color TFT touch panel
(XGA:1024*768)
FCU8-DU182-34 /
FCU8-DU181-34
LCD panel
Backlight I/F PCB
Menu keys
Escutcheon
Base metal plate
Cable
Screw cap set
Personal computer unit is prepared at the same
time.
Built-in disk of the display unit is prepared at the
same time.
Front side memory I/F is normally equipped with
the display unit
(Windows-based display)
19-type color TFT touch panel
(SXGA:1024*1280) FCU8-DU191-75
LCD panel
Backlight I/F PCB
Escutcheon
Base metal plate
Cable
Personal computer unit is prepared at the same
time.
Built-in disk of the display unit is prepared at the
same time.
Side memory I/F unit is separately prepared.
(Windows-based display)
19-type color TFT touch panel
(SXGA:1280*1024) FCU8-DU192-75
LCD panel
Backlight I/F PCB
Escutcheon
Base metal plate
Cable
Personal computer unit is prepared at the same
time.
Built-in disk of the display unit is prepared at the
same time.
Side memory I/F unit is separately prepared.
(Windows-based display)
Classification Type Components Remarks
8.4-type color TFT
(VGA:640*480) FCU8-DU121-12
LCD panel
Menu keys
Escutcheon
Base metal plate

Cable
Screw cap set
Front side memory I/F is normally equipped with
the control unit
(non-Windows-based display)
10.4-type color TFT touch panel
(VGA:640*480)
FCU8-DU142-32 /
FCU8-DU141-32
LCD panel
Menu keys
Escutcheon
Base metal plate
Cable
Screw cap set
Front side memory I/F is normally equipped with
the control unit
(non-Windows-based display)
15-type color TFT touch panel
(XGA:1024*768)
FCU8-DU182-32 /
FCU8-DU181-32
LCD panel
Menu keys
Escutcheon
Base metal plate
Cable
Screw cap set
Front side memory I/F is normally equipped with
the control unit
(non-Windows-based display)
15-type color TFT touch panel
(XGA:1024*768)
FCU8-DU182-36 /
FCU8-DU181-36
LCD panel
Backlight I/F PCB
Menu keys
Escutcheon
Base metal plate
Cable
Screw cap set
Personal computer unit is prepared at the same
time.
Built-in disk of the display unit is prepared at the
same time.
Front side memory I/F is normally equipped with
the display unit
(Windows-based display)
19-type color TFT touch panel
(SXGA:1024*1280) FCU8-DU191-77
LCD panel
Backlight I/F PCB
Escutcheon
Base metal plate
Cable
Personal computer unit is prepared at the same
time.
Built-in disk of the display unit is prepared at the
same time.
Side memory I/F unit is separately prepared.
(Windows-based display)
19-type color TFT touch panel
(SXGA:1280*1024) FCU8-DU192-77
LCD panel
Backlight I/F PCB
Escutcheon
Base metal plate
Cable
Personal computer unit is prepared at the same
time.
Built-in disk of the display unit is prepared at the
same time.
Side memory I/F unit is separately prepared.
(Windows-based display)

3.5 Personal Computer Unit
3.6 Graphic Control Unit
3.7 Keyboard Unit [M800W]
3.8 Keyboard Unit [M80W]
Classification Type Components Remarks
Personal Computer Unit FCU8-PC231
PC board
PC cooling FAN
Unit lid (Resin molded article) etc.
Built-in Disk of the Display Unit FCU8-CF032G-1 Windows OS / data storage Windows8

Classification Type Components Remarks
Graphic control unit FCU8-GC211 Base control card
Front-side memory I/F card
(Note) This unit occupies the 13th and 14th RIO
stations.
Classification Type Components Remarks
Keyboard for 10.4-type display unit
Clear keys FCU8-KB041
Escutcheon, key switch
G402 cable
Screw cap set
ONG layout (for L system, XZF)
Keyboard for 10.4-type display unit
Clear keys FCU8-KB046
Escutcheon, key switch
G402 cable
Screw cap set
ONG layout (for M system/L system, XYZ)
Keyboard for 10.4-type display unit
Clear keys FCU8-KB047
Escutcheon, key switch
G402 cable
Screw cap set
Full keyboard (for M system/L system) (in tandem)
Keyboard for 10.4-type display unit
Clear keys FCU8-KB048
Escutcheon, key switch
G402 cable
Screw cap set
ABC layout (for M system/L system)
Keyboard for 15-type display unit
Clear keys FCU8-KB083
Escutcheon, key switch
G402 cable
Screw cap set
Full keyboard (for M system/L system) (in tandem)
Classification Type Components Remarks
Keyboard for 8.4-type display unit
Clear keys FCU8-KB026
Escutcheon, key switch
G402 cable
Screw cap set
ONG layout (for M system/L system, XYZ)
Keyboard for 8.4-type display unit
Clear keys FCU8-KB028
Escutcheon, key switch
G402 cable
Screw cap set
ONG layout (for L system, XZF)
Keyboard for 8.4-type display unit
Clear keys FCU8-KB029
Escutcheon, key switch
G402 cable
Screw cap set
ONG layout (for M system/L system) (in tandem)
Keyboard for 10.4-type display unit
Clear keys FCU8-KB041
Escutcheon, key switch
G402 cable
Screw cap set
ONG layout (for L system, XZF)
Keyboard for 10.4-type display unit
Clear keys FCU8-KB046
Escutcheon, key switch
G402 cable
Screw cap set
ONG layout (for M system/L system, XYZ)
Keyboard for 10.4-type display unit
Clear keys FCU8-KB047
Escutcheon, key switch
G402 cable
Screw cap set
Full keyboard (for M system/L system) (in tandem)
Keyboard for 10.4-type display unit
Clear keys FCU8-KB048
Escutcheon, key switch
G402 cable
Screw cap set
ABC layout (for M system/L system)
Keyboard for 15-type display unit
Clear keys FCU8-KB083
Escutcheon, key switch
G402 cable
Screw cap set
Full keyboard (for M system/L system) (in tandem)

3.9 Operation Panel I/O Unit
(Note) DI: Digital input signals, DO: Digital output signals
Classification Type Components Remarks
DI 24V/0V common input [64 points]
DO Source output [64 points] FCU8-DX830
Base card
Add-on card
RIO 2.0 terminator connector (R2-TM)
DI: 64-points 24V/0V common type
DO: 64-points source type (200mA/point)
Manual pulse generator input: 3ch
Display unit I/F
Keyboard unit I/F
Emergency stop input
Remote I/O 2.0 I/F
RIO occupied stations (fixed):
1 to 4, 7 to 14, 20 to 22
RIO extensible stations:
5, 6, 15 to 19, 23 to 64
(Note) J291 cable is required for connection with
the personal computer unit.
(for windows-based display)
DI 24V/0V common input [64 points]
DO Source output [64 points]
Scan input [64 points]
Scan output [64 points]
FCU8-DX834
Base card
Add-on card
RIO 2.0 terminator connector (R2-TM)
DI: 64-points 24V/0V common type
DO: 64-points source type (200mA/point)
Scan input: 64 points
Scan output: 64 points
Manual pulse generator input: 3ch
Display unit I/F
Keyboard unit I/F
Emergency stop input
Remote I/O 2.0 I/F
RIO occupied stations (fixed):
1 to 4, 7 to 14, 20 to 22
RIO extensible stations:
5, 6, 15 to 19, 23 to 64
(Note) J291 cable is required for connection with
the personal computer unit.
(for windows-based display)
DI 24V/0V common input [64 points]
DO Source output [64 points]
Safety DI 24V/0V common input [8 points]
FCU8-DX837
Base card
Add-on card
RIO 2.0 terminator connector (R2-TM)
DI: 64-points 24V/0V common type
DO: 64-points source type (200mA/point)
Safety DI: 8-points 0V common type
Manual pulse generator input: 3ch
Display unit I/F
Keyboard unit I/F
Emergency stop input
Remote I/O 2.0 I/F
RIO occupied stations (fixed):
1 to 4, 7 to 14, 20 to 22
RIO extensible stations:
5, 6, 15 to 19, 23 to 64
(Note) J291 cable is required for connection with
the personal computer unit.
(for windows-based display)
DI 24V/0V common input [64 points]
DO Source output [64 points] FCU8-DX730 Base card
RIO 2.0 terminator connector (R2-TM)
DI: 64-points 24V/0V common type
DO: 64-points source type (200mA/point)
Manual pulse generator input: 3ch
Graphic control unit I/F
Keyboard unit I/F
Remote I/O 2.0 I/F
RIO occupied stations (fixed):
1, 2, 7 to 12, 20 to 22
RIO extensible stations:
3 to 6, 15 to 19, 23 to 64
(13 and 14 are occupied by the graphic control
unit.)
(Note) J010 cable is required for connection with
the graphic control unit.
(for non-Windows-based display)

3.10 Remote I/O Unit

(Note) DI: Digital input signals, DO: Digital output signals, AI: Analog input signals, AO: Analog output signals

3.11 Function Expansion Unit

[Connector: EXT1/EXT2 of the control unit]

[Connector: EXT3/EXT4 of the control unit]

Classification Type Components Remarks

DI 24V/0V common input [32 points]

DO Source output [32 points] FCU8-DX220 Base card

RIO 2.0 connector set

DI: 32-points 24V/0V common type

Do: 32-points source type (200mA/point)

Number of occupied stations: 1

DI 24V/0V common input [64 points]

DO Source output [48 points] FCU8-DX230 Base card

RIO 2.0 connector set

DI: 64-points 24V/0V common type

DO: 48-points source type (200mA/point)

Number of occupied stations: 2

DI 24V/0V common input

DO Source output [48 points]

AO Analog output [1 point]

FCU8-DX231 Base card

RIO 2.0 connector set

DI: 64-points 24V/0V common type

DO: 48-points source type (200mA/point)

AO: 1 point

Number of occupied stations: 2

AI Analog input [4 points]

AO Analog output [1 point] FCU8-DX202 Base card

RIO 2.0 connector set

AI : 4 points

AO: 1 point

Number of occupied stations: 1

DI 0V common input [16 points]

DO Source output (large capacity) [8

points]

FCU8-DX213 Base card

RIO 2.0 connector set

DI: 16-points 0V common type (3mA/point)

DO: 8-points source type (2A/point)

Number of occupied stations: 1

DI 0V common input [16 points]

DO Source output (large capacity) [8

points]

FCU8-DX213-1 Base card

RIO 2.0 connector set

DI: 16-points 0V common type (9mA/point)

DO: 8-points source type (2A/point)

Number of occupied stations: 1

Safety DI 0V common input [8 points]

Safety DO Source output (large capacity)

[4 points]

FCU8-DX654 Base card

RIO 2.0 connector set

Safety DI: 8-points 0V common type (3mA/point)

Safety DO: 4-points source type (2A/point)

Number of occupied stations: 2

Safety DI 0V common input [8 points]

Safety DO Source output (large capacity)

[4 points]

FCU8-DX654-1 Base card

RIO 2.0 connector set

Safety DI: 8-points 0V common type (9mA/point)

Safety DO: 4-points source type (2A/point)

Number of occupied stations: 2

DI 24V/0V common input [32points]

DO Source output [32 points]

Safety DI 0V common input [8 points]

(Note 1)

Safety relay output [4 points] (Note 2)

FCU8-DX651

Base card

Add-on card

RIO 2.0 connector set

DI: 32-points 24V/0V common type

Do: 32-points source type (200mA/point)

Safety DI: 8-points 0V common type

Safety relay: 4-points (non-voltage contact)

Relay contact welding detection

Number of occupied stations: 3

(Note 1) Safety DI uses 16 points of terminal

because of the duplication wiring.

(Note 2) Safety relay output uses 8 points of

terminal because of the duplication wiring.

Thermistor input [12 points] FCU8-DX408 Base card

RIO 2.0 connector set

Thermistor input: 12 points

Number of occupied stations: 3
Multi-analog input [4 points] (Note 3) FCU8-DX409 Base card
RIO 2.0 connector set
Multi-analog input: 4 points
(Note 3) Voltage input, current input,
thermocouple input and resistance temperature
detector input are selected for each CH.
Number of occupied stations: 4
Classification Type Components Remarks
Encoder (manual pulse generator) I/F
expansion unit FCU8-EX544 Encoder I/F PCB Encoder input 1ch
5V manual pulse generator input 2ch
Classification Type Components Remarks
CC-Link expansion unit FCU8-EX561 CC-Link I/F PCB CC-Link 1ch
PROFIBUS-DP master unit FCU8-EX563 PROFIBUS-DP I/F PCB PROFIBUS-DP 1ch
CC-Link IE Field
Master/local unit FCU8-EX564 Base card
Add-on card CC-Link IE Field 2ch
EtherNet/IP
Scanner/adapter unit FCU8-EX565 Base card
Add-on card
EtherNet/IP 1ch
(Only LAN1, LAN2 cannot be used)
FL-net expansion unit FCU8-EX568 Base card
Add-on card
FL-net 1ch
(Only LAN1, LAN2 cannot be used)
Vibration cutting expansion unit FCU8-EX744 Base card Vibration cutting control
M800/M80/E80/C80 Series Specifications Manual (Hardware)
3 List of Configuration (M800W/M80W Series)
21 IB-1501506-M
3.12 Side Memory I/F Unit
3.13 Manual Pulse Generator
3.14 Synchronous Feed Encoder
3.15 Machine Operation Panel
3.16 Handy Terminal
Classification Type Components Remarks
Side Memory I/F Unit FCU8-EP201-2
Side memory I/F PCB
J292 cable
Structural member
SDHC 1ch
USB2.0 1ch
USB communication
(between side memory I/F PCB and personal
computer)
Unit lid (resin molded article), metal plate, etc.
Exclusive for 19-type display unit
Classification Type Components Remarks
5V Manual Pulse Generator UFO-01-2Z9 UFO-01-2Z9
(Produced by NIDEC NEMICON)
Input 5VDC
100pulse/rev
12V Manual Pulse Generator HD60C HD60C Input 12VDC
25pulse/rev
Classification Type Components Remarks
Synchronous feed encoder OSE1024-3-15-68 OSE1024-3-15-68
Input 5VDC
1024pulse/rev
6000r/min, 68-square flange
Synchronous feed encoder OSE1024-3-15-68-8 OSE1024-3-15-68-8
Input 5VDC
1024pulse/rev
8000r/min ,68-square flange
Synchronous feed encoder OSE1024-3-15-160 OSE1024-3-15-160
Input 5VDC
1024pulse/rev
6000r/min, 160-square flange
Classification Type Components Remarks
Main panel A
(For 8.4-type/15-type display unit) FCU8-KB921
Escutcheon, key switch
control card
G054 cable, Screw cap set
MITSUBISHI standard key layout (55 keys)
(Standard specification A)
Main panel A
(For 8.4-type/15-type display unit) FCU8-KB922
Escutcheon, key switch
control card
G054 cable, Screw cap set
Custom specification key layout (55 keys)
(Clear key top cover sold separately)
Main panel B
(For 10.4-type display unit) FCU8-KB923
Escutcheon, key switch
control card
G054 cable, Screw cap set

MITSUBISHI standard key layout (55 keys)
(Standard specification A)
Main panel B
(For 10.4-type display unit) FCU8-KB924
Escutcheon, key switch
control card
G054 cable, Screw cap set
Custom specification key layout (55 keys)
(Clear key top cover sold separately)
Main panel A
(For 8.4-type/15-type display unit) FCU8-KB925
Escutcheon, key switch
control card
G054 cable, Screw cap set
MITSUBISHI standard key layout (55 keys)
(Standard specification B)
Main panel B
(For 10.4-type display unit) FCU8-KB926
Escutcheon, key switch
control card
G054 cable, Screw cap set
MITSUBISHI standard key layout (55 keys)
(Standard specification B)
Sub panel A
(Common for all display units) FCU8-KB931
Escutcheon
Emergency stop switch, Override switch
ON/OFF switch, Screw cap set
MITSUBISHI standard switch specification
(Standard specification A)
Sub panel A
(Common for all display units) FCU8-KB941
Escutcheon
Emergency stop switch, Override switch
ON/OFF switch, Screw cap set
MITSUBISHI standard switch specification
(Standard specification B)
Clear key top set N030C975G51 /
N030C975G55 Clear key top cover (20 pcs/60 pcs)
Set of labels for M7 standard key layout N939A169G51 Labels for M7 standard key layout (1
sheet)
Classification Type Components Remarks
Handy Terminal HG1T-SB12UH MK1346-L5
M800/M80/E80/C80 Series Specifications Manual (Hardware)
3 List of Configuration (M800W/M80W Series)
IB-1501506-M 22
3.17 Cable Connector Sets
3.18 Thermistor Sets
3.19 Genuine Memory Card
3.20 Durable Parts
(Note) Contact the Service Center, Sales Office or dealer for repairs or part replacement.
3.21 Replacements
Classification Type Components Remarks
General I/O units
(For SKIP,SIO,MPG,AIO) FCUA-CS000 Connector (10120-3000PE,2pcs),
Shell kit (10320-52F0-008,2pcs)
Emergency stop connector
(For EMG)
005057-9403
0016020103 x 3 pcs.
Connector (50-57-9403),
Contact (0016020103,3pcs.)
Connector kit for RIO 2.0 unit RIO2 CON
Connector (1-1318119-3,2pcs.),
Contact (1318107-1,8pcs.),
Connector (2-178288-3),
Contact (1-175218-5,3pcs)
24VDC power supply connector
(For DCIN) FCUA-CN220 Connector (2-178288-3),
Contact (1-175218-5,3pcs)
DI/DO connector
(For operation panel I/O unit)
(For remote I/O unit)
7940-6500SC x 4pcs.
3448-7940 x 4pcs.
Connector (7940-6500SC,4pcs.),
Strain relief (3448-7940,4pcs.)
ON/OFF switch connector 005057-9404
0016020103 x 4pcs.
Connector (50-57-9404),
Contact (0016020103,4pcs.)
THERMISTOR connector 37104-2165-000FL 10P Connector (37104-2165-000FL,10pcs.)
Classification Type Components Remarks
Thermistor PT3C-51F-M2 10P Thermistor (PT3C-51F-M2,10pcs.)
Classification Type Components Remarks
Exclusive SD cards 1GB FCU8-SD001G FCU8-SD001G 1GB capacity
Exclusive SD cards 4GB FCU8-SD004G FCU8-SD004G 4GB capacity
Durable parts Part type

Battery for control unit Q6BAT
Cooling fan for personal computer unit 109P0424H3103
Replacements Part type Manufacturer
Protection fuse for operation panel I/O LM50 Daito Communication Apparatus Co., Ltd.
Protection fuse for FCU8-DX220/230/231 LM50 Daito Communication Apparatus Co., Ltd.
Protection fuse for FCU8-DX213/654/213-1/654-1 MP63 Daito Communication Apparatus Co., Ltd.
Pair of SD/USB covers for display unit N031C089G51 -

3.22 List of Cables
[Cable relating to NC]
(Note 1) "x" in type columns indicate cable length (unit: m).
(Note 2) Lengths indicated with an asterisk (*) in the max. cable length column indicate the maximum cable length when connecting via other unit.
Type Application Available cable length (m) Max. cable length
FCUA-R050-xM Synchronous encoder - control unit (straight, with connector) (for FCU8-EX544) 5 30m
FCUA-R054-xM Synchronous encoder - control unit (right angle, with connector) (for FCU8-EX544) 3, 5, 10, 15, 20 30m
G071 LxM 24VDC relay cable for machine operation panel 0.12, 0.5, 1 1m
G123 Cable for emergency stop release - -
G170 LxM ON/OFF switch cable (ON/OFF switch - Personal computer unit) (for windows-based display) 1, 2, 3, 5, 10, 15 15m
G430 LxM Cable for connection to handy terminal 3, 5, 10 10m
G460 LxM Cable for machine operation panel (Cable between main panel and sub panel) 0.5 0.5m
J010 LxM Operation panel I/O interface cable (for non-Windows-based display) 0.5, 1 1m
J020 LxM Manual pulse generator cable (12V): 1ch 1, 2, 3, 5, 7, 10, 15, 20, 30 50m
J021 LxM Manual pulse generator cable (12V): 2ch 1, 2, 3, 5, 7, 10, 15, 20, 30 50m
J022 LxM Manual pulse generator cable (12V): 3ch 1, 2, 3, 5, 7, 10, 15, 20, 30 50m
J023 LxM Manual pulse generator cable (5V): 1ch 1, 2, 3, 5, 7, 10, 15, 20 20m
J024 LxM Manual pulse generator cable (5V): 2ch 1, 2, 3, 5, 7, 10, 15, 20 20m
J025 LxM Manual pulse generator cable (5V): 3ch 1, 2, 3, 5, 7, 10, 15, 20 20m
J026 LxM Manual pulse generator cable (5V): 1ch (for connection to control unit) 1, 2, 3, 5, 7, 10, 15, 20 20m (*)
J027 LxM Manual pulse generator cable (5V): 2ch (for connection to control unit) 1, 2, 3, 5, 7, 10, 15, 20 20m (*)
J030 LxM RS-232C I/F cable: 1ch 1, 2, 3, 5, 7, 10 15m (*)
J031 LxM RS-232C I/F cable: 2ch 1, 2, 3, 5, 7, 10 15m (*)
J070 LxM 24VDC power cable 1, 2, 3, 5, 7, 10, 15 15m
J071 LxM 24VDC power cable (for long distance) 20 20m
J100 LxM SKIP input cable 1, 2, 3, 5, 7, 10, 15, 20 20m
J120 LxM Emergency stop cable 1, 2, 3, 5, 7, 10, 15, 20, 30 30m
J121 LxM Emergency stop cable for machine operation panel 1, 2, 3, 5, 7, 10, 15, 20, 30 30m
J170 LxM ON/OFF switch cable (ON/OFF switch - Graphic control unit) (for non-Windows-based display) 1, 2, 3, 5, 10, 15 15m
J210 LxM Remote I/O 2.0 communication cable 0.3, 1, 2, 3, 5, 7, 10, 15, 20, 30 50m (*)
J220 LxM Analog output cable (for M800W) 2, 3, 7 30m
J221 LxM Analog input/output cable (for remote I/O unit) 2, 3, 7 30m
J291 LxM Connection cable between personal computer unit and operation panel I/O unit 0.15, 0.5, 1 1m
J303 LxM LAN straight cable 1, 2, 3, 5, 7, 10, 15, 20, 30 50m
J350 LxM DI/DO cable (connectors at both ends) 1, 2, 3, 5 50m
J351 LxM DI/DO cable (connector at one end) 3 50m
J460 LxM DI/DO cable (connectors at both ends) 1, 2, 3, 5 50m
J461 LxM DI/DO cable (connector at one end) 3 50m
R2-TM Terminator for remote I/O interface - -

[Cable Relating to Drive Unit]
(Note 1) "x" in type columns indicate cable length (unit: m).
(Note 2) Lengths indicated with an asterisk (*) in the max. cable length column indicate the maximum cable length when connecting via other unit.
3.23 System Type
Type Application Available cable length (m) Max. cable length
CNP2E-1-xM Motor side PLG cable Spindle side accuracy encoder TS5690 cable
2, 3, 4, 5, 7, 10, 15, 20, 25, 30 30m
CNP3EZ-2P-xM Spindle side encoder cable OSE-1024 cable 2, 3, 4, 5, 7, 10, 15, 20, 25, 30 30m
CNP3EZ-3P-xM Spindle side encoder cable OSE-1024 cable 2, 3, 4, 5, 7, 10, 15, 20, 25, 30 30m
CNV2E-8P-xM For HG/HG-H, HQ-H, HK/HK-H, HG-JR

Motor side encoder cable (for D47/D48/D51/D74/G48)
Ball screw side encoder cable (OSA405ET2AS, OSA676ET2AS)
2, 3, 4, 5, 7, 10, 15, 20, 25, 30 30m
CNV2E-9P-xM
For HG/HG-H, HQ-H, HK/HK-H, HG-JR
Motor side encoder cable (for D47/D48/D51/D74/G48)
Ball screw side encoder cable (OSA405ET2AS, OSA676ET2AS)
2, 3, 4, 5, 7, 10, 15, 20, 25, 30 30m
CNV2E-D-xM MDS-B-SD unit cable 2, 3, 4, 5, 7, 10, 15, 20, 25, 30 30m
CNV2E-HP-xM MDS-EX-HR unit cable 2, 3, 4, 5, 7, 10, 15, 20, 25, 30 30m
DG30-xM
Battery cable
(For drive unit - Battery box,
For drive unit - drive unit)
0.3, 0.5, 1, 2, 3, 5, 7, 10 10m
G380 LxM Optical communication cable
For wiring between drive units (outside panel) 5, 10, 12, 15, 20, 25, 30 30m
J395 LxM
Optical communication cable
For wiring between drive units (outside panel)
For wiring between NC-drive units
3, 5, 7, 10 10m
J396 LxM Optical communication cable
For wiring between drive units (inside panel) 0.2, 0.3, 0.5, 1, 2, 3, 5 10m
MR-BKS1CBLxMA1-H
<200V Series>
Brake cable for HG96
Lead out in direction of motor shaft
2, 3, 5, 7, 10 10m
MR-BKS1CBLxMA2-H
<200V Series>
Brake cable for HG96
Lead out in opposite direction of motor shaft
2, 3, 5, 7, 10 10m
MR-BT6V2CBL LxM Battery cable (MDS-EJ/EJH)
(For drive unit - drive unit) 0.3, 1 1m
MR-D05UDL3M-B STO cable 3 3m
MR-ENE4CBLxM-H-MTH For HG-H1502 Motor side encoder cable (for D48/D51/D74) 5, 10, 20, 30 30m
MR-PWS1CBLxMA1-H
<200V Series>
Power cable for HG96
Lead out in direction of motor shaft
2, 3, 5, 7, 10 10m
MR-PWS1CBLxMA2-H
<200V Series>
Power cable for HG96
Lead out in opposite direction of motor shaft
2, 3, 5, 7, 10 10m
SH21 LxM Power supply communication cable
Power backup unit communication cable 0.35, 0.5, 1, 2, 3 30m
Series Model name System type Control unit
M800W Series M850W FCA850U FCU8-MA041-001
M830W FCA830U FCU8-MU042-001
M80W Series M80W FCA80U FCU8-MU044-001

4.1 Environment Conditions [M800W]
4.1.1 Environment Conditions inside the Operation Panel
(Note 1) "Short term" means within one month.
(Note 2) For the whole NC system, consider the characteristics of the drive units when the altitude is more than 1000 meters above sea level. Refer to the manual of drive unit for details.
(Note 3) When the display unit is mounted on an incline, the inclination angle to place the unit should follow below.
10.4 or 15-type display unit: the inclination should be 30 degrees or less from the vertical direction.
19-type display unit: the inclination should be 60 degrees or less from the vertical direction.
(Note 4) The current consumption of the display unit is included in that of the personal computer unit or the graphic control unit.
Item
Unit name Display unit Personal computer unit Graphic control unit
Type
FCU8-DU142-31 / FCU8-DU141-31 : (10.4-type)
FCU8-DU182-31 / FCU8-DU181-31 : (15-type)
FCU8-DU182-34 / FCU8-DU181-34 : (15-type)
FCU8-DU191-75 / FCU8-DU192-75 : (19-type)
FCU8-PC231 FCU8-GC211
General
Specifications
Ambient
temperature
During
operation 0 to 58C
During
storage -20 to 60C
Ambient
humidity

Long term 10 to 75% RH (with no dew condensation)
Short term 10 to 95% RH (with no dew condensation) (Note 1)
Vibration resistance 4.9m/s2 [0.5G] or less
Shock resistance 29.4m/s2 [3G] or less
Working atmosphere No corrosive gases, dust or oil mist
Altitude Operation/Storage: 1000 meters or less above sea level,
Transportation: 13000 meters or less above sea level
Power supply voltage
FCU8-DU142-31 : 12VDC/5VDC/3.3VDC
FCU8-DU141-31 : 12VDC/5VDC/3.3VDC
FCU8-DU182-31 : 12VDC/5VDC/3.3VDC
FCU8-DU181-31 : 12VDC/5VDC/3.3VDC
FCU8-DU182-34 : 12VDC/5VDC/3.3VDC
FCU8-DU181-34 : 12VDC/5VDC/3.3VDC
FCU8-DU191-75 : 12VDC/5VDC
FCU8-DU192-75 : 12VDC/5VDC
24VDC 24VDC
(Supply from personal computer unit or graphic
control unit)
Current consumption - (Note 4) 2.2A 2.5A
Maximum
heating value(W)
FCU8-DU142-31 / FCU8-DU141-31 : 10
FCU8-DU182-31 / FCU8-DU181-31 : 14
FCU8-DU182-34 / FCU8-DU181-34 : 18
FCU8-DU191-75 / FCU8-DU192-75 : 21
32 12
Mass (kg)
FCU8-DU142-31 / FCU8-DU141-31 : 1.7
FCU8-DU182-31 : 4.1
FCU8-DU181-31 : 4
FCU8-DU182-34 : 3.9
FCU8-DU181-34 : 4
FCU8-DU191-75 / FCU8-DU192-75 : 5.7
1.2 1.1
Outline
dimension
WH
or
WHD
(mm)
FCU8-DU142-31 / FCU8-DU141-31 : 290220
FCU8-DU182-31 / FCU8-DU181-31 : 400320
FCU8-DU182-34 / FCU8-DU181-34 : 400320
FCU8-DU191-75 : 365440
FCU8-DU192-75 : 440365
23718253.5 239.1173.475
M800/M80/E80/C80 Series Specifications Manual (Hardware)
4 General Specifications (M800W/M80W Series)
27 IB-1501506-M
(Note 1) "Short term" means within one month.
(Note 2) The current consumption of the keyboard unit is included in that of the operation panel I/O unit or the graphic control unit.
(Note 3) Current consumption for the I/O circuit needs to be separately calculated based on the number of points used and its load.
(Note 4) The current consumption of FCU8-DX730 is included in that of the graphic control unit.
(Note 5) For the heating value of the I/O circuit, calculate with the number of points used.
(Note 6) For the whole NC system, consider the characteristics of the drive units when the altitude is more than 1000 meters above sea level. Refer to the manual of drive unit for details.
(Note 7) 24V power input is not required for FCU8-KB931/KB941.
Item
Unit name Keyboard unit Operation panel I/O unit Machine operation panel
Type
FCU8-KB041/KB046 :
(10.4-type)
FCU8-KB047 : (10.4-
type/vertical
arrangement)
FCU8-KB048 : (10.4-
type)
FCU8-KB083 : (15-type/
vertical arrangement)
FCU8-DX830/
DX834/DX837 FCU8-DX730
FCU8-KB921/KB922/
KB925
FCU8-KB923/KB924/
KB926
FCU8-KB931/KB941
General
Specifications
Ambient
temperature
During
operation 0 to 58C
During
storage -20 to 60C
Ambient

humidity
Long term 10 to 75% RH (with no dew condensation)
Short term 10 to 95% RH (with no dew condensation) (Note 1)
Vibration resistance 4.9m/s2 [0.5G] or less
Shock resistance 29.4m/s2 [3G] or less
Working atmosphere No corrosive gases, dust or oil mist
Altitude Operation/Storage: 1000 meters or less above sea level,
Transportation: 13000 meters or less above sea level
Power supply voltage
5VDC
24VDC
5VDC, 3.3VDC
24VDC (Note 7) (Supply from Operation
Panel I/O Unit)
(Supply from
Graphic Control
Unit)
Current consumption - (Note 2) 0.3A (Note 3) - (Note 3,4) 0.3A (Note 7)
Maximum
heating value(W) 1 8 (Note 5) 4 (Note 5) 7.2
Mass (kg)
FCU8-KB041/KB046 :
0.8
FCU8-KB047 : 1.3
FCU8-KB048 : 1.4
FCU8-KB083 : 1.5
0.4 0.3
FCU8-KB921/KB922/
KB925 :
1.1
FCU8-KB923/KB924/
KB926 :
1.2
FCU8-KB931/KB941 :
0.5
Outline
dimension
WH
(mm)
FCU8-KB041/KB046 :
140220
FCU8-KB047 : 290160
FCU8-KB048 : 230220
FCU8-KB083 : 400140
116179
FCU8-KB921/KB922/
KB925 :
260140
FCU8-KB923/KB924/
KB926 :
290140
FCU8-KB931/KB941 :
140140
M800/M80/E80/C80 Series Specifications Manual (Hardware)
4 General Specifications (M800W/M80W Series)
IB-1501506-M 28
4.1.2 Environment Conditions inside the Control Panel
(Note 1) "Short term" means within one month.
(Note 2) For the whole NC system, consider the characteristics of the drive units when the altitude is more than 1000 meters above sea level. Refer to the manual of drive unit for details.
Item
Unit name Control unit
Type FCU8-MU042
FCU8-MA041
General
Specifications
Ambient
temperature
During operation 0 to 55C
During storage -20 to 60C
Ambient
humidity
Long term 10 to 75% RH (with no dew condensation)
Short term 10 to 95% RH (with no dew condensation) (Note 1)
Vibration resistance 4.9m/s2 [0.5G] or less
Shock resistance 29.4m/s2 [3G] or less
Working atmosphere No corrosive gases, dust or oil mist
Altitude Operation/Storage: 1000 meters or less above sea level,
Transportation: 13000 meters or less above sea level
Power supply voltage 24VDC
Current consumption 1.5A
Maximum
heating value(W) 16
Mass (kg) 2.0
Outline
dimension
WHD
(mm) 90380180

(Note 1) "Short term" means roughly within one month.
(Note 2) This value includes the maximum value of DO external load current (3.2A).
(Note 3) This value does not include DO external load current.
(Note 4) For the heating value of the I/O circuit, calculate with the number of points used.
(Note 5) For the whole NC system, consider the characteristics of the drive units when the altitude is more than 1000 meters above sea level. Refer to the manual of drive unit for details.
(Note 6) The maximum value including the heating value of analog input circuit.

Item					
Unit name	Remote I/O unit				
Type	FCU8-DX220/ DX230/ DX231	FCU8-DX202	FCU8-DX213/ DX213-1/ DX654/ DX654-1	FCU8-DX408	FCU8-DX409 FCU8-DX651
General Specifications					
Ambient temperature					
During operation	0 to 58C				
During storage	-20 to 60C				
Ambient humidity	Long term 10 to 75% RH (with no dew condensation) Short term 10 to 95% RH (with no dew condensation) (Note 1)				10 to 85% RH (with no dew condensation) (Note 1)
Vibration resistance	4.9m/s2 or less				
Shock resistance	29.4m/s2 or less				
Working atmosphere	No corrosive gases, dust or oil mist				
Altitude	Operation/Storage: 1000 meters or less above sea level, Transportation: 13000 meters or less above sea level				
Power supply voltage	24VDC				
Current consumption	3.5A (Note 2)	0.3A	0.3A (Note 3)	0.1A	0.2A 3.7A (Note 2)
Maximum heating value (W)	8 (Note 4)	3	6 (Note 6)	8 (Note 4)	
Mass (kg)	0.4	0.2	0.3	0.8	
Outline dimension WHD (mm)	40175133	40175119	40175130	40175109	40175130 104175115

4.1.3 24VDC Stabilized Power Supply Selecting Conditions
Consider the following characteristics for the stabilized power supply, and select the power supply that complies with laws, regulations, or safety standards of the country where the machine will be installed.

Item	Specifications	Remarks
Output Voltage	24VDC	When the stabilized power supply and 24VDC input unit are distant, select the stabilized power supply which is possible to set output voltage 24VDC or more allowing for the influence of voltage down by the cable.
Voltage fluctuation	5%	
Current	-	Calculate the current value as a reference of maximum current consumption for the unit which uses the power supply.
Ripple noise	0.2V (P-P)	
Output holding time	min 20ms	Output holding time is decided by loading ratio; however, the stabilized power supply which complies with the specification on the left must be selected during maximum loading.
Overcurrent output shutoff function	-	Use a power supply having the overcurrent output shutoff function.

CAUTION
1. Using a stabilized power supply without overcurrent protection may cause the unit's failure due to miswiring of 24V.

4.2 Environment Conditions [M80W]
4.2.1 Environment Conditions inside the Operation Panel
(Note 1) "Short term" means within one month.
(Note 2) For the whole NC system, consider the characteristics of the drive units when the altitude is more than 1000 meters above sea level. Refer to the manual of drive unit for details.

(Note 3) When the display unit is mounted on an incline, the inclination angle to place the unit should follow below.
8.4, 10.4, or 15-type display unit: the inclination should be 30 degrees or less from the vertical direction.
19-type display unit: the inclination should be 60 degrees or less from the vertical direction.
(Note 4) The current consumption of the display unit is included in that of the personal computer unit or the graphic control unit.

Item	Unit name Display unit	Personal computer unit	Graphic control unit
Type	FCU8-DU121-12 : (8.4-type) FCU8-DU142-32 / FCU8-DU141-32 : (10.4-type) FCU8-DU182-32 / FCU8-DU181-32 : (15-type) FCU8-DU182-36 / FCU8-DU181-36 : (15-type) FCU8-DU191-77 / FCU8-DU192-77 : (19-type)	FCU8-PC231	FCU8-GC211
General Specifications			
Ambient temperature	During operation 0 to 58C During storage -20 to 60C		
Ambient humidity	Long term 10 to 75% RH (with no dew condensation) Short term 10 to 95% RH (with no dew condensation) (Note 1)		
Vibration resistance	4.9m/s2 [0.5G] or less		
Shock resistance	29.4m/s2 [3G] or less		
Working atmosphere	No corrosive gases, dust or oil mist		
Altitude	Operation/Storage: 1000 meters or less above sea level, Transportation: 13000 meters or less above sea level		
Power supply voltage	FCU8-DU121-12 : 12VDC/3.3VDC FCU8-DU142-32 : 12VDC/5VDC/3.3VDC FCU8-DU141-32 : 12VDC/5VDC/3.3VDC FCU8-DU182-32 : 12VDC/5VDC/3.3VDC FCU8-DU181-32 : 12VDC/5VDC/3.3VDC FCU8-DU182-36 : 12VDC/5VDC/3.3VDC FCU8-DU181-36 : 12VDC/5VDC/3.3VDC FCU8-DU191-77 : 12VDC/5VDC FCU8-DU192-77 : 12VDC/5VDC	24VDC	24VDC (Supply from personal computer unit or graphic control unit)
Current consumption	-	(Note 4) 2.2A	2.5A
Maximum heating value(W)	FCU8-DU121-12 : 6 FCU8-DU142-32 / FCU8-DU141-32 : 10 FCU8-DU182-32 / FCU8-DU181-32 : 14 FCU8-DU182-36 / FCU8-DU181-36 : 18 FCU8-DU191-77 / FCU8-DU192-77 : 21	32	12
Mass (kg)	FCU8-DU121-12 : 1.2 FCU8-DU142-32 / FCU8-DU141-32 : 1.7 FCU8-DU182-32 : 4.1 FCU8-DU181-32 : 4 FCU8-DU182-36 : 3.9 FCU8-DU181-36 : 4 FCU8-DU191-77 / FCU8-DU192-77 : 5.7	1.2	1.1
Outline dimension WH or WHD (mm)	FCU8-DU121-12 : 260200 FCU8-DU142-32 / FCU8-DU141-32 : 290220 FCU8-DU182-32 / FCU8-DU181-32 : 400320 FCU8-DU182-36 / FCU8-DU181-36 : 400320 FCU8-DU191-77 : 365440 FCU8-DU192-77 : 440365	23718253.5	239.1173.475

(Note 1) "Short term" means within one month.
(Note 2) The current consumption of the keyboard unit is included in that of the operation panel I/O unit or the graphic control unit.
(Note 3) Current consumption for the I/O circuit needs to be separately calculated based on the number of points used and its load.
(Note 4) The current consumption of FCU8-DX730 is included in that of the graphic control unit.
(Note 5) For the heating value of the I/O circuit, calculate with the number of points used.
(Note 6) For the whole NC system, consider the characteristics of the drive units when the altitude is more than 1000 meters above sea level. Refer to the manual of drive unit for details.
(Note 7) 24V power input is not required for FCU8-KB931/KB941.

Item
Unit name Keyboard unit Operation panel I/O unit Machine operation panel
Type
FCU8-KB026/KB028 :
(8.4-type)
FCU8-KB029 : (8.4-type/
vertical arrangement)
FCU8-KB041/KB046 :
(10.4-type)
FCU8-KB047 : (10.4-
type/vertical
arrangement)
FCU8-KB048 : (10.4-
type)
FCU8-KB083 : (15-type/
vertical arrangement)
FCU8-DX830/
DX834/DX837 FCU8-DX730
FCU8-KB921/KB922/
KB925
FCU8-KB923/KB924/
KB926
FCU8-KB931/KB941
General
Specifications
Ambient
temperature
During
operation 0 to 58C
During
storage -20 to 60C
Ambient
humidity
Long term 10 to 75% RH (with no dew condensation)
Short term 10 to 95% RH (with no dew condensation) (Note 1)
Vibration resistance 4.9m/s2 [0.5G] or less
Shock resistance 29.4m/s2 [3G] or less
Working atmosphere No corrosive gases, dust or oil mist
Altitude Operation/Storage: 1000 meters or less above sea level,
Transportation: 13000 meters or less above sea level
Power supply voltage
5VDC
24VDC
5VDC, 3.3VDC
24VDC (Note 7) (Supply from Operation
Panel I/O Unit)
(Supply from
Graphic Control
Unit)
Current consumption - (Note 2) 0.3A (Note 3) - (Note 3,4) 0.3A (Note 7)
Maximum
heating value(W) 1 8 (Note 5) 4 (Note 5) 7.2
Mass (kg)
FCU8-KB026/KB028 :
0.75
FCU8-KB029 :1.0
FCU8-KB041/KB046 :
0.8
FCU8-KB047 : 1.3
FCU8-KB048 : 1.4
FCU8-KB083 : 1.5
0.4 0.3
FCU8-KB921/KB922/
KB925 :
1.1
FCU8-KB923/KB924/
KB926 :
1.2
FCU8-KB931/KB941 :
0.5
Outline
dimension
WH
(mm)
FCU8-KB026/KB028 :
140200
FCU8-KB029 : 260140
FCU8-KB041/KB046 :
140220
FCU8-KB047 : 290160
FCU8-KB048 : 230220
FCU8-KB083 : 400140
116179
FCU8-KB921/KB922/
KB925 :
260140
FCU8-KB923/KB924/
KB926 :

290140
FCU8-KB931/KB941 :
140140

4.2.2 Environment Conditions inside the Control Panel
(Note 1) "Short term" means within one month.
(Note 2) For the whole NC system, consider the characteristics of the drive units when the altitude is more than 1000 meters above sea level. Refer to the manual of drive unit for details.

Item		
Unit name	Control unit	
Type	FCU8-MU044	
General Specifications		
Ambient temperature	During operation	0 to 55C
	During storage	-20 to 60C
Ambient humidity	Long term	10 to 75% RH (with no dew condensation)
	Short term	10 to 95% RH (with no dew condensation) (Note 1)
Vibration resistance	4.9m/s2 [0.5G] or less	
Shock resistance	29.4m/s2 [3G] or less	
Working atmosphere	No corrosive gases, dust or oil mist	
Altitude	Operation/Storage: 1000 meters or less above sea level, Transportation: 13000 meters or less above sea level	
Power supply voltage	24VDC	
Current consumption	1.25A	
Maximum heating value(W)	16	
Mass (kg)	2.0	
Outline dimension WHD (mm)	60380180	

(Note 1) "Short term" means roughly within one month.
(Note 2) This value includes the maximum value of DO external load current (3.2A).
(Note 3) This value does not include DO external load current.
(Note 4) For the heating value of the I/O circuit, calculate with the number of points used.
(Note 5) For the whole NC system, consider the characteristics of the drive units when the altitude is more than 1000 meters above sea level. Refer to the manual of drive unit for details.
(Note 6) The maximum value including the heating value of analog input circuit.

Item					
Unit name	Remote I/O unit				
Type	FCU8-DX220/ DX230/ DX231	FCU8-DX202	FCU8-DX213/ DX213-1/ DX654/ DX654-1	FCU8-DX408	FCU8-DX409 FCU8-DX651
General Specifications					
Ambient temperature	During operation	0 to 58C			
	During storage	-20 to 60C			
Ambient humidity	Long term	10 to 75% RH (with no dew condensation)			
	Short term	10 to 95% RH (with no dew condensation) (Note 1)	10 to 85% RH (with no dew condensation) (Note 1)		
Vibration resistance	4.9m/s2 or less				
Shock resistance	29.4m/s2 or less				
Working atmosphere	No corrosive gases, dust or oil mist				
Altitude	Operation/Storage: 1000 meters or less above sea level, Transportation: 13000 meters or less above sea level				
Power supply voltage	24VDC				
Current consumption	3.5A (Note 2)	0.3A	0.3A (Note 3)	0.1A	0.2A 3.7A (Note 2)
Maximum heating value (W)	8 (Note 4)	3	6 (Note 6)	8 (Note 4)	
Mass (kg)	0.4	0.2	0.3	0.8	

Outline
dimension
WHD
(mm) 40175133 40175119 40175130 40175109 40175130 104175115

4.2.3 24VDC Stabilized Power Supply Selecting Conditions
Consider the following characteristics for the stabilized power supply, and select the power supply that complies with laws, regulations, or safety standards of the country where the machine will be installed.

Item	Specifications	Remarks
Output		
Voltage	24VDC	When the stabilized power supply and 24VDC input unit are distant, select the stabilized power supply which is possible to set output voltage 24VDC or more allowing for the influence of voltage down by the cable.
Voltage fluctuation	5%	
Current	-	Calculate the current value as a reference of maximum current consumption for the unit which uses the power supply.
Ripple noise	0.2V (P-P)	
Output holding time	min 20ms	Output holding time is decided by loading ratio; however, the stabilized power supply which complies with the specification on the left must be selected during maximum loading.
Overcurrent output shutoff function	-	Use a power supply having the overcurrent output shutoff function.

CAUTION
1. Using a stabilized power supply without overcurrent protection may cause the unit's failure due to miswiring of 24V.

4.3 Control Unit [M800W]
4.3.1 M830W(FCU8-MU042) / M850W(FCU8-MA041)
[Outline dimension]
80 or more
100 or more 100 or more
Top
Bottom
[mm]
90 180
380

[Installation dimension]
45
10 360
[mm] 90 (Unit outline)
380 (Unit outline)
2-M5
Screw

4.4 Control Unit [M80W]
4.4.1 FCU8-MU044
[Outline dimension]
80 or more
100 or more 100 or more
Top
Bottom
[mm]
60 180
380

[Installation dimension]
30
10 360
[mm]
40 10
60 (Unit outline)
380 (Unit outline)
3-M5 Screw

4.5 Display Unit [M800W]
4.5.1 10.4-type (FCU8-DU142-31 / FCU8-DU141-31)
[Outline dimension]
(Note) The figure above shows the state with the graphic control unit mounted.
[Panel cut dimension]
290
220
9.5
[mm]

110
(Space required for wiring)
Top
Bottom
0.5
2060.3
1920.3
2760.3
20.2
(7) (7) 12 12
[mm]
290
277
207
220
2720.3
7 7
(7) (7)
70.2
4-C 2
4-M3
0.5
(Unit outline)
(Unit outline)
(Square hole dimension)
(Square hole dimension)
screw
4 - 4 holes

4.5.2 15-type (FCU8-DU182-31 / FCU8-DU181-31)
[Outline dimension: FCU8-DU182-31]
(Note) The figure above shows the state with the graphic control unit mounted.
400
320
9.5
[mm]
A
(Space required
for wiring)
Top
Bottom

[Outline dimension: FCU8-DU181-31]
(Note) The figure above shows the state with the graphic control unit mounted.
400
320
9.5
[mm]
110
(Space required
for wiring)
Top
Bottom

[Panel cut dimension]
0.5
1930.3
1380.3
3020.3
1530.3
1930.3
193.5
80.2 80.2
20.2
(7) (7)
12 12
[mm]
a
a a a
a
a
a a a a
b
b b
b
b
b
b
b
400
387
307

320
1990.3 1830.3
1530.3
1540.3
18
5
7 7
13
26
7
(7) (7)
70.2
12-C 2
8-M3
(Unit outline)
(Unit outline)
(Square hole dimension)
(Square hole dimension)
10 - 4 holes
screw

4.5.3 15-type (FCU8-DU182-34 / FCU8-DU181-34)
[Outline dimension]
(Note) The figure above shows the state with the personal computer unit mounted.
400
320
9.5
[mm]
72
Top
Bottom

[Panel cut dimension]
0.5
1930.3
1380.3
3020.3
1530.3
1930.3
193.5
80.2 80.2
20.2
(7) (7)
12 12
[mm]
a
a a a
a
a
a a a a
b
b b
b
b
b
b
b
400
387
307
320
1990.3 1830.3
1530.3
1540.3
18
5
7 7
13
26
7
(7) (7)
70.2
12-C 2
8-M3
(Unit outline)
(Unit outline)
(Square hole dimension)
(Square hole dimension)
10 - 4 holes
screw

4.5.4 19-type (FCU8-DU191-75)

[Outline dimension]
(Note) The figure above shows the state with the personal computer unit and the operation panel I/O unit mounted.
365
440
24
[mm]
105
(Space required for wiring)
Top
Bottom

[Panel cut dimension]
6.5
4160.3
170.50.3
2730.3
1430.3
1480.3
2220.3
3700.3
170.50.3
188.50.3 154.50.3
170.2 170.2
230.2
10.2
164
(12) (12)
(12) (12)
[mm]
a
a
a
a a
a
a
a
a a a a
b
b
b
b
b
b
b
b
b
b
365 (Unit outline)
440 (Unit outline)
328 (Square hole dimension)
403 (Square hole dimension)
10- 5 holes
12- 9 holes

4.5.5 19-type (FCU8-DU192-75)
[Outline dimension]
(Note) The figure above shows the state with the personal computer unit and the operation panel I/O unit mounted.
365
440 24
[mm]
105
(Space required for wiring)
Top
Bottom

[Panel cut dimension]
6.5
4160.3
1710.3
2730.3
187.50.3
170.50.3
153.50.3
230.2
10.2
(12) (12)
(12) (12)
[mm]
4170.3
2450.3

1430.3
10.2
6.5
3930.3
3420.3
3410.3
365 (Unit outline)
440 (Unit outline)
328
(Square hole dimension)
403
(Square hole
dimension)
10- 5 holes
12- 9 holes
Square hole

4.6 Display Unit [M80W]
4.6.1 8.4-type (FCU8-DU121-12)
[Outline dimension]
(Note 1) The 8.4-type display unit is incompatible with the touchscreen.
(Note 2) The figure above shows the state with the graphic control unit mounted.
[Panel cut dimension]
260
200
9.5
[mm]
110
(Space required for wiring)
Top
Bottom
0.5
1860.3
1720.3
2460.3
20.2
(7) (7) 12 12
[mm]
260
247
187
200
2420.3
7 7
(7) (7)
70.2
4-C 2
4-M3
0.5
(Unit outline)
(Unit outline)
(Square hole dimension)
(Square hole dimension)
screw
4 - 4 holes

4.6.2 10.4-type (FCU8-DU142-32 / FCU8-DU141-32)
[Outline dimension]
(Note) The figure above shows the state with the graphic control unit mounted.
[Panel cut dimension]
290
220
9.5
[mm]
110
(Space required for wiring)
Top
Bottom
0.5
2060.3
1920.3
2760.3
20.2
(7) (7) 12 12
[mm]
290
277
207
220
2720.3
7 7
(7) (7)
70.2
4-C 2

4-M3
0.5
(Unit outline)
(Unit outline)
(Square hole dimension)
(Square hole dimension)
screw
4 - 4 holes

4.6.3 15-type (FCU8-DU182-32 / FCU8-DU181-32)
[Outline dimension: FCU8-DU182-32]
(Note) The figure above shows the state with the graphic control unit mounted.
400
320
9.5
[mm]
A
Top
Bottom
(Space required
for wiring)

[Outline dimension: FCU8-DU181-32]
(Note) The figure above shows the state with the graphic control unit mounted.
400
320
9.5
[mm]
110
(Space required
for wiring) Top
Bottom

[Panel cut dimension]
0.5
1930.3
1380.3
3020.3
1530.3
1930.3
193.5
80.2 80.2
20.2
(7) (7)
12 12
[mm]
a
a a a
a
a
a a a a
b
b b
b
b
b
b
b
400
387
307
320
1990.3 1830.3
1530.3
1540.3
18
5
7 7
13
26
7
(7) (7)
70.2
12-C 2
8-M3
(Unit outline)
(Unit outline)
(Square hole dimension)
(Square hole dimension)
10 - 4 holes
screw

4.6.4 15-type (FCU8-DU182-36 / FCU8-DU181-36)
[Outline dimension]
(Note) The figure above shows the state with the personal computer unit mounted.
400
320
9.5
[mm]
72
(Space required
for wiring)
Top
Bottom

[Panel cut dimension]
0.5
1930.3
1380.3
3020.3
1530.3
1930.3
193.5
80.2 80.2
20.2
(7) (7)
12 12
[mm]
a
a a a
a
a
a a a a
b
b b
b
b
b
b
b
400
387
307
320
1990.3 1830.3
1530.3
1540.3
18
5
7 7
13
26
7
(7) (7)
70.2
12-C 2
8-M3
(Unit outline)
(Unit outline)
(Square hole dimension)
(Square hole dimension)
10 - 4 holes
screw

4.6.5 19-type (FCU8-DU191-77)
[Outline dimension]
(Note) The figure above shows the state with the personal computer unit and the operation panel I/O unit
mounted.
365
440
24
[mm]
105
(Space required for wiring)
Top
Bottom

[Panel cut dimension]
6.5
4160.3
170.50.3
2730.3

1430.3
1480.3
2220.3
3700.3
170.50.3
188.50.3 154.50.3
170.2 170.2
230.2
10.2
164
(12) (12)
(12) (12)
[mm]
a
a
a
a a
a
a
a
a a a a
b
b
b
b
b
b
b
b
b
b
365 (Unit outline)
440 (Unit outline)
328 (Square hole dimension)
403 (Square hole dimension)
10- 5 holes
12- 9 holes

4.6.6 19-type (FCU8-DU192-77)
[Outline dimension]
(Note) The figure above shows the state with the personal computer unit and the operation panel I/O unit mounted.
365
440 24
[mm]
105
(Space required for wiring)
Top
Bottom

[Panel cut dimension]
6.5
4160.3
1710.3
2730.3
187.50.3
170.50.3
153.50.3
230.2
10.2
(12) (12)
(12) (12)
[mm]
4170.3
2450.3
1430.3
10.2
6.5
3930.3
3420.3
3410.3
365 (Unit outline)
440 (Unit outline)
328
(Square hole dimension)
403
(Square hole
dimension)
10- 5 holes
12- 9 holes
Square hole

4.7 Personal Computer Unit
4.7.1 Personal Computer Unit (FCU8-PC231)
[Outline dimension]
4.7.2 Built-in Disk of the Display Unit (FCU8-CF032G-1)
[Outline dimension]
220 35 53.5
2.5
237
182

(Unit mount surface)
42.8 3.3 36.4

4.8 Graphic Control Unit
4.8.1 FCU8-GC211
[Outline dimension]
(Note) Refer to the following chapter for the space required for wiring.
"4.5 Display Unit [M800W]"
"4.6 Display Unit [M80W]"
[mm]
47
156
172.4
173.4
28
214.5
239.1
208
11
6
6

4.9 Keyboard Unit
4.9.1 Keyboard for 8.4-type Display Unit (FCU8-KB026)
[Outline dimension]
(Note) The above side view shows the state with the operation panel I/O unit mounted.
[Panel cut dimension]
140
200
9.5
[mm]
110
(Space required for wiring)
Top
Bottom
[mm]
1280.3
140
127
1260.3
0.5
187
1860.3
1730.3
(7) (7)
(7) (7)
9
13
9
13
(6.5)
3.5 3.5 0.5
6.50.2
(6.5)
10.2 4-M3
200
(Unit outline)
(Unit outline)
(Square hole
dimension)
(Square hole dimension)
screw
4 - 4 holes

4.9.2 Keyboard for 8.4-type Display Unit (FCU8-KB028)
[Outline dimension]
(Note) The above side view shows the state with the operation panel I/O unit mounted.
[Panel cut dimension]
140
200
9.5
[mm]

110
(Space required for wiring)
Top
Bottom
[mm]
1280.3
140
127
1260.3
0.5
187
1860.3
1730.3
(7) (7)
(7) (7)
9
13
9
13
(6.5)
3.5 3.5 0.5
6.50.2
(6.5)
10.2 4-M3
200
(Unit outline)
(Unit outline)
(Square hole
dimension)
(Square hole dimension)
screw
4 - 4 holes

4.9.3 Keyboard for 8.4-type Display Unit (FCU8-KB029)
[Outline dimension]
(Note) The above side view shows the state with the operation panel I/O unit mounted.
[Panel cut dimension]
[mm]
260
140
9.5 110
(Space required for wiring)
Top
Bottom
[mm]
2480.3
260
247
2460.3
0.5
127
1260.3
1130.3
(7) (7)
(7) (7)
9
13 13
9
(6.5)
3.5 3.5 0.5 (6.5)
6.50.2
10.2
4-M3
140
(Unit outline)
(Unit outline)
(Square hole dimension)
(Square hole
dimension)
screw
4 - 4 holes

4.9.4 Keyboard for 10.4-type Display Unit (FCU8-KB041)
[Outline dimension]
(Note) The above side view shows the state with the operation panel I/O unit mounted.
[Panel cut dimension]
140
220
9.5
[mm]
110
(Space required for wiring)
Top
Bottom

[mm]
1280.3
140
127
1260.3
0.5
207
2060.3
1930.3
(7) (7)
(7) (7)
9
13
9
13
(6.5)
3.5 3.5 0.5
6.50.2
(6.5)
10.2 4-M3
220
(Unit outline)
(Unit outline)
(Square hole
 dimension)
(Square hole dimension)
screw
4 - 4 holes

4.9.5 Keyboard for 10.4-type Display Unit (FCU8-KB046)
[Outline dimension]
(Note) The above side view shows the state with the operation panel I/O unit mounted.
[Panel cut dimension]
140
220
9.5
[mm]
110
(Space required for wiring)
Top
Bottom
[mm]
1280.3
140
127
1260.3
0.5
207
2060.3
1930.3
(7) (7)
(7) (7)
9
13
9
13
(6.5)
3.5 3.5 0.5
6.50.2
(6.5)
10.2 4-M3
220
(Unit outline)
(Unit outline)
(Square hole
 dimension)
(Square hole dimension)
screw
4 - 4 holes

4.9.6 Keyboard for 10.4-type Display Unit (FCU8-KB047)
[Outline dimension]
(Note) The above side view shows the state with the operation panel I/O unit mounted.
[Panel cut dimension]
290
160
9.5
[mm]
110
(Space required for wiring)
Top
Bottom
[mm]
2780.3

290
277
2760.3
0.5
147
1460.3
1330.3
(7) (7)
(7) (7)
9
13
9
13
(6.5)
3.5 3.5 0.5
6.50.2
(6.5)
10.2
4-M3
160
(Unit outline)
(Unit outline)
(Square hole dimension)
(Square hole
 dimension)
screw
4 - 4 holes

4.9.7 Keyboard for 10.4-type Display Unit (FCU8-KB048)
[Outline dimension]
(Note) The above side view shows the state with the operation panel I/O unit mounted.
[Panel cut dimension]
[mm]
230
220
9.5 110
(Space required for wiring)
Top
Bottom
[mm]
2180.3
230
217
2160.3
0.5
207
2060.3
1930.3
(7) (7)
(7) (7)
9
13 13
9
(6.5)
3.5 3.5 0.5
6.50.2
(6.5)
10.2
4-M3
220
(Unit outline)
(Unit outline)
(Square hole dimension)
(Square hole
 dimension)
screw
4 - 4 holes

4.9.8 Keyboard for 15-type Display Unit (FCU8-KB083)
[Outline dimension]
(Note) The above side view shows the state with the operation panel I/O unit mounted.
[Panel cut dimension]
400
140
9.5
[mm]
110
(Space required for wiring)
Top
Bottom
[mm]
200.50.3
400
387

1930.3
193.5
127
1260.3
1130.3
(7) (7)
(7) (7)
9
13
9
13
(6.5)
3.5 3.5 0.5 (6.5)
6.50.2
6-M3
140
187.50.3
1930.3
1280.3 (6)
6.50.2 6.50.2 (6) 3.5
4
3.5
4
9
18
10.2
(Unit outline)
(Unit outline)
(Square hole dimension)
(Square hole
 dimension)
screw
8 - 4 holes

4.10 Operation Panel I/O Unit
4.10.1 List of Units
(Note) The connection method of DO (CG32/CG34) of FCU8-DX834 is different from other operation panel I/O units.
Be careful not to connect to a wrong connector. See the descriptions mentioned in the later section for more
specific explanation on connections.
Classification Type Components Remarks
DI 24V/0V common input [64 points]
DO Source output [64 points] FCU8-DX830
Base card
Add-on card
RIO 2.0 terminator connector (R2-TM)
DI: 64-points 24V/0V common type
DO: 64-points source type (200mA/point)
Manual pulse generator input: 3ch
Display unit I/F
Keyboard unit I/F
Emergency stop input
Remote I/O 2.0 I/F
RIO occupied stations (fixed):
 1 to 4, 7 to 14, 20 to 22
RIO extensible stations:
 5, 6, 15 to 19, 23 to 64
(Note) J291 cable is required for connection with
the personal computer unit.
(for windows-based display)
DI 24V/0V common input [64 points]
DO Source output [64 points]
Scan input [64 points]
Scan output [64 points]
FCU8-DX834
(Note)
Base card
Add-on card
RIO 2.0 terminator connector (R2-TM)
DI: 64-points 24V/0V common type
DO: 64-points source type (200mA/point)
Scan input: 64 points
Scan output: 64 points
Manual pulse generator input: 3ch
Display unit I/F
Keyboard unit I/F
Emergency stop input
Remote I/O 2.0 I/F
RIO occupied stations (fixed):
 1 to 4, 7 to 14, 20 to 22
RIO extensible stations:
 5, 6, 15 to 19, 23 to 64
(Note) J291 cable is required for connection with
the personal computer unit.
(for windows-based display)
DI 24V/0V common input [64 points]
DO Source output [64 points]

Safety DI 24V/0V common input [8 points]
FCU8-DX837
Base card
Add-on card
RIO 2.0 terminator connector (R2-TM)
DI: 64-points 24V/0V common type
DO: 64-points source type (200mA/point)
Safety DI: 8-points 0V common type
Manual pulse generator input: 3ch
Display unit I/F
Keyboard unit I/F
Emergency stop input
Remote I/O 2.0 I/F
RIO occupied stations (fixed):
1 to 4, 7 to 14, 20 to 22
RIO extensible stations:
5, 6, 15 to 19, 23 to 64
(Note) J291 cable is required for connection with
the personal computer unit.
(for windows-based display)
DI 24V/0V common input [64 points]
DO Source output [64 points] FCU8-DX730 Base card
RIO 2.0 terminator connector (R2-TM)
DI: 64-points 24V/0V common type
DO: 64-points source type (200mA/point)
Manual pulse generator input: 3ch
Graphic control unit I/F
Keyboard unit I/F
Remote I/O 2.0 I/F
RIO occupied stations (fixed):
1, 2, 7 to 12, 20 to 22
RIO extensible stations:
3 to 6, 15 to 19, 23 to 64
(13 and 14 are occupied by the graphic control
unit.)
(Note) J010 cable is required for connection with
the graphic control unit.
(for non-Windows-based display)

4.10.2 FCU8-DX830 / FCU8-DX834 / FCU8-DX837 / FCU8-DX730
[Outline dimension : FCU8-DX830]
[Outline dimension : FCU8-DX834]
[mm]
116
179
99 (Space required for wiring)
[mm]
116
179
99 (Space required for wiring)

[Outline dimension : FCU8-DX837]
[Outline dimension : FCU8-DX730]
[mm]
116
179
99 (Space required for wiring)
[mm]
116
179
99 (Space required for wiring)

[Installation dimension : FCU8-DX830 / FCU8-DX834 / FCU8-DX837 / FCU8-DX730]
(Note) The unit thickness of the fixed part with screws is 16.6mm.
Select the fixing screws having the length suitable for the thickness.
1710.3
(5)
(4)
1060.3
(4)
(5)
[mm]
4-M3 screw
116 (Unit outline)
179 (Unit outline)

4.11 Remote I/O Unit
Types of signals described on the list of units can be input/output from the remote I/O unit (FCU8-DXxxx) according to the type and No. of contacts. Remote I/O units are used by being connected to the control unit or the operation panel I/O unit.

Multiple remote I/O units can be used as long as the total number of occupied stations is 64 or less.
(Note) The maximum connectable number of remote I/O units is 32.
4.11.1 List of Units
Classification Type Components Remarks
DI 24V/0V common input [32 points]
DO Source output [32 points] FCU8-DX220 Base card
RIO 2.0 connector set
DI: 32-points 24V/0V common type
Do: 32-points source type (200mA/point)
Number of occupied stations: 1
DI 24V/0V common input [64 points]
DO Source output [48 points] FCU8-DX230 Base card
RIO 2.0 connector set
DI: 64-points 24V/0V common type
DO: 48-points source type (200mA/point)
Number of occupied stations: 2
DI 24V/0V common input
DO Source output [48 points]
AO Analog output [1 point]
FCU8-DX231 Base card
RIO 2.0 connector set
DI: 64-points 24V/0V common type
DO: 48-points source type (200mA/point)
AO: 1 point
Number of occupied stations: 2
AI Analog input [4 points]
AO Analog output [1 point] FCU8-DX202 Base card
RIO 2.0 connector set
AI : 4 points
AO: 1 point
Number of occupied stations: 1
DI 0V common input [16 points]
DO Source output (large capacity) [8
points]
FCU8-DX213 Base card
RIO 2.0 connector set
DI: 16-points 0V common type (3mA/point)
DO: 8-points source type (2A/point)
Number of occupied stations: 1
DI 0V common input [16 points]
DO Source output (large capacity) [8
points]
FCU8-DX213-1 Base card
RIO 2.0 connector set
DI: 16-points 0V common type (9mA/point)
DO: 8-points source type (2A/point)
Number of occupied stations: 1
Safety DI 0V common input [8 points]
Safety DO Source output (large capacity)
[4 points]
FCU8-DX654 Base card
RIO 2.0 connector set
Safety DI: 8-points 0V common type (3mA/point)
Safety DO: 4-points source type (2A/point)
Number of occupied stations: 2
Safety DI 0V common input [8 points]
Safety DO Source output (large capacity)
[4 points]
FCU8-DX654-1 Base card
RIO 2.0 connector set
Safety DI: 8-points 0V common type (9mA/point)
Safety DO: 4-points source type (2A/point)
Number of occupied stations: 2
DI 24V/0V common input [32points]
DO Source output [32 points]
Safety DI 0V common input [8 points]
(Note 1)
Safety relay output [4 points] (Note 2)
FCU8-DX651
Base card
Add-on card
RIO 2.0 connector set
DI: 32-points 24V/0V common type
Do: 32-points source type (200mA/point)
Safety DI: 8-points 0V common type
Safety relay: 4-points (non-voltage contact)
Relay contact welding detection
Number of occupied stations: 3
(Note 1) Safety DI uses 16 points of terminal
because of the duplication wiring.
(Note 2) Safety relay output uses 8 points of
terminal because of the duplication wiring.
Thermistor input [12 points] FCU8-DX408 Base card
RIO 2.0 connector set
Thermistor input: 12 points
Number of occupied stations: 3
Multi-analog input [4 points] (Note 3) FCU8-DX409 Base card
RIO 2.0 connector set

Multi-analog input: 4 points
(Note 3) Voltage input, current input,
thermocouple input and resistance temperature
detector input are selected for each CH.
Number of occupied stations: 4

4.11.2 FCU8-DX220 / FCU8-DX230 / FCU8-DX231 / FCU8-DX202 / FCU8-DX213 /
FCU8-DX213-1 / FCU8-DX654 / FCU8-DX654-1 / FCU8-DX651/ FCU8-DX408 / FCU8-DX409
[Outline dimension : FCU8-DX220]
[Outline dimension : FCU8-DX230]
(Space required above the unit) (Space required below the unit)
(Space
required for
wiring)
Top
Bottom
40
168 2.5
45 115
4
[mm] 30 30
(Space required above the unit) (Space required below the unit)
(Space
required for
wiring)
Top
Bottom
40
168 2.5
45 115
4
[mm] 30 30

[Outline dimension : FCU8-DX231]
[Outline dimension : FCU8-DX202]
(Space required above the unit) (Space required below the unit)
(Space
required for
wiring)
Top
Bottom
40
168 2.5
45 115
4
[mm] 30 30
40
168 2.5
115
4
[mm]
(Space required for
wiring)
Top
Bottom
80

[Outline dimension : FCU8-DX213]
[Outline dimension : FCU8-DX213-1]
(Space required above the unit) (Space required below the unit)
(Space
required for
wiring)
Top
Bottom
40
168 2.5
45 115
4
[mm] 30 30
(Space required above the unit) (Space required below the unit)
(Space
required for
wiring)
Top
Bottom
40
168 2.5
45 115
4
[mm] 30 30

[Outline dimension : FCU8-DX654]
[Outline dimension : FCU8-DX654-1]
(Space required above the unit) (Space required below the unit)
(Space
required for
wiring)
Top
Bottom
40
168 2.5
45 115
4
[mm] 30 30
(Space required above the unit) (Space required below the unit)
(Space
required for
wiring)
Top
Bottom
40
168 2.5
45 115
4
[mm] 30 30

[Outline dimension : FCU8-DX651]
[Outline dimension : FCU8-DX408]
100
168
115
[mm]
45
2.5 4 4
(Space
required for
wiring) Top
Bottom
(Space
required for
Top wiring)
Bottom
40
168 2.5
45 109
4
[mm]

[Outline dimension : FCU8-DX409]
(Space
required for
Top wiring)
Bottom
40
168 2.5
45 115
4
[mm]

[Installation dimension : FCU8-DX220 / FCU8-DX230 / FCU8-DX231 / FCU8-DX202 /
FCU8-DX213 / FCU8-DX213-1 / FCU8-DX654 / FCU8-DX654-1 / FCU8-DX408 / FCU8-DX409]
[Installation dimension : FCU8-DX651]
[mm]
156 0.2
6
6
(Unit outline)
40
168
2-M5 Screw
4
(Unit outline) (Unit outline)
[mm]
156 0.2
4 168
88 0.2
100
6
6
4
3-M5 Screw(Unit outline) (Unit outline)

(Unit outline)

4.12 Function Expansion Unit
4.12.1 Encoder (Manual Pulse Generator) I/F Expansion (FCU8-EX544)
[Outline dimension]
80 or more
[mm]
107.5 30 124

4.12.2 CC-Link (FCU8-EX561)
[Outline dimension]
80 or more
[mm]
94.6 30 124

4.12.3 PROFIBUS-DP (FCU8-EX563)
[Outline dimension]
100 or more
[mm]
94.6 30 124

4.12.4 CC-Link IE Field (FCU8-EX564)
[Outline dimension]
80 or more
[mm]
94.6 30 124

4.12.5 EtherNet/IP (FCU8-EX565)
[Outline dimension]
80 or more
[mm]
94.6 30 124

4.12.6 FL-net (FCU8-EX568)
[Outline dimension]
80 or more
[mm]
94.6 30 124

4.12.7 Vibration Cutting Expansion Unit (FCU8-EX744)
[Outline dimension]
94.6 30 124
[mm]

4.13 Side Memory I/F Unit
(Note) Side memory I/F unit is only for 19-type display unit.
[Outline dimension]
[Installation dimension]
38 [mm]
154
134
123
28 8.8
66
1.4
2- 5 holes
(Packing
thickness)
Top
Bottom
290.3
40
4-R2.5
B
B
1240.3
1340.3
156
8.8
0.8
(8)
2- 9

B - B
[mm]
Hole
2-M4screw
(Valid depth of screw: 5.5 or more)

4.14 Manual Pulse Generator
4.14.1 5V Manual Pulse Generator (UFO-01-2Z9)
100 pulse/rev
[Outline dimension]
[Panel cut dimension]
Produced by NIDEC NEMICON CORPORATION
3-M4
[mm]
0
10
20
30
40
50
60
70
80
90
0V A B
80.5
60
1 6 6 2 6
R43
77
58
56
8.89 7.6 M3 x 6
5V
Gasket
Above size only
72 at equal pitch
Panel cut diameter
Index stud
Top
Bottom
[mm]
72
62
at equal pitch

4.14.2 12V Manual Pulse Generator (HD60C)
25 pulse/rev
[Outline dimension]
[Panel cut dimension]
3.6
16 27 0.5
L10
8.89 7.60
t 2.0 3-M4
77 0.5
80 1
58 0.5
60 0.5
[mm]
24 0.5
56 0.5
Installation of screws
Packing stud bolt
other than M3 x 6
not possible
Top
Bottom
12V 0V BA
40
30
50
60
70
10
20
90
0
80
3 - 4. 8
62
+2
0
72 0. 2

120
[mm]
(Divide equally
by three)

4.15 Synchronous Feed Encoder
4.15.1 Synchronous Feed Encoder (OSE-1024-3-15-68)
[Outline dimension]
19. 5
102
135
5 3
33
2
68
28
20
56
68
4 - 5. 4
21mm
14. 3 0
- 0.11
1. 15 +0.14
0 1. 15 +0.14
0
2
26
16
50
15- 0.006
- 0.017
- 0. 009
- 0. 025
2
5 - 0. 012
- 0. 042
3 +0. 1
0
68
56
50
- 0. 009 - 0. 025
[mm]
Caution plate
hole
Enlarged drawing of key
Valid depth of key groove is
Cross section BB

[Connector]
Connector pin assignment
Pin Function Pin Function
A A phase K 0V
B Z phase L -
C B phase M -
D - N A phase reverse
E Case grounding P Z phase reverse
F - R B phase reverse
G - S -
H +5V T -
J -
F
J
T
G
L
K
M
H
C
D
E S R
P
N
B
A

4.16 Machine Operation Panel
4.16.1 Main Panel A , B
(FCU8-KB921 / FCU8-KB922 / FCU8-KB925 , FCU8-KB923 / FCU8-KB924 / FCU8-KB926)
[Outline dimension : FCU8-KB921]

[Outline dimension : FCU8-KB922]
[Outline dimension : FCU8-KB925]
[mm]
260
140
9.5 60
(Space required
for wiring)
Top
Bottom
[mm]
260
140
9.5 60
(Space required
for wiring)
Top
Bottom
[mm]
260
140
9.5 60
(Space required
for wiring)
Top
Bottom

[Outline dimension : FCU8-KB923]
[Outline dimension : FCU8-KB924]
[Outline dimension : FCU8-KB926]
[mm]
290
140
9.5 60
(Space required
for wiring)
Top
Bottom
[mm]
290
140
9.5 60
(Space required
for wiring)
Top
Bottom
[mm]
290
140
9.5 60
(Space required
for wiring)
Top
Bottom

[Panel cut dimension : FCU8-KB921 / FCU8-KB922 / FCU8-KB925]
[Panel cut dimension : FCU8-KB923 / FCU8-KB924 / FCU8-KB926]
[mm]
2480.3
260
247
2460.3
0.5
127
1260.3
1130.3
(7) (7)
(7) (7)
9
13 13
9
(6.5)
3.5 3.5 0.5 (6.5)
6.50.2
10.2
4-M3
140
(6.5)
(6.5)
(Unit outline)
(Unit outline)
(Square hole dimension)
(Square hole
dimension)

screw
4 - 4 holes
[mm]
2780.3
290
277
2760.3
0.5
127
1260.3
1130.3
(7) (7)
(7) (7)
9
13 13
9
(6.5)
3.5 3.5 0.5 (6.5)
6.50.2
10.2
4-M3
140
(6.5)
(6.5)
(Unit outline)
(Unit outline)
(Square hole dimension)
(Square hole
dimension)
screw
4 - 4 holes

[Letter label dimension : FCU8-KB922 / FCU8-KB924]
Clear key top
Letter label
(Material: PET or equivalent, t = 0.125 or less)
Example of a letter
12.8 or less
9.8 or less

4.16.2 Sub Panel A (FCU8-KB931 / FCU8-KB941)
[Outline dimension : FCU8-KB931]
[Outline dimension : FCU8-KB941]
[Panel cut dimension : FCU8-KB931 / FCU8-KB941]
[mm]
140
140
9.5 70
(Space required for
wiring)
Top
Bottom
[mm]
140
140
9.5 70
(Space required for
wiring)
Top
Bottom
[mm]
1280.3
140
127
1260.3
0.5
127
1260.3
1130.3
(7) (7)
(7) (7)
9
13 13
9
(6.5)
3.5 3.5 0.5 (6.5)
6.50.2
10.2
4-M3
140
(Unit outline)
(Unit outline)
(Square hole dimension)
(Square hole

dimension)
screw
4 - 4 holes

4.17 Handy Terminal
(Note 1) "Short term" means within one month.
(Note 2) The unit is an IP65F equivalent.
Item
Unit name Handy terminal
Type HG1T-SB12UH-MK1346-L5
General
Specifications
Ambient
temperature
During
operation 0 to 40
During
storage -20 to 60
Ambient
humidity
Long term: 10 to 75% RH (with no dew condensation)
Short term: 10 to 95% RH (with no dew condensation) (Note 1)
Vibration
resistance
During
operation 9.8m/s2 [1.0G] or less, 10 to 55Hz
Shock
resistance
During
storage 98m/s2 [10.0G] or less
Working
atmosphere No corrosive gases, dust or oil mist
Power
specifications
Power voltage 24VDC5% Ripple noise 240mV (P-P)
Current
consumption (max.) 0.2A
Instantaneous
stop tolerance
time
24VDC: 4ms or less
Others Heating value 4W (max.)
Mass 0.6kg

Dimension and names of parts
(Note) Do not press multiple switches simultaneously: When three or more switches are pressed simultaneously,
unpressed switches are also detected as pressed ones.
No. Name Function/ Specification No. Name Function/ Specification
(1) LCD
Monochrome display with
backlight
192(W) 64(H) dots
(7) HOST Host interface connector
(DDK: 17JE-23250-02(D8A6))
(2) SW1
Emergency stop switch
Contact rating/ Contact: 24VDC,
1A
Contact configuration: 2b contacts
(IDEC Corporation: HA1E V2S2VR)
(8) - Host interface cable
(5m)
(3) - Membrane switch (Note) (9) - Simplified hand strap
(IDEC Corporation: HG9Z-PS1)
(4) SW2
Enable switch
Contact rating/ Contact: 24VDC,
50mA
Contact configuration: 3 position
contact 2
(OFF-ON-OFF)
(IDEC Corporation: HE3B-M2)
(10) - Panel hanging fitting
(IDEC Corporation: HG9Z-TK1)
(5) SW4
Manual pulse generator
Output: Open collector
4.7k pull-up resistor is
connected. (TOKYO
SOKUTEIKIZAI CO., LTD:
RE19PH50C16RR)
(11) - Serial number plate
(6) SW6 Selector switch

255
90
46.7
38
51
15 11.5
(2)
(5)
(6)
(3)
(1)
(4)
(8)
(7)
(9)
(10) (11)

4.18 Thermistor
4.18.1 Thermistor(PT3C-51F-M2)
[Outline dimension]
Made by SHIBAURA ELECTRONICS Co., Ltd.
Ambient temperature -10 to + 190
Insulation resistance 100M or more at 500VDC [between case and lead wire]
25010
3
3 12
4.5
[mm]

4.19 Exclusive SD Cards
(Note 1) SLC stands for Single Level Cell, and it stores one bit data in each memory cell.
This provides longer life span and high product reliability in comparison with MLC (Multi Level Cell), which is commonly applied to SD cards.
(Note 2) Do not touch the terminal part with fingers, etc. when handling the SD cards.
The contamination of the terminal part of SD card causes a contact failure or a trouble.
Item FCU8-SD001G FCU8-SD004G
Capacity 1GB 4GB
NAND Flash SLC (Note 1)
Ambient temperature During operation -25 to +85
During storage -40 to +85
Ambient humidity During operation 5% to 95%RH (with no dew condensation)
During storage 5% to 95%RH (with no dew condensation)

4.20 Specifications and Precautions of USB/SD/LAN Interface
4.20.1 USB Interface (Personal Computer Unit, Side Memory I/F Unit)
(Note 1) Data transfer speed is the theoretical value on the standard, and the actual speed will be inferior to the value listed above. The transfer speed may be restrained depending on the specification of the connected device.
(Note 2) Side memory I/F unit is only for 19-type display unit.
(Note 3) Do not connect devices other than the USB memory to the front memory I/F of the graphic control unit.
(1) Precautions for use of commercially available USB keyboards and mice(Only for the display unit with the computer.)
MITSUBISHI will not provide performance guarantee and maintenance for commercially available USB keyboards and mice. In case of using one of them, careful performance check must be required by the machine tool builder.
Commercially available devices may not be compatible with MITSUBISHI units or suitable FA environment for temperature- or noise-wise.
Commercially available USB keyboards/mice are susceptible to noise, etc., and may cause a malfunction in the unit that may lead to an accident. Do not use them while the machine is operated.
(2) Precautions for use of other commercially available USB devices(Only for the display unit with the computer.)
When connecting a commercially available USB device that requires power exceeding the maximum current, select the one of which power can be supplied from an outside source.
MITSUBISHI will not provide performance guarantee and maintenance for commercially available USB printer, USB floppy disk, USB memory, USB hub, USB-CD drive, USB-DVD drive, and other USB devices. Commercially available devices may not be compatible with MITSUBISHI units or suitable FA environment for temperature- or noise-wise.
In the case of using one of them, careful performance check must be required by the machine tool builder, and necessary noise countermeasures, such as executing EMI countermeasures or adding the ferrite cores, must be taken.
(3) Precautions for insertion/removal of USB memory
When inserting/removing an USB memory, turn the MITSUBISHI device's power OFF. Do not pull out the USB memory or turn OFF the power during access to the USB memory. Failure to observe this could cause the memory contents to be erased.
When Inserting/removing a USB memory, be sure to have enough interval to perform that (about 10 seconds or more).
In case of emergency, always perform backups by having your important data duplicate, etc. as MITSUBISHI will not guarantee the broken or lost data.
(4) Precaution for operation with front-side USB memory
A USB memory to be used has to be supported USB2.0 Hi-Speed (480Mbps).
When connecting the USB memory, connect it directly without using the extension cable or USB hub.
Machine vibration may cause the USB memory to fall out depending on environment. Therefore, the operation with the front-side USB memory is required to be performed on your own responsibility.
Standards USB3.0 USB2.0

Data transfer speed
(Note)
Super Speed (5Gbps)
High Speed (480Mbps)
Full Speed (12Mbps)
Low Speed (1.5Mbps)
High Speed (480Mbps)
Full Speed (12Mbps)
Low Speed (1.5Mbps)
Power supply to USB
device
Supply voltage: 5V 5%
Supply current: Max. 900mA/port
Supply voltage: 5V 5%
Supply current: Max. 500mA/port
(However, max. 200mA/port for side memory I/F unit)
Number of free ports Personal computer unit 2 Personal computer unit 4, Side memory I/F unit 1
Max. cable length 3m
(During Super Speed. 5m for up to High Speed) 5m

4.20.2 SD Interface (Control Unit, Side Memory I/F Unit)
(Note 1) SDXC is not supported.
(Note 2) Side memory I/F unit is only for 19-type display unit.
(1) Precautions for use of commercially available SD card
MITSUBISHI will not provide performance guarantee and maintenance for commercially available SD card, mini SD card or micro SD card (requires converting adapter). In case of using one of them, careful performance check must be required by the machine tool builder.
Commercially available devices may not be compatible with MITSUBISHI units or suitable FA environment for temperature- or noise-wise.
(2) Precautions for insertion/removal of SD card
When inserting/removing an SD card, turn the MITSUBISHI device's power OFF. Do not pull out the card or turn OFF the power during access to the SD card. Failure to observe this could cause the memory contents to be erased.
In case of emergency, always perform backups by having your important data duplicate, etc. as MITSUBISHI will not guarantee the broken or lost data.
4.20.3 LAN Interface (Control Unit, Personal Computer Unit)
(Note 1) Data transfer speed is the theoretical value on the standard, and the actual speed will be inferior to the value listed above. The transfer speed may be restrained depending on the specification of the connected device.
(Note 2) When using half-duplex communication, the response time may become long depending on the opposite device.
Use full-duplex communication to connect with the opposite device via a switching HUB.
(1) Precautions for selection of LAN cable
Make sure to select the LAN cables which are "category 5e or above" and "shielded". Cable wire material with double shielded, which is appropriate for FA environment., is recommended.
Standards SD/SDHC (Note)
Transfer speed According to the connecting SD card
Capacity 32GB
Number of free ports Control unit 1, Side memory I/F unit 1
Standards 1000BASE-T / 100BASE-TX / 10BASE-T
Data transfer speed
(Note) 1000Mbps / 100Mbps / 10Mbps
Number of free ports Control unit 1, Personal computer unit 1
Max. cable length 100m

1
System Basic Configuration
(M800S/M80/E80 Series)

1.1 System Basic Configuration Drawing
(Note) For the drive unit configuration, refer to the Instruction Manual of the drive unit you use.
(Control unit is added onto
back of display unit.)
Motor group
Servo/Spindle
drive unit
Manual pulse generator
Manual pulse penerator
Remote I/O unit
Remote I/O unit
Display unit
Operation panel I/O unit
Control unit
(Operation panel I/O unit is added
onto back of keyboard unit.)
Keyboard unit
Synchronous

feed encoder
111 IB-1501506-M
2
General Connection Diagram
(M800S/M80/E80 Series)
M800/M80/E80/C80 Series Specifications Manual (Hardware)
2 General Connection Diagram (M800S/M80/E80 Series)
IB-1501506-M 112
2.1 General Connection Diagram [M800S]
When the display unit is FCU8-DU142-31/FCU8-DU182-31, refer to "2.4 Difference in Connection Depending on the Display Unit" for connection of the display unit.
(Note 1) For information on how to connect the drive unit, refer to the drive unit's manual.
J395/
J396/
G380
FCUA-R050/054
(1ch)
Field Network
L1 L2 L3
D-AL
MC
DCOUT
FG
ACIN
CP/NFB
MC
ON OFF
MC
MC
CP/NFB
FG
Max.
8 points
EMG J120
J303
J070/071
J303
J100
J030(1ch)
J031(2ch)
EMG
LAN1
SKIP
DCIN
SIO LAN2
FCU8-EX56x
FCU8-EX70x
FRONT
ENC RIO2 CJ71
BL
< J09x>
RIO1
USB_F
SDC_F
USB_B
SDC_B
< J08x>
NCKB
3ch
<G402>
J210
RIO3EXT MPG
5V : J023(1ch)/024(2ch)/025(3ch)
12V : J020(1ch)/021(2ch)/022(3ch)
J350/351
LCD
MENUKEY
DI:CJ31/33
DO:CJ32/34
RIO1
DCIN
RIO2
J350/351
J350/351
(R2-TM)
J210
FCU8-KB92x FCU8-KB941/KB931
G460
J026(1ch)
J027(2ch)
J070/071
J070/071
J210
J210
J070/071
DI:CJ31/33
DO:CJ32/34
RIO1

DCIN
RIO2
DI:CJ31/33
DO:CJ32/34
RIO1
DCIN
RIO2
J350/351
J350/351
J070/071
DI:CJ31/33
DO:CJ32/34
RIO1
DCIN
RIO2
DI:CJ31/33
DO:CJ32/34
RIO1
DCIN
RIO2
J350/351
J350/351
(R2-TM)
(R2-TM)
J010 CJ71
FCU8-DX731/DX750/DX760/DX761
DI : CJ37/39
DO : CJ38/40
J460/461
Machine operation panel manufactured by Mitsubishi Electric
(Note 1)
Drive unit
Control unit
Synchronous feed
encoder
No-fuse breaker (NFB)
AC reactor
Circuit protector (CP)
Ethernet device
Ethernet device
24VDC
RS-232C
device
Function
expansion
unit
Menu key
Display unit
Memory mediums
Front memory I/F card
Operation panel I/O unit
Machine
control
relay/contact
Remote I/O unit
24VDC
Keyboard unit
Machine operation panel
made by the machine tool builder
Skip signal input
24VDC stabilized
power supply
To the next remote
I/O or terminator
connector
Manual pulse generator
(5V/12V)
Dotted lines indicate the sections prepared by the machine tool builder.
<> Angle brackets indicates attached cable of unit.
Option
relay unit
24VDC
Manual pulse
generator (5V)
Remote I/O unit
24VDC
Remote I/O unit
24VDC
Remote I/O unit
24VDC
Remote I/O unit
24VDC
To the next remote
I/O or terminator
connector
To the next remote
I/O or terminator
connector

Machine
control
relay/contact
Machine
control
relay/contact
G430
/
FCU8-EX744
TP < J421>
FCU8-KB04x
FCU8-KB083
FCU8-DX2xx/DX6xx/DX4xx
OPTH1 OPTH2
J395/
J396/
G380
FCU8-MU54x/FCU8-MA54x
Handy terminal
10.4-type:FCU8-DU141-31
15-type:FCU8-DU181-31
Add-on
CPU card
Drive unit
(Note 1)
M800/M80/E80/C80 Series Specifications Manual (Hardware)
2 General Connection Diagram (M800S/M80/E80 Series)
113 IB-1501506-M
2.2 General Connection Diagram [M80]
When the display unit is FCU8-DU142-32/FCU8-DU182-32, refer to "2.4 Difference in Connection Depending on the Display Unit" for connection of the display unit.
The general connection diagram with smart safety observation function is as below.
Without smart safety observation function, functional safety expansion unit is not installed in the control unit.
(Note 1) For information on how to connect the drive unit, refer to the drive unit's manual.
(Note 2) For the 8.4-type display unit, TP connector is not used.
(Note 3) The safety remote I/O unit is available only when the functional safety expansion unit is mounted.
J395/
J396/
G380
FCUA-R050/054
(1ch)
Field Network
L1 L2 L3
D-AL
MC
DCOUT
FG
ACIN
CP/NFB
MC
ON OFF
MC
MC
CP/NFB
FG
Max.
8 points
EMG J120
J303
J070/071
J303
J100
J030(1ch)
J031(2ch)
EMG
LAN1
SKIP
DCIN
SIO LAN2
FCU8-EX56x
FCU8-EX70x
FRONT
ENC RIO2 CJ71
BL
< J09x>
RIO1
USB_F
SDC_F
USB_B
SDC_B
< J08x>
NCKB
3ch
<G402>
J210
RIO3EXT MPG
5V : J023(1ch)/024(2ch)/025(3ch)
12V : J020(1ch)/021(2ch)/022(3ch)

J350/351
LCD
MENUKEY
DI:CJ31/33
DO:CJ32/34
RIO1
DCIN
RIO2
J350/351
J350/351
(R2-TM)
J210
FCU8-KB92x FCU8-KB941/KB931
G460
J026(1ch)
J027(2ch)
J070/071
J070/071
J210
J210
J070/071
DI:CJ31/33
DO:CJ32/34
RIO1
DCIN
RIO2
DI:CJ31/33
DO:CJ32/34
RIO1
DCIN
RIO2
J350/351
J350/351
J070/071
DI:CJ31/33
DO:CJ32/34
RIO1
DCIN
RIO2
DI:CJ31/33
DO:CJ32/34
RIO1
DCIN
RIO2
J350/351
J350/351
(R2-TM)
(R2-TM)
J010 CJ71
FCU8-DX731/DX750/DX760/DX761
DI : CJ37/39
DO : CJ38/40
J460/461
Machine operation panel manufactured by Mitsubishi Electric
(Note 1)
Drive unit
Control unit
Synchronous feed
encoder
No-fuse breaker (NFB)
AC reactor
Circuit protector (CP)
Ethernet device
Ethernet device
24VDC
RS-232C
device
Function
expansion
unit
Menu key
Display unit
Memory mediums
Front memory I/F card
Operation panel I/O unit
Machine
control
relay/contact
Remote I/O unit
24VDC
Keyboard unit
Machine operation panel
made by the machine tool builder
Skip signal input
24VDC stabilized
power supply
To the next remote
I/O or terminator

connector
Manual pulse generator
(5V/12V)
Dotted lines indicate the sections prepared by the machine tool builder.
<> Angle brackets indicates attached cable of unit.
Option
relay unit
24VDC
Manual pulse
generator (5V)
Remote I/O unit
24VDC
Remote I/O unit
24VDC
Remote I/O unit
24VDC
Remote I/O unit
24VDC
To the next remote
I/O or terminator
connector
To the next remote
I/O or terminator
connector
Machine
control
relay/contact
Machine
control
relay/contact
G430
/
FCU8-EX744
FCU8-KB04x
FCU8-KB083
TP < J421>
FCU8-DX2xx/DX6xx/DX4xx
FCU8-KB026/KB028/KB029
OPTH1
FCU8-MU511/FCU8-MU512
FCU8-EX133
Handy terminal
8.4-type:FCU8-DU121-12
10.4-type:FCU8-DU141-32
15-type:FCU8-DU181-32
(Note 2)
Functional
safety
expansion unit
(Note 3)
M800/M80/E80/C80 Series Specifications Manual (Hardware)
2 General Connection Diagram (M800S/M80/E80 Series)
IB-1501506-M 114
2.3 General Connection Diagram [E80]
(Note 1) For information on how to connect the drive unit, refer to the drive unit's manual.
J395/
J396/
G380
FCUA-R050/054
(1ch)
Field Network
L1 L2 L3
D-AL
MC
DCOUT
FG
ACIN
CP/NFB
MC
ON OFF
MC
MC
CP/NFB
FG
Max.
8 points
EMG J120
J303
J070/071
J303
J100
J030(1ch)
J031(2ch)
EMG
LAN1
SKIP
DCIN
SIO LAN2

FCU8-EX56x
FCU8-EX70x
FRONT
ENC RIO2 CJ71
BL
< J09x>
RIO1
USB_F
SDC_F
USB_B
SDC_B
< J08x>
NCKB
3ch
<G402>
J210
RIO3EXT MPG
5V : J023(1ch)/024(2ch)/025(3ch)
12V : J020(1ch)/021(2ch)/022(3ch)
J350/351
LCD
MENUKEY
DI:CJ31/33
DO:CJ32/34
RIO1
DCIN
RIO2
J350/351
J350/351
(R2-TM)
J210
FCU8-KB92x FCU8-KB941/KB931
G460
J026(1ch)
J027(2ch)
J070/071
J070/071
J210
J210
J070/071
DI:CJ31/33
DO:CJ32/34
RIO1
DCIN
RIO2
DI:CJ31/33
DO:CJ32/34
RIO1
DCIN
RIO2
J350/351
J350/351
J070/071
DI:CJ31/33
DO:CJ32/34
RIO1
DCIN
RIO2
DI:CJ31/33
DO:CJ32/34
RIO1
DCIN
RIO2
J350/351
J350/351
(R2-TM)
(R2-TM)
J010 CJ71
FCU8-DX731/DX750/DX760/DX761
DI : CJ37/39
DO : CJ38/40
J460/461
Machine operation panel manufactured by Mitsubishi Electric
(Note 1)
Drive unit
Control unit
Synchronous feed
encoder
No-fuse breaker (NFB)
AC reactor
Circuit protector (CP)
Ethernet device
Ethernet device
24VDC
RS-232C
device
Function
expansion

unit
Menu key
Display unit
Memory mediums
Front memory I/F card
Operation panel I/O unit
Machine
control
relay/contact
Remote I/O unit
24VDC
Keyboard unit
Machine operation panel
made by the machine tool builder
Skip signal input
24VDC stabilized
power supply
To the next remote
I/O or terminator
connector
Manual pulse generator
(5V/12V)
Dotted lines indicate the sections prepared by the machine tool builder.
<> Angle brackets indicates attached cable of unit.
Option
relay unit
24VDC
Manual pulse
generator (5V)
Remote I/O unit
24VDC
Remote I/O unit
24VDC
Remote I/O unit
24VDC
Remote I/O unit
24VDC
To the next remote
I/O or terminator
connector
To the next remote
I/O or terminator
connector
Machine
control
relay/contact
Machine
control
relay/contact
FCU8-KB024/KB025
OPTH1
FCU8-MU513/FCU8-MU514
FCU8-DX2xx/DX4xx
8.4-type:FCU8-DU121-13
M800/M80/E80/C80 Series Specifications Manual (Hardware)
2 General Connection Diagram (M800S/M80/E80 Series)
115 IB-1501506-M
2.4 Difference in Connection Depending on the Display Unit
Cables are different depending on the display unit.
The parts surrounded by the dotted lines in the figures below are different.
[FCU8-DU142-31 / FCU8-DU142-32 / FCU8-DU182-31 / FCU8-DU182-32]
[FCU8-DU141-31 / FCU8-DU141-32 / FCU8-DU181-31 / FCU8-DU181-32]
LCD
MENUKEY
TP
BL
<J50x/J991>
<J473>
<J424>
FCU8-DU182-31 / FCU8-DU182-32
FCU8-DU142-31 / FCU8-DU142-32
Control unit
LCD
with touch panel
Menu key
Display unit
LCD
MENUKEY
TP
BL
<J09x>
<J08x>
<J421>
FCU8-DU181-31 / FCU8-DU181-32
FCU8-DU141-31 / FCU8-DU141-32
Control unit
LCD
with touch panel

Menu key
Display unit

2.5 Connecting an Operation Panel I/O Unit (FCU8-DX834)
Dotted lines indicate the sections which is different from the FCU8-DX731/DX750/DX760/DX761 in FCU8-DX834.
[FCU8-DX834]
[FCU8-DX731 / FCU8-DX750 / FCU8-DX760 / FCU8-DX761]
CJ71
NCKB
RIO3EXT MPG
J350/351
Control unit
Operation panel I/O unit
Machine operation panel
made by the
machine tool builder
J070/071
J012
RIO3
FCU8-DX834
DI : CG31/33
DO : CG32/34
J350/351
KEYUSB
CJ71
J460/461
DCIN
OPKB
24VDC
CJ71
NCKB
RIO3EXT MPG
J350/351
Control unit
Operation panel I/O unit
Machine operation panel
made by the
machine tool builder
J010
CJ71
FCU8-DX731/DX750/DX760/DX761
DI : CJ37/39
DO : CJ38/40
J460/461

2.6 Connecting a Pulse-controlled Inverter [M80/E80]
Pulse-controlled inverter refers to an inverter capable of controlling spindle operation through pulse train input.
(Note) When the pulse-controlled inverter is connected, the remote I/O unit cannot be connected to the either of the RIO1 connector or the RIO2 connector.
2.7 Connecting a BiSS Encoder
BiSS encoder refers to an encoder compatible with BiSS-C.
Connect the BiSS encoder to the ENC connector and the RIO2 connector of the control unit.
ENC RIO1 RIO2
Control unit
FCUA-R050/054
(1ch)
Synchronous feed
encoder
Spindle motor
Pulse-controlled
inverter
ENC RIO1 RIO2
Control unit
BiSS encoder

2.8 Connecting an EcoMonitorLight
Connect the EcoMonitorLight to RIO2 of the control unit.
RIO2
EcoMonitorLight
Control unit

3
List of Configuration
(M800S/M80/E80 Series)

3.1 Control Unit [M800S]
3.2 Control Unit [M80]
3.3 Control Unit [E80]
Classification Type Components Remarks
NC functions

and display controller
For M830S
FCU8-MU542
Base control card
Add-on CPU card
Front-side memory I/F card
This unit is not compliant with both Export Trade
Control Order and Foreign Exchange Order.
NC functions
and display controller
For M850S
FCU8-MA542
Base control card
Add-on CPU card
Front-side memory I/F card
This unit is not compliant with Export Trade
Control Order, and it is compliant with Foreign
Exchange Order.
NC functions
and display controller
For M830S
FCU8-MU541
Base control card
Add-on CPU card
Front-side memory I/F card
This unit is not compliant with both Export Trade
Control Order and Foreign Exchange Order.
NC functions
and display controller
For M850S
FCU8-MA541
Base control card
Add-on CPU card
Front-side memory I/F card
This unit is not compliant with Export Trade
Control Order, and it is compliant with Foreign
Exchange Order.
Classification Type Components Remarks
NC functions
and display controller
For M80 TypeB
FCU8-MU511 Base control card
Front-side memory I/F card
This unit is not compliant with both Export Trade
Control Order and Foreign Exchange Order.
NC functions
and display controller
For M80 TypeA
FCU8-MU512 Base control card
Front-side memory I/F card
This unit is not compliant with both Export Trade
Control Order and Foreign Exchange Order.
NC functions
and display controller
For M80 TypeB
FCU8-MU501 Base control card
Front-side memory I/F card
This unit is not compliant with both Export Trade
Control Order and Foreign Exchange Order.
NC functions
and display controller
For M80 TypeA
FCU8-MU502 Base control card
Front-side memory I/F card
This unit is not compliant with both Export Trade
Control Order and Foreign Exchange Order.
Classification Type Components Remarks
NC functions
and display controller
For E80 TypeB
FCU8-MU513 Base control card
Front-side memory I/F card
This unit is not compliant with both Export Trade
Control Order and Foreign Exchange Order.
NC functions
and display controller
For E80 TypeA
FCU8-MU514 Base control card
Front-side memory I/F card
This unit is not compliant with both Export Trade
Control Order and Foreign Exchange Order.

3.4 Display Unit [M800S]
3.5 Display Unit [M80]
3.6 Display Unit [E80]
3.7 Keyboard Unit [M800S]

Classification Type Components Remarks
10.4-type color TFT touch panel
(VGA:640*480)
FCU8-DU142-31 /
FCU8-DU141-31
LCD panel
Menu keys
Escutcheon
Base metal plate
Cable
Screw cap set
Front side memory I/F is normally equipped with
the control unit
15-type color TFT touch panel
(XGA:1024*768)
FCU8-DU182-31 /
FCU8-DU181-31
LCD panel
Menu keys
Escutcheon
Base metal plate
Cable
Screw cap set
Front side memory I/F is normally equipped with
the control unit
Classification Type Components Remarks
8.4-type color TFT
(VGA:640*480) FCU8-DU121-12
LCD panel
Menu keys
Escutcheon
Base metal plate
Cable
Screw cap set
Front side memory I/F is normally equipped with
the control unit
10.4-type color TFT touch panel
(VGA:640*480)
FCU8-DU142-32 /
FCU8-DU141-32
LCD panel
Menu keys
Escutcheon
Base metal plate
Cable
Screw cap set
Front side memory I/F is normally equipped with
the control unit
15-type color TFT touch panel
(XGA:1024*768)
FCU8-DU182-32 /
FCU8-DU181-32
LCD panel
Menu keys
Escutcheon
Base metal plate
Cable
Screw cap set
Front side memory I/F is normally equipped with
the control unit
Classification Type Components Remarks
8.4-type color TFT
(VGA:640*480) FCU8-DU121-13
LCD panel
Menu keys
Escutcheon
Base metal plate
Cable
Screw cap set
Front side memory I/F is normally equipped with
the control unit
Classification Type Components Remarks
Keyboard for 10.4-type display unit
Clear keys FCU8-KB041
Escutcheon, key switch
G402 cable
Screw cap set
ONG layout (for L system, XZF)
Keyboard for 10.4-type display unit
Clear keys FCU8-KB046
Escutcheon, key switch
G402 cable
Screw cap set
ONG layout (for M system/L system, XYZ)
Keyboard for 10.4-type display unit
Clear keys FCU8-KB047
Escutcheon, key switch
G402 cable

Screw cap set
Full keyboard (for M system/L system) (in tandem)
Keyboard for 10.4-type display unit
Clear keys FCU8-KB048
Escutcheon, key switch
G402 cable
Screw cap set
ABC layout (for M system/L system)
Keyboard for 15-type display unit
Clear keys FCU8-KB083
Escutcheon, key switch
G402 cable
Screw cap set
Full keyboard (for M system/L system) (in tandem)

3.8 Keyboard Unit [M80]
3.9 Keyboard Unit [E80]
Classification Type Components Remarks
Keyboard for 8.4-type display unit
Clear keys FCU8-KB026
Escutcheon, key switch
G402 cable
Screw cap set
ONG layout (for M system/L system, XYZ)
Keyboard for 8.4-type display unit
Clear keys FCU8-KB028
Escutcheon, key switch
G402 cable
Screw cap set
ONG layout (for L system, XZF)
Keyboard for 8.4-type display unit
Clear keys FCU8-KB029
Escutcheon, key switch
G402 cable
Screw cap set
ONG layout (for M system/L system) (in tandem)
Keyboard for 10.4-type display unit
Clear keys FCU8-KB041
Escutcheon, key switch
G402 cable
Screw cap set
ONG layout (for L system, XZF)
Keyboard for 10.4-type display unit
Clear keys FCU8-KB046
Escutcheon, key switch
G402 cable
Screw cap set
ONG layout (for M system/L system, XYZ)
Keyboard for 10.4-type display unit
Clear keys FCU8-KB047
Escutcheon, key switch
G402 cable
Screw cap set
Full keyboard (for M system/L system) (in tandem)
Keyboard for 10.4-type display unit
Clear keys FCU8-KB048
Escutcheon, key switch
G402 cable
Screw cap set
ABC layout (for M system/L system)
Keyboard for 15-type display unit
Clear keys FCU8-KB083
Escutcheon, key switch
G402 cable
Screw cap set
Full keyboard (for M system/L system) (in tandem)
Classification Type Components Remarks
Keyboard for 8.4-type display unit
Sheet keys FCU8-KB024
Escutcheon, key switch
G402 cable
Screw cap set
ONG layout (for M system/L system, XYZ)
Keyboard for 8.4-type display unit
Sheet keys FCU8-KB025
Escutcheon, key switch
G402 cable
Screw cap set
ONG layout (for L system, XZF)

3.10 Operation Panel I/O Unit
(Note) DI: Digital input signals, DO: Digital output signals
Classification Type Components Remarks
DI 24V/0V common input [64 points]

DO Source output [48 points]
AO Analog output [1 point]
FCU8-DX731 Base card
RIO 2.0 terminator connector (R2-TM)
DI: 64-points 24V/0V common type
DO: 48-points source type (200mA/point)
AO: 1 point
Manual pulse generator input: 2ch
Control unit I/F
Keyboard unit I/F
Remote I/O 2.0 I/F
RIO occupied stations (fixed):
1, 3, 7 to 12, 20 to 22
RIO extensible stations:
2, 4 to 6, 13 to 19, 23 to 64
DI 24V/0V common input [96 points]
DO Source output [64 points] FCU8-DX750 Base card
RIO 2.0 terminator connector (R2-TM)
DI: 96-points 24V/0V common type
DO: 64-points source type (200mA/point)
Manual pulse generator input: 3ch
Control unit I/F
Keyboard unit I/F
Remote I/O 2.0 I/F
RIO occupied stations (fixed):
1 to 3, 7 to 12, 20 to 22
RIO extensible stations:
4 to 6, 13 to 19, 23 to 64
DI 24V/0V common input [96 points]
DO Source output [96 points] FCU8-DX760
Base card
Add-on card
RIO 2.0 terminator connector (R2-TM)
DI: 96-points 24V/0V common type
DO: 96-points source type (200mA/point)
Manual pulse generator input: 3ch
Control unit I/F
Keyboard unit I/F
Remote I/O 2.0 I/F
RIO occupied stations (fixed):
1 to 4, 7 to 12, 20 to 22
RIO extensible stations:
5, 6, 13 to 19, 23 to 64
DI 24V/0V common input [96 points]
DO Source output [64 points]
AI Analog input [1 point]
AO Analog output [1 point]
FCU8-DX761
Base card
Add-on card
RIO 2.0 terminator connector (R2-TM)
DI: 96-points 24V/0V common type
DO: 64-points source type (200mA/point)
AI: 1 point
AO: 1 point
Manual pulse generator input: 3ch
Control unit I/F
Keyboard unit I/F
Remote I/O 2.0 I/F
RIO occupied stations (fixed):
1 to 5, 7 to 12, 20 to 22
RIO extensible stations:
6, 13 to 19, 23 to 64
DI 24V/0V common input [64 points]
DO Source output [64 points]
Scan input [64 points]
Scan output [64 points]
FCU8-DX834
Base card
Add-on card
RIO 2.0 terminator connector (R2-TM)
DI: 64-points 24V/0V common type
DO: 64-points source type (200mA/point)
Scan input: 64 points
Scan output: 64 points
Manual pulse generator input: 3ch
Keyboard unit I/F
Remote I/O 2.0 I/F
RIO occupied stations (fixed):
1 to 4, 7 to 14, 20 to 22
RIO extensible stations:
5, 6, 15 to 19, 23 to 64

3.11 Remote I/O Unit [M800S/M80]
(Note) DI: Digital input signals, DO: Digital output signals, AI: Analog input signals, AO: Analog output signals
Classification Type Components Remarks

DI 24V/0V common input [32 points]
DO Source output [32 points] FCU8-DX220 Base card
RIO 2.0 connector set
DI: 32-points 24V/0V common type
Do: 32-points source type (200mA/point)
Number of occupied stations: 1
DI 24V/0V common input [64 points]
DO Source output [48 points] FCU8-DX230 Base card
RIO 2.0 connector set
DI: 64-points 24V/0V common type
DO: 48-points source type (200mA/point)
Number of occupied stations: 2
DI 24V/0V common input
DO Source output [48 points]
AO Analog output [1 point]
FCU8-DX231 Base card
RIO 2.0 connector set
DI: 64-points 24V/0V common type
DO: 48-points source type (200mA/point)
AO: 1 point
Number of occupied stations: 2
AI Analog input [4 points]
AO Analog output [1 point] FCU8-DX202 Base card
RIO 2.0 connector set
AI : 4 points
AO: 1 point
Number of occupied stations: 1
DI 0V common input [16 points]
DO Source output (large capacity) [8
points]
FCU8-DX213 Base card
RIO 2.0 connector set
DI: 16-points 0V common type (3mA/point)
DO: 8-points source type (2A/point)
Number of occupied stations: 1
DI 0V common input [16 points]
DO Source output (large capacity) [8
points]
FCU8-DX213-1 Base card
RIO 2.0 connector set
DI: 16-points 0V common type (9mA/point)
DO: 8-points source type (2A/point)
Number of occupied stations: 1
Safety DI 0V common input [8 points]
Safety DO Source output (large capacity)
[4 points]
FCU8-DX654 Base card
RIO 2.0 connector set
Safety DI: 8-points 0V common type (3mA/point)
Safety DO: 4-points source type (2A/point)
Number of occupied stations: 2
Safety DI 0V common input [8 points]
Safety DO Source output (large capacity)
[4 points]
FCU8-DX654-1 Base card
RIO 2.0 connector set
Safety DI: 8-points 0V common type (9mA/point)
Safety DO: 4-points source type (2A/point)
Number of occupied stations: 2
DI 24V/0V common input [32points]
DO Source output [32 points]
Safety DI 0V common input [8 points]
(Note 1)
Safety relay output [4 points] (Note 2)
FCU8-DX651
Base card
Add-on card
RIO 2.0 connector set
DI: 32-points 24V/0V common type
Do: 32-points source type (200mA/point)
Safety DI: 8-points 0V common type
Safety relay: 4-points (non-voltage contact)
Relay contact welding detection
Number of occupied stations: 3
(Note 1) Safety DI uses 16 points of terminal
because of the duplication wiring.
(Note 2) Safety relay output uses 8 points of
terminal because of the duplication wiring.
Thermistor input [12 points] FCU8-DX408 Base card
RIO 2.0 connector set
Thermistor input: 12 points
Number of occupied stations: 3
Multi-analog input [4 points] (Note 3) FCU8-DX409 Base card
RIO 2.0 connector set
Multi-analog input: 4 points
(Note 3) Voltage input, current input,
thermocouple input and resistance temperature
detector input are selected for each CH.

Number of occupied stations: 4

3.12 Remote I/O Unit [E80]
(Note) DI: Digital input signals, DO: Digital output signals, AI: Analog input signals, AO: Analog output signals
3.13 Functional Safety Expansion Unit [M80]
3.14 Function Expansion Unit [M800S/M80]
(Note) To use the function expansion unit, the option relay unit (FCU8-EX70x) is required.
3.15 Function Expansion Unit [E80]
(Note) To use the function expansion unit, the option relay unit (FCU8-EX70x) is required.
Classification Type Components Remarks
DI 24V/0V common input [32 points]
DO Source output [32 points] FCU8-DX220 Base card
RIO 2.0 connector set
DI: 32-points 24V/0V common type
Do: 32-points source type (200mA/point)
Number of occupied stations: 1
DI 24V/0V common input [64 points]
DO Source output [48 points] FCU8-DX230 Base card
RIO 2.0 connector set
DI: 64-points 24V/0V common type
DO: 48-points source type (200mA/point)
Number of occupied stations: 2
DI 24V/0V common input
DO Source output [48 points]
AO Analog output [1 point]
FCU8-DX231 Base card
RIO 2.0 connector set
DI: 64-points 24V/0V common type
DO: 48-points source type (200mA/point)
AO: 1 point
Number of occupied stations: 2
AI Analog input [4 points]
AO Analog output [1 point] FCU8-DX202 Base card
RIO 2.0 connector set
AI : 4 points
AO: 1 point
Number of occupied stations: 1
DI 0V common input [16 points]
DO Source output (large capacity) [8
points]
FCU8-DX213 Base card
RIO 2.0 connector set
DI: 16-points 0V common type (3mA/point)
DO: 8-points source type (2A/point)
Number of occupied stations: 1
DI 0V common input [16 points]
DO Source output (large capacity) [8
points]
FCU8-DX213-1 Base card
RIO 2.0 connector set
DI: 16-points 0V common type (9mA/point)
DO: 8-points source type (2A/point)
Number of occupied stations: 1
Thermistor input [12 points] FCU8-DX408 Base card
RIO 2.0 connector set
Thermistor input: 12 points
Number of occupied stations: 3
Multi-analog input [4 points] (Note 3) FCU8-DX409 Base card
RIO 2.0 connector set
Multi-analog input: 4 points
(Note 3) Select voltage input, current input,
thermocouple and resistance temperature
detector input for each ch.
Number of occupied stations: 4
Classification Type Components Remarks
Functional safety expansion unit FCU8-EX133 Add-on card Smart safety observation
Classification Type Components Remarks
CC-Link expansion unit FCU8-EX561 CC-Link I/F PCB CC-Link 1ch
PROFIBUS-DP master unit FCU8-EX563 PROFIBUS-DP I/F PCB PROFIBUS-DP 1ch
CC-Link IE Field
Master/local unit FCU8-EX564 Base card
Add-on card CC-Link IE Field 2ch
EtherNet/IP
Scanner/adapter unit FCU8-EX565 Base card
Add-on card
EtherNet/IP 1ch
(Only LAN1, LAN2 cannot be used)
FL-net expansion unit FCU8-EX568 Base card
Add-on card
FL-net 1ch
(Only LAN1, LAN2 cannot be used)
Vibration cutting expansion unit FCU8-EX744 Base card Vibration cutting control
Classification Type Components Remarks
Option Relay Unit FCU8-EX702 Relay PCB For function expansion unit 1 slot
Option Relay Unit FCU8-EX703 Relay PCB For function expansion unit 2 slots
Classification Type Components Remarks

CC-Link expansion unit FCU8-EX561 CC-Link I/F PCB CC-Link 1ch
PROFIBUS-DP master unit FCU8-EX563 PROFIBUS-DP I/F PCB PROFIBUS-DP 1ch
CC-Link IE Field
Master/local unit FCU8-EX564 Base card
Add-on card CC-Link IE Field 2ch
EtherNet/IP
Scanner/adapter unit FCU8-EX565 Base card
Add-on card
EtherNet/IP 1ch
(Only LAN1, LAN2 cannot be used)
FL-net expansion unit FCU8-EX568 Base card
Add-on card
FL-net 1ch
(Only LAN1, LAN2 cannot be used)
Classification Type Components Remarks
Option Relay Unit FCU8-EX702 Relay PCB For function expansion unit 1 slot
Option Relay Unit FCU8-EX703 Relay PCB For function expansion unit 2 slots

3.16 Manual Pulse Generator
3.17 Synchronous Feed Encoder
3.18 Machine Operation Panel [M800S/M80]
Classification Type Components Remarks
5V Manual Pulse Generator UFO-01-2Z9 UFO-01-2Z9
(Produced by NIDEC NEMICON)
Input 5VDC
100pulse/rev
12V Manual Pulse Generator HD60C HD60C Input 12VDC
25pulse/rev
Classification Type Components Remarks
Synchronous feed encoder OSE1024-3-15-68 OSE1024-3-15-68
Input 5VDC
1024pulse/rev
6000r/min, 68-square flange
Synchronous feed encoder OSE1024-3-15-68-8 OSE1024-3-15-68-8
Input 5VDC
1024pulse/rev
8000r/min ,68-square flange
Synchronous feed encoder OSE1024-3-15-160 OSE1024-3-15-160
Input 5VDC
1024pulse/rev
6000r/min, 160-square flange
Classification Type Components Remarks
Main panel A
(For 8.4-type/15-type display unit) FCU8-KB921
Escutcheon, key switch
control card
G054 cable, Screw cap set
MITSUBISHI standard key layout (55 keys)
(Standard specification A)
Main panel A
(For 8.4-type/15-type display unit) FCU8-KB922
Escutcheon, key switch
control card
G054 cable, Screw cap set
Custom specification key layout (55 keys)
(Clear key top cover sold separately)
Main panel B
(For 10.4-type display unit) FCU8-KB923
Escutcheon, key switch
control card
G054 cable, Screw cap set
MITSUBISHI standard key layout (55 keys)
(Standard specification A)
Main panel B
(For 10.4-type display unit) FCU8-KB924
Escutcheon, key switch
control card
G054 cable, Screw cap set
Custom specification key layout (55 keys)
(Clear key top cover sold separately)
Main panel A
(For 8.4-type/15-type display unit) FCU8-KB925
Escutcheon, key switch
control card
G054 cable, Screw cap set
MITSUBISHI standard key layout (55 keys)
(Standard specification B)
Main panel B
(For 10.4-type display unit) FCU8-KB926
Escutcheon, key switch
control card
G054 cable, Screw cap set
MITSUBISHI standard key layout (55 keys)
(Standard specification B)
Sub panel A
(Common for all display units) FCU8-KB931

Escutcheon
Emergency stop switch, Override switch
ON/OFF switch, Screw cap set
MITSUBISHI standard switch specification
(Standard specification A)
Sub panel A
(Common for all display units) FCU8-KB941
Escutcheon
Emergency stop switch, Override switch
ON/OFF switch, Screw cap set
MITSUBISHI standard switch specification
(Standard specification B)
Clear key top set N030C975G51 /
N030C975G55 Clear key top cover (20 pcs/60 pcs)
Set of labels for M7 standard key layout N939A169G51 Labels for M7 standard key layout (1
sheet)
M800/M80/E80/C80 Series Specifications Manual (Hardware)
3 List of Configuration (M800S/M80/E80 Series)
127 IB-1501506-M
3.19 Machine Operation Panel [E80]
3.20 Handy Terminal
3.21 Cable Connector Sets
Classification Type Components Remarks
Main panel A
(For 8.4-type/15-type display unit) FCU8-KB922
Escutcheon, key switch
control card
G054 cable, Screw cap set
Custom specification key layout (55 keys)
(Clear key top cover sold separately)
Main panel A
(For 8.4-type/15-type display unit) FCU8-KB925
Escutcheon, key switch
control card
G054 cable, Screw cap set
MITSUBISHI standard key layout (55 keys)
(Standard specification B)
Sub panel A
(Common for all display units) FCU8-KB941
Escutcheon
Emergency stop switch, Override switch
ON/OFF switch, Screw cap set
MITSUBISHI standard switch specification
(Standard specification B)
Clear key top set N030C975G51 /
N030C975G55 Clear key top cover (20 pcs/60 pcs)
Set of labels for M7 standard key layout N939A169G51 Labels for M7 standard key layout (1
sheet)
Classification Type Components Remarks
Handy Terminal HG1T-SB12UH MK1346-L5
Classification Type Components Remarks
General I/O units
(For SKIP,SIO,MPG,AIO) FCUA-CS000 Connector (10120-3000PE,2pcs),
Shell kit (10320-52F0-008,2pcs)
Emergency stop connector
(For EMG)
005057-9403
0016020103 x 3 pcs.
Connector (50-57-9403),
Contact (0016020103,3pcs.)
Connector kit for RIO 2.0 unit RIO2 CON
Connector (1-1318119-3,2pcs.),
Contact (1318107-1,8pcs.),
Connector (2-178288-3),
Contact (1-175218-5,3pcs)
24VDC power supply connector
(For DCIN) FCUA-CN220 Connector (2-178288-3),
Contact (1-175218-5,3pcs)
DI/DO connector
(For operation panel I/O unit)
(For remote I/O unit)
7940-6500SC x
4pcs.
3448-7940 x 4pcs.
Connector (7940-6500SC,4pcs.),
Strain relief (3448-7940,4pcs.) FCU8-DX731
DI connector (For operation panel I/O
unit)
7950-6500SC x
2pcs.
3448-7950 x 2pcs.
Connector (7950-6500SC,2pcs.),
Strain relief (3448-7950,2pcs.) FCU8-DX750/760/761
Connector for CJ71 2-1318119-4
1318107-1 x 8pcs.
Connector (2-1318119-4),
Contact (1318107-1,8pcs.)
THERMISTOR connector 37104-2165-000FL

10P Connector (37104-2165-000FL,10pcs.)
M800/M80/E80/C80 Series Specifications Manual (Hardware)
3 List of Configuration (M800S/M80/E80 Series)
IB-1501506-M 128
3.22 Thermistor Sets
3.23 Genuine Memory Card
3.24 Durable Parts
(Note) Contact the Service Center, Sales Office or dealer for repairs or part replacement.
3.25 Replacements
Classification Type Components Remarks
Thermistor PT3C-51F-M2 10P Thermistor (PT3C-51F-M2,10pcs.)
Classification Type Components Remarks
Exclusive SD cards 1GB FCU8-SD001G FCU8-SD001G 1GB capacity
Exclusive SD cards 4GB FCU8-SD004G FCU8-SD004G 4GB capacity
Durable parts Part type
Battery for control unit Q6BAT
Replacements Part type Manufacturer
Protection fuse for operation panel I/O LM50 Daito Communication Apparatus Co., Ltd.
Protection fuse for FCU8-DX220/230/231/651 LM50 Daito Communication Apparatus Co., Ltd.
Protection fuse for FCU8-DX213/654/213-1/654-1 MP63 Daito Communication Apparatus Co., Ltd.
Pair of SD/USB covers for display unit N031C089G51 -
M800/M80/E80/C80 Series Specifications Manual (Hardware)
3 List of Configuration (M800S/M80/E80 Series)
129 IB-1501506-M
3.26 List of Cables
[Cable relating to NC]
(Note 1) "x" in type columns indicate cable length (unit: m).
(Note 2) Lengths indicated with an asterisk (*) in the max. cable length column indicate the maximum cable length when connecting via other unit.
Type Application Available cable length (m) Max. cable length
FCUA-R050-xM Synchronous encoder - control unit (straight, with connector) 5 30m
FCUA-R054-xM Synchronous encoder - control unit (right angle, with connector) 3, 5, 10, 15, 20 30m
G071 LxM 24VDC relay cable for machine operation panel 0.12, 0.5, 1 1m
G123 Cable for emergency stop release - -
G430 LxM Cable for connection to handy terminal 3, 5, 10 10m
G460 LxM Cable for machine operation panel
(Cable between main panel and sub panel) 0.5 0.5m
J010 LxM Operation panel I/O interface cable 0.5, 1 1m
J012 LxM Operation panel I/O interface cable (for FCU8-DX834) 0.5, 1 1m
J020 LxM Manual pulse generator cable (12V): 1ch 1, 2, 3, 5, 7, 10, 15, 20, 30 50m
J021 LxM Manual pulse generator cable (12V): 2ch 1, 2, 3, 5, 7, 10, 15, 20, 30 50m
J022 LxM Manual pulse generator cable (12V): 3ch 1, 2, 3, 5, 7, 10, 15, 20, 30 50m
J023 LxM Manual pulse generator cable (5V): 1ch 1, 2, 3, 5, 7, 10, 15, 20 20m
J024 LxM Manual pulse generator cable (5V): 2ch 1, 2, 3, 5, 7, 10, 15, 20 20m
J025 LxM Manual pulse generator cable (5V): 3ch 1, 2, 3, 5, 7, 10, 15, 20 20m
J026 LxM Manual pulse generator cable (5V): 1ch
(for connection to control unit) 1, 2, 3, 5, 7, 10, 15, 20 20m (*)
J027 LxM Manual pulse generator cable (5V): 2ch
(for connection to control unit) 1, 2, 3, 5, 7, 10, 15, 20 20m (*)
J030 LxM RS-232C I/F cable: 1ch 1, 2, 3, 5, 7, 10 15m (*)
J031 LxM RS-232C I/F cable: 2ch 1, 2, 3, 5, 7, 10 15m (*)
J070 LxM 24VDC power cable 1, 2, 3, 5, 7, 10, 15 15m
J071 LxM 24VDC power cable (for long distance) 20 20m
J100 LxM SKIP input cable 1, 2, 3, 5, 7, 10, 15, 20 20m
J120 LxM Emergency stop cable 1, 2, 3, 5, 7, 10, 15, 20, 30 30m
J121 LxM Emergency stop cable for machine operation panel 1, 2, 3, 5, 7, 10, 15, 20, 30 30m
J210 LxM Remote I/O 2.0 communication cable 0.3, 1, 2, 3, 5, 7, 10, 15, 20, 30 50m (*)
J221 LxM Analog input/output cable (for remote I/O unit) 2, 3, 7 30m
J224 LxM Analog input/output cable (for operation panel I/O unit) 1, 2, 3, 5, 7, 10, 15, 20 30m
J225 LxM Analog output cable (for operation panel I/O unit) 1, 2, 3, 5, 7, 10, 15, 20 30m
J303 LxM LAN straight cable 1, 2, 3, 5, 7, 10, 15, 20, 30 50m
J350 LxM DI/DO cable (connectors at both ends) 1, 2, 3, 5 50m
J351 LxM DI/DO cable (connector at one end) 3 50m
J460 LxM DI/DO cable (connectors at both ends) 1, 2, 3, 5 50m
J461 LxM DI/DO cable (connector at one end) 3 50m
R2-TM Terminator for remote I/O interface - -
M800/M80/E80/C80 Series Specifications Manual (Hardware)
3 List of Configuration (M800S/M80/E80 Series)
IB-1501506-M 130
[Cable Relating to Drive Unit]
(Note 1) "x" in type columns indicate cable length (unit: m).
(Note 2) Lengths indicated with an asterisk (*) in the max. cable length column indicate the maximum cable length when connecting via other unit.
3.27 System Type
Type Application Available cable length (m) Max. cable length
CNP2E-1-xM
Motor side PLG cable
Spindle side accuracy encoder
TS5690 cable
2, 3, 4, 5, 7, 10, 15, 20, 25, 30 30m
CNP3EZ-2P-xM Spindle side encoder cable
OSE-1024 cable 2, 3, 4, 5, 7, 10, 15, 20, 25, 30 30m
CNP3EZ-3P-xM Spindle side encoder cable
OSE-1024 cable 2, 3, 4, 5, 7, 10, 15, 20, 25, 30 30m
CNV2E-8P-xM
For HG/HG-H, HQ-H, HK/HK-H, HG-JR

Motor side encoder cable (for D47/D48/D51/D74/G48)
Ball screw side encoder cable (OSA405ET2AS, OSA676ET2AS)
2, 3, 4, 5, 7, 10, 15, 20, 25, 30 30m
CNV2E-9P-xM
For HG/HG-H, HQ-H, HK/HK-H, HG-JR
Motor side encoder cable (for D47/D48/D51/D74/G48)
Ball screw side encoder cable (OSA405ET2AS, OSA676ET2AS)
2, 3, 4, 5, 7, 10, 15, 20, 25, 30 30m
CNV2E-D-xM MDS-B-SD unit cable 2, 3, 4, 5, 7, 10, 15, 20, 25, 30 30m
CNV2E-HP-xM MDS-EX-HR unit cable 2, 3, 4, 5, 7, 10, 15, 20, 25, 30 30m
DG30-xM
Battery cable
(For drive unit - Battery box,
For drive unit - drive unit)
0.3, 0.5, 1, 2, 3, 5, 7, 10 10m
G380 LxM Optical communication cable
For wiring between drive units (outside panel) 5, 10, 12, 15, 20, 25, 30 30m
J395 LxM
Optical communication cable
For wiring between drive units (outside panel)
For wiring between NC-drive units
3, 5, 7, 10 10m
J396 LxM Optical communication cable
For wiring between drive units (inside panel) 0.2, 0.3, 0.5, 1, 2, 3, 5 10m
MR-BKS1CBLxMA1-H
<200V Series>
Brake cable for HG96
Lead out in direction of motor shaft
2, 3, 5, 7, 10 10m
MR-BKS1CBLxMA2-H
<200V Series>
Brake cable for HG96
Lead out in opposite direction of motor shaft
2, 3, 5, 7, 10 10m
MR-BT6V2CBL LxM Battery cable (MDS-EJ/EJH)
(For drive unit - drive unit) 0.3, 1 1m
MR-D05UDL3M-B STO cable 3 3m
MR-ENE4CBLxM-H-MTH For HG-H1502 Motor side encoder cable (for D48/D51/D74) 5, 10, 20, 30 30m
MR-PWS1CBLxMA1-H
<200V Series>
Power cable for HG96
Lead out in direction of motor shaft
2, 3, 5, 7, 10 10m
MR-PWS1CBLxMA2-H
<200V Series>
Power cable for HG96
Lead out in opposite direction of motor shaft
2, 3, 5, 7, 10 10m
SH21 LxM Power supply communication cable
Power backup unit communication cable 0.35, 0.5, 1, 2, 3 30m
Series Model name System type Control unit Display unit
M800S Series
M850S FCA850H-8S FCU8-MA542-001 FCU8-DU181-31 (15-type color LCD touchscreen)
FCA850H-4S FCU8-DU141-31 (10.4-type color LCD touchscreen)
M830S FCA830H-8S FCU8-MU542-001 FCU8-DU181-31 (15-type color LCD touchscreen)
FCA830H-4S FCU8-DU141-31 (10.4-type color LCD touchscreen)
M80 Series
M80 TypeA
FCA80H-8A
FCU8-MU512-001
FCU8-DU181-32 (15-type color LCD touchscreen)
FCA80H-4A FCU8-DU141-32 (10.4-type color LCD touchscreen)
FCA80P-2A FCU8-DU121-12 (8.4-type color LCD)
M80 TypeB
FCA80H-8B
FCU8-MU511-001
FCU8-DU181-32 (15-type color LCD touchscreen)
FCA80H-4B FCU8-DU141-32 (10.4-type color LCD touchscreen)
FCA80P-2B FCU8-DU121-12 (8.4-type color LCD)
E80 Series E80 TypeA FCA80P-2EA FCU8-MU514-001 FCU8-DU121-13 (8.4-type color LCD)
E80 TypeB FCA80P-2EB FCU8-MU513-001 FCU8-DU121-13 (8.4-type color LCD)

4.1 Environment Conditions [M800S]
4.1.1 Installation Environment Conditions
(Note 1) "Short term" means roughly within one month.
(Note 2) The current consumption of the display unit is included in that of the control unit.
(Note 3) For the whole NC system, consider the characteristics of the drive units when the altitude is more than 1000 meters above sea level. Refer to the manual of drive unit for details.
(Note 4) When the display unit is mounted on an incline, the inclination angle to place the unit should be 30 degrees or less from the vertical direction.
Item
Unit name Control unit Display unit

Type FCU8-MU542/MA542
FCU8-MU541/MA541
FCU8-DU142-31 : (10.4-type)
FCU8-DU182-31 : (15-type)
FCU8-DU141-31 : (10.4-type)
FCU8-DU181-31 : (15-type)
General
Specifications
Ambient
temperature
During
operation 0 to 58C
During
storage -20 to 60C
Ambient
humidity
Long term 10 to 75% RH (with no dew condensation)
Short term 10 to 95% RH (with no dew condensation) (Note 1)
Vibration resistance 4.9m/s2 or less
Shock resistance 29.4m/s2 or less
Working atmosphere No corrosive gases, dust or oil mist
Altitude Operation/Storage: 1000 meters or less above sea level,
Transportation: 13000 meters or less above sea level
Power supply voltage 24VDC
FCU8-DU142-31 : 12VDC/5VDC/3.3VDC
FCU8-DU182-31 : 12VDC/5VDC/3.3VDC
FCU8-DU141-31 : 12VDC/5VDC/3.3VDC
FCU8-DU181-31 : 12VDC/5VDC/3.3VDC
(Supply from Control Unit)
Current consumption 2.5A - (Note 2)
Maximum
heating value(W) 16
FCU8-DU142-31 : 10
FCU8-DU182-31 : 14
FCU8-DU141-31 : 10
FCU8-DU181-31 : 14
Mass (kg) 1.1
FCU8-DU142-31 : 1.7
FCU8-DU182-31 : 4.1
FCU8-DU141-31 : 1.7
FCU8-DU181-31 : 4
Outline
dimension
WHD
or
WH
(mm) 239.1173.475
FCU8-DU142-31 : 290220
FCU8-DU182-31 : 400320
FCU8-DU141-31 : 290220
FCU8-DU181-31 : 400320
M800/M80/E80/C80 Series Specifications Manual (Hardware)
4 General Specifications (M800S/M80/E80 Series)
133 IB-1501506-M
(Note 1) "Short term" means roughly within one month.
(Note 2) The current consumption of the keyboard unit and the operation panel I/O unit (control section) are included in that of the control unit. Current consumption for the I/O circuit needs to be separately calculated based on the number of points used and its load.
(Note 3) For the heating value of the I/O circuit, calculate with the number of points used.
(Note 4) For the whole NC system, consider the characteristics of the drive units when the altitude is more than 1000 meters above sea level. Refer to the manual of drive unit for details.
(Note 5) 24V power input is not required for FCU8-KB931/KB941.
(Note 6) Current consumption for the I/O circuit needs to be separately calculated based on the number of points used and its load.
Item
Unit name Keyboard unit Operation panel I/O unit Machine operation panel
Type
FCU8-KB041/KB046 : (10.4-type)
FCU8-KB047 : (10.4-type/vertical
arrangement)
FCU8-KB048 : (10.4-type)
FCU8-KB083 : (15-type/vertical
arrangement)
FCU8-DX731
FCU8-DX750
FCU8-DX760
FCU8-DX761
FCU8-DX834
FCU8-KB921/KB922/
KB925
FCU8-KB923/KB924/
KB926
FCU8-KB931/KB941
General
Specifications
Ambient
temperature
During

operation 0 to 58C
During
storage -20 to 60C
Ambient
humidity
Long term 10 to 75% RH (with no dew condensation)
Short term 10 to 95% RH (with no dew condensation) (Note 1)
Vibration resistance 4.9m/s2 or less
Shock resistance 29.4m/s2 or less
Working atmosphere No corrosive gases, dust or oil mist
Altitude Operation/Storage: 1000 meters or less above sea level,
Transportation: 13000 meters or less above sea level
Power supply voltage
5VDC 5VDC/3.3VDC
24VDC 24VDC (Note 5) (Supply from Control Unit)
Current consumption - (Note 2) 0.3A (Note 6) 0.3A (Note 5)
Maximum
heating value(W) 1 4 (Note 3) 8 (Note 3) 7.2
Mass (kg)
FCU8-KB041/KB046 : 0.8
FCU8-KB047 : 1.3
FCU8-KB048 : 1.4
FCU8-KB083 : 1.5
FCU8-DX731 :
0.3
FCU8-DX750 :
0.4
FCU8-DX760 :
0.5
FCU8-DX761 :
0.5
0.4
FCU8-KB921/KB922/
KB925 :
1.1
FCU8-KB923/KB924/
KB926 :
1.2
FCU8-KB931/KB941 :
0.5
Outline
dimension
WH
(mm)
FCU8-KB041/KB046 : 140220
FCU8-KB047 : 290160
FCU8-KB048 : 230220
FCU8-KB083 : 400140
116179
FCU8-KB921/KB922/
KB925 :
260140
FCU8-KB923/KB924/
KB926 :
290140
FCU8-KB931/KB941 :
140140
M800/M80/E80/C80 Series Specifications Manual (Hardware)
4 General Specifications (M800S/M80/E80 Series)
IB-1501506-M 134
(Note 1) "Short term" means roughly within one month.
(Note 2) This value includes the maximum value of DO external load current (3.2A).
(Note 3) This value does not include DO external load current.
(Note 4) For the heating value of the I/O circuit, calculate with the number of points used.
(Note 5) For the whole NC system, consider the characteristics of the drive units when the altitude is more than 1000
meters above sea level. Refer to the manual of drive unit for details.
(Note 6) The maximum value including the heating value of analog input circuit.
Item
Unit name Remote I/O unit
Type
FCU8-DX220/
DX230/
DX231
FCU8-DX202
FCU8-DX213/
DX213-1/
DX654/
DX654-1
FCU8-DX408 FCU8-DX409 FCU8-DX651
General
Specifications
Ambient
temperature
During
operation 0 to 58C
During
storage -20 to 60C
Ambient

humidity
Long term 10 to 75% RH (with no dew condensation)
Short term
10 to 95% RH
(with no dew condensation)
(Note 1)
10 to 85% RH
(with no dew
condensation)
(Note 1)
Vibration resistance 4.9m/s2 or less
Shock resistance 29.4m/s2 or less
Working atmosphere No corrosive gases, dust or oil mist
Altitude Operation/Storage: 1000 meters or less above sea level,
Transportation: 13000 meters or less above sea level
Power supply voltage 24VDC
Current consumption 3.5A (Note 2) 0.3A 0.3A (Note 3) 0.1A 0.2A 3.7A (Note 2)
Maximum
heating value (W) 8 (Note 4) 3 6 (Note 6) 8 (Note 4)
Mass (kg) 0.4 0.2 0.3 0.8
Outline
dimension
WHD
(mm) 40175133 40175119 40175130 40175109 40175130 104175115

4.1.2 24VDC Stabilized Power Supply Selecting Conditions
Consider the following characteristics for the stabilized power supply, and select the power supply that complies with laws, regulations, or safety standards of the country where the machine will be installed.
Item Specifications Remarks
Output
Voltage 24VDC
When the stabilized power supply and 24VDC input unit are distant, select
the stabilized power supply which is possible to set output voltage 24VDC or
more allowing for the influence of voltage down by the cable.
Voltage fluctuation 5%
Current - Calculate the current value as a reference of maximum current consumption
for the unit which uses the power supply.
Ripple noise 0.2V (P-P)
Output holding time min 20ms
Output holding time is decided by loading ratio; however, the stabilized power
supply which complies with the specification on the left must be selected
during maximum loading.
Overcurrent output
shutoff function - Use a power supply having the overcurrent output shutoff function.
CAUTION
1. Using a stabilized power supply without overcurrent protection may cause the unit's failure due to miswiring of 24V.

4.2 Environment Conditions [M80]
4.2.1 Installation Environment Conditions
(Note 1) "Short term" means roughly within one month.
(Note 2) The current consumption of the display unit is included in that of the control unit.
(Note 3) For the whole NC system, consider the characteristics of the drive units when the altitude is more than 1000 meters above sea level. Refer to the manual of drive unit for details.
(Note 4) When the display unit is mounted on an incline, the inclination angle to place the unit should be 30 degrees or less from the vertical direction.
Item
Unit name Control unit Display unit
Type FCU8-MU511/MU512
FCU8-MU501/MU502
FCU8-DU142-32 : (10.4-type)
FCU8-DU182-32 : (15-type)
FCU8-DU121-12 : (8.4-type)
FCU8-DU141-32 : (10.4-type)
FCU8-DU181-32 : (15-type)
General
Specifications
Ambient
temperature
During
operation 0 to 58C
During
storage -20 to 60C
Ambient
humidity
Long term 10 to 75% RH (with no dew condensation)
Short term 10 to 95% RH (with no dew condensation) (Note 1)
Vibration resistance 4.9m/s2 or less
Shock resistance 29.4m/s2 or less
Working atmosphere No corrosive gases, dust or oil mist
Altitude Operation/Storage: 1000 meters or less above sea level,
Transportation: 13000 meters or less above sea level
Power supply voltage 24VDC
FCU8-DU142-32 : 12VDC/5VDC/3.3VDC

FCU8-DU182-32 : 12VDC/5VDC/3.3VDC
FCU8-DU121-12 : 12VDC/3.3VDC
FCU8-DU141-32 : 12VDC/5VDC/3.3VDC
FCU8-DU181-32 : 12VDC/5VDC/3.3VDC
(Supply from Control Unit)
Current consumption 2.5A - (Note 2)
Maximum
heating value(W) 12
FCU8-DU142-32 : 10
FCU8-DU182-32 : 14
FCU8-DU121-12 : 6
FCU8-DU141-32 : 10
FCU8-DU181-32 : 14
Mass (kg) 1.1
FCU8-DU142-32 : 1.7
FCU8-DU182-32 : 4.1
FCU8-DU121-12 : 1.2
FCU8-DU141-32 : 1.7
FCU8-DU181-32 : 4
Outline
dimension
WHD
or
WH
(mm) 239.1173.475
FCU8-DU142-32 : 290220
FCU8-DU182-32 : 400320
FCU8-DU121-12 : 260200
FCU8-DU141-32 : 290220
FCU8-DU181-32 : 400320

(Note 1) "Short term" means roughly within one month.
(Note 2) The current consumption of the keyboard unit and the operation panel I/O unit (control section) are included in that of the control unit. Current consumption for the I/O circuit needs to be separately calculated based on the number of points used and its load.
(Note 3) For the heating value of the I/O circuit, calculate with the number of points used.
(Note 4) For the whole NC system, consider the characteristics of the drive units when the altitude is more than 1000 meters above sea level. Refer to the manual of drive unit for details.
(Note 5) 24V power input is not required for FCU8-KB931/KB941.
(Note 6) Current consumption for the I/O circuit needs to be separately calculated based on the number of points used and its load.
Item
Unit name Keyboard unit Operation panel I/O unit Machine operation panel
Type
FCU8-KB026/KB028 : (8.4-type)
FCU8-KB029 : (8.4-type/vertical
arrangement)
FCU8-KB041/KB046 : (10.4-type)
FCU8-KB047 : (10.4-type/vertical
arrangement)
FCU8-KB048 : (10.4-type)
FCU8-KB083 : (15-type/vertical
arrangement)
FCU8-DX731
FCU8-DX750
FCU8-DX760
FCU8-DX761
FCU8-DX834
FCU8-KB921/KB922/
KB925
FCU8-KB923/KB924/
KB926
FCU8-KB931/KB941
General
Specifications
Ambient
temperature
During
operation 0 to 58C
During
storage -20 to 60C
Ambient
humidity
Long term 10 to 75% RH (with no dew condensation)
Short term 10 to 95% RH (with no dew condensation) (Note 1)
Vibration resistance 4.9m/s2 or less
Shock resistance 29.4m/s2 or less
Working atmosphere No corrosive gases, dust or oil mist
Altitude Operation/Storage: 1000 meters or less above sea level,
Transportation: 13000 meters or less above sea level
Power supply voltage
5VDC 5VDC/3.3VDC
24VDC 24VDC (Note 5) (Supply from Control Unit)
Current consumption - (Note 2) 0.3A (Note 6) 0.3A (Note 5)
Maximum
heating value(W) 1 4 (Note 3) 8 (Note 3) 7.2

Mass (kg)
FCU8-KB026/KB028 : 0.75
FCU8-KB029 :1.0
FCU8-KB041/KB046 : 0.8
FCU8-KB047 : 1.3
FCU8-KB048 : 1.4
FCU8-KB083 : 1.5
FCU8-DX731 :
0.3
FCU8-DX750 :
0.4
FCU8-DX760 :
0.5
FCU8-DX761 :
0.5
0.4
FCU8-KB921/KB922/
KB925 :
1.1
FCU8-KB923/KB924/
KB926 :
1.2
FCU8-KB931/KB941 :
0.5
Outline
dimension
WH
(mm)
FCU8-KB026/KB028 : 140200
FCU8-KB029 : 260140
FCU8-KB041/KB046 : 140220
FCU8-KB047 : 290160
FCU8-KB048 : 230220
FCU8-KB083 : 400140
116179
FCU8-KB921/KB922/
KB925 :
260140
FCU8-KB923/KB924/
KB926 :
290140
FCU8-KB931/KB941 :
140140
M800/M80/E80/C80 Series Specifications Manual (Hardware)
4 General Specifications (M800S/M80/E80 Series)
IB-1501506-M 138
(Note 1) "Short term" means roughly within one month.
(Note 2) This value includes the maximum value of DO external load current (3.2A).
(Note 3) This value does not include DO external load current.
(Note 4) For the heating value of the I/O circuit, calculate with the number of points used.
(Note 5) For the whole NC system, consider the characteristics of the drive units when the altitude is more than 1000 meters above sea level. Refer to the manual of drive unit for details.
(Note 6) The maximum value including the heating value of analog input circuit.
Item
Unit name Remote I/O unit
Type
FCU8-DX220/
DX230/
DX231
FCU8-DX202
FCU8-DX213/
DX213-1/
DX654/
DX654-1
FCU8-DX408 FCU8-DX409 FCU8-DX651
General
Specifications
Ambient
temperature
During
operation 0 to 58C
During
storage -20 to 60C
Ambient
humidity
Long term 10 to 75% RH (with no dew condensation)
Short term
10 to 95% RH
(with no dew condensation)
(Note 1)
10 to 85% RH
(with no dew
condensation)
(Note 1)
Vibration resistance 4.9m/s2 or less
Shock resistance 29.4m/s2 or less
Working atmosphere No corrosive gases, dust or oil mist
Altitude Operation/Storage: 1000 meters or less above sea level,

Transportation: 13000 meters or less above sea level
Power supply voltage 24VDC
Current consumption 3.5A (Note 2) 0.3A 0.3A (Note 3) 0.1A 0.2A 3.7A (Note 2)
Maximum
heating value (W) 8 (Note 4) 3 6 (Note 6) 8 (Note 4)
Mass (kg) 0.4 0.2 0.3 0.8
Outline
dimension
WHD
(mm) 40175133 40175119 40175130 40175109 40175130 104175115

4.2.2 24VDC Stabilized Power Supply Selecting Conditions
Consider the following characteristics for the stabilized power supply, and select the power supply that complies with laws, regulations, or safety standards of the country where the machine will be installed.
Item Specifications Remarks
Output
Voltage 24VDC
When the stabilized power supply and 24VDC input unit are distant, select
the stabilized power supply which is possible to set output voltage 24VDC or
more allowing for the influence of voltage down by the cable.
Voltage fluctuation 5%
Current - Calculate the current value as a reference of maximum current consumption
for the unit which uses the power supply.
Ripple noise 0.2V (P-P)
Output holding time min 20ms
Output holding time is decided by loading ratio; however, the stabilized power
supply which complies with the specification on the left must be selected
during maximum loading.
Overcurrent output
shutoff function - Use a power supply having the overcurrent output shutoff function.
CAUTION
1. Using a stabilized power supply without overcurrent protection may cause the unit's failure due to miswiring of 24V.

4.3 Environment Conditions [E80]
4.3.1 Installation Environment Conditions
(Note 1) "Short term" means roughly within one month.
(Note 2) The current consumption of the display unit is included in that of the control unit.
(Note 3) For the whole NC system, consider the characteristics of the drive units when the altitude is more than 1000 meters above sea level. Refer to the manual of drive unit for details.
(Note 4) When the display unit is mounted on an incline, the inclination angle to place the unit should be 30 degrees or less from the vertical direction.
Item
Unit name Control unit Display unit
Type FCU8-MU513
FCU8-MU514 FCU8-DU121-13 : (8.4-type)
General
Specifications
Ambient
temperature
During
operation 0 to 58C
During
storage -20 to 60C
Ambient
humidity
Long term 10 to 75% RH (with no dew condensation)
Short term 10 to 95% RH (with no dew condensation) (Note 1)
Vibration resistance 4.9m/s2 or less
Shock resistance 29.4m/s2 or less
Working atmosphere No corrosive gases, dust or oil mist
Altitude Operation/Storage: 1000 meters or less above sea level,
Transportation: 13000 meters or less above sea level
Power supply voltage 24VDC
12VDC/3.3VDC
(Supply from Control Unit)
Current consumption 2.5A - (Note 2)
Maximum
heating value(W) 12 6
Mass (kg) 1.1
FCU8-DU121-12 : 1.2
FCU8-DU141-32 : 1.7
FCU8-DU181-32 : 4
Outline
dimension
WHD
or
WH
(mm) 239.1173.475 260200

(Note 1) "Short term" means roughly within one month.
(Note 2) The current consumption of the keyboard unit and the operation panel I/O unit (control section) are included in

that of the control unit. Current consumption for the I/O circuit needs to be separately calculated based on the number of points used and its load.
(Note 3) For the heating value of the I/O circuit, calculate with the number of points used.
(Note 4) For the whole NC system, consider the characteristics of the drive units when the altitude is more than 1000 meters above sea level. Refer to the manual of drive unit for details.
(Note 5) 24V power input is not required for FCU8-KB941.
(Note 6) Current consumption for the I/O circuit needs to be separately calculated based on the number of points used and its load.

Item				
Unit name	Keyboard unit	Operation panel I/O unit	Machine operation panel	
Type	FCU8-KB024 FCU8-KB025	FCU8-DX731 FCU8-DX750 FCU8-DX760 FCU8-DX761 FCU8-DX834	FCU8-KB922/KB925 FCU8-KB941	
General Specifications				
Ambient temperature				
During operation	0 to 58C			
During storage	-20 to 60C			
Ambient humidity	Long term 10 to 75% RH (with no dew condensation) Short term 10 to 95% RH (with no dew condensation) (Note 1)			
Vibration resistance	4.9m/s2 or less			
Shock resistance	29.4m/s2 or less			
Working atmosphere	No corrosive gases, dust or oil mist			
Altitude	Operation/Storage: 1000 meters or less above sea level, Transportation: 13000 meters or less above sea level			
Power supply voltage	5VDC	5VDC/3.3VDC	24VDC	24VDC (Note 5) (Supply from Control Unit)
Current consumption	-	(Note 2) 0.3A	(Note 6) 0.3A	(Note 5)
Maximum heating value(W)	1	4 (Note 3)	8 (Note 3)	7.2
Mass (kg)	0.75	FCU8-DX731 : 0.3 FCU8-DX750 : 0.4 FCU8-DX760 : 0.5 FCU8-DX761 : 0.5	0.4 FCU8-KB922/KB925 : 1.1 FCU8-KB941 : 0.5	
Outline dimension WH (mm)	140200	116179	FCU8-KB922/KB925 : 260140 FCU8-KB941 : 140140	

(Note 1) "Short term" means roughly within one month.
(Note 2) This value includes the maximum value of DO external load current (3.2A).
(Note 3) This value does not include DO external load current.
(Note 4) For the heating value of the I/O circuit, calculate with the number of points used.
(Note 5) For the whole NC system, consider the characteristics of the drive units when the altitude is more than 1000 meters above sea level. Refer to the manual of drive unit for details.
(Note 6) The maximum value including the heating value of analog input circuit.

Item			
Unit name	Remote I/O unit		
Type	FCU8-DX220/ DX230/ DX231	FCU8-DX202	FCU8-DX213/ DX213-1
General Specifications			
Ambient temperature			
During operation	0 to 58C		
During			

storage -20 to 60C
Ambient
humidity
Long term 10 to 75% RH (with no dew condensation)
Short term 10 to 95% RH (with no dew condensation) (Note 1)
Vibration resistance 4.9m/s2 or less
Shock resistance 29.4m/s2 or less
Working atmosphere No corrosive gases, dust or oil mist
Altitude Operation/Storage: 1000 meters or less above sea level,
Transportation: 13000 meters or less above sea level
Power supply voltage 24VDC
Current consumption 3.5A (Note 2) 0.3A 0.3A (Note 3) 0.1A 0.2A
Maximum
heating value (W) 8 (Note 4) 3 6 (Note 6)
Mass (kg) 0.4 0.2 0.3
Outline
dimension
WHD
(mm) 40175133 40175119 40175130 40175109 40175130

4.3.2 24VDC Stabilized Power Supply Selecting Conditions
Consider the following characteristics for the stabilized power supply, and select the power supply that complies with laws, regulations, or safety standards of the country where the machine will be installed.
Item Specifications Remarks
Output
Voltage 24VDC
When the stabilized power supply and 24VDC input unit are distant, select
the stabilized power supply which is possible to set output voltage 24VDC or
more allowing for the influence of voltage down by the cable.
Voltage fluctuation 5%
Current - Calculate the current value as a reference of maximum current consumption
for the unit which uses the power supply.
Ripple noise 0.2V (P-P)
Output holding time min 20ms
Output holding time is decided by loading ratio; however, the stabilized power
supply which complies with the specification on the left must be selected
during maximum loading.
Overcurrent output
shutoff function - Use a power supply having the overcurrent output shutoff function.
CAUTION
1. Using a stabilized power supply without overcurrent protection may cause the unit's failure due to miswiring of 24V.

4.4 Control Unit [M800S]
4.4.1 FCU8-MU542 / FCU8-MA542 / FCU8-MU541 / FCU8-MA541
[Outline dimension]
[mm]
47
156
172.4
173.4
90
28
214.5
239.1
208
11
6
6

4.5 Control Unit [M80]
4.5.1 FCU8-MU511 / FCU8-MU512 / FCU8-MU501 / FCU8-MU502
[Outline dimension]
[mm]
47
156
172.4
173.4
90
28
214.5
239.1
208
11
6
6

4.6 Control Unit [E80]
4.6.1 FCU8-MU513 / FCU8-MU514
[Outline dimension]

[mm]
47
156
172.4
173.4
90
28
214.5
239.1
208
11
6
6

4.7 Display Unit [M800S]
4.7.1 10.4-type (FCU8-DU142-31/FCU8-DU141-31)
[Outline dimension]
(Note) The figure above shows the state with the control unit mounted.
Option relay unit
not mounted
Option relay unit,
FCU8-EX702 mounted
Option relay unit,
FCU8-EX703 mounted
A
(Space required for wiring) 110 114
290
220
9.5
[mm]
A
(Space required for wiring)
Top
Bottom

[Panel cut dimension]
0.5
2060.3
1920.3
2760.3
20.2
(7) (7) 12 12
[mm]
290
277
207
220
2720.3
7 7
(7) (7)
70.2
4-C 2
4-M3
0.5
(Unit outline)
(Unit outline)
(Square hole dimension)
(Square hole dimension)
screw
4 - 4 holes

4.7.2 15-type (FCU8-DU182-31/FCU8-DU181-31)
[Outline dimension: FCU8-DU182-31]
(Note) The figure above shows the state with the control unit mounted.
Option relay unit
not mounted
Option relay unit,
FCU8-EX702 mounted
Option relay unit,
FCU8-EX703 mounted
A
(Space required for wiring) 110 114
400
320
9.5
[mm]
A
(Space required
for wiring)
Top
Bottom

[Outline dimension: FCU8-DU181-31]
(Note) The figure above shows the state with the control unit mounted.
Option relay unit
not mounted
Option relay unit,
FCU8-EX702 mounted
Option relay unit,
FCU8-EX703 mounted
A
(Space required for wiring) 110 114
400
320
9.5
[mm]
A
(Space required
for wiring)
Top
Bottom

[Panel cut dimension]
0.5
1930.3
1380.3
3020.3
1530.3
1930.3
193.5
80.2 80.2
20.2
(7) (7)
12 12
[mm]
a
a a a
a
a
a a a a
b
b b
b
b
b
b
b
400
387
307
320
1990.3 1830.3
1530.3
1540.3
18
5
7 7
13
26
7
(7) (7)
70.2
12-C 2
8-M3
(Unit outline)
(Unit outline)
(Square hole dimension)
(Square hole dimension)
10 - 4 holes
screw

4.8 Display Unit [M80]
4.8.1 8.4-type (FCU8-DU121-12)
[Outline dimension]
(Note 1) The 8.4-type display unit is incompatible with the touchscreen.
(Note 2) The figure above shows the state with the control unit mounted.
Option relay unit
not mounted
Option relay unit,
FCU8-EX702 mounted
Option relay unit,
FCU8-EX703 mounted
A
(Space required for wiring) 110 114

260
200
9.5
[mm]
A
(Space required for wiring)
Top
Bottom

[Panel cut dimension]
0.5
1860.3
1720.3
2460.3
20.2
(7) (7) 12 12
[mm]
260
247
187
200
2420.3
7 7
(7) (7)
70.2
4-C 2
4-M3
0.5
(Unit outline)
(Unit outline)
(Square hole dimension)
(Square hole dimension)
screw
4 - 4 holes

4.8.2 10.4-type (FCU8-DU142-32/FCU8-DU141-32)
[Outline dimension]
(Note) The figure above shows the state with the control unit mounted.
Option relay unit
not mounted
Option relay unit,
FCU8-EX702 mounted
Option relay unit,
FCU8-EX703 mounted
A
(Space required for wiring) 110 114
290
220
9.5
[mm]
A
(Space required for wiring)
Top
Bottom

[Panel cut dimension]
0.5
2060.3
1920.3
2760.3
20.2
(7) (7) 12 12
[mm]
290
277
207
220
2720.3
7 7
(7) (7)
70.2
4-C 2
4-M3
0.5
(Unit outline)
(Unit outline)
(Square hole dimension)
(Square hole dimension)
screw
4 - 4 holes

4.8.3 15-type (FCU8-DU182-32/FCU8-DU181-32)
[Outline dimension: FCU8-DU182-32]
(Note) The figure above shows the state with the control unit mounted.
Option relay unit
not mounted
Option relay unit,
FCU8-EX702 mounted
Option relay unit,
FCU8-EX703 mounted
A
(Space required for wiring) 110 114
400
320
9.5
[mm]
A
Top
Bottom
(Space required
for wiring)

[Outline dimension: FCU8-DU181-32]
(Note) The figure above shows the state with the control unit mounted.
Option relay unit
not mounted
Option relay unit,
FCU8-EX702 mounted
Option relay unit,
FCU8-EX703 mounted
A
(Space required for wiring) 110 114
400
320
9.5
[mm]
A
(Space required
for wiring)
Top
Bottom

[Panel cut dimension]
0.5
1930.3
1380.3
3020.3
1530.3
1930.3
193.5
80.2 80.2
20.2
(7) (7)
12 12
[mm]
a
a a a
a
a
a a a a
b
b b
b
b
b
b
b
400
387
307
320
1990.3 1830.3
1530.3
1540.3
18
5
7 7
13
26
7
(7) (7)
70.2
12-C 2
8-M3

(Unit outline)
(Unit outline)
(Square hole dimension)
(Square hole dimension)
10 - 4 holes
screw

4.9 Display Unit [E80]
4.9.1 8.4-type (FCU8-DU121-13)
[Outline dimension]
(Note 1) The 8.4-type display unit is incompatible with the touchscreen.
(Note 2) The figure above shows the state with the control unit mounted.
Option relay unit
not mounted
Option relay unit,
FCU8-EX702 mounted
Option relay unit,
FCU8-EX703 mounted
A
(Space required for wiring) 110 114
260
200
9.5
[mm]
A
(Space required for wiring)
Top
Bottom

[Panel cut dimension]
0.5
1860.3
1720.3
2460.3
20.2
(7) (7) 12 12
[mm]
260
247
187
200
2420.3
7 7
(7) (7)
70.2
4-C 2
4-M3
0.5
(Unit outline)
(Unit outline)
(Square hole dimension)
(Square hole dimension)
screw
4 - 4 holes

4.10 Keyboard Unit
4.10.1 Keyboard for 8.4-type Display Unit (FCU8-KB026)
[Outline dimension]
(Note) The above side view shows the state with the operation panel I/O unit mounted.
[Panel cut dimension]
140
200
9.5
[mm]
110
(Space required for wiring)
Top
Bottom
[mm]
1280.3
140
127
1260.3
0.5
187
1860.3
1730.3
(7) (7)
(7) (7)
9
13
9

13
(6.5)
3.5 3.5 0.5
6.50.2
(6.5)
10.2 4-M3
200
(Unit outline)
(Unit outline)
(Square hole
 dimension)
(Square hole dimension)
screw
4 - 4 holes

4.10.2 Keyboard for 8.4-type Display Unit (FCU8-KB028)
[Outline dimension]
(Note) The above side view shows the state with the operation panel I/O unit mounted.
[Panel cut dimension]
140
200
9.5
[mm]
110
(Space required for wiring)
Top
Bottom
[mm]
1280.3
140
127
1260.3
0.5
187
1860.3
1730.3
(7) (7)
(7) (7)
9
13
9
13
(6.5)
3.5 3.5 0.5
6.50.2
(6.5)
10.2 4-M3
200
(Unit outline)
(Unit outline)
(Square hole
 dimension)
(Square hole dimension)
screw
4 - 4 holes

4.10.3 Keyboard for 8.4-type Display Unit (FCU8-KB029)
[Outline dimension]
(Note) The above side view shows the state with the operation panel I/O unit mounted.
[Panel cut dimension]
[mm]
260
140
9.5 110
(Space required for wiring)
Top
Bottom
[mm]
2480.3
260
247
2460.3
0.5
127
1260.3
1130.3
(7) (7)
(7) (7)
9
13 13
9
(6.5)
3.5 3.5 0.5 (6.5)
6.50.2

10.2
4-M3
140
(Unit outline)
(Unit outline)
(Square hole dimension)
(Square hole
 dimension)
screw
4 - 4 holes

4.10.4 Keyboard for 10.4-type Display Unit (FCU8-KB041)
[Outline dimension]
(Note) The above side view shows the state with the operation panel I/O unit mounted.
[Panel cut dimension]
140
220
9.5
[mm]
110
(Space required for wiring)
Top
Bottom
[mm]
1280.3
140
127
1260.3
0.5
207
2060.3
1930.3
(7) (7)
(7) (7)
9
13
9
13
(6.5)
3.5 3.5 0.5
6.50.2
(6.5)
10.2 4-M3
220
(Unit outline)
(Unit outline)
(Square hole
 dimension)
(Square hole dimension)
screw
4 - 4 holes

4.10.5 Keyboard for 10.4-type Display Unit (FCU8-KB046)
[Outline dimension]
(Note) The above side view shows the state with the operation panel I/O unit mounted.
[Panel cut dimension]
140
220
9.5
[mm]
110
(Space required for wiring)
Top
Bottom
[mm]
1280.3
140
127
1260.3
0.5
207
2060.3
1930.3
(7) (7)
(7) (7)
9
13
9
13
(6.5)
3.5 3.5 0.5
6.50.2
(6.5)
10.2 4-M3

220
(Unit outline)
(Unit outline)
(Square hole
 dimension)
(Square hole dimension)
screw
4 - 4 holes

4.10.6 Keyboard for 10.4-type Display Unit (FCU8-KB047)
[Outline dimension]
(Note) The above side view shows the state with the operation panel I/O unit mounted.
[Panel cut dimension]
290
160
9.5
[mm]
110
(Space required for wiring)
Top
Bottom
[mm]
2780.3
290
277
2760.3
0.5
147
1460.3
1330.3
(7) (7)
(7) (7)
9
13
9
13
(6.5)
3.5 3.5 0.5
6.50.2
(6.5)
10.2
4-M3
160
(Unit outline)
(Unit outline)
(Square hole dimension)
(Square hole
 dimension)
screw
4 - 4 holes

4.10.7 Keyboard for 10.4-type Display Unit (FCU8-KB048)
[Outline dimension]
(Note) The above side view shows the state with the operation panel I/O unit mounted.
[Panel cut dimension]
[mm]
230
220
9.5 110
(Space required for wiring)
Top
Bottom
[mm]
2180.3
230
217
2160.3
0.5
207
2060.3
1930.3
(7) (7)
(7) (7)
9
13 13
9
(6.5)
3.5 3.5 0.5
6.50.2
(6.5)
10.2
4-M3
220
(Unit outline)

(Unit outline)
(Square hole dimension)
(Square hole
dimension)
screw
4 - 4 holes

4.10.8 Keyboard for 15-type Display Unit (FCU8-KB083)
[Outline dimension]
(Note) The above side view shows the state with the operation panel I/O unit mounted.
[Panel cut dimension]
400
140
9.5
[mm]
110
(Space required for wiring)
Top
Bottom
[mm]
200.50.3
400
387
1930.3
193.5
127
1260.3
1130.3
(7) (7)
(7) (7)
9
13
9
13
(6.5)
3.5 3.5 0.5 (6.5)
6.50.2
6-M3
140
187.50.3
1930.3
1280.3 (6)
6.50.2 6.50.2 (6) 3.5
4
3.5
4
9
18
10.2
(Unit outline)
(Unit outline)
(Square hole dimension)
(Square hole
dimension)
screw
8 - 4 holes

4.10.9 Keyboard for 8.4-type Display Unit (FCU8-KB024)
[Outline dimension]
(Note) The above side view shows the state with the operation panel I/O unit mounted.
[Panel cut dimension]
140
200
9.5
[mm]
110
(Space required for wiring)
Top
Bottom
[mm]
1280.3
140
127
1260.3
0.5
187
1860.3
1730.3
(7) (7)
(7) (7)
9
13
9
13

(6.5)
3.5 3.5 0.5
6.50.2
(6.5)
10.2 4-M3
200
(Unit outline)
(Unit outline)
(Square hole
 dimension)
(Square hole dimension)
screw
4 - 4 holes

4.10.10 Keyboard for 8.4-type Display Unit (FCU8-KB025)
[Outline dimension]
(Note) The above side view shows the state with the operation panel I/O unit mounted.
[Panel cut dimension]
140
200
9.5
[mm]
110
(Space required for wiring)
Top
Bottom
[mm]
1280.3
140
127
1260.3
0.5
187
1860.3
1730.3
(7) (7)
(7) (7)
9
13
9
13
(6.5)
3.5 3.5 0.5
6.50.2
(6.5)
10.2 4-M3
200
(Unit outline)
(Unit outline)
(Square hole
 dimension)
(Square hole dimension)
screw
4 - 4 holes

4.11 Operation Panel I/O Unit
4.11.1 List of Units
(Note 1) The form of the CG31/CG32/CG35/CG36 connectors on FCU8-DX731 are the same as that of CJ38/CJ40/
CJ42 connectors on other units.
Be careful not to connect to a wrong connector.
See the descriptions below for more specific explanation on connections.
(Note 2) The connection method of DO (CG32/CG34) of FCU8-DX834 is different from other operation panel I/O units.
Be careful not to connect to a wrong connector. See the descriptions mentioned in the later section for more
specific explanation on connections.
Classification Type Components Remarks
DI 24V/0V common input [64 points]
DO Source output [48 points]
AO Analog output [1 point]
FCU8-DX731
(Note 1)
Base card
RIO 2.0 terminator connector (R2-TM)
DI: 64-points 24V/0V common type
DO: 48-points source type (200mA/point)
AO: 1 point
Manual pulse generator input: 2ch
Control unit I/F
Keyboard unit I/F
Remote I/O 2.0 I/F
RIO occupied stations (fixed):
 1, 3, 7 to 12, 20 to 22
RIO extensible stations:
 2, 4 to 6, 13 to 19, 23 to 64
DI 24V/0V common input [96 points]

DO Source output [64 points] FCU8-DX750 Base card
RIO 2.0 terminator connector (R2-TM)
DI: 96-points 24V/0V common type
DO: 64-points source type (200mA/point)
Manual pulse generator input: 3ch
Control unit I/F
Keyboard unit I/F
Remote I/O 2.0 I/F
RIO occupied stations (fixed):
1 to 3, 7 to 12, 20 to 22
RIO extensible stations:
4 to 6, 13 to 19, 23 to 64
DI 24V/0V common input [96 points]
DO Source output [96 points] FCU8-DX760
Base card
Add-on card
RIO 2.0 terminator connector (R2-TM)
DI: 96-points 24V/0V common type
DO: 96-points source type (200mA/point)
Manual pulse generator input: 3ch
Control unit I/F
Keyboard unit I/F
Remote I/O 2.0 I/F
RIO occupied stations (fixed):
1 to 4, 7 to 12, 20 to 22
RIO extensible stations:
5, 6, 13 to 19, 23 to 64
DI 24V/0V common input [96 points]
DO Source output [64 points]
AI Analog input [1 point]
AO Analog output [1 point]
FCU8-DX761
Base card
Add-on card
RIO 2.0 terminator connector (R2-TM)
DI: 96-points 24V/0V common type
DO: 64-points source type (200mA/point)
AI: 1 point
AO: 1 point
Manual pulse generator input: 3ch
Control unit I/F
Keyboard unit I/F
Remote I/O 2.0 I/F
RIO occupied stations (fixed):
1 to 5, 7 to 12, 20 to 22
RIO extensible stations:
6, 13 to 19, 23 to 64
DI 24V/0V common input [64 points]
DO Source output [64 points]
Scan input [64 points]
Scan output [64 points]
FCU8-DX834
(Note 2)
Base card
Add-on card
RIO 2.0 terminator connector (R2-TM)
DI: 64-points 24V/0V common type
DO: 64-points source type (200mA/point)
Scan input: 64 points
Scan output: 64 points
Manual pulse generator input: 3ch
Keyboard unit I/F
Remote I/O 2.0 I/F
RIO occupied stations (fixed):
1 to 4, 7 to 14, 20 to 22
RIO extensible stations:
5, 6, 15 to 19, 23 to 64

4.11.2 FCU8-DX731 / FCU8-DX750 / FCU8-DX760 / FCU8-DX761 / FCU8-DX834
[Outline dimension : FCU8-DX731]
[Outline dimension : FCU8-DX750]
[mm]
116
179
99 (Space required for wiring)
[mm]
116
179
99 (Space required for wiring)

[Outline dimension : FCU8-DX760]
[Outline dimension : FCU8-DX761]
[mm]
116

179
99 (Space required for wiring)
[mm]
116
179
99 (Space required for wiring)

[Outline dimension : FCU8-DX834]
[mm]
116
179
99 (Space required for wiring)

[Installation dimension: FCU8-DX731 / FCU8-DX750 / FCU8-DX760 / FCU8-DX761 / FCU8-DX834]
(Note) The unit thickness of the fixed part with screws is 16.6mm.
Select the fixing screws having the length suitable for the thickness.
1710.3
(5)
(4)
1060.3
(4)
(5)
[mm]
4-M3 screw
116 (Unit outline)
179 (Unit outline)

4.12 Remote I/O Unit
Types of signals described on the list of units can be input/output from the remote I/O unit (FCU8-DXxxx) according to the type and No. of contacts. Remote I/O units are used by being connected to the control unit or the operation panel I/O unit.
Multiple remote I/O units can be used as long as the total number of occupied stations is 64 or less.
(Note) The maximum connectable number of remote I/O units is 32.
4.12.1 List of Units
Classification Type Components Remarks
DI 24V/0V common input [32 points]
DO Source output [32 points] FCU8-DX220 Base card
RIO 2.0 connector set
DI: 32-points 24V/0V common type
Do: 32-points source type (200mA/point)
Number of occupied stations: 1
DI 24V/0V common input [64 points]
DO Source output [48 points] FCU8-DX230 Base card
RIO 2.0 connector set
DI: 64-points 24V/0V common type
DO: 48-points source type (200mA/point)
Number of occupied stations: 2
DI 24V/0V common input
DO Source output [48 points]
AO Analog output [1 point]
FCU8-DX231 Base card
RIO 2.0 connector set
DI: 64-points 24V/0V common type
DO: 48-points source type (200mA/point)
AO: 1 point
Number of occupied stations: 2
AI Analog input [4 points]
AO Analog output [1 point] FCU8-DX202 Base card
RIO 2.0 connector set
AI : 4 points
AO: 1 point
Number of occupied stations: 1
DI 0V common input [16 points]
DO Source output (large capacity) [8
points]
FCU8-DX213 Base card
RIO 2.0 connector set
DI: 16-points 0V common type (3mA/point)
DO: 8-points source type (2A/point)
Number of occupied stations: 1
DI 0V common input [16 points]
DO Source output (large capacity) [8
points]
FCU8-DX213-1 Base card
RIO 2.0 connector set
DI: 16-points 0V common type (9mA/point)
DO: 8-points source type (2A/point)
Number of occupied stations: 1
Safety DI 0V common input [8 points]
Safety DO Source output (large capacity)
[4 points]
FCU8-DX654 Base card

RIO 2.0 connector set
Safety DI: 8-points 0V common type (3mA/point)
Safety DO: 4-points source type (2A/point)
Number of occupied stations: 2
Safety DI 0V common input [8 points]
Safety DO Source output (large capacity)
[4 points]
FCU8-DX654-1 Base card
RIO 2.0 connector set
Safety DI: 8-points 0V common type (9mA/point)
Safety DO: 4-points source type (2A/point)
Number of occupied stations: 2
DI 24V/0V common input [32points]
DO Source output [32 points]
Safety DI 0V common input [8 points]
(Note 1)
Safety relay output [4 points] (Note 2)
FCU8-DX651
Base card
Add-on card
RIO 2.0 connector set
DI: 32-points 24V/0V common type
Do: 32-points source type (200mA/point)
Safety DI: 8-points 0V common type
Safety relay: 4-points (non-voltage contact)
Relay contact welding detection
Number of occupied stations: 3
(Note 1) Safety DI uses 16 points of terminal
because of the duplication wiring.
(Note 2) Safety relay output uses 8 points of
terminal because of the duplication wiring.
Thermistor input [12 points] FCU8-DX408 Base card
RIO 2.0 connector set
Thermistor input: 12 points
Number of occupied stations: 3
Multi-analog input [4 points] (Note 3) FCU8-DX409 Base card
RIO 2.0 connector set
Multi-analog input: 4 points
(Note 3) Voltage input, current input,
thermocouple input and resistance temperature
detector input are selected for each CH.
Number of occupied stations: 4

4.12.2 FCU8-DX220 / FCU8-DX230 / FCU8-DX231 / FCU8-DX202 / FCU8-DX213 /
FCU8-DX213-1 / FCU8-DX654 / FCU8-DX654-1 / FCU8-DX651/ FCU8-DX408 / FCU8-DX409
[Outline dimension : FCU8-DX220]
[Outline dimension : FCU8-DX230]
(Space required above the unit) (Space required below the unit)
(Space
required for
wiring)
Top
Bottom
40
168 2.5
45 115
4
[mm] 30 30
(Space required above the unit) (Space required below the unit)
(Space
required for
wiring)
Top
Bottom
40
168 2.5
45 115
4
[mm] 30 30

[Outline dimension : FCU8-DX231]
[Outline dimension : FCU8-DX202]
(Space required above the unit) (Space required below the unit)
(Space
required for
wiring)
Top
Bottom
40
168 2.5
45 115
4
[mm] 30 30
40

168 2.5
115
4
[mm]
(Space required for
wiring)
Top
Bottom
80

[Outline dimension : FCU8-DX213]
[Outline dimension : FCU8-DX213-1]
(Space required above the unit) (Space required below the unit)
(Space
required for
wiring)
Top
Bottom
40
168 2.5
45 115
4
[mm] 30 30
(Space required above the unit) (Space required below the unit)
(Space
required for
wiring)
Top
Bottom
40
168 2.5
45 115
4
[mm] 30 30

[Outline dimension : FCU8-DX654]
[Outline dimension : FCU8-DX654-1]
(Space required above the unit) (Space required below the unit)
(Space
required for
wiring)
Top
Bottom
40
168 2.5
45 115
4
[mm] 30 30
(Space required above the unit) (Space required below the unit)
(Space
required for
wiring)
Top
Bottom
40
168 2.5
45 115
4
[mm] 30 30

[Outline dimension : FCU8-DX651]
[Outline dimension : FCU8-DX408]
100
168
115
[mm]
45
2.5 4 4
(Space
required for
wiring) Top
Bottom
(Space
required for
Top wiring)
Bottom
40
168 2.5
45 109
4
[mm]

[Outline dimension : FCU8-DX409]
(Space
required for
Top wiring)
Bottom
40
168 2.5
45 115
4
[mm]

[Installation dimension : FCU8-DX220 / FCU8-DX230 / FCU8-DX231 / FCU8-DX202 /
FCU8-DX213 / FCU8-DX213-1 / FCU8-DX654 / FCU8-DX654-1 / FCU8-DX408 / FCU8-DX409]
[Installation dimension : FCU8-DX651]
[mm]
156 0.2
6
6
(Unit outline)
40
168
2-M5 Screw
4
(Unit outline) (Unit outline)
[mm]
156 0.2
4 168
88 0.2
100
6
6
4
3-M5 Screw(Unit outline) (Unit outline)
(Unit outline)

4.13 Functional Safety Expansion Unit
4.13.1 Functional Safety Expansion Unit (FCU8-EX133)
[Outline dimension]
23.4
[mm]
118.2
129.3

4.14 Function Expansion Unit
4.14.1 CC-Link (FCU8-EX561)
[Outline dimension]
94.6 30 124
[mm]

4.14.2 PROFIBUS-DP (FCU8-EX563)
[Outline dimension]
94.6 30 124
[mm]

4.14.3 CC-Link IE Field (FCU8-EX564)
[Outline dimension]
94.6 30 124
[mm]

4.14.4 EtherNet/IP (FCU8-EX565)
[Outline dimension]
94.6 30 124
[mm]

4.14.5 FL-net (FCU8-EX568)
[Outline dimension]
94.6 30 124
[mm]

4.14.6 Vibration Cutting Expansion Unit (FCU8-EX744)

[Outline dimension]
94.6 30 124
[mm]

4.14.7 Option Relay Unit (FCU8-EX702)
[Outline dimension]
50
94.6
134.9
[mm]

4.14.8 Option Relay Unit (FCU8-EX703)
[Outline dimension]
78.4
99
134.9
[mm]

4.15 Manual Pulse Generator
4.15.1 5V Manual Pulse Generator (UFO-01-2Z9)
100 pulse/rev
[Outline dimension]
[Panel cut dimension]
Produced by NIDEC NEMICON CORPORATION
3-M4
[mm]
0
10
20
30
40
50
60
70
80
90
0V A B
80.5
60
1 6 6 2 6
R43
77
58
56
8.89 7.6 M3 x 6
5V
Gasket
Above size only
72 at equal pitch
Panel cut diameter
Index stud
Top
Bottom
[mm]
72
62
at equal pitch

4.15.2 12V Manual Pulse Generator (HD60C)
25 pulse/rev
[Outline dimension]
[Panel cut dimension]
3.6
16 27 0.5
L10
8.89 7.60
t 2.0 3-M4
77 0.5
80 1
58 0.5
60 0.5
[mm]
24 0.5
56 0.5
Installation of screws
Packing stud bolt
other than M3 x 6
not possible
Top
Bottom

12V 0V BA
40
30
50
60
70
10
20
90
0
80
3 - 4. 8
62
+2
0
72 0. 2
120
[mm]
(Divide equally
by three)

4.16 Synchronous Feed Encoder
4.16.1 Synchronous Feed Encoder (OSE-1024-3-15-68)
[Outline dimension]
19. 5
102
135
5 3
33
2
68
28
20
56
68
4 - 5. 4
21mm
14. 3 0
- 0.11
1. 15 +0.14
0 1. 15 +0.14
0
2
26
16
50
15- 0.006
- 0.017
- 0. 009
- 0. 025
2
5 - 0. 012
- 0. 042
3 +0. 1
0
68
56
50
- 0. 009 - 0. 025
[mm]
Caution plate
hole
Enlarged drawing of key
Valid depth of key groove is
Cross section BB

[Connector]
Connector pin assignment
Pin Function Pin Function
A A phase K 0V
B Z phase L -
C B phase M -
D - N A phase reverse
E Case grounding P Z phase reverse
F - R B phase reverse
G - S -
H +5V T -
J -
F
J
T
G
L
K

M
H
C
D
E S R
P
N
B
A

4.17 Machine Operation Panel
4.17.1 Main Panel A , B
(FCU8-KB921 / FCU8-KB922 / FCU8-KB925 , FCU8-KB923 / FCU8-KB924 / FCU8-KB926)
[Outline dimension : FCU8-KB921]
[Outline dimension : FCU8-KB922]
[Outline dimension : FCU8-KB925]
[mm]
260
140
9.5 60
(Space required
for wiring)
Top
Bottom
[mm]
260
140
9.5 60
(Space required
for wiring)
Top
Bottom
[mm]
260
140
9.5 60
(Space required
for wiring)
Top
Bottom

[Outline dimension : FCU8-KB923]
[Outline dimension : FCU8-KB924]
[Outline dimension : FCU8-KB926]
[mm]
290
140
9.5 60
(Space required
for wiring)
Top
Bottom
[mm]
290
140
9.5 60
(Space required
for wiring)
Top
Bottom
[mm]
290
140
9.5 60
(Space required
for wiring)
Top
Bottom

[Panel cut dimension : FCU8-KB921 / FCU8-KB922 / FCU8-KB925]
[Panel cut dimension : FCU8-KB923 / FCU8-KB924 / FCU8-KB926]
[mm]
2480.3
260
247
2460.3
0.5
127
1260.3
1130.3
(7) (7)
(7) (7)

9
13 13
9
(6.5)
3.5 3.5 0.5 (6.5)
6.50.2
10.2
4-M3
140
(6.5)
(6.5)
(Unit outline)
(Unit outline)
(Square hole dimension)
(Square hole
 dimension)
screw
4 - 4 holes
[mm]
2780.3
290
277
2760.3
0.5
127
1260.3
1130.3
(7) (7)
(7) (7)
9
13 13
9
(6.5)
3.5 3.5 0.5 (6.5)
6.50.2
10.2
4-M3
140
(6.5)
(6.5)
(Unit outline)
(Unit outline)
(Square hole dimension)
(Square hole
 dimension)
screw
4 - 4 holes

[Letter label dimension : FCU8-KB922 / FCU8-KB924]
Clear key top
Letter label
(Material: PET or equivalent, t = 0.125 or less)
Example of a letter
12.8 or less
9.8 or less

4.17.2 Sub Panel A (FCU8-KB931 / FCU8-KB941)
[Outline dimension : FCU8-KB931]
[Outline dimension : FCU8-KB941]
[Panel cut dimension : FCU8-KB931 / FCU8-KB941]
[mm]
140
140
9.5 70
(Space required for
wiring)
Top
Bottom
[mm]
140
140
9.5 70
(Space required for
wiring)
Top
Bottom
[mm]
1280.3
140
127
1260.3
0.5
127
1260.3

1130.3
(7) (7)
(7) (7)
9
13 13
9
(6.5)
3.5 3.5 0.5 (6.5)
6.50.2
10.2
4-M3
140
(Unit outline)
(Unit outline)
(Square hole dimension)
(Square hole
dimension)
screw
4 - 4 holes

4.18 Handy Terminal
(Note 1) "Short term" means within one month.
(Note 2) The unit is an IP65F equivalent.
Item
Unit name Handy terminal
Type HG1T-SB12UH-MK1346-L5
General
Specifications
Ambient
temperature
During
operation 0 to 40
During
storage -20 to 60
Ambient
humidity
Long term: 10 to 75% RH (with no dew condensation)
Short term: 10 to 95% RH (with no dew condensation) (Note 1)
Vibration
resistance
During
operation 9.8m/s2 [1.0G] or less, 10 to 55Hz
Shock
resistance
During
storage 98m/s2 [10.0G] or less
Working
atmosphere No corrosive gases, dust or oil mist
Power
specifications
Power voltage 24VDC5% Ripple noise 240mV (P-P)
Current
consumption (max.) 0.2A
Instantaneous
stop tolerance
time
24VDC: 4ms or less
Others Heating value 4W (max.)
Mass 0.6kg

Dimension and names of parts
(Note) Do not press multiple switches simultaneously: When three or more switches are pressed simultaneously,
unpressed switches are also detected as pressed ones.
No. Name Function/ Specification No. Name Function/ Specification
(1) LCD
Monochrome display with
backlight
192(W) 64(H) dots
(7) HOST Host interface connector
(DDK: 17JE-23250-02(D8A6))
(2) SW1
Emergency stop switch
Contact rating/ Contact: 24VDC,
1A
Contact configuration: 2b contacts
(IDEC Corporation: HA1E V2S2VR)
(8) - Host interface cable
(5m)
(3) - Membrane switch (Note) (9) - Simplified hand strap
(IDEC Corporation: HG9Z-PS1)
(4) SW2
Enable switch
Contact rating/ Contact: 24VDC,
50mA

Contact configuration: 3 position
contact 2
(OFF-ON-OFF)
(IDEC Corporation: HE3B-M2)
(10) - Panel hanging fitting
(IDEC Corporation: HG9Z-TK1)
(5) SW4
Manual pulse generator
Output: Open collector
4.7k pull-up resistor is
connected. (TOKYO
SOKUTEIKIZAI CO., LTD:
RE19PH50C16RR)
(11) - Serial number plate
(6) SW6 Selector switch
133
255
90
46.7
38
51
15 11.5
(2)
(5)
(6)
(3)
(1)
(4)
(8)
(7)
(9)
(10) (11)

4.19 Thermistor
4.19.1 Thermistor(PT3C-51F-M2)
[Outline dimension]
Made by SHIBAURA ELECTRONICS Co., Ltd.
Ambient temperature -10 to + 190
Insulation resistance 100M or more at 500VDC [between case and lead wire]
25010
3
3 12
4.5
[mm]

4.20 Exclusive SD Cards
(Note 1) SLC stands for Single Level Cell, and it stores one bit data in each memory cell.
This provides longer life span and high product reliability in comparison with MLC (Multi Level Cell), which is commonly applied to SD cards.
(Note 2) Do not touch the terminal part with fingers, etc. when handling the SD cards.
The contamination of the terminal part of SD card causes a contact failure or a trouble.
Item FCU8-SD001G FCU8-SD004G
Capacity 1GB 4GB
NAND Flash SLC (Note 1)
Ambient temperature During operation -25 to +85
During storage -40 to +85
Ambient humidity During operation 5% to 95%RH (with no dew condensation)
During storage 5% to 95%RH (with no dew condensation)

4.21 Specifications and Precautions of USB/SD/LAN Interface
4.21.1 USB Interface (Memory I/F card)
(Note 1) Data transfer speed is the theoretical value on the standard, and the actual speed will be inferior to the value listed above. The transfer speed may be restrained depending on the specification of the connected device.
(Note 2) Do not connect the devices other than the USB memory.
(1) Precautions for insertion/removal of USB memory
When inserting/removing an USB memory, turn the MITSUBISHI device's power OFF. Do not pull out the USB memory or turn OFF the power during access to the USB memory. Failure to observe this could cause the memory contents to be erased.
When Inserting/removing a USB memory, be sure to have enough interval to perform that (about 10 seconds or more).
In case of emergency, always perform backups by having your important data duplicate, etc. as MITSUBISHI will not guarantee the broken or lost data.
(2) Precaution for operation with front-side USB memory
A USB memory to be used has to be supported USB2.0 Hi-Speed (480Mbps).
When connecting the USB memory, connect it directly without using the extension cable or USB hub.
Machine vibration may cause the USB memory to fall out depending on environment. Therefore, the operation with the front-side USB memory is required to be performed on your own responsibility.
M800S / M80
Standards USB2.0
Data transfer speed
(Note)
High Speed (480Mbps)

Full Speed (12Mbps)
Low Speed (1.5Mbps)
Power supply to USB
device
Supply voltage: 5V 5%
Supply current: Max. 500mA/port
Number of free ports Front X 1
Max. cable length 5m

4.21.2 SD Interface (Memory I/F card)
(Note) SDXC is not supported.
(1) Precautions for use of commercially available SD card
MITSUBISHI will not provide performance guarantee and maintenance for commercially available SD card, mini SD card or micro SD card (requires converting adapter). In case of using one of them, careful performance check must be required by the machine tool builder.
Commercially available devices may not be compatible with MITSUBISHI units or suitable FA environment for temperature- or noise-wise.
(2) Precautions for insertion/removal of SD card
When inserting/removing an SD card, turn the MITSUBISHI device's power OFF. Do not pull out the card or turn OFF the power during access to the SD card. Failure to observe this could cause the memory contents to be erased.
In case of emergency, always perform backups by having your important data duplicate, etc. as MITSUBISHI will not guarantee the broken or lost data.
4.21.3 LAN Interface (Control Unit)
(Note 1) Data transfer speed is the theoretical value on the standard, and the actual speed will be inferior to the value listed above. The transfer speed may be restrained depending on the specification of the connected device.
(Note 2) When using half-duplex communication, the response time may become long depending on the connected device.
Use full-duplex communication to connect with the opposite device via a switching HUB.
(1) Precautions for selection of LAN cable
Make sure to select the LAN cables which are "category 5e or above" and "shielded". Cable wire material with double shielded, which is appropriate for FA environment., is recommended.
M800S / M80
Standards SD/SDHC (Note)
Transfer speed According to the connecting SD card
Capacity 32GB
Number of free ports Front X 1, Rear X 1
M800S/M80
Standards 100BASE-TX / 10BASE-T
Data transfer speed
(Note 1) 100Mbps / 10Mbps
Number of free ports Control unit 2

C80 Series
Hardware

1
System Basic Configuration (C80 Series)

1.1 System Basic Configuration Drawing
(Note) The supported versions of the GT Designer3 are as follows:
SVGA: Version 1.155M or later
VGA: Version 1.165X or later
GX Works3 Version 1.025B or later is required.
CNC CPU
R16NCCPU-S1
RnCPU
LED
GT Designer3
GX Works3
NC Analyzer2
EMG
SKIP
MPG
GOT2000 Series
(SVGA, VGA)
SD card
Ethernet connection
PLC CPU Rotary switch
Optical communication
Drive unit

2
General Connection Diagram (C80 Series)

(Note 1) HD60C (12VDC) requires another power source 12VDC.
(Note 2) A CPU module can be mounted on the CPU slot of the base unit or the slot No. 0 to 6. A slot between CPU

modules can be left empty for reservation. Note that you cannot mount an I/O module or intelligent function module on a slot between CPU modules.
EMG
FG
RIO1
PLCIO
NCIO
RIO2
EMG DISPLAY I/F MPG CN1 EXT I/F RIO
MPG#1
ACIN/DCIN
AC/DC
H300
H010
H401
H101
H501 H501
R16NCCPU-S1
J303
FA-CBLxxFMV-M
R173SXY
MPG#2 MPG#3
RIO1
PLCIO
NCIO
RIO2
R173SXY
RIO1
PLCIO
NCIO
RIO2
R173SXY
H501
SKIP
TU I/F
SW
MPG TERMINAL DCIN
H310
MPG#2
MPG#3
MPG#1
DCIN
DCIN
FA-TBS40P
FA-TBS40P
Machine I/O
/Operation panel
Manual Pulse Generator
Drive Units
Power
Unit
MELSEC iQ-R I/O Module
/ Intelligent Module
CPU Module
/ Network Module
UFO-01-2Z9 (5VDC)
(Note1)
cable
(Max:20m)
cable
(Max:0.5m)
cable
(Max:20m)
cable
Cable
cable
(Max:20m)
cable
(Max:5m)
Cable
G020 (5VDC, 1ch, Max:15m)
G021 (5VDC, 2ch, Max:15m)
G022 (5VDC, 3ch, Max:15m)
F020 (12VDC, 1ch, Max:45m)
F021 (12VDC, 2ch, Max:45m)
F022 (12VDC, 3ch, Max:45m)
Dotted lines indicate the sections prepared by the machine tool builder.
Used with connector. Cannot be used with cable H300 at the same time
Cable for terminal block
(Max:5m)
Terminal block type
24VDC
24VDC or
100 to 240VAC
Source Power
UFO-01-2Z9 (5VDC)
24VDC
Dual Signal Module

Terminal block type
24VDC
Display module
GOT2000 Series
HD60C (12VDC)
(Max:20m)
PLC
CPU
Module
CPU/
Net work
Module
#1
Dual
Signal
Module
CNCCPU
Module
Manual Pulse Generator 3CH
SKIP signals. 4 points (24VDC)
/ Manual Pulse Generator 2CH
Specifications including unit names, cable
names, and maximum lengths of cables are
subject to change without notice. Always
confirm these details before placing an order.
cable
24VDC or
100 to 240VAC
Basic
Base
CPU/
Net work
Module
#2
Dual
Signal
Module
Dual
Signal
Module
I/O
Module
#5
I/O
Module
#4
I/O
Module
#3
I/O
Module
#2
I/O
Module
#1
I/O
Module
#6
G380 (Max:30m, for wiring outside the panel)
J395 (Max:10m, for wiring outside the panel)
J396 (Max:10m, for wiring inside the panel)
cable
Signal splitter
FCU7-HN387
SKIP signals. 4 points (24VDC)
cable
(Max:15m)
24VDC (Not used)
(12VDC)(Note1)
215 IB-1501506-M
3
List of Configuration (C80 Series)
M800/M80/E80/C80 Series Specifications Manual (Hardware)
3 List of Configuration (C80 Series)
IB-1501506-M 216
3.1 CNC Control Unit
(1) Basic base
(2) Power supply
(3) PLC CPU
(4) CNC CPU module
(5) Input module
(a) AC
(b) DC (positive/negative common type)
Model name Remarks Reference
R35B 5 slots: for mounting MELSEC iQ-R series module MELSEC iQ-R Module
Configuration Manual
(SH(NA)-081262)
R38B 8 slots: for mounting MELSEC iQ-R series module

R312B 12 slots: for mounting MELSEC iQ-R series module
Model name Remarks Reference
R61P AC power supply module input: AC100 to 240V, output: DC5V/6.5A
MELSEC iQ-R Module
Configuration Manual
(SH(NA)-081262)
R62P AC power supply module input: AC100 to 240V, output: DC5V/3.5A, DC24V/
0.6A
R63P DC power supply module input: DC24V, output: DC5V/6.5A
R64P AC power supply module input: AC100 to 240V, output: DC5V/9A
Model name Remarks Reference
R04CPU Program capacity: 40k steps, Elementary operation processing speed (LD
command): 0.98ns
MELSEC iQ-R CPU Module
User's Manual (Startup)
(SH(NA)-081263)
MELSEC iQ-R CPU Module
User's Manual (Application)
(SH(NA)-081264)
R08CPU Program capacity: 80k steps, Elementary operation processing speed (LD
command): 0.98ns
R16CPU Program capacity: 160k steps, Elementary operation processing speed (LD
command): 0.98ns
R32CPU Program capacity: 320k steps, Elementary operation processing speed (LD
command): 0.98ns
R120CPU Program capacity: 1200k steps, Elementary operation processing speed (LD
command): 0.98ns
Model name Remarks
R16NCCPU-S1 CNC CPU module
Model name Remarks Reference
RX10 AC input: 16 points, AC100 to 120V (50/60Hz) MELSEC iQ-R I/O Module User's
Manual (SH(NA)-081247)
Model name Remarks Reference
RX40C7 DC input: 16 points, DC24V, 7.0mA
MELSEC iQ-R I/O Module User's
Manual (SH(NA)-081247)
RX41C4 DC input: 32 points, DC24V, 4.0mA
RX42C4 DC input: 64 points, DC24V, 4.0mA
RX41C4-TS DC input, 32 points, DC24V, 4.0mA, Spring clamp terminal block
M800/M80/E80/C80 Series Specifications Manual (Hardware)
3 List of Configuration (C80 Series)
217 IB-1501506-M
(6) Analog input module
(a) Voltage input module
(b) Current input module
(c) Voltage/current input module
(7) Output module
(a) Relay
(b) Triac
Model name Remarks Reference
R60ADV8 Voltage input module: 8CH
DC-10 to 10V/-32000 to 32000 80s/CH
MELSEC iQ-R Analog-Digital
Converter Module User's Manual
(Startup) (SH(NA)-081232)
MELSEC iQ-R Analog-Digital
Converter Module User's Manual
(Application) (SH(NA)-081233)
Model name Remarks Reference
R60ADI8 Current input module: 8CH
DC0 to 20mA/0 to 32000 80s/CH
MELSEC iQ-R Analog-Digital
Converter Module User's Manual
(Startup) (SH(NA)-081232)
MELSEC iQ-R Analog-Digital
Converter Module User's Manual
(Application) (SH(NA)-081233)
Model name Remarks Reference
R60AD4 Voltage/current input module: 4CH
DC-10 to 10V/-32000 to 32000DC0 to 20mA/0 to 32000 80s/CH
MELSEC iQ-R Analog-Digital
Converter Module User's Manual
(Startup) (SH(NA)-081232)
MELSEC iQ-R Analog-Digital
Converter Module User's Manual
(Application) (SH(NA)-081233)
Model name Remarks Reference
RY10R2 Relay output: 16 points, 24 V DC/2 A, 240 V AC/2 A MELSEC iQ-R I/O Module User's
RY18R2A Relay output, 8 points; 24 V DC/2 A, 240 V AC/2 A Manual (SH(NA)-081247)
Model name Remarks Reference
RY20S6 Triac output, 16 points: 100-240 VAC / 0.6A MELSEC iQ-R I/O Module User's
Manual (SH(NA)-081247)
M800/M80/E80/C80 Series Specifications Manual (Hardware)
3 List of Configuration (C80 Series)
IB-1501506-M 218
(c) Transistor (sink type)
(d) Transistor (independent)
(8) Analog output module

Voltage output module
(b) Current output module
(c) Voltage/current output module
Model name Remarks Reference
RY40NT5P Transistor (sink type) output: 16 points, DC12 to 24V, 0.5A
MELSEC iQ-R I/O Module User's
Manual (SH(NA)-081247) RY41NT2P Transistor (sink type) output: 32 points, DC12 to 24V, 0.2A
RY42NT2P Transistor (sink type) output: 64 points, DC12 to 24V, 0.2A
Model name Remarks Reference
RY40PT5P Transistor (source type) output: 16 points, DC12 to 24V, 0.5A
MELSEC iQ-R I/O Module User's
Manual (SH(NA)-081247)
RY41PT1P Transistor (source type) output: 32 points, DC12 to 24V, 0.1A
RY42PT1P Transistor (source type) output: 64 points, DC12 to 24V, 0.1A
RY41PT1P-TS Transistor (source type) output: 32 points, DC12 to 24V, 0.1A, Spring clamp
terminal block
Model name Remarks Reference
R60DAV8 Voltage output module: 8CH
-32000 to 32000/DC-10 to 10V 80s/CH
MELSEC iQ-R Digital-Analog
Converter Module User's Manual
(Startup) (SH(NA)-081235)
MELSEC iQ-R Digital-Analog
Converter Module User's Manual
(Application) (SH(NA)-081237)
Model name Remarks Reference
R60DAI8 Current input module: 8CH
0 to 32000/DC0 to 20mA 80s/CH
MELSEC iQ-R Digital-Analog
Converter Module User's Manual
(Startup) (SH(NA)-081235)
MELSEC iQ-R Digital-Analog
Converter Module User's Manual
(Application) (SH(NA)-081237)
Model name Remarks Reference
R60DA4 Voltage/current input module: 4CH
DC-10 to 10V/-32000 to 32000DC0 to 20mA/0 to 32000 80s/CH
MELSEC iQ-R Digital-Analog
Converter Module User's Manual
(Startup) (SH(NA)-081235)
MELSEC iQ-R Digital-Analog
Converter Module User's Manual
(Application) (SH(NA)-081237)
M800/M80/E80/C80 Series Specifications Manual (Hardware)
3 List of Configuration (C80 Series)
219 IB-1501506-M
(9) Temperature adjustment
(a) Thermocouple
(b) Platinum RTD
Model name Remarks Reference
R60TCTRT2TT2
(R60TCTT4)
4 channels
Thermocouple (K,J,T,B,S,E,R,N,U,L,PL ,W5Re/W26Re)
Platinum RTD (Pt100,JPt100)
Without heater disconnection detection
Sampling period: 250ms/4channels, 500ms/4channels
18-point terminal block
Channels are isolated
Heating and cooling control
Temperature Control Module
User's Manual (Startup)
(SH(NA)-081535)
Temperature Control Module
User's Manual (Application)
(SH(NA)-081536)
R60TCTRT2TT2BW
(R60TCTT4BW)
4 channels
Thermocouple (K,J,T,B,S,E,R,N,U,L,PL ,W5Re/W26Re)
Platinum RTD (Pt100,JPt100)
With heater disconnection detection
Sampling period: 250ms/4channels, 500ms/4channels
2 units of 18-point terminal block
Channels are isolated
Heating and cooling control
Model name Remarks Reference
R60TCRT4
4 channels
Platinum RTD (Pt100,JPt100)
Without heater disconnection detection
Sampling period: 250ms/4channels, 500ms/4channels
18-point terminal block
Channels are isolated
Heating and cooling control
Temperature Control Module
User's Manual (Startup)
(SH(NA)-081535)

Temperature Control Module
User's Manual (Application)
(SH(NA)-081536)
R60TCRT4BW
4 channels
Platinum RTD (Pt100,JPt100)
With heater disconnection detection
Sampling period: 250ms/4channels, 500ms/4channels
2 units of 18-point terminal block
Channels are isolated
Heating and cooling control
M800/M80/E80/C80 Series Specifications Manual (Hardware)
3 List of Configuration (C80 Series)
IB-1501506-M 220
(10) High-speed counter module
(11) Ethernet
(12) Serial communication
(13) MES interface module
(14) CC-Link
Model name Remarks Reference
RD62P2
DC5/12/24V, input: 2CH
Maximum counting speed: 200kpulse/s
External output: transistor (sink type) MELSEC iQ-R High-Speed
Counter Module User's Manual
(Startup) (SH(NA)-081239)
MELSEC iQ-R High-Speed
Counter Module User's Manual
(Application) (SH(NA)-081241)
RD62D2
Differential-input: 2CH
Maximum counting speed: 8Mpulse/s
External output: transistor (sink type)
RD62P2E
DC5/12/24V, input: 2CH
Maximum counting speed: 200kpulse/s
External output: transistor (source type)
Model name Remarks Reference
RJ71EN71
1Gbps/100Mbps/10Mbps: 2 ports
Multi-network supported
(Ethernet/CC-Link IE Field Network, CC-Link IE Controller Network (twisted
pair cable))
MELSEC iQ-R Ethernet/CC-Link
IE User's Manual (Startup)
(SH(NA)-081256)
MELSEC iQ-R Ethernet User's
Manual (Application)
(SH(NA)-081257)
MELSEC iQ-R CC-Link IE
Controller Network User's Manual
(Application) (SH(NA)-081258)
MELSEC iQ-R CC-Link IE Field
Network User's Manual
(Application) (SH(NA)-081259)
Model name Remarks Reference
RJ71C24 Max. 230.4kbps RS-232:1CHRS-422/485:1CH MELSEC iQ-R Serial
Communication Module User's
Manual (Startup)
(SH(NA)-081250)
MELSEC iQ-R Serial
Communication Module User's
Manual (Application)
(SH(NA)-081251)
RJ71C24-R2 Max. 230.4kbps RS-232:2CH
RJ71C24-R4 Max. 230.4kbps RS-422/485:2CH
Model name Remarks Reference
RD81MES96N 1000BASE-T/100BASE-TX/10BASE-T
Database dynamic link (MX ME Interface-R is separately required.)
MELSEC iQ-R MES Interface
Module User's Manual (Startup)
(SH(NA)-081422)
MELSEC iQ-R MES Interface
Module User's Manual
(Application) (SH(NA)-081423)
Model name Remarks Reference
RJ61BT11 Max. 10Mbps master/local station CC-Link Ver.2 supported
MELSEC iQ-R CC-Link System
Master/Local Module User's
Manual (Startup)
(SH(NA)-081269)
MELSEC iQ-R CC-Link System
Master/Local Module User's
Manual (Application)
(SH(NA)-081270)
M800/M80/E80/C80 Series Specifications Manual (Hardware)
3 List of Configuration (C80 Series)
221 IB-1501506-M

(15) CC-Link IE controller network
(16) CC-Link IE Field Network
(17) DeviceNet
(18) PROFIBUS-DP
(19) EtherNetI/P
(20) Extension base
Model name Remarks Reference
RJ71GP21-SX 1Gbps optical fiber cable control/normal station
MELSEC iQ-R Ethernet/CC-Link
IE User's Manual (Startup)
(SH(NA)-081256)
MELSEC iQ-R CC-Link IE
Controller Network User's Manual
(Application) (SH(NA)-081258)
Model name Remarks Reference
RJ71GF11-T2 1Gbps master/local station
MELSEC iQ-R Ethernet/CC-Link
IE User's Manual (Startup)
(SH(NA)-081256)
MELSEC iQ-R CC-Link IE Field
Network User's Manual
(Application) (SH(NA)-081259)
Model name Remarks Reference
RJ71DN91 Max. 500kbaud, master/local station
MELSEC iQ-R DeviceNet Master/
Slave Module User's Manual
(Startup)
(SH(NA)-081765)
MELSEC iQ-R DeviceNet Master/
Slave Module User's Manual
(Application)
(SH(NA)-081767)
Model name Remarks Reference
RJ71PB91V Max. 12Mbps, master/local station
MELSEC iQ-R PROFIBUS-DP
Module User's Manual (Startup)
(SH(NA)-081855)
MELSEC iQ-R PROFIBUS-DP
Module User's Manual
(Application)
(SH(NA)-081857)
Model name Remarks Reference
RJ71EIP91 EtherNet/IP Scanner Module
MELSEC iQ-R EtherNet/IP
Network Interface Module User's
Manual (Startup)
(SH(NA)-081913)
MELSEC iQ-R EtherNet/IP
Network Interface Module User's
Manual (Application)
(SH(NA)-081915)
Model name Remarks Reference
R65B 5 slots: for mounting MELSEC iQ-R series module MELSEC iQ-R Module
Configuration Manual
(SH(NA)-081262)
R68B 8 slots: for mounting MELSEC iQ-R series module
R612B 12 slots: for mounting MELSEC iQ-R series module
M800/M80/E80/C80 Series Specifications Manual (Hardware)
3 List of Configuration (C80 Series)
IB-1501506-M 222
(21) RQ extension base
(22) Spring clamp terminal block
(23) Connector/terminal block converter module
(24) Cable
(a) Cables for CNC CPU
(Note) The Standard cable length column shows the lengths of the cable available from MITSUBISHI.
(b) Cable for connector and terminal block changeover unit
Model name Remarks Reference
RQ65B 5 slots: for mounting MELSEC Q series module MELSEC iQ-R Module
Configuration Manual
(SH(NA)-081262)
RQ68B 8 slots: for mounting MELSEC Q series module
RQ612B 12 slots: for mounting MELSEC Q series module
Model name Remarks Reference
Q6TE-18SN For 16 points I/O modules, 0.3 to 1.5mm2 (AWG22 to 16) I/O Module Type Building Block
User's Manual (SH(NA)-080042)
Model name Remarks Reference
A6TBX70 For positive common type input modules (3-wire type) I/O Module Type Building Block
User's Manual (SH(NA)-080042)
A6TBXY36 For positive common type input modules and sink type output modules
(standard type)
A6TBXY54 For positive common type input modules and sink type output modules
(2-wire type)
Cable type Application Max. lengthStandard cable length (m) Remarks
F020 Manual pulse generator: 1ch 45m 0.5, 1, 2, 3, 5, 7, 10, 15, 20
12V power supply type can be used.
For Signal splitter F021 Manual pulse generator: 2ch 45m 0.5, 1, 2, 3, 5, 7, 10, 15, 20
F022 Manual pulse generator: 3ch 45m 0.5, 1, 2, 3, 5, 7, 10, 15, 20

G020 Manual pulse generator: 1ch 15m 0.5, 1, 2, 3, 5, 7, 10, 15
5V power supply type can be used.
For Signal splitter G021 Manual pulse generator: 2ch 15m 0.5, 1, 2, 3, 5, 7, 10, 15
G022 Manual pulse generator: 3ch 15m 0.5, 1, 2, 3, 5, 7, 10, 15
H010 Signal splitter connection 5m 0.5, 1, 2, 3, 5
H101 Emergency stop 20m 0.5, 1, 2, 3, 5, 7, 10, 15, 20
H300 SKIP/manual pulse generator input 20m 0.5, 1, 2, 3, 5, 7, 10, 15, 20
H310 SKIP connection 15m 0.5, 1, 2, 3, 5, 7, 10, 15 For Signal splitter
H401 Manual pulse generator: 1ch for 5V 20m 0.5, 1, 2, 3, 5, 7, 10, 15, 20
H501 Dual-signal module communication 0.5m 0.1, 0.2, 0.3, 0.5
J303 Display module communication
(Straight) 20m 1, 2, 3, 5, 7, 10, 15, 20
Model name Remarks Reference
AC05TB For A6TBXY36/A6TBXY54/A6TBX70 (positive common/sink type modules)
0.5m
I/O Module Type Building Block
User's Manual (SH(NA)-080042)
AC10TB For A6TBXY36/A6TBXY54/A6TBX70 (positive common/sink type modules)
1m
AC20TB For A6TBXY36/A6TBXY54/A6TBX70 (positive common/sink type modules)
2m
AC30TB For A6TBXY36/A6TBXY54/A6TBX70 (positive common/sink type modules)
3m
AC50TB For A6TBXY36/A6TBXY54/A6TBX70 (positive common/sink type modules)
5m
AC80TB For A6TBXY36/A6TBXY54/A6TBX70 (positive common/sink type modules)
8m (Common current not exceeding 0.5A)
AC100TB For A6TBXY36/A6TBXY54/A6TBX70 (positive common/sink type modules)
10m (Common current not exceeding 0.5A)
M800/M80/E80/C80 Series Specifications Manual (Hardware)
3 List of Configuration (C80 Series)
223 IB-1501506-M
(c) Cable for drive unit
(Note 1) The Standard cable length column shows the lengths of the cable available from MITSUBISHI.
(Note 2) "x" in type columns indicate cable length (unit: m).
Cable type Application Max. length Standard cable length (m)
CNP2E-1-xM
Motor side PLG cable
Spindle side accuracy encoder
TS5690 cable
30m 2, 3, 4, 5, 7, 10, 15, 20, 25, 30
CNP3EZ-2P-xM Spindle side encoder cable
OSE-1024 cable 30m 2, 3, 4, 5, 7, 10, 15, 20, 25, 30
CNP3EZ-3P-xM Spindle side encoder cable
OSE-1024 cable 30m 2, 3, 4, 5, 7, 10, 15, 20, 25, 30
CNV2E-8P-xM Motor side encoder cable for HG/HG-H, HQ/HQ-H (For D48/D51/D74) 30m 2, 3, 4, 5, 7, 10, 15, 20, 25, 30
CNV2E-9P-xM Motor side encoder cable for HG/HG-H, HQ/HQ-H (For D48/D51/D74) 30m 2, 3, 4, 5, 7, 10, 15, 20, 25, 30
CNV2E-D-xM MDS-B-SD unit cable 30m 2, 3, 4, 5, 7, 10, 15, 20, 25, 30
CNV2E-HP-xM MDS-B-HR unit cable 30m 2, 3, 4, 5, 7, 10, 15, 20, 25, 30
DG30-xM Battery cable
(drive unit - battery box, drive unit - drive unit) 10m 0.3, 0.5, 1, 2, 3, 5, 7, 10
G380 LxM Optical communication cable
for wiring between drive units (outside panel) 30m 5, 10, 12, 15, 20, 25, 30
J395 LxM
Optical communication cable
for wiring between drive units (outside panel)
for wiring between NC-drive units
10m 3, 5, 7, 10
J396 LxM Optical communication cable
for wiring between drive units (inside panel) 10m 0.2, 0.3, 0.5, 1, 2, 3, 5
MR-BKS1CBLxMA1-H
<200V Series>
Brake cable for HG96
Lead out in direction of motor shaft
10m 2, 3, 5, 7, 10
MR-BKS1CBLxMA2-H
<200V Series>
Brake cable for HG96
Lead out in opposite direction of motor shaft
10m 2, 3, 5, 7, 10
MR-BT6V2CBL LxM Battery cable (MDS-EJ/EJH)
(drive unit - drive unit) 1m 0.3, 1
MR-D05UDL3M-B STO cable 3m 3
MR-PWS1CBLxMA1-
H
<200V Series>
Power cable for HG96
Lead out in direction of motor shaft
10m 2, 3, 5, 7, 10
MR-PWS1CBLxMA2-
H
<200V Series>
Power cable for HG96
(Note) It can not be used with HF-KP13.
Lead out in opposite direction of motor shaft
10m 2, 3, 5, 7, 10
SH21 LxM Power supply communication cable
Power backup unit communication cable 30m 0.35, 0.5, 1, 2, 3

(25) Relay terminal unit
(a) Unit
(b) Cable
(26) Extension cable
(27) Connector
Model name Remarks Reference
A6TE2-16SRN 40 pin connector For 24VDC Transistor output unit (sink type module)
Relay Terminal Module User's
Manual (Hardware) A6TE2-
16SRN (IB(NA)-66833)
Model name Remarks Reference
AC06TE
For A6TE2-16SRN 0.6m
For 32 points (1 connector), one of this cable and two units of the relay terminal
unit are used
Relay Terminal Module User's
Manual (Hardware) A6TE2-
16SRN (IB(NA)-66833)
AC10TE
For A6TE2-16SRN 1m
For 32 points (1 connector), one of this cable and two units of the relay terminal
unit are used
AC30TE
For A6TE2-16SRN 3m
For 32 points (1 connector), one of this cable and two units of the relay terminal
unit are used
AC50TE
For A6TE2-16SRN 5m
For 32 points (1 connector), one of this cable and two units of the relay terminal
unit are used
AC100TE
For A6TE2-16SRN 10m
For 32 points (1 connector), one of this cable and two units of the relay terminal
unit are used
Model name Remarks Reference
RC06B 0.6m cable for connecting the extension base/the RQ extension base with the
basic base
MELSEC iQ-R Module
Configuration Manual
(SH(NA)-081262)
RC12B 1.2m cable for connecting the extension base/the RQ extension base with the
basic base
RC30B 3m cable for connecting the extension base/the RQ extension base with the
basic base
RC50B 5m cable for connecting the extension base/the RQ extension base with the
basic base
Model name Remarks Reference
A6CON1 Soldering type 32 point-connector (40-pin connector)
I/O Module Type Building Block
User's Manual (SH(NA)-080042)
A6CON2 Crimp-contact type 32 point-connector (40-pin connector)
A6CON3 Flat cable pressure displacement type 32-point connector (40-pin connector)
A6CON4 Soldering type 32 point-connector
(40-pin connector; two-way cable can be mounted)

(28) CC-Link Remote I/O unit
(a) Thread terminal block type
(b) Waterproof connector type
(29) I/O mixed unit
(a) DC input/transistor output
(30) SD memory card
(31) Extended SRAM cassette
Model name Remarks Reference
AJ65SBTB1-16D Input 16 points: 24VDC (positive/negative common shared type), 1-wire,
terminal block type, response time: 1.5 ms
CC-Link System Compact Type
Remote I/O Module User's
Manual (SH(NA)-4007)
AJ65SBTB1-32D Input 32 points: 24VDC (positive/negative common shared type), 1-wire,
terminal block type, response time: 1.5 ms
AJ65SBTB1-16TE Output 16 points: 12/24VDC (0.1A), transistor output (source type), 1-wire,
terminal block type
AJ65SBTB1-32TE1 Output 32 points: 12/24VDC (0.5A), transistor output (source type), 1-wire,
terminal block type
Model name Remarks Reference
AJ65FBTA4-16DE Input 16 points: 24VDC (negative common), 4-wire, super-slim waterproof type,
response time: 1.5 ms CC-Link System Compact Type
Remote I/O Module User's
AJ65FBTA2-16TE Manual (SH(NA)-4007) Output 16 points: 12/24VDC (1.0A), transistor output (source type), 2-wire,
super-slim waterproof type
Model name Remarks Reference
RH42C4NT2P DC input: 32 points, DC24V, 4.0mA
Transistor (sink type) output: 32 points, DC12 to 24V, 0.2A

MELSEC iQ-R I/O Module User's
Manual (SH(NA)-081247)
Model name Remarks Reference
NZ1MEM-2GBSD 2G byte
MELSEC iQ-R Module
Configuration Manual
(SH(NA)-081262)
Model name Remarks Reference
NZ2MC-1MBS 1M byte
MELSEC iQ-R Module
Configuration Manual
(SH(NA)-081262)
M800/M80/E80/C80 Series Specifications Manual (Hardware)
3 List of Configuration (C80 Series)
IB-1501506-M 226
3.2 GOT
3.2.1 GT27
(1) GOT
(a) GT2715
(b) GT2712
(c) GT2710
Model name Remarks Reference
GT2715-XTBA
15-type XGA [1024768 dots] TFT color liquid crystal display, 65536 colors
<Multimedia and video/RGB and multi-touch supported>
100-240VAC, user memory, storage memory (ROM):57MB, operation memory
(RAM): 128MB
Requiring GT Designer3 Version(GOT2000) 1.117X or later.
GT27 General Description
(IB(NA)-0800502)
Model name Remarks Reference
GT2712-STBA
12.1-type SVGA [800600 dots] TFT color liquid crystal display, 65536 colors
<Multimedia and video/RGB and multi-touch supported>
100-240VAC, user memory, storage memory (ROM):57MB, operation memory
(RAM): 128MB
Requiring GT Designer3 Version1 (GOT2000) 1.155M or later. GT27 General Description
(IB(NA)-0800502)
GT2712-STBD
12.1-type SVGA [800600 dots] TFT color liquid crystal display, 65536 colors
<Multimedia and video/RGB and multi-touch supported>
24VDC, user memory, storage memory (ROM): 57MB, operation memory
(RAM): 128MB
Requiring GT Designer3 Version1 (GOT2000) 1.155M or later.
Model name Remarks Reference
GT2710-STBA
10.4-type SVGA [800600 dots] TFT color liquid crystal display, 65536 colors
<Multimedia and video/RGB and multi-touch supported>
100-240VAC, user memory, storage memory (ROM):57MB, operation memory
(RAM): 128MB
Requiring GT Designer3 Version1 (GOT2000) 1.155M or later. GT27 General Description
(IB(NA)-0800502)
GT2710-STBD
10.4-type SVGA [800600 dots] TFT color liquid crystal display, 65536 colors
<Multimedia and video/RGB and multi-touch supported>
24VDC, user memory, storage memory (ROM): 57MB, operation memory
(RAM): 128MB
Requiring GT Designer3 Version1 (GOT2000) 1.155M or later.
GT2710-VTBA
10.4-type VGA640480 dots] TFT color liquid crystal display, 65536 colors
<Multimedia and video/RGB and multi-touch supported>
100-240VAC, user memory, storage memory (ROM):57MB, operation memory
(RAM): 128MB
Requiring GT Designer3 Version1 (GOT2000) 1.165X or later. GT27 General Description
(IB(NA)-0800502)
GT2710-VTBD
10.4-type VGA640480 dots] TFT color liquid crystal display, 65536 colors
<Multimedia and video/RGB and multi-touch supported>
24VDC, user memory, storage memory (ROM): 57MB, operation memory
(RAM): 128MB
Requiring GT Designer3 Version1 (GOT2000) 1.165X or later.
M800/M80/E80/C80 Series Specifications Manual (Hardware)
3 List of Configuration (C80 Series)
227 IB-1501506-M
(d) GT2708
(e) GT2705
(2) SD card
(3) Protection sheet
Model name Remarks Reference
GT2708-STBA
8.4-type SVGA [800600 dots] TFT color liquid crystal display, 65536 colors
<Multimedia and video/RGB and multi-touch supported>
100-240VAC, user memory, storage memory (ROM): 57MB, operation memory
(RAM): 128MB
Requiring GT Designer3 Version1 (GOT2000) 1.155M or later. GT27 General Description
(IB(NA)-0800502)
GT2708-STBD
8.4-type SVGA [800600 dots] TFT color liquid crystal display, 65536 colors

<Multimedia and video/RGB and multi-touch supported>
24VDC, user memory, storage memory (ROM): 57MB, operation memory
(RAM): 128MB
Requiring GT Designer3 Version1 (GOT2000) 1.155M or later.
GT2708-VTBA
8.4-type VGA640480 dots] TFT color liquid crystal display, 65536 colors
<Multimedia and video/RGB and multi-touch supported>
100-240VAC, user memory, storage memory (ROM): 57MB, operation memory
(RAM): 128MB
Requiring GT Designer3 Version1 (GOT2000) 1.165X or later. GT27 General Description
(IB(NA)-0800502)
GT2708-VTBD
8.4-type VGA640480 dots] TFT color liquid crystal display, 65536 colors
<Multimedia and video/RGB and multi-touch supported>
24VDC, user memory, storage memory (ROM): 57MB, operation memory
(RAM): 128MB
Requiring GT Designer3 Version1 (GOT2000) 1.165X or later.
Model name Remarks Reference
GT2705-VTBD
5.7-type VGA640480 dots] TFT color liquid crystal display, 65536 colors
<Multi-touch supported>
24VDC, user memory, storage memory (ROM): 32MB, operation memory
(RAM): 80MB
Requiring GT Designer3 Version1 (GOT2000) 1.165X or later.
GT27 General Description
(IB(NA)-0800502)
Model name Remarks Reference
NZ1MEM-2GBSD 2GB SD memory card for GOT
MELSEC iQ-R Module
Configuration Manual
(SH(NA)-081262)
Model name Remarks Reference
GT27-15PSCC
Protection sheet for 15-type (Clear, 5 sheets)
Surface treatment: clear, sheet color: clear, USB environment resistant cover
part: with opening, the number of sheets in a set: 5 sheets
GOT2000 Series Protective
Sheet for GT27/GT25/GT23
User's Manual (IB(NA)-0800499)
GT25-12PSCC
Protection sheet for 12.1-type (Clear, 5 sheets)
Surface treatment: clear, sheet color: clear, USB environment resistant cover
part: with opening, the number of sheets in a set: 5 sheets
GT25-10PSCC
Protection sheet for 10.4-type (Clear, 5 sheets)
Surface treatment: clear, sheet color: clear, USB environment resistant cover
part: with opening, the number of sheets in a set: 5 sheets
GT25-08PSCC
Protection sheet for 8.4-type (Clear, 5 sheets)
Surface treatment: clear, sheet color: clear, USB environment resistant cover
part: with opening, the number of sheets in a set: 5 sheets
GT25-05PSCC
Protection sheet for 5.7-type (Clear, 5 sheets)
Surface treatment: clear, sheet color: clear, USB environment resistant cover
part: with opening, the number of sheets in a set: 5 sheets
M800/M80/E80/C80 Series Specifications Manual (Hardware)
3 List of Configuration (C80 Series)
IB-1501506-M 228
3.2.2 GT25
(1) GOT
(a) GT2512
(b) GT2510
(c) GT2508
(d) GT25 Handy GOT
(e) GT25 Handy Connector conversion box
(f) GT25 Handy External connection cable (to connect the connector conversion box)
Model name Remarks Reference
GT2512-STBA
12.1-type SVGA [800600 dots] TFT color liquid crystal display, 65536 colors
100-240VAC, user memory, storage memory (ROM):32MB, operation memory
(RAM): 80MB
Requiring GT Designer3 Version1 (GOT2000) 1.155X or later. GT25 General Description
(IB(NA)-0800537)
GT2512-STBD
12.1-type SVGA [800600 dots] TFT color liquid crystal display, 65536 colors
24VDC, user memory, storage memory (ROM): 32MB, operation memory
(RAM): 80MB
Requiring GT Designer3 Version1 (GOT2000) 1.155X or later.
Model name Remarks Reference
GT2510-VTBA
10.4-type VGA640480 dots] TFT color liquid crystal display, 65536 colors
100-240VAC, user memory, storage memory (ROM):32MB, operation memory
(RAM): 80MB
Requiring GT Designer3 Version1 (GOT2000) 1.165X or later. GT25 General Description
(IB(NA)-0800537)
GT2510-VTBD
10.4-type VGA640480 dots] TFT color liquid crystal display, 65536 colors
24VDC, user memory, storage memory (ROM): 32MB, operation memory

(RAM): 80MB
Requiring GT Designer3 Version1 (GOT2000) 1.165X or later.
Model name Remarks Reference
GT2508-VTBA
8.4-type VGA640480 dots] TFT color liquid crystal display, 65536 colors
100-240VAC, user memory, storage memory (ROM): 32MB, operation memory
(RAM): 80MB
Requiring GT Designer3 Version1 (GOT2000) 1.165X or later. GT25 General Description
(IB(NA)-0800537)
GT2508-VTBD
8.4-type VGA640480 dots] TFT color liquid crystal display, 65536 colors
24VDC, user memory, storage memory (ROM): 32MB, operation memory
(RAM): 80MB
Requiring GT Designer3 Version1 (GOT2000) 1.165X or later.
Model name Remarks Reference
GT2506HS-VTBD
Display section: 6.5" VGA, TFT color liquid crystal display, 65536 colors, panel
color: black, power supply: 24 V DC
Requiring GT Works3 Version1.195D or later
GT25 Handy GOT General
Description (GT2506HS-V)
(JY997D72901)
Model name Remarks Reference
GT16H-CNB-42S For converting the Handy GOT signals into individual signals for the terminal
block, D-sub connector, and Ethernet RJ-45.
CONNECTOR CONVERSION
BOX GT16H-CNB-42S User's
Manual
(JY997D40401)
Model name Remarks Reference
GT16H-C30-42P For connection between the Handy GOT and the connector conversion box
(GT16H-CNB-42S) 3m
GT2506/GT16 Handy GOT
External Cable User's Manual
(JY997D42601)
GT16H-C60-42P For connection between the Handy GOT and the connector conversion box
(GT16H-CNB-42S) 6m
GT16H-C100-42P For connection between the Handy GOT and the connector conversion box
(GT16H-CNB-42S) 10m
M800/M80/E80/C80 Series Specifications Manual (Hardware)
3 List of Configuration (C80 Series)
229 IB-1501506-M
(2) SD card
(3) Protection sheet
3.3 Peripheral Device
(1) Signal splitter
(2) FL-net (OPCN-2) Interface module
(3) Manual pulse generator
3.4 Dual Signal Module
(1) Dual signal module
(2) Terminal block
(3) Cable
Model name Remarks Reference
NZ1MEM-2GBSD 2GB SD memory card for GOT
MELSEC iQ-R Module
Configuration Manual
(SH(NA)-081262)
Model name Remarks Reference
GT25-12PSCC
Protection sheet for 12.1-type (Clear, 5 sheets)
Surface treatment: clear, sheet color: clear, USB environment resistant cover
part: with opening, the number of sheets in a set: 5 sheets
GOT2000 Series Protective
Sheet for GT27/GT25/GT23
User's Manual (IB(NA)-0800499)
GT25-10PSCC
Protection sheet for 10.4-type (Clear, 5 sheets)
Surface treatment: clear, sheet color: clear, USB environment resistant cover
part: with opening, the number of sheets in a set: 5 sheets
GT25-08PSCC
Protection sheet for 8.4-type (Clear, 5 sheets)
Surface treatment: clear, sheet color: clear, USB environment resistant cover
part: with opening, the number of sheets in a set: 5 sheets
Model name Remarks
FCU7-HN387 Manual pulse generator is required for 2 or 3 axes specifications
Model name Remarks
ER-1FL2-T 10BASE-T, 100BASE-TX
Model name Remarks
UFO-01-2Z9 5V specifications
HD60C 12V specifications, for connection to operation panel I/O module
12V power supply is separately required.
Model name Remarks
R173SXY I/O duplication monitoring module (Maximum 3 modules)
Model name Remarks
FA-TBS40P Terminal block converter module (Arrangement : MITSUBISHI ELECTRIC ENGINEERING COMPANY LIMITED)
UL supported.
FA-LTB40P Terminal block converter module (Arrangement : MITSUBISHI ELECTRIC ENGINEERING COMPANY LIMITED)
Model name Remarks

FA-CBL FMV-M Cable for terminal block converter module (Cable length = 05:0.5m, 10:1m, 20:2m, 30:3m, 50:5m)
(Arrangement: MITSUBISHI ELECTRIC ENGINEERING COMPANY LIMITED)
M800/M80/E80/C80 Series Specifications Manual (Hardware)
3 List of Configuration (C80 Series)
IB-1501506-M 230
3.5 List of Q Series Units (for RQ extension base unit)
(1) Extension base
(2) Extension cable
(3) Power supply
(4) Output module
(a) Transistor (independent)
(5) Analog output module
(a) Voltage/current output module
Model name Remarks Reference
Q63B 3 slots; for mounting Q series modules including power supply module
QCPU Users Manual (Hardware
Design, Maintenance and
Inspection)
(SH(NA)-080483ENG)
Q65B 5 slots; for mounting Q series modules including power supply module
Q68B 8 slots; for mounting Q series modules including power supply module
Q612B 12 slots; for mounting Q series modules including power supply module
Q52B 2 slots; for mounting Q series modules including power supply module
Q55B 5 slots; for mounting Q series modules including power supply module
Model name Remarks Reference
QC05B 0.45m Cable
QCPU Users Manual (Hardware
Design, Maintenance and
Inspection)
(SH(NA)-080483ENG)
QC06B 0.6m Cable
QC12B 1.2m Cable
QC30B 3m Cable
QC50B 5m Cable
QC100B 10m Cable
Model name Remarks Reference
Q61P Input power supply: 100 to 240VAC, output power supply: 5VDC, output
current: 6A QCPU Users Manual (Hardware
Design, Maintenance and
Inspection)
(SH(NA)-080483ENG)
Q63P Input voltage: 24VDC, output voltage: 5VDC, output current: 6A
Q64PN Input voltage: 100 to 240VAC, output voltage: 5VDC, output current: 8.5A
Model name Remarks Reference
QY68A
8 points, 5 to 24VDC
OFF-time leakage current: 0.1mA
Response time: 10ms, Sink/source type
18-point terminal block, Surge killer provided
All points isolated
I/O Module Type Building Block
User's Manual (SH(NA)-080042)
Model name Remarks Reference
Q62DA-FG
2 channels
Input (resolution): 0 to 12000; -12000 to 12000; -16000 to 16000
Output: -12 to 12VDC, 0 to 22mADC
Conversion speed: 10ms/2channels
18-point terminal block, Channels are isolated
Channel Isolated Digital-Analog
Converter Module User's Manual
(SH(NA)-080281)
M800/M80/E80/C80 Series Specifications Manual (Hardware)
3 List of Configuration (C80 Series)
231 IB-1501506-M
(6) MELSECNET/H
(a) SI/QSI optical interface
(b) Coaxial interface
(7) FL-net (OPCN-2)
(a) Ver.2.00
(8) AS-i
(9) DeviceNet
Model name Remarks Reference
QJ71LP21-25
SI/QSI/H-PCF/Broad-band H-PCF optical cable, Double loop
PLC to PLC network (control/normal station)/Remote I/O net (remote master
station)
Q Corresponding MELSECNET/
H Network System Reference
Manual (PLC to PLC network)
(SH(NA)-080049)
Q Corresponding MELSECNET/
H Network System Reference
Manual (Remote I/O network)
(SH(NA)-080124)
For QnA/Q4AR MELSECNET/10
Network System Reference
Manual (IB(NA)-66690)

Model name Remarks Reference
QJ71BR11
3C-2V/5C-2V coaxial cable, Single bus
PLC to PLC network (control/normal station)/
Remote I/O net (remote master station)
Q Corresponding MELSECNET/
H Network System Reference
Manual (PLC to PLC network)
(SH(NA)-080049)
Q Corresponding MELSECNET/
H Network System Reference
Manual (Remote I/O network)
(SH(NA)-080124)
For QnA/Q4AR MELSECNET/10
Network System Reference
Manual (IB(NA)-66690)
Model name Remarks Reference
QJ71FL71-T-F01 10BASE-T/100BASE-TX
FL-net(OPCN-2) Interface
Module Users Manual
(SH(NA)-080350E)
Model name Remarks Reference
QJ71AS92 Master station, AS-Interface Specification Version 2.11 supported
AS-i Master Module User's
Manual (Hardware)
(IB(NA)-0800122E)
Model name Remarks Reference
QJ71DN91
M800/M80/E80/C80 Series Specifications Manual (Hardware)
3 List of Configuration (C80 Series)
IB-1501506-M 232
233 IB-1501506-M
4
General Specifications (C80 Series)
M800/M80/E80/C80 Series Specifications Manual (Hardware)
4 General Specifications (C80 Series)
IB-1501506-M 234
For the specifications of GOT, I/O unit, etc. refer to the manuals listed in "3 List of Configuration".
For the drive unit specifications, refer to the specification manual for the drive unit you are using.
4.1 Installation Environment Conditions
This NC system, which is an open equipment, must be installed within a sealed metal control panel (IP54 or higher).
This NC system must also be used and stored under the conditions listed in the table of specifications below.
(Note 1) This indicates the section of the power supply to which the equipment is assumed to be connected between the public electrical power distribution network and the machinery within premises.
Category II applies to equipment for which electrical power is supplied from fixed facilities.
The surge withstand voltage for the equipment up to the rated 300V is 2500V.
(Note 2) This index indicates the degree to which conductive material is generated in terms of the environment in which the equipment is used.
Pollution level 2 is when only non-conductive pollution occurs. A temporary conductivity caused by condensing must be expected occasionally.
(Note 3) Do not use or store this NC system under pressure higher than the atmospheric pressure of altitude 0m. Doing so can cause an operation failure.
(Note 4) The following environment conditions are also required for the layout design.
- No large amount of conductible dust, iron filings, oil mist, salt, or organic solvents
- No direct sunlight
- No strong electrical or magnetic fields
- No direct vibrations nor shocks on this NC system
Item Specification
Operating ambient
temperature 0 to 55 (-13 to 167F)
Storage ambient
temperature -25 to 75 (-13 to 167F)
Operating ambient
humidity 5 to 95%RH non-condensing
Storage ambient humidity 5 to 95%RH non-condensing
Vibration resistance
Compliant
with JIS B
3502 and
IEC 61131-2
Frequency Constant
acceleration Half amplitude Sweep count
Under
intermittent
vibration
5 to 8.4Hz - 3.5mm 10 times each in X, Y,
Z directions (For 80
min.) 8.4 to 150Hz 9.8m/s2 -
Under
continuous
vibration
5 to 8.4Hz - 1.75mm
- 8.4 to 150Hz 4.9m/s2 -
Shock resistance 147m/s2, 3 times in each of 3 directions X, Y, Z
Operating ambience No corrosive gases nor inflammable gases
Operating altitude 2000m (6561.68ft.) or less (Note 3)
Installation location Inside control panel
Overvoltage category

(Note 1) II or less
Pollution level (Note 2) 2 or less

4.2 Base Unit
4.2.1 Basic Base Unit
[mm]
R35B R38B R312B
n 455
W 245 328 439
WS1 - 1900.3 1900.3
WS2 - 1160.3 2270.3
WS3 - (170) (170)
WS4 - (138) (249)
WS1+WS2 222.50.3 - -
WS3+WS4 (224.5) - -
Number Name Description
(1) Extension cable connector (OUT)
A connector for connecting to an extension base unit. A MELSEC iQ-R series extension
cable is connected here.
When no cable is connected, attach the supplied extension connector cover to prevent
entry of foreign matter such as dust.
(2) Extension connector cover A protective cover for the extension cable connector.
(3) Module connector
A connector for mounting MELSEC iQ-R series modules.
Attach the supplied connector cover or the blank cover module (RG60) to the connector(s)
where no module is mounted to prevent entry of foreign matter such as dust.
(4) Module fixing hole A screw hole to fix a module to the base unit (M312 screw)
(5) Base unit installation hole A hole to install a base unit to a control panel. (M4 screw)
(6) DIN rail adapter mounting hole A hole to mount a DIN rail adapter.
(7) Guide A guide to mount a module to the base unit.
(8) Production information marking Shows the production information (16 digits) of the module.
98
101
80 0.3 10
15.5
7
W
WS1 WS2
WS3 WS4
32.5
(6)
(5) (4)
(8)
(3) (7)
(1) (2) n - M4x14 [mm]
Top
Bottom

4.2.2 Extension Base Unit
(1) R65B/R68B/RQ612B
[mm]
R65B R68B R612B
n 455
W 245 328 439
WS1 - 1900.3 1900.3
WS2 - 1160.3 2270.3
WS3 - (170) (170)
WS4 - (138) (249)
WS1+WS2 222.50.3 - -
WS3+WS4 (224.5) - -
No. Name Description
(1) Extension cable connector (IN) A connector for connecting to a base unit (upper level). A MELSEC iQ-R series extension
cable is connected here.
(2) Extension cable connector (OUT)
A connector for connecting to a base unit (lower level). A MELSEC iQ-R series extension
cable is connected here.
When no cable is connected, attach the supplied extension connector cover to prevent
entry of foreign matter such as dust.
(3) Extension connector cover A protective cover for the extension cable connector.
(4) Module connector
A connector for mounting MELSEC iQ-R series modules. The CPU module and remote
head module cannot be mounted on an extension base unit. Attach the supplied connector
cover or the blank cover module (RG60) to the connector(s) where no module is mounted
to prevent entry of foreign matter such as dust.
(5) Module fixing hole A screw hole to fix a module to the base unit. (M312 screw)
(6) Base unit installation hole A hole to install a base unit to a control panel. (M4 screw)
(7) DIN rail adapter mounting hole A hole to mount a DIN rail adapter.
(8) Guide A guide to mount a module to the base unit.
(9) Production information marking Shows the production information (16 digits) of the module.
(9)
101
80 0.3 10
15.5
W

WS1
WS3
WS2
WS4
(6) n - M4x14
(2) (5)
(4) (8)
(1) (3) [mm]
98
7
32.5
(7)
Top
Bottom

(2) Q63B/Q65B/Q68B/Q612B/Q52B/Q55B
[mm]
Q63B Q65B Q68B Q612B Q52B Q55B
n 445544
W 189 245 328 439 106 189
WS1 15.5
WS2 - - 1900.3 1900.3 - -
WS3 - - 1160.3 2270.3 - -
WS4 1670.3 222.50.3 - - 83.50.3 1670.3
H 98
HS1 7
HS2 800.3
No. Name Application
(1) Extension cable connector Connector to which the extension cables are connected for sending and receiving signals from the extension base unit.
(2) Base cover
Protective cover of extension cable connector. Before an extension cable is connected, the area of the base cover surrounded by the groove under the word "OUT" on the base cover must be removed with a tool such as nippers.
(3) Module connector
Connector for installing the Q series power supply module, CPU module, I/O modules, and intelligent function module.
Attach the supplied connector cover or the blank cover module (QG60) to the connector(s) where no module is mounted to prevent entry of foreign matter such as dust.
(4) Module fixing screw hole Screw hole for fixing the module to the base unit. Screw size: M3x12
(5) Base fixing hole Hole for fixing this base unit onto the panel of the control panel.
(for M4 screw)
W
M4 x n
7.5
(2)
(1)
(3)
(4)
(5)
WS1 WS2 WS3
WS4
H
HS1 HS2
[mm]
Top
Bottom

4.2.3 RQ Extension Base Unit
[mm]
RQ65B RQ68B RQ612B
n 455
W 245 328 439
WS1 - 1900.3 1900.3
WS2 - 1160.3 2270.3
WS1+WS2 222.50.3 - -
No. Name Description
(1) Extension cable connector (IN) A connector for connecting to a MELSEC iQ-R series base unit (upper level). A MELSEC iQ-R series extension cable is connected here.
(2) Extension cable connector (OUT)
A connector for connecting to a MELSEC-Q series base unit (lower level). A MELSEC-Q series extension cable is connected here.
When no cable is connected, attach the supplied extension connector cover to prevent entry of foreign matter such as dust.
(3) Extension connector cover A protective cover for the extension cable connector.
(4) Module connector
A connector for mounting the MELSEC-Q series unit. The CPU module cannot be mounted on the extension base unit.
Attach the supplied connector cover or the blank cover module (QG60) to the connector(s) where no module is mounted to prevent entry of foreign matter such as dust.
(5) Module fixing hole A screw hole to fix a module to the base unit. (M312 screw)
(6) Base unit installation hole A hole to install a base unit to a control panel. (M4 screw)
(7) DIN rail adapter mounting hole A hole to mount a DIN rail adapter.

(8) Production information marking Shows the production information (16 digits) of the module.
[mm]
(6) n - M4x14
(2) (5)
(7)
(4)
(1)(3)
80 0.3
(8)
98
7
15.5
44.1
7.5
W
WS1 WS2
Top
Bottom

4.3 Power Supply
4.3.1 R61P/R62P/R63P/R64P
Specifications
Item AC input power supply module DC input power supply
module
R61P R62P R64P R63P
Input power supply voltage (*1) 100 to 240VAC
(85 to 264VAC)
24VDC
(15.6 to 31.2VDC)
Input frequency 50/60Hz5% -
Input voltage distortion factor Within 5% -
Maximum input apparent power 130VA 120VA 160VA -
Maximum input power - 50W
Inrush current (*2) 20A, 8ms or less 100A, 1ms or less
Rated output
current
5VDC 6.5A 3.5A 9A 6.5A
24VDC - 0.6A- -
Overcurrent
protection (*3)
5VDC 7.1A or higher 3.8A or higher 10.0A or higher 7.1A or higher
24VDC - 0.66A or higher - -
Overvoltage
protection (*4) 5VDC 5.5 to 6.5V
Efficiency 76% or more 70% or more
Allowable momentary power failure
time (*5) Within 20ms Within 10ms
Withstand voltage
2300VACrms per minute (altitude 0 to 2000m),
Between the combined "line input/LG terminals" and the "FG terminal and
output"
510VAC per minute
(altitude 0 to 2000m),
between primary
terminal and 5VDC
terminal
Insulation resistance
10M or higher by 500VDC insulation resistance tester (between the combined "line input/LG
terminals" and the "FG terminal and output", the line input and LG terminals, the output and FG
terminals)
Noise withstand level Noise voltage 1500Vp-p, noise width 1s, noise frequency 25 to 60Hz (noise simulator condition)
 Noise immunity test IEC 61000-4-4: 2kV
Fuse Built-in (user-unchangeable)
Contact output
section
Application ERR contact
Rated switching
voltage/current 24VDC, 0.5A
Minimum switching
load 5VDC, 1mA
Response time Off on: 10ms or less
On off: 12ms or less
Life time Mechanical: 20 million times or more
Electrical: Rated switching voltage/current, 100 thousand times or more
Surge suppressor None
Fuse None
Terminal screw size M4 (M3.5 for +24V and 24G terminals of the R62P)
Applicable wire size 0.75 to 2mm2
Applicable solderless terminal
RAV1.25-4, RAV2-4, thickness of 0.8mm or less, up to two solderless terminal connections per
terminal
(for the +24V and 24G terminals of the R62P: RAV1.25-3.5, RAV2-3.5, thickness of 0.8mm or less,
up to two solderless terminal connections per terminal)
Applicable tightening torque M4 screw: 1.02 to 1.38Nm
M3.5 screw: 0.66 to 0.89Nm
External

dimensions
Height 106mm (Base unit mounting side: 98mm)
Width 54.6mm
Depth 110mm
Mass 0.41kg 0.45kg 0.46kg 0.41kg

(*1) Input power supply voltage
Input power supply voltage is a voltage required for the power supply module to operate normally. If the voltage is out of the specified range, an error is detected and the system may stop.
(*2) Inrush current
Inrush current is the maximum, instantaneous input current drawn into the circuits immediately after power-on. If power is supplied to the system immediately after shut-off, an inrush current of more than the specified value may flow.
Wait for five seconds or more after shut-off, and supply power to the system again.
When selecting a fuse or a breaker for the external circuit, consider blowouts, sensing property, and specified value of inrush current.
(*3) Overcurrent protection
The function of this protection is to shut off the circuit to stop the system if a current exceeding the specification value flows into a circuit of 5VDC or 24VDC.
With overcurrent protection activated, the LED of the power supply module goes off or lights dim green due to a voltage drop.
To restart the system, shut off the power and eliminate the cause of the problem, such as insufficient current or short-circuit. After the cause is eliminated, wait for a few minutes, and supply power to the system again. When the output current is back to normal, the system starts initially.
(*4) Overvoltage protection
The function of this protection is to shut off the circuit to stop the system if an overvoltage exceeding the specified value is applied to a 5VDC circuit.
With overvoltage protection activated, the POWER LED of the power supply module turns off.
To restart the system, shut off the power, wait for a few minutes, and supply power to the system again. Then, the system starts initially.
If the system does not restart and the POWER LED remains off, replace the power supply module.
(*5) Allowable momentary power failure time
The system detects an input voltage down and stops its operation when a momentary power failure occurs. Allowable momentary power failure time is a period of time that the system can continue its operation even after the power failure.
If power fails exceeding this period of time, the system can either continue its operation or start initially, depending on the load of the power supply module. When the system continues its operation, the operation will be the same as that of the system returned within the allowable momentary power failure time.

Outline dimension
54.6
106
98 4
110
[mm]
182
19.5
Top
Bottom

Names of parts
(*1) Individually ground the FG and LG terminals with a ground resistance of 100 ohms or less.
(*2) Only the R62P has these terminals.
No. Name Description
(1) POWER LED
Indicates the operating status of the power supply module.
On: Normal operation
Off: Power-off, power failure, or hardware failure
(2) ERR contact
[When mounting the module on the main base unit]
The contact turns on when the entire system operates normally. (M4 screw)
This contact turns off (opens) in the following cases:
- When the power supply module fails
- When the power is not supplied
- When a stop error (including reset) occurs in the CPU module
- When the fuse is blown

In a multiple CPU system, the contact turns off when a stop error occurs in any of the CPU modules.
When the remote head module is mounted, this contact turns off when moderate or major error (including reset) occurs.
[When mounting the module on the extension base unit]
The contact is off at all times.
When the module is mounted on a redundant power supply extension base unit, the following operation is performed:
- The contact turns on when the power supply module operates normally. (M4 screw)
- This contact turns off (opens) when the power supply module fails, the power is not supplied, or the fuse is blown.

(3) FG terminal (*1) A ground terminal connected to the shield pattern of the printed circuit board. This terminal is a functional ground terminal. (M4 screw)
(4) LG terminal (*1)
A ground terminal for the power supply input filter. This terminal is a functional ground terminal. For AC input, the terminal has one-half the potential of the input voltage. (M4

screw)
(5) Power input terminal A power input terminal for the power supply module. The power supply to be connected
differs depending on a power supply module. (M4 screw) (Refer to the specifications list.)
(6) Terminal cover A protective cover for the terminal block.
(7) Production information marking Shows the production information (16 digits) of the module.
(8)(*2) +24V terminal and 24G terminal Used for a device that requires a supply of 24VDC. (M3.5 screw)
The power is supplied to a device through the external wiring.
(7)
(1)
(2)
(8)
(3)
(4)
(5)
(6)

4.3.2 Q61P/Q63P/Q64PN
Specifications
Item Q61P
Base loading position Q series power supply module loading slot
Applicable base unit Q63B, Q65B, Q68B, Q612B
Input power supply 100 to 240VAC+10%-15%
(85 to 264VAC)
Input frequency 50/60Hz5%
Input voltage distortion factor Within 5%
Maximum input apparent power 130VA
Inrush current Within 20A 8ms (*4)
Rated output current
5VDC 6A
24VDC -
Overcurrent protection
(*1)
5VDC 6.6A or higher
24VDC -
Overvoltage protection
(*2) 5VDC 5.5 to 6.5V
Efficiency 70% or more
Permissible instantaneous
power off time (*3) Within 20ms
Withstand voltage
Across inputs/LG and outputs/FG
2830VAC rms/3 cycles
(Altitude: 2000m)
Insulation resistance
Across inputs and outputs
(LG and FG separated),
across inputs for LG/FG,
across outputs for LG/FG
10M or more by insulation
resistance tester (500VDC)
Noise withstand level By noise simulator of 1500Vp-p noise voltage, 1s noise width and 25 to 60Hz noise frequency
Noise voltage IEC61000-4-4, 2kV
Operation display LED display (Normal: ON (Green), Error: OFF)
Fuse Built-in (Unchangeable by user)
Contact
output
section
Application ERR contact
Rated switching
voltage/current 24VDC, 0.5A
Minimum switching
load 5VDC, 1mA
Response time OFF to ON:10ms or less, ON to OFF:12ms or less
Life time Mechanical: 20 million times or more
Electrical: 100 thousand times or more at rated switching voltage/current
Surge suppressor None
Fuse None
Terminal screw size M3.5 screw
Applicable size of wire 0.75 to 2mm 2
Applicable solderless terminal RAV1.25-3.5, RAV2-3.5
Applicable tightening torque 0.66 to 0.89Nm
Mass [kg] 0.4

Item Q63P Q64PN
Base loading position Q series power supply module loading slot
Applicable base unit Q63B, Q65B, Q68B, Q612B
Input power supply 24VDC+30%-35%
(15.6 to 31.2VDC)
100 to 240VAC+10%-15%
(85 to 264VAC)
Input frequency - 50/60Hz5%
Input voltage distortion
factor - Within 5%
Maximum input apparent

power
45W 160VA
Input current at 24VDC input: 1.82A or less
at 15.6VDC input: 2.8A or less
at 100VAC input: 1.3A or less
at 200VAC input: 0.75A or less
Repetitive peak current - 4A or less
Inrush current 100A 1ms or less (at 24VDC input) Within 20A 8ms (*4)
Rated output
current
5VDC 6A 8.5A
24VDC - -
Overcurrent
protection (*1)
5VDC 6.6A or higher 9.9A or higher
24VDC - -
Overvoltage
protection (*2) 5VDC 5.5 to 6.5V
Efficiency 70% or more
Permissible instantaneous
power off time (*3) Within 10ms (at 24VDC input) Within 20ms
Withstand voltage 500VAC across primary and 5VDC
Across inputs/LG and outputs/FG
2,830VAC rms/3 cycles
(Altitude: 2,000m (6,561.68ft.))
Insulation resistance 10M or more (measured with an insulation
resistance tester)
Input and LG batched, output and FG batched,
batch input-LG, batch output-FG
10M or m ore by insulation resistance tester
(500VDC)
Noise withstand level By noise simulator of 500Vp-p noise voltage, 1s
noise width and 25 to 60Hz noise frequency
By noise simulator of 1,500Vp-p noise voltage,
1s noise width and 25 to 60Hz noise frequency
Noise voltage IEC61000-4-4, 2kV
Operation display LED display
(Normal: ON (Green), Error: OFF)
LED display
(Normal: ON (Green), Error: OFF)
Fuse Built-in (Unchangeable by user)
Contact output section
Application ERR contact
Rated switching
voltage/current 24VDC, 0.5A
Minimum switching
load 5VDC, 1mA
Response time OFF to ON: 10ms or less, ON to OFF: 12ms or less
Life time Mechanical: 20 million times or more
Electrical: 100 thousand times or more at rated switching voltage/current
Surge suppressor None
Fuse None
Terminal screw size M3.5 screw
Applicable size of wire 0.75 to 2mm 2
Applicable solderless
terminal RAV1.25-3.5, RAV2-3.5
Applicable tightening torque 0.66 to 0.89Nm
Mass [kg] 0.33 0.47
M800/M80/E80/C80 Series Specifications Manual (Hardware)
4 General Specifications (C80 Series)
245 IB-1501506-M
(*1) Overcurrent protection
The overcurrent protection device shuts off the 5V, 24VDC circuit and stops the system if the current flowing in the circuit exceeds the specified value.
The LED of the power supply module is turned off or lights up in dim green when voltage is lowered.
If this device is activated, switch the input power supply off and eliminate the cause such as insufficient current capacity or short. Then, a few minutes later, switch it on to restart the system.
The initial start for the system takes place when the current value becomes normal.
(*2) Overvoltage protection
The overvoltage protection device shuts off the 5VDC circuit and stops the system if a voltage of 5.5VDC or more is applied to the circuit.
When this device is activated, the power supply module LED is switched OFF.
To restart the system, switch the input power OFF, then a few minutes later ON.
The initial start for the system will take place.
The power supply module must be changed if the system is not booted and the LED remains OFF.
(*3) Permissible instantaneous power off time
(1) For AC input power supply
An instantaneous power failure lasting less than 20ms will cause AC down to be detected, but operation will continue.
An instantaneous power failure lasting in excess of 20ms may cause the operation to continue or initial start to take place depending on the power supply load.
Further, when the AC supply of the AC input module is the same as that of the power supply module, it prevents the sensor connected to the AC input module, which is ON at power-off, from turning OFF by switching off the power supply.
However, if only the AC input module is connected to the AC line, which is connected to the power supply, detection of the AC down for the power supply module may be delayed by the capacitor in the AC input module. Thus, connect a load of approx. 30mA per AC input module to the AC line.
(2) For DC input power supply

An instantaneous power failure lasting less than 10ms* will cause 24VDC down to be detected, but operation will continue.
An instantaneous power failure lasting in excess of 10ms* may cause the operation to continue or initial start to take place depending on the power supply load. * : This is for a 24VDC input. This is 10ms or less for less than 24VDC.
(*4) Inrush current
When power is switched on again immediately (within 5 seconds) after power-off, an inrush current of more than the specified value (2ms or less) may flow. Reapply power 5 seconds after power-off.
When selecting a fuse and breaker in the external circuit, take account of the blow out, detection characteristics and above matters.
(*5) Operation indication
During the operation, do not allow the input voltage to change from 200VAC level (170 to 264VAC) to 100VAC level (85 to 132VAC).
(If changed, the POWER LED of the module turns off and the system operation stops.)

Outline dimension
Names of parts
(1) POWER LED
Q61P/Q64PN
ON (green):
Normal (5VDC output, instantaneous power failure within 20ms)
OFF:
- The power supply module is out of order while AC power supply is ON. (5VDC error, internal circuit failure, blown fuse)
- Over current protection or over voltage protection operated.
- AC power supply is not ON (including power failure and an instantaneous power failure of more than 20ms)
Q63P
ON (green):
Normal (5VDC output, instantaneous power failure within 10ms)
OFF:
- The power supply module is out of order while DC power supply is ON. (5VDC error, internal circuit failure, blown fuse)
- Over current protection or over voltage protection operated.
- DC power supply is not ON (including power failure and an instantaneous power failure of more than 10ms)
Q61P/Q63P Q64PN
Top
Bottom
Top
Bottom
Q63P Q61P/Q64PN

(2) ERR terminal
Q61P/Q64PN
- Turned ON when the whole system operates normally.
- This terminal turns OFF (opens) when the AC power is not input, a stop error (including a reset) occurs in the CPU module, or the fuse is blown.
- In a Multiple CPU system configuration, turned OFF when a stop error occurs in any of the CPU modules.
- Normally OFF when loaded in an extension base unit.
Q63P
- Turned ON when the whole system operates normally.
- This terminal turns OFF (opens) when the DC power is not input, a stop error (including a reset) occurs in the CPU module, or the fuse is blown.
- In a Multiple CPU system configuration, turned OFF when a stop error occurs in any of the CPU modules.
- Normally OFF when loaded in an extension base unit.
(3) FG terminal
Ground terminal connected to the shield pattern of the printed circuit board.
(4) LG terminal
- Grounding for the power supply filter.
- This terminal has potential of 1/2 of the input voltage for AC input (Q61P, Q64PN and Q64P).
- This is also a protective earth terminal (PE).
(5) Power input terminals
- Power input terminals connected to a power supply of 100VAC or 200VAC. (Q64PN)
- Power input terminals connected to a power supply of 24VDC. (Q63P)
- Power input terminals connected to a power supply of 100-200VAC. (Q61P)
(6) Terminal screw
M3.5 x 7 screw
(7) Terminal cover
Protective cover of the terminal block
(8) Module fixing screw hole
Used to fix the module to the base unit.
M3 x 12 screw (user-prepared) (Tightening torque: 0.36 to 0.48 Nm)
(9) Module loading lever
Used to load the module into the base unit.
(Note 1) Q63P is dedicated for inputting a voltage of 24VDC. Q63P may break down unless connected to 24VDC for inputting or with reversed polarity.
(Note 2) Ensure that the earth terminals LG and FG are grounded. (Ground resistance: 100 or less) Since the LG terminals have potential of 1/2 input voltage, the operator may receive an electric shock when touching metal parts.
(Note 3) When Q61P, Q63P, Q64PN or Q64P is loaded on the extension base unit, a system error cannot be detected by the ERR terminal. (ERR terminal is always OFF.)

4.4 PLC CPU
For the further details than the following descriptions, refer to the following manuals:
MELSEC iQ-R CPU Module User's Manual (Startup) (SH(NA)-081263)
MELSEC iQ-R CPU Module User's Manual (Application) (SH(NA)-081264)
Outline dimension
98
106
4
110
154
27.8
27
[mm]
Top
Bottom

Names of parts
(1)
(9)
(2)
(3)
(4)
(5)
(6)
(7)
(8)
(12)
(11)
(14)
(15)
(17)
(13)
(21)
(10)
(18)
(19)
(20)
(16)

Number Name Details
(1) READY LED Indicates the operating status of the CPU module and the error level.
[READY LED-ERROR LED status]
On-off: Normal operation
On-on: Minor error
On-flashing: Moderate error
Flashing-on: Minor error (Changing module online)
Flashing (every 2s)-off: Initial processing
Flashing (every 400ms)-off: Changing module online
Off-on/flashing: Major error
(2) ERROR LED
(3)
PROGRAM RUN LED
Indicates the operating status of the program.
On: Being executed (RUN state)
Flashing: Being suspended (PAUSE state)
Off: Stopped (STOP state) or stop error
PROGRAM RUN LED
(When the Process CPU is used in
redundant mode)
Indicates the operating status of the program.
(a) Control system (CTRL LED of the redundant function module: On)
On: Being executed (RUN state)
Flashing: Being suspended (PAUSE state)
Off: Stopped (STOP state) or stop error
(b) Standby system (SBY LED of the redundant function module: On)
[Backup mode]
On: Being executed (programs being executed in both systems)
Flashing: Being suspended (PAUSE state) (programs being executed in both systems)
Off: Stopped (STOP state/RUN state/PAUSE state) (no program being executed in both systems) or stop error
[Separate mode]
On: Being executed (RUN state)
Flashing: Being suspended (PAUSE state) or waiting for state transition to RUN (same as STOP state)
Off: Stopped (STOP state) or stop error
(c) Systems not determined
Flashing: Waiting for state transition to RUN by switch operation (same as STOP state)
Off: Under normal operation
(4) USER LED
Indicates the status of the annunciator (F).
On: Annunciator (F) ON
Off: Normal operation
(5) BATTERY LED

Indicates the battery status.
Flashing: Battery low
Off: Normal operation
(6) CARD READY LED
Indicates the availability of the SD memory card.
On: Available
Flashing: Ready
Off: Not available or not inserted
(7) CARD ACCESS LED
Indicates the access status of the SD memory card.
On: Being accessed
Off: Not accessed
(8) FUNCTION LED Indicates the status of the function being executed.
(9) SPEED LED Refer to the following.
MELSEC iQ-R Ethernet/CC-Link IE User's Manual (Startup) (10) SD/RD LED
(11) RUN/STOP/RESET switch
A switch for controlling the operating status of the CPU module.
RUN: Executes the program.
STOP: Stops the program.
RESET: Resets the CPU module. (Keep the switch in the RESET position for approximately
one second.)
Operate the RUN/STOP/RESET switch with your fingers. To prevent the switch from being
damaged, do not use any tool such as a screwdriver.
(12) SD memory card access control switch A switch for disabling access to the SD memory card to remove it from the CPU module.
(13) SD memory card slot A slot where an SD memory card is inserted.
(14) USB port (*1) A connector for a USB-compatible peripheral. (connector type: miniB)
(15) Ethernet port Refer to the following.
MELSEC iQ-R Ethernet/CC-Link IE User's Manual (Startup)
(16) Battery A backup battery to hold clock data and to use the backup power function for the device/label
memory.
(17) Battery connector pin A pin for connecting a lead wire of the battery.
To save the battery, the lead wire is disconnected from the connector before shipment.
M800/M80/E80/C80 Series Specifications Manual (Hardware)
4 General Specifications (C80 Series)
251 IB-1501506-M
(*1) When a cable is connected to the USB connector at all times, clamp the cable. It prevents a poor connection,
moving, and disconnection by unintentional pulling.
Battery life
There are two types of values for describing a battery life: actual service value and guaranteed value.
Actual service value: The battery life estimated based on the value actually measured by Mitsubishi under a
storage ambient temperature of 40C. This value varies depending on the characteristics and variation of the
components, and should be referred to as a reference value.
Guaranteed value: Refers to the battery life at 70C guaranteed by Mitsubishi in a storage ambient temperature of
70C based on the characteristics of the memory device provided by the component manufacturer.
[Actual service value (reference value)]
(18) Cassette cover A cover for the connector where an extended SRAM cassette is inserted. To use an
extended SRAM cassette, open the cover, and insert the cassette.
(19) LED cover
A cover for the LED indicators, SD memory card slot, and switches. Open this cover and
insert or remove an SD memory card or set the RUN/STOP/RESET switch.
Otherwise, keep the cover closed to prevent entry of foreign matter such as dust.
(20) USB cover A cover for the USB port. Open this cover and connect a USB-compatible peripheral.
Otherwise, keep the cover closed to prevent entry of foreign matter such as dust.
(21) Production information marking Shows the production information (16 digits) of the module.
Extended SRAM
cassette
Power-on time
ratio (*1)
Actual service value when used with
the R04CPU
Actual service value when used with
the R08CPU, R16CPU, R32CPU, or
R120CPU
Q6BAT Q7BAT Q6BAT Q7BAT
Not used,
used (1MB type),
used (2MB type),
used (4MB type),
used (8MB type)
0 to 100% 43800 hours (5.00
years)
43800 hours (5.00
years)
43800 hours (5.00
years)
43800 hours (5.00
years)
Used (16MB type) (*2)
0% 30100 hours (3.43
years)
25500 hours (2.91
years)
30% 43000 hours (4.90
years)
36400 hours (4.15
years)
50 to 100% 43800 hours (5.00
years)

43800 hours (5.00
years)
Number Name Details
M800/M80/E80/C80 Series Specifications Manual (Hardware)
4 General Specifications (C80 Series)
IB-1501506-M 252
[Guaranteed value]
(*1) The power-on time ratio indicates the ratio of the programmable controller power-on time to 24 hours. (If the total power-on time is 12 hours, the ratio will be 50%. If the total power-on time is 6 hours, the ratio will be 25%.)
(*2) To use the extended SRAM cassette (16MB type) with the RnCPU, check the version of the CPU module and engineering tool.
Extended SRAM
cassette
Power-on time
ratio (*1)
Guaranteed value when used with the
R04CPU
Guaranteed value when used with the
R08CPU, R16CPU, R32CPU, or
R120CPU
Q6BAT Q7BAT Q6BAT Q7BAT
Not used
0% 31700 hours (3.61
years)
43800 hours (5.00
years)
30600 hours (3.49
years)
43800 hours (5.00
years)
30%
43800 hours (5.00
years)
43700 hours (4.98
years)
50 to 100% 43800 hours (5.00
years)
Used (1MB type)
0% 22000 hours (2.51
years)
21500 hours (2.45
years)
30% 31400 hours (3.58
years)
30700 hours (3.50
years)
50%
43800 hours (5.00
years)
43000 hours (4.90
years)
70 to 100% 43800 hours (5.00
years)
Used (2MB type)
0% 19600 hours (2.23
years)
19100 hours (2.18
years)
43100 hours (4.92
years)
30% 28000 hours (3.19
years)
27200 hours (3.10
years)
43800 hours (5.00
years) 50% 39200 hours (4.47
years)
38200 hours (4.36
years)
70 to 100% 43800 hours (5.00
years)
43800 hours (5.00
years)
Used (4MB type)
0% 15300 hours (1.74
years)
39600 hours (4.52
years)
15000 hours (1.71
years)
36200 hours (4.13
years)
30% 21800 hours (2.48
years)
43800 hours (5.00
years)
21400 hours (2.44
years)

43800 hours (5.00
years) 50% 30600 hours (3.49
years)
30000 hours (3.42
years)
70 to 100% 43800 hours (5.00
years)
43800 hours (5.00
years)
Used (8MB type)
0% 10100 hours (1.15
years)
26900 hours (3.07
years)
10000 hours (1.14
years)
24800 hours (2.83
years)
30% 14400 hours (1.64
years)
38400 hours (4.38
years)
14200 hours (1.62
years)
35400 hours (4.04
years)
50% 20200 hours (2.30
years)
43800 hours (5.00
years)
20000 hours (2.28
years)
43800 hours (5.00
years) 70% 33600 hours (3.83
years)
33300 hours (3.80
years)
100% 43800 hours (5.00
years)
43800 hours (5.00
years)
Used (16MB type) (*2)
0% 6400 hours (0.73
years)
16100 hours (1.83
years)
6400 hours (0.73
years)
16000 hours (1.82
years)
30% 9100 hours (1.03
years)
23000 hours (2.62
years)
9100 hours (1.03
years)
22800 hours (2.62
years)
50% 12800 hours (1.46
years)
32200 hours (3.67
years)
12800 hours (1.46
years)
32000 hours (3.65
years)
70% 21300 hours (2.43
years) 43800 hours (5.00
years)
21300 hours (2.43
years) 43800 hours (5.00
years) 100% 43800 hours (5.00
years)
43800 hours (5.00
years)
M800/M80/E80/C80 Series Specifications Manual (Hardware)
4 General Specifications (C80 Series)
253 IB-1501506-M
4.5 CNC CPU Module
Dimension and Names of parts
(1) READY LED
(2) ERROR LED
The operating state and the error state of CNC CPU will be displayed.
(3) SW
Rotary switch for maintenance (usually set to "0")
(4) Dot matrix LED
The operating state and the error information will be displayed. (3 digits)
READY LED ERROR LED Operating state

Not lit Not lit Power OFF or hardware failure
Flashing Not lit Initializing
Lit Not lit Under normal operation
Lit Flashing Occurrence of a moderate error
Not lit Lit or flashing Occurrence of a severe error
4 98
110
106
27.8
(9) (8) (7)
(1)
(2)
(3)
(4)
(5)
(6)
(10)
[mm]
Top
Bottom

(5) CN1
Connector for servo/spindle drive unit
(6) DISPLAY I/F
Connector for display (GOT)
(7) EMG
Connector for the emergency stop signal input
Input type: Current sinking/sourcing
Insulation method: Optocoupler insulation
Input voltage: 24VDC (+10%, -15%, ripple ratio within 5%)
OFF voltage/current : 17.5VDC or more / 3.0mA or less
ON voltage/current : 1.8VDC or less / 0.18mA or less
Input resistance: Approximate 10k
Response time (OFF -> ON or ON -> OFF): 1ms
Applicable size of wire : 0.3mm2
2
1
1 IN RD
2 OUT TD
1
8
1 OUT TD+
2 OUT TD 3 IN RD+
4 CMTR
5 CMTR
6 IN RD 7 CMIT
8 CMIT
2
1 1 SG(0V)
2 IN
70553-0001
(MOLEX)
2
1
EMG
SG(0V)
EMG 10k

(8) MPG
Connector for 5V manual pulse generator
Input pulse signal type: 90phase difference between HA1 and HB1
Max. input pulse frequency: 5kHz
Number of pulses per rotation: 100pulse/rev
Input signal voltage: H level 3.5V to 5.25V, L level 0V to 0.5V
For pulse generators
Power voltage for pulse generators : 5VDC10%
Max. output current: 100mA
a.b.c.d.e: HA1 or HB1 rising edge (falling edge) phase difference = T/4 T/10
T: Ha1 or HB1 phase cycle (Min. 10s)
(9) RIO
Connector for Dual signal module
1
6
1 OUT 5VDC
2 IN HA1
3 IN HB1
4 OUT SG(0V)
5 -
6 FG
2
1
FG
4
6

+5VDC
SG(0V)
HB1
HA1
470
+5VDC
220
0V
4700pF
3
470
220
0V
4700pF
0V
FG
70553-0005
(MOLEX)
T
HA1(HB1)
HB1(HA1)
a b c d e
3
1 1 IN/OUT RXTXH
2 IN/OUT RXTXL
3 SG(0V)
70553-0002
(MOLEX)
M800/M80/E80/C80 Series Specifications Manual (Hardware)
4 General Specifications (C80 Series)
IB-1501506-M 256
(10) EXT I/F
Connector for the expansion connection of skip signal/ 5V manual pulse generator
---Manual pulse generator I/F specification----
Input pulse signal type: 90phase difference between HA1 and HB1.
Max. input pulse frequency : 5kHz
Number of pulses per rotation: 100pulse/rev
Input signal voltage : H level 3.5V to 5.25V, L level 0V to 0.5V
Output power voltage : +5VDC -10% -10%
Max. output current : 100mA
(Note) The connector MPG and EXT I/F have input pins for HA1 and HB1. Use either of the
connectors. Use either of the connectors.
a.b.c.d.e: HA1 or HB1 rising edge (falling edge) phase difference = T/4 T/10
T: Ha1 or HB1 phase cycle (Min. 10s)
---SKIP I/F specification---
Input ON voltage : 18V or more to 25.2V or
less
Input ON current : 2mA or more
Input OFF voltage : 4V or less
Input OFF current : 0.4mA or less
Input signal holding time (Ton) : 2ms or more
Internal response time : 0.08ms or less
(Note) NC recognizes input signals of 2ms or more as the valid skip signals. If machine contacts
(relay, etc.) are used, malfunctions will occur due to chattering. Use semiconductor contacts
(transistor, etc.).
1
25
26
50
HDR-EC50LFDT1-SDL+
(HONDA)
1 OUT 5VDC 26 OUT 5VDC
2 OUT 5VDC 27 OUT 5VDC
3 OUT SG(0V) 28 OUT SG(0V)
4
11
(Reserve)
29 OUT SG(0V)
30
36
(Reserve)
12 OUT SG(0V) 37 OUT SG(0V)
13 (Reserve) 38 (Reserve)
14 (Reserve) 39 (Reserve)
15 OUT SG(0V) 40 OUT SG(0V)
16 (Reserve) 41 (Reserve)
17 OUT SG(0V) 42 OUT SG(0V)
18 IN HA3 43 IN HB3
19 IN HA2 44 IN HB2
20 IN HA1 45 IN HB1
21 (Reserve) 46 (Reserve)
22 (Reserve) 47 (Reserve)
23 IN SKIPCOM 48 IN SKIPCOM
24 IN SKIP1 49 IN SKIP2
25 IN SKIP3 50 IN SKIP4
10k
20
1

15
+5VDC
SG(0V)
HB1
HA1
470
+5VDC
220
0V
4700pF
45
470
220
0V
4700pF
FG
2
3
MPG
19
HB2
HA2
470
220
0V
4700pF
44
470
220
0V
4700pF
+5VDC 26
SG(0V) 40
2
17
+5VDC
SG(0V)
18
HB3
HA3
470
220
0V
4700pF
43
470
220
0V
4700pF
+5VDC 27
SG(0V) 42
10k
10k
10k
24
49
25
50
SKIPCOM 23
SKIPCOM 48
SKIP4
SKIP3
SKIP2
SKIP1
T
HA1(HB1)
HB1(HA1)
a b c d e
0V t
+24VDC
Ton >= 2ms

4.6 Dual Signal Module
Use the dual signal module within the following specifications.
Items Specifications
R173SXY
Number of input points 32 points x 2 systems (32 points for PLC CPU control + 32 points for CNC CPU control, 20 points x 2 systems for safety input, 12 points x 2 systems for feedback input for output)
Input insulation method Optocoupler insulation
Rated input voltage 24VDC (+20/-15%, ripple ratio within 5%)
Rated input current Approximate 4mA
Input derating Refer to the derating figure
ON voltage/ON current 19V or more/3mA or more
OFF voltage/OFF current 4V or less / 1.7mA or less
Input resistance Approximate 5.6k
Input response time 1ms

Input common method
32 points/common
(Common terminal 1A01, 1A02, 2A01, 2A02)
(Each part-system has a different common.)
Input type Type 1, Current sinking
Number of output points 12 points x 2 systems
Output insulation method Optocoupler insulation
Rated load voltage 24VDC (+20/-15%)
Maximum load current (0.1A x 8 points, 0.2A x 4 points) x 2 systems
Common current: 1.6A or less for each connector
Utilization category DC12/DC13
Maximum rush current 0.7A,10ms or less (1.4A, 10ms or less for 0.2A output pin)
OFF-time leakage current 0.1mA or less
ON-time maximum voltage drop 0.1VDC(TYP.)0.1A, 0.2VDC(MAX.)0.1A
Output response time 1ms or less (at rated load and resistance load)
Output common method
12 points/common
(Common terminal 1B01, 1B02, 2B01, 2B02)
(Each part-system has a different common.)
Output Current sourcing
Surge suppressor Zener diode
Fuse Not provided
External power supply Voltage 24VDC (+20/-15%, ripple ratio within 5%)
Electric current 40mA
Protection
Provided (thermal protection and short circuit protection)
Thermal protection works for each 2 points.
Short circuit protection works for each 1 point. (1 to 3A/point)
Withstand voltage 560VAC rms/3cycles (at 2000m elevation)
Insulation resistance 10M or more (measured with an insulation resistance tester)
Noise withstand level
Simulator noise 500Vp-p, Noise width 1s
measured with a noise simulator with noise frequency 25 to 60Hz
First transient noise IEC61000-4-4: 1kV
Protection degree IP2X
Number of I/O occupational points 32 points (with I/O assignments as 32 points I/O mixed unit)
Operation display ON display (LED) and 32 input points display for PLC CPU control
External connection method 40-pin connector
Applicable size of wire 0.3mm2 (for A6CON1 and A6CON4)
Connector for external wiring A6CON1, A6CON2, A6CON3, A6CON4 (sold separately)
Terminal block changeover unit FA-LTB40P (Cable FA-CBL FMV-M)
5VDC internal power dissipation 200mA (TYP. when all points are ON)
Mass 0.14kg

Names of parts
(1) RUN LED
Shows the operating state of the dual signal module.
(2) LED
Shows the input signal state of PLCIO (part-system 2).
(3) ALM LED
Shows the communication state with the CNC CPU module.
(4) RSW
Rotary switch for station No. setting Set within the range of 0 to 2.
(5) RIO1/RIO2
Connector for connecting the CNC CPU module and the 2nd or subsequent dual signal module.
4 98
110
106
27.8
(5) (4) (3)
(6)
(1)
(7)
(2)
[mm]
Top
Bottom
3
1 1 IN/OUT RXTXH
2 IN/OUT RXTXL
3 SG(V)
70553-0005
(MOLEX)

(6) NCIO
Part-system 1 I/O signal connector
(Note 1) Output pins with (*) allow 0.2A output. Other pins have 0.1A output.
(Note 2) Pins with signal names "NC-Y0A" and "NC-X0A" are the output signals controlled by CNC CPU. When any of the signals is output to Y0A, the signal is input to X0A as a feedback signal.
(Note 3) The device Nos. written above are for the assignment on hardware. These Nos. are different from the device Nos. to be actually used.
1A20
1A19
1A18

1A17
1A18
1A15
1A14
1A13
1A12
1A11
1A10
1A09
1A08
1A07
1A06
1A05
1A04
1A03
1A02
1A01
1B20
1B19
1B18
1B17
1B18
1B15
1B14
1B13
1B12
1B11
1B10
1B09
1B08
1B07
1B06
1B05
1B04
1B03
1B02
1B01
R
R
R
R
R
L
L
1B20
1A11
1B10
1A05
1B02
1A02
1B01
1A01
+
2B02
2B01
1B20 IN NC-X00 1A20 IN NC-X10
1B19 IN NC-X01 1A19 IN NC-X11
1B18 IN NC-X02 1A18 IN NC-X12
1B17 IN NC-X03 1A17 IN NC-X13
1B16 IN NC-X04 1A16 IN NC-X14
1B15 IN NC-X05 1A15 IN NC-X15
1B14 IN NC-X06 1A14 IN NC-X16
1B13 IN NC-X07 1A13 IN NC-X17
1B12 IN NC-X08 1A12 IN NC-X18
1B11 IN NC-X09 1A11 IN NC-X19
1B10(*) IN/OUT NC-Y0A/PC-X0A 1A10(*) IN/OUT NC-Y1A/PC-X1A
1B09(*) IN/OUT NC-Y0B/PC-X0B 1A09(*) IN/OUT NC-Y1B/PC-X1B
1B08 IN/OUT NC-Y0C/PC-X0C 1A08 IN/OUT NC-Y1C/PC-X1C
1B07 IN/OUT NC-Y0D/PC-X0D 1A07 IN/OUT NC-Y1D/PC-X1D
1B06 IN/OUT NC-Y0E/PC-X0E 1A06 IN/OUT NC-Y1E/PC-X1E
1B05 IN/OUT NC-Y0F/PC-X0F 1A05 IN/OUT NC-Y1F/PC-X1F
1B04 --- 1A04 ---
1B03 --- 1A03 ---
1B02 24VDC(COM1) 1A02 0V(COM2)
1B01 24VDC(COM1) 1A01 0V(COM2)
0 10 20 30 40 50 55 () 20
30
40
50
60
70
80
90
100
()
ON
rate
Temperature

24VDC
24VDC
26.4VDC
28.8VDC
M800/M80/E80/C80 Series Specifications Manual (Hardware)
4 General Specifications (C80 Series)
IB-1501506-M 260
(7) PLCIO
Part-system 2 I/O signal connector
(Note 1) Output pins with (*) allow 0.2A output. Other pins have 0.1A output.
(Note 2) The device Nos. written above are for the assignment on hardware. These Nos. are different from the device
Nos. to be actually used.
0 10 20 30 40 50 55 () 20
30
40
50
60
70
80
90
100
()
ON
rate
Temperature
R
R
R
R
R
L
L
2B20
2A11
2B10
2A05
2B02
2A02
2B01
2A01
+
1B02
1B01
2A20
2A19
2A18
2A17
2A18
2A15
2A14
2A13
2A12
2A11
2A10
2A09
2A08
2A07
2A06
2A05
2A04
2A03
2A02
2A01
2B20
2B19
2B18
2B17
2B18
2B15
2B14
2B13
2B12
2B11
2B10
2B09
2B08
2B07
2B06
2B05
2B04
2B03
2B02
2B01
2B20 IN PC-X00
2B19 IN PC-X01
2B18 IN PC-X02
2B17 IN PC-X03
2B16 IN PC-X04

2B15 IN PC-X05
2B14 IN PC-X06
2B13 IN PC-X07
2B12 IN PC-X08
2B11 IN PC-X09
2B10(*) IN/OUT PC-Y0A/NC-X0A
2B09(*) IN/OUT PC-Y0B/NC-X0B
2B08 IN/OUT PC-Y0C/NC-X0C
2B07 IN/OUT PC-Y0D/NC-X0D
2B06 IN/OUT PC-Y0E/NC-X0E
2B05 IN/OUT PC-Y0F/NC-X0F
2B04 ---
2B03 ---
2B02 24VDC(COM1)
2B01 24VDC(COM1)
2A20 IN PC-X10
2A19 IN PC-X11
2A18 IN PC-X12
2A17 IN PC-X13
2A16 IN PC-X14
2A15 IN PC-X15
2A14 IN PC-X16
2A13 IN PC-X17
2A12 IN PC-X18
2A11 IN PC-X19
2A10(*) IN/OUT PC-Y1A/NC-X1A
2A09(*) IN/OUT PC-Y1B/NC-X1B
2A08 IN/OUT PC-Y1C/NC-X1C
2A07 IN/OUT PC-Y1D/NC-X1D
2A06 IN/OUT PC-Y1E/NC-X1E
2A05 IN/OUT PC-Y1F/NC-X1F
2A04 ---
2A03 ---
2A02 0V(COM2)
2A01 0V(COM2)
24VDC
24VDC
26.4VDC
28.8VDC
M800/M80/E80/C80 Series Specifications Manual (Hardware)
4 General Specifications (C80 Series)
261 IB-1501506-M
<Cable side connector type>
Connector type Pressure displacement
type Crimp-contact type Soldering type
Connector FCN-367J040-AU/F FCN-363J040 FCN-361J040-AU
Contact - AWG#24 to #28: FCN-363J-AU
AWG#22 to #26: FCN-363J-AU/S -
Case -
FCN-360C040-B
FCN-360C040-D (Wide-mouthed type)
FCN-360C040-E (Long screw type)
-
FCN-360C040-H/E (Side-mouthed type)
FCN-360C040-J1 (Sloped-mouth cover)
FCN-360C040-J2 (Thin sloped-mouth
cover)
Manufacturer FUJITSU Component
M800/M80/E80/C80 Series Specifications Manual (Hardware)
4 General Specifications (C80 Series)
IB-1501506-M 262
4.7 Signal Splitter
(Note) Signal splitter allows DIN rail installation only.
Dimension and Names of parts
(1) NC I/F
Connector for CNC CPU
(2) RIO1
(Not used)
(3) DCIN
Terminal block for power supply (Used for the 12V power supply type manual pulse generator)
(4) SKIP
Connector for skip signal
---SKIP I/F specification---
Input ON voltage: 18V or more to 25.2V or less
Input ON current: 6mA or more
Input OFF voltage: 4V or less
Input OFF current: 2mA or less
Input signal holding time (Ton): 2ms or more
Internal response time: 0.08ms or less
(Note) NC recognizes input signals of 2ms or more as the valid skip signals. If machine
contacts (relay, etc.) are used, malfunctions will occur due to chattering. Use
semiconductor contacts (transistor, etc.).
86
172 45 66
RIO1
33
DIN Rail
DIN Rail

(1) (2) (3) (4) (5) (6)
[mm]
1
2
3
4 SKIP4
5 ---
IN
IN
IN
IN
SKIP1
SKIP2
SKIP3
1
5
6
9
D-SUB 9pin
6
7
8
9 IN COM4
IN
IN
IN
COM1
COM2
COM3
M800/M80/E80/C80 Series Specifications Manual (Hardware)
4 General Specifications (C80 Series)
263 IB-1501506-M
(5) MPG
5V/12V Connector for manual pulse generator
a.b.c.d.e: HA1 or HB1 rising edge (falling edge) phase difference = T/4 T/10
T: HA1 or HB1 cycle (Min. 10s)
(Note) 12V power is separately required to connect 12V manual pulse generator.
(Refer to "6.9 Connecting the Manual Pulse Generator".)
(6) TERMINAL
(Not used)
5V manual pulse generator (UFO-01-2Z9)
input conditions
12V manual pulse generator (HD60C)
input conditions
Input pulse signal type HA1 and HB1 phases (with phase difference 90) (Refer to the waveform below.)
Input signal voltage H level 3.5V to 5.25V
L level 0V to 0.5V
Max. input pulse
frequency 5kHz
Pulse generators power
supply voltage 5VDC10% 12VDC10%
Current consumption 100mA or less
Number of pulses per
rotation 100 pulse/rev 25 pulse/rev
1
8
9
15
D-SUB 15pin
1
2
3
4 HB2
5 HA3
6
7 +5VDC
8 +5VDC
OUT
OUT
IN HB3
IN
IN
IN
IN
IN
HA1
HB1
HA2
9
10
11
12 +12VDC
13 SG(0V)
14
15 ---
OUT +12VDC
OUT
OUT

OUT
OUT
OUT
SG(0V)
+12VDC
SG(0V)
T
a b c d e
HA1 (HB1)
HB1 (HA1)
0V
+5V
1
3
2
4
7
8
0V
+5V
+5V
+5V
0V
0V
0V
10
12
+12V
+12V
5V
12V
5
6
+12V 14
0V
9
11
13
0.1F
HA1
HA2
HA3
HB1
HB2
HB3
12V
MPG
0.1F
Signal
input
Power
output
Power
output
Control
unit
(Note)
Signal Splitter CNC CPU
M800/M80/E80/C80 Series Specifications Manual (Hardware)
4 General Specifications (C80 Series)
IB-1501506-M 264
4.8 Manual Pulse Generator
4.8.1 5V Manual Pulse Generator (UFO-01-2Z9)
100 pulse/rev
[Outline dimension]
[Panel cut dimension]
Produced by NIDEC NEMICON CORPORATION
3-M4
[mm]
0
10
20
30
40
50
60
70
80
90
0V A B
80.5
60
1 6 6 2 6
R43
77
58
56
8.89 7.6 M3 x 6

5V
Gasket
Above size only
72 at equal pitch
Panel cut diameter
Index stud
Top
Bottom
[mm]
72
62
at equal pitch

4.8.2 12V Manual Pulse Generator (HD60C)
25 pulse/rev
[Outline dimension]
[Panel cut dimension]
4.9 Recommended Terminal Block for Dual Signal Module
Terminal block converter module FA-TBS40P or FA-LTB40P, produced by MITSUBISHI ELECTRIC ENGINEERING, is recommended to connect the dual signals to the dual signal module. Use the connection cable FA-CBL FMV-M produced by MITSUBISHI ELECTRIC ENGINEERING.
[MITSUBISHI ELECTRIC ENGINEERING: http://www.mee.co.jp]
3.6
16 27 0.5
L10
8.89 7.60
t 2.0 3-M4
77 0.5
80 1
58 0.5
60 0.5
[mm]
24 0.5
56 0.5
Installation of screws
Packing stud bolt
other than M3 x 6
not possible
Top
Bottom
12V 0V BA
40
30
50
60
70
10
20
90
0
80
3 - 4. 8
62
+2
0
72 0. 2
120
[mm]
(Divide equally
by three)

4.10 GOT (Panel Cut Dimensions)
Make an installation hole on the control panel with the dimensions as shown below.
The C dimension shows the measurements for installing fittings on the control panel.
A
C BC
A
C B C
ABC
GT2712-S 302
GT2710-S,GT2710-V 289
GT2708-S,GT2708-V 227 176
GT2705-V 153 121
+2
0
+2
0
+2
0
+2
0
+2
0 +2
0

+2
0 +2
0
GT2512-S 302 228
GT2510-V 289 200
GT2508-V 227 176
+2
0
+2
0
+2
0
+2
0
+2
0
+2
0
GT2715-X 383.5 282.5 +2
0
+2
0
228
200
Horizontal Vertical
Model Panel thickness
10 or More 1.6 to 4
Unit: mm
Revision History
Date of
revision Manual No. Revision details
Sep. 2017 IB(NA)1501506-A The first edition was created excerpting from General specifications pages in "M800/
M80/C80 Series Specifications Manual" (IB-1501267(ENG)-G).
"M800W/M80W Series Hardware" was created integrating "M800W Series General
Specifications" and "M80W Series General Specifications".
"M800S/M80 Series Hardware" was created integrating "M800S Series General
Specifications" and "M80 Series General Specifications".
The chapter title "C80 Series General Specifications" was changed to "C80 Series
Hardware".
Other contents were added/revised/deleted according to specification.
Dec. 2017 IB(NA)1501506-B The descriptions of M800 Series/M80 Series were revised in response to S/W version
C7.
"M800W/M80W Series Hardware"
The following units were added.
FCU8-KB922 (MITSUBISHI CNC Machine operation panel)
FCU8-KB924 (MITSUBISHI CNC Machine operation panel)
The following cable was deleted.
CNV2E-MB (Cable for MBE405W/MBA405W)
The following contents were changed.
3.16 MITSUBISHI CNC Machine Operation Panel
3.23 List of Cables
4.1.1 Environment Conditions inside the Operation Panel
4.2.1 Environment Conditions inside the Operation Panel
4.15.2 12V Manual Pulse Generator (HD60C)
4.17.1 Main Panel A , B (FCU8-KB921 / FCU8-KB922 , FCU8-KB923 / FCU8-KB924)
"M800S/M80 Series Hardware"
The following units were added.
FCU8-KB922 (MITSUBISHI CNC Machine operation panel)
FCU8-KB924 (MITSUBISHI CNC Machine operation panel)
The following cable was deleted.
CNV2E-MB (Cable for MBE405W/MBA405W)
The following contents were changed.
3.13 MITSUBISHI CNC Machine Operation Panel
3.20 List of Cables
4.1.1 Installation Environment Conditions
4.2.1 Installation Environment Conditions
4.8.2 FCU8-DX750 / FCU8-DX760 / FCU8-DX761
4.12.2 12V Manual Pulse Generator (HD60C)
4.14.1 Main Panel A , B (FCU8-KB921 / FCU8-KB922 , FCU8-KB923 / FCU8-KB924)
Other contents were added/revised/deleted according to specification.
Mar.2018 IB(NA)1501506-C The descriptions were revised in response to Mitsubishi Electric CNC E80 Series.
"M800W/M80W Series Hardware"
The following units were added.
FCU8-DX409 (Remote I/O unit)
FCU8-EX564 (Communication expansion unit)
FCU8-KB925 (MITSUBISHI CNC Machine operation panel)
FCU8-KB926 (MITSUBISHI CNC Machine operation panel)
FCU8-KB941 (MITSUBISHI CNC Machine operation panel)
The following chapters were added.
4.13.3 CC-Link IE Field (FCU8-EX564)
The following contents were changed.
3.10 Remote I/O Unit
3.12 Communication Expansion Unit
3.16 MITSUBISHI CNC Machine Operation Panel
4.1.1 Environment Conditions inside the Operation Panel
4.1.2 Environment Conditions inside the Control Panel
4.2.1 Environment Conditions inside the Operation Panel
4.2.2 Environment Conditions inside the Control Panel

4.11 Remote I/O Unit
4.13.1 CC-Link (FCU8-EX561)
4.13.2 PROFIBUS-DP (FCU8-EX563)
4.13.4 EtherNet/IP (FCU8-EX565)
4.17.1 Main Panel A , B (FCU8-KB921 / FCU8-KB922 / FCU8-KB925 ,
FCU8-KB923 / FCU8-KB924 / FCU8-KB92)
4.17.2 Sub Panel A (FCU8-KB931 / FCU8-KB94)
(Continue to the next page)
Date of
revision Manual No. Revision details
Mar.2018 IB(NA)1501506-C (Continued from the previous page)
"M800S/M80/E80 Series Hardware"
The following units were added.
FCU8-MU513 (Control unit)
FCU8-MU514 (Control unit)
FCU8-DU121-13 (Display unit)
FCU8-KB024 (Keyboard unit)
FCU8-KB025 (Keyboard unit)
FCU8-DX731 (Operation panel I/O unit)
FCU8-DX409 (Remote I/O unit)
FCU8-EX564 (Communication expansion unit)
FCU8-KB925 (MITSUBISHI CNC Machine operation panel)
FCU8-KB926 (MITSUBISHI CNC Machine operation panel)
FCU8-KB941 (MITSUBISHI CNC Machine operation panel)
The following cable was added.
J225 (Analog output cable)
The following chapters were added.
2.3 General Connection Diagram [E80]
3.3 Control Unit [E80]
3.6 Display Unit [E80]
3.9 Keyboard Unit [E80]
3.12 Remote I/O Unit [E80]
3.18 MITSUBISHI CNC Machine Operation Panel [E80]
4.3 Environment Conditions [E80]
4.6 Control Unit [E80]
4.9 Display Unit [E80]
4.10.9 Keyboard for 8.4-type Display Unit (FCU8-KB024)
4.10.10 Keyboard for 8.4-type Display Unit (FCU8-KB025)
4.14.3 CC-Link IE Field (FCU8-EX564)
The following contents were changed.
2 General Connection Diagram
3.10 Operation Panel I/O Unit
3.11 Remote I/O Unit [M800S/M80]
3.14 Communication Expansion Unit
3.17 MITSUBISHI CNC Machine Operation Panel [M800S/M80]
3.20 Cable Connector Sets
3.25 List of Cables
4.1.1 Installation Environment Conditions
4.2.1 Installation Environment Conditions
4.10 Keyboard Unit
4.11 Operation Panel I/O Unit
4.12 Remote I/O Unit
4.14.1 CC-Link (FCU8-EX561)
4.14.2 PROFIBUS-DP (FCU8-EX563)
4.14.4 EtherNet/IP (FCU8-EX565)
4.17.1 Main Panel A , B (FCU8-KB921 / FCU8-KB922 / FCU8-KB925 ,
FCU8-KB923 / FCU8-KB924 / FCU8-KB926)
4.17.2 Sub Panel A (FCU8-KB931 / FCU8-KB941)
Other contents were added/revised/deleted according to specification.
Date of
revision Manual No. Revision details
Sep. 2018 IB(NA)1501506-D The descriptions were revised corresponding to S/W version B0 of Mitsubishi Electric
CNC C80 series.
"C80 Series Hardware"
Added the following chapter.
4.10 GOT (Panel Cut Dimensions)
Changed the following contents.
3.1 CNC Control Unit
4.6 Dual Signal Module
Other mistakes were corrected.
Apr. 2019 IB(NA)1501506-E The descriptions of M800 Series/M80 Series/E80 Series were revised in response to
S/W version E0.
"M800W/M80W Series Hardware"
The following contents were changed.
2.1.1 M800W, Windows-based Display (15-type)
2.1.2 M800W, Windows-based Display (19-type)
2.1.3 M800W, Non-Windows-based Display (10.4-type / 15-type)
2.2.1 M80W, Windows-based Display (15-type)
2.2.2 M80W, Windows-based Display (19-type)
2.2.3 M80W, Non-Windows-based Display (8.4-type /10.4-type /15-type)
3.9 Operation Panel I/O Unit
3.18 Cable Connector Sets
3.22 Replacements
4.10 Operation Panel I/O Unit
4.10.1 List of Units
4.10.2 FCU8-DX830 / FCU8-DX837 / FCU8-DX730
"M800S/M80/E80 Series Hardware"
The following contents were changed.

2.1 General Connection Diagram [M800S]
2.2 General Connection Diagram [M80]
2.3 General Connection Diagram [E80]
3.10 Operation Panel I/O Unit
3.14 Communication Expansion Unit
3.20 Cable Connector Sets
3.24 Replacements
4.11.1 List of Units
4.11.2 FCU8-DX731 / FCU8-DX750 / FCU8-DX760 / FCU8-DX761
Other mistakes were corrected.
Sep. 2019 IB(NA)1501506-F The descriptions of M800 Series/M80 Series/E80 Series were revised in response to S/W version E1.
"M800W/M80W Series Hardware"
The following units were added.
FCU8-DX834 (Operation panel I/O unit)
FCU8-EX568 (FL-net expansion unit)
The following cable was added.
J460 (DI/DO cable)
J461 (DI/DO cable)
(Continue to the next page)
Date of
revision Manual No. Revision details
Sep. 2019 IB(NA)1501506-F (Continued from the previous page)
The following chapters were added.
3.24 System Type
4.13.5 FL-net (FCU8-EX568)
The following contents were changed.
2.1.1 M800W, Windows-based Display (15-type)
2.1.2 M800W, Windows-based Display (19-type)
2.2.1 M80W, Windows-based Display (15-type)
2.2.2 M80W, Windows-based Display (19-type)
3.9 Operation Panel I/O Unit
3.12 Communication Expansion Unit
3.23 List of Cables
4.1.1 Environment Conditions inside the Operation Panel
4.2.1 Environment Conditions inside the Operation Panel
4.5.1 10.4-type (FCU8-DU141-31)
4.5.2 15-type (FCU8-DU181-31)
4.5.3 15-type (FCU8-DU181-34)
4.5.4 19-type (FCU8-DU191-75)
4.5.5 19-type (FCU8-DU192-75)
4.6.1 8.4-type (FCU8-DU121-12)
4.6.2 10.4-type (FCU8-DU141-32)
4.6.3 15-type (FCU8-DU181-32)
4.6.4 15-type (FCU8-DU181-36)
4.6.5 19-type (FCU8-DU191-77)
4.6.6 19-type (FCU8-DU192-77)
4.10 Operation Panel I/O Unit
4.10.1 List of Units
4.10.2 FCU8-DX830 / FCU8-DX834 / FCU8-DX837 / FCU8-DX730
"M800S/M80/E80 Series Hardware"
The following units were added.
FCU8-DX834 (Operation panel I/O unit)
FCU8-EX568 (FL-net expansion unit)
The following cable was added.
J012 (Operation panel I/O interface cable)
The following chapters were added.
2.3.1 Connecting a Spindle Drive Unit
2.3.2 Connecting a Pulse-controlled Inverter
3.26 System Type
4.14.5 FL-net (FCU8-EX568)
(Continue to the next page)
Date of
revision Manual No. Revision details
Sep. 2019 IB(NA)1501506-F (Continued from the previous page)
The following contents were changed.
2.1 General Connection Diagram [M800S]
2.2 General Connection Diagram [M80]
2.3 General Connection Diagram [E80]
3.10 Operation Panel I/O Unit
3.14 Communication Expansion Unit
3.25 List of Cables
4.1.1 Installation Environment Conditions
4.2.1 Installation Environment Conditions
4.3.1 Installation Environment Conditions
4.4.1 FCU8-MU542 / FCU8-MA542 / FCU8-MU541 / FCU8-MA541
4.6.1 FCU8-MU513 / FCU8-MU514
4.7.1 10.4-type (FCU8-DU141-31)
4.7.2 15-type (FCU8-DU181-31)
4.8.1 8.4-type (FCU8-DU121-12)
4.8.2 10.4-type (FCU8-DU141-32)
4.8.3 15-type (FCU8-DU181-32)
4.9.1 8.4-type (FCU8-DU121-13)
4.11 Operation Panel I/O Unit
4.11.1 List of Units
4.11.2 FCU8-DX731 / FCU8-DX750/ FCU8-DX760 / FCU8-DX761 / FCU8-DX834
Other mistakes were corrected.
Jan. 2020 IB(NA)1501506-G The descriptions were revised in response to S/W version F0 of M800/M80/E80 Series.

The descriptions were revised in response to S/W version B5 of C80 Series.
"M800S/M80/E80 Series Hardware"
The following chapters were added.
2.2.1 Connecting a Spindle Drive Unit
2.2.2 Connecting a Pulse-controlled Inverter
The following contents were changed.
2.3.2 Connecting a Pulse-controlled Inverter
"C80 Series Hardware"
The following contents were changed.
3.1 CNC Control Unit
3.2.1 GT27
3.2.2 GT25
3.3 Peripheral Device
4.5 CNC CPU Module
4.10 GOT (Panel Cut Dimensions)
Other mistakes were corrected.
Date of
revision Manual No. Revision details
Jun. 2020 IB(NA)1501506-H The descriptions were revised in response to S/W version F1 of M800/M80/E80 Series.
"M800W/M80W Series Hardware"
- The following contents were changed.
2.1.1 M800W, Windows-based Display (15-type)
2.1.2 M800W, Windows-based Display (19-type)
2.1.3 M800W, Non-Windows-based Display (10.4-type / 15-type)
2.2.1 M80W, Windows-based Display (15-type)
2.2.2 M80W, Windows-based Display (19-type)
2.2.3 M80W, Non-Windows-based Display (8.4-type /10.4-type /15-type)
3.1 Control Unit [M800W]
3.2 Control Unit [M80W]
3.20 Genuine Memory Card
3.23 List of Cables
4.1.1 Environment Conditions inside the Operation Panel
4.1.2 Environment Conditions inside the Control Panel
4.2.1 Environment Conditions inside the Operation Panel
4.2.2 Environment Conditions inside the Control Panel
4.11.2 FCU8-DX220 / FCU8-DX230 / FCU8-DX231 / FCU8-DX202 / FCU8-DX213
/ FCU8-DX213-1 / FCU8-DX654 / FCU8-DX654-1 / FCU8-DX651 / FCU8-DX408
/ FCU8-DX409
- The chapter titles were corrected.
3.16 Machine Operation Panel
4.17 Machine Operation Panel
4.20 Exclusive SD Cards
"M800S/M80/E80 Series Hardware"
- The following contents were changed.
2.1 General Connection Diagram [M800S]
2.2.1 Connecting a Spindle Drive Unit
2.3.1 Connecting a Spindle Drive Unit
2.3.2 Connecting a Pulse-controlled Inverter
3.1 Control Unit [M800S]
3.2 Control Unit [M80]
3.3 Control Unit [E80]
3.22 Genuine Memory Card
3.25 List of Cables
4.1.1 Installation Environment Conditions
4.2.1 Installation Environment Conditions
4.3.1 Installation Environment Conditions
4.4.1 FCU8-MU542 / FCU8-MA542 / FCU8-MU541 / FCU8-MA541
4.6.1 FCU8-MU513 / FCU8-MU514
4.12.2 FCU8-DX220 / FCU8-DX230 / FCU8-DX231 / FCU8-DX202 / FCU8-DX213
/ FCU8-DX213-1 / FCU8-DX654 / FCU8-DX654-1 / FCU8-DX651 / FCU8-DX408
/ FCU8-DX409
- The chapter titles were corrected.
3.17 Machine Operation Panel [M800S/M80]
3.18 Machine Operation Panel [E80]
4.17 Machine Operation Panel
4.20 Exclusive SD Cards
Other mistakes were corrected.
Date of
revision Manual No. Revision details
Mar. 2021 IB(NA)1501506-J The descriptions were revised in response to S/W version F4 of M800/M80/E80 Series.
The descriptions were revised in response to S/W version B7 of C80 Series.
"M800W/M80W Series Hardware"
- The following units were added.
FCU8-EX744 (Vibration cutting expansion unit)
- The following chapters were added.
4.12.7 Vibration Cutting Expansion Unit (FCU8-EX744) [M800S/M80]
- The following contents were changed.
2.1.1 M800W, Windows-based Display (15-type)
2.1.2 M800W, Windows-based Display (19-type)
2.1.3 M800W, Non-Windows-based Display (10.4-type / 15-type)
2.2.1 M80W, Windows-based Display (15-type)
2.2.2 M80W, Windows-based Display (19-type)
2.2.3 M80W, Non-Windows-based Display (8.4-type /10.4-type /15-type)
3.3 Display Unit [M800W]
3.4 Display Unit [M80W]
3.11 Function Expansion Unit
4.3.1 M830W(FCU8-MU042) / M850W(FCU8-MA041)
4.4.1 FCU8-MU044

4.5.1 10.4-type (FCU8-DU141-31)
4.5.2 15-type (FCU8-DU181-31)
4.5.3 15-type (FCU8-DU181-34)
4.5.4 19-type (FCU8-DU191-75)
4.5.5 19-type (FCU8-DU192-75)
4.6.1 8.4-type (FCU8-DU121-12)
4.6.2 10.4-type (FCU8-DU141-32)
4.6.3 15-type (FCU8-DU181-32)
4.6.4 15-type (FCU8-DU181-36)
4.6.5 19-type (FCU8-DU191-77)
4.6.6 19-type (FCU8-DU192-77)
4.9.1 Keyboard for 8.4-type Display Unit (FCU8-KB026)
4.9.2 Keyboard for 8.4-type Display Unit (FCU8-KB028)
4.9.3 Keyboard for 8.4-type Display Unit (FCU8-KB029)
4.9.4 Keyboard for 10.4-type Display Unit (FCU8-KB041)
4.9.5 Keyboard for 10.4-type Display Unit (FCU8-KB046)
4.9.6 Keyboard for 10.4-type Display Unit (FCU8-KB047)
4.9.7 Keyboard for 10.4-type Display Unit (FCU8-KB048)
4.9.8 Keyboard for 15-type Display Unit (FCU8-KB083)
4.11.2 FCU8-DX220 / FCU8-DX230 / FCU8-DX231 / FCU8-DX202 / FCU8-DX213 / FCU8-DX213-1 / FCU8-DX654 / FCU8-DX654-1 / FCU8-DX651 / FCU8-DX408 / FCU8-DX409
4.13 Side Memory I/F Unit
4.14.1 5V Manual Pulse Generator (UFO-01-2Z9)
4.14.2 12V Manual Pulse Generator (HD60C)
4.16.1 Main Panel A , B (FCU8-KB921 / FCU8-KB922 / FCU8-KB925 , FCU8-KB923 / FCU8-KB924 / FCU8-KB926)
4.16.2 Sub Panel A (FCU8-KB931 / FCU8-KB941)
- Chapter title deleted.
3.12 Communication Expansion Unit
4.13 Communication Expansion Unit
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Date of revision	Manual No.	Revision details
Mar. 2021	IB(NA)1501506-J	(Continued from the previous page) "M800S/M80/E80 Series Hardware" - The following units were added. FCU8-EX744 (Vibration cutting expansion Unit) - The following chapters were added. 2.4 Connecting a Pulse-controlled Inverter [M80/E80] 3.15 Function Expansion Unit [E80] 4.14.6 Vibration Cutting Expansion Unit (FCU8-EX744) - The following chapter was deleted. 2.2.2 Connecting a Pulse-controlled Inverter 2.3.2 Connecting a Pulse-controlled Inverter - The following contents were changed. 2.1 General Connection Diagram [M800S] 2.2 General Connection Diagram [M80] 2.3 General Connection Diagram [E80] 3.14 Function Expansion Unit [M800S/M80] 4.4.1 FCU8-MU542 / FCU8-MA542 / FCU8-MU541 / FCU8-MA541 4.5.1 FCU8-MU511 / FCU8-MU512 / FCU8-MU501 / FCU8-MU502 4.6.1 FCU8-MU513 / FCU8-MU514 4.7.1 10.4-type (FCU8-DU141-31) 4.7.2 15-type (FCU8-DU181-31) 4.8.1 8.4-type (FCU8-DU121-12) 4.8.2 10.4-type (FCU8-DU141-32) 4.8.3 15-type (FCU8-DU181-32) 4.9.1 8.4-type (FCU8-DU121-13) 4.10.1 Keyboard for 8.4-type Display Unit (FCU8-KB026) 4.10.2 Keyboard for 8.4-type Display Unit (FCU8-KB028) 4.10.3 Keyboard for 8.4-type Display Unit (FCU8-KB029) 4.10.4 Keyboard for 10.4-type Display Unit (FCU8-KB041) 4.10.5 Keyboard for 10.4-type Display Unit (FCU8-KB046) 4.10.6 Keyboard for 10.4-type Display Unit (FCU8-KB047) 4.10.7 Keyboard for 10.4-type Display Unit (FCU8-KB048) 4.10.8 Keyboard for 15-type Display Unit (FCU8-KB083) 4.10.9 Keyboard for 8.4-type Display Unit (FCU8-KB024) 4.10.10 Keyboard for 8.4-type Display Unit (FCU8-KB025) 4.11.2 FCU8-DX731 / FCU8-DX750 / FCU8-DX760 / FCU8-DX761 / FCU8-DX834 4.12.2 FCU8-DX220 / FCU8-DX230 / FCU8-DX231 / FCU8-DX202 / FCU8-DX213 / FCU8-DX213-1 / FCU8-DX654 / FCU8-DX654-1 / FCU8-DX651 / FCU8-DX408 / FCU8-DX409 4.15.1 5V Manual Pulse Generator (UFO-01-2Z9) 4.15.2 12V Manual Pulse Generator (HD60C) 4.17.1 Main Panel A , B (FCU8-KB921 / FCU8-KB922 / FCU8-KB925 , FCU8-KB923 / FCU8-KB924 / FCU8-KB926) 4.17.2 Sub Panel A (FCU8-KB931 / FCU8-KB941) - The chapter titles were corrected. 3.13 Function Safety Expansion Unit [M80] 3.14 Function Expansion Unit [M800S/M80] 4.13 Functional Safety Expansion Unit 4.14 Function Expansion Unit 4.14.7 Option Relay Unit (FCU8-EX702) 4.14.8 Option Relay Unit (FCU8-EX703) - Chapter title deleted. 2.2.1 Connecting a Spindle Drive Unit 2.3.1 Connecting a Spindle Drive Unit

(Continue to the next page)
Date of
revision Manual No. Revision details
Mar. 2021 IB(NA)1501506-J (Continued from the previous page)
"C80 Series Hardware"
- Changed the following contents.
 4.6 Dual Signal Module
Other mistakes were corrected.
Jul. 2022 IB(NA)1501506-K The descriptions were revised in response to S/W version F8 of Mitsubishi Electric CNC
M800/M80/E80 Series.
"M800W/M80W Series Hardware"
- The following display units were added.
 FCU8-DU142-31 / FCU8-DU182-31 / FCU8-DU182-34 / FCU8-DU142-32 / FCU8-
DU182-32 / FCU8-DU182-36
- The following chapters were added.
 2.3 Difference in Connection Depending on the Display Unit

- The following contents were changed.
 2.1.1 M800W, Windows-based Display (15-type)
 2.1.3 M800W, Non-Windows-based Display (10.4-type / 15-type)
 2.2.1 M80W, Windows-based Display (15-type)
 2.2.3 M80W, Non-Windows-based Display (8.4-type /10.4-type /15-type)
 4.1.1 Environment Conditions inside the Operation Panel
 4.2.1 Environment Conditions inside the Operation Panel
 4.5.2 15-type (FCU8-DU182-31 / FCU8-DU181-31)
 4.5.6 Precautions
 4.6.3 15-type (FCU8-DU182-32 / FCU8-DU181-32)
 4.6.7 Precautions
 4.8.1 FCU8-GC211
 4.16.1 Main Panel A,B (FCU8-KB921 / FCU8-KB922 / FCU8-KB925, FCU8-KB923 /
FCU8-KB924 / FCU8-KB926)
- The chapter titles were changed.
 4.5.1 10.4-type (FCU8-DU142-31 / FCU8-DU141-31)
 4.5.2 15-type (FCU8-DU182-31 / FCU8-DU181-31)
 4.5.3 15-type (FCU8-DU182-34 / FCU8-DU181-34)
 4.6.2 10.4-type (FCU8-DU142-32 / FCU8-DU141-32)
 4.6.3 15-type (FCU8-DU182-32 / FCU8-DU181-32)
 4.6.4 15-type (FCU8-DU182-36 / FCU8-DU181-36)
"M800S/M80/E80 Series Hardware"
- The following display units were added.
 FCU8-DU142-31 / FCU8-DU182-31 / FCU8-DU142-32 / FCU8-DU182-32
- The following chapters were added.
 2.4 Difference in Connection Depending on the Display Unit
 2.5 Connecting an Operation Panel I/O Unit (FCU8-DX834)
 2.7 Connecting a BiSS Encoder
(Continue to the next page)
Date of
revision Manual No. Revision details
Jul. 2022 IB(NA)1501506-K (Continued from the previous page)
- The following contents were changed.
 2.1 General Connection Diagram [M800S]
 2.2 General Connection Diagram [M80]
 2.3 General Connection Diagram [E80]
 3.4 Display Unit [M800S]
 3.5 Display Unit [M80]
 3.27 System Type
 4.1.1 Installation Environment Conditions
 4.2.1 Installation Environment Conditions
 4.3.1 Installation Environment Conditions
 4.4.1 FCU8-MU542 / FCU8-MA542 / FCU8-MU541 / FCU8-MA541
 4.7.2 15-type (FCU8-DU182-31/FCU8-DU181-31)
 4.7.3 Precautions
 4.8.3 15-type (FCU8-DU182-32/FCU8-DU181-32)
 4.8.4 Precautions
 4.17.1 Main Panel A,B (FCU8-KB921 / FCU8-KB922 / FCU8-KB925, FCU8-KB923 /
FCU8-KB924 / FCU8-KB926)
- The chapter titles were changed.
 4.7.1 10.4-type (FCU8-DU142-31/FCU8-DU141-31)
 4.7.2 15-type (FCU8-DU182-31/FCU8-DU181-31)
 4.8.2 10.4-type (FCU8-DU142-32/FCU8-DU141-32)
 4.8.3 15-type (FCU8-DU182-32/FCU8-DU181-32)
- Mistakes were corrected.
Dec. 2022 IB(NA)1501506-L "M800W/M80W Series Hardware"
- The following contents were corrected.
 2.1.1 M800W, Windows-based Display (15-type)
 2.1.2 M800W, Windows-based Display (19-type)
 2.1.3 M800W, Non-Windows-based Display (10.4-type / 15-type)
 2.2.1 M80W, Windows-based Display (15-type)
 2.2.2 M80W, Windows-based Display (19-type)
 2.2.3 M80W, Non-Windows-based Display (8.4-type /10.4-type /15-type)
"M800S/M80/E80 Series Hardware"
- The following contents were corrected.
 2.1 General Connection Diagram [M800S]
 2.2 General Connection Diagram [M80]
 2.3 General Connection Diagram [E80]
"C80 Series Hardware"
The descriptions were revised corresponding to S/W version BC of C80 series.

- The following contents were changed.
3.1 CNC Control Unit
3.2.2 GT25
- The following contents were corrected.
4.10 GOT (Panel Cut Dimensions)
Date of
revision Manual No. Revision details
Jan. 2024 IB(NA)1501506-M The descriptions were revised in response to S/W version FC of M800/M80/E80 Series.
"M800W/M80W Series Hardware"
- The following contents were changed.
2.1.1 M800W, Windows-based Display (15-type)
2.1.2 M800W, Windows-based Display (19-type)
2.1.3 M800W, Non-Windows-based Display (10.4-type / 15-type)
2.2.1 M80W, Windows-based Display (15-type)
2.2.2 M80W, Windows-based Display (19-type)
2.2.3 M80W, Non-Windows-based Display (8.4-type /10.4-type /15-type)
3.22 List of Cables
4.11.2 FCU8-DX220 / FCU8-DX230 / FCU8-DX231 / FCU8-DX202 / FCU8-DX213 /
FCU8-DX213-1 / FCU8-DX654 / FCU8-DX654-1 / FCU8-DX651 / FCU8-DX408 /
FCU8-DX409
"M800S/M80/E80 Series Hardware"
- The following chapters was added.
2.8 Connecting an EcoMonitorLight
- The following contents were changed.
3.26 List of Cables
4.12.2 FCU8-DX220 / FCU8-DX230 / FCU8-DX231 / FCU8-DX202 / FCU8-DX213 /
FCU8-DX213-1 / FCU8-DX654 / FCU8-DX654-1 / FCU8-DX651 / FCU8-DX408 /
FCU8-DX409
Date of
revision Manual No. Revision details

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Minneapolis, MN Service Satellite
Detroit, MI Service Satellite South Germany Service Center (Stuttgart)
Grand Rapids, MI Service Satellite SCHELMENWASENSTRASSE 16-20, 70567 STUTTGART, GERMANY
Cleveland, OH Service Satellite TEL: + 49-711-770598-123 / FAX: +49-711-770598-141
St. Louis, MO Service Satellite
Indianapolis, IN Service Saltellite France Service Center (Paris)
2 RUE DE LUNION, 92565 RUEIL-MALMAISON CEDEX, FRANCE
TEL: +33-1-41-02-83-13 / FAX: +33-1-49-01-07-25
South/East Region Service Center (Georgia)
1845 SATELLITE BOULEVARD STE. 450, DULUTH, GEORGIA 30097, U.S.A. France Service Satellite (Lyon)
9154-852-876-1+ XAF / 9254-852-876-1+ LET ECNARF TSEIRP TNIAS 00896 DONOM SEUQCAJ EELLA ,042
Charleston, SC Service Satellite TEL: +33-1-41-02-83-13 / FAX: +33-1-49-01-07-25
Charlotte, NC Service Satellite
Raleigh, NC Service Satellite Italy Service Center (Milan)
Dallas, TX Service Satellite VIA ENERGY PARK 14, VIMERCATE 20871 (MB) ITALY
Houston, TX Service Satellite TEL: +39-039-6053-342 / FAX: +39-039-6053-206
Hartford, CT Service Satellite
Knoxville, TN Service Satellite Italy Service Satellite (Padova)
Nashville, TN Service Satellite VIA G. SAVELLI, 24 - 35129 PADOVA, ITALY
Huntsville, AL Satellite TEL: +39-039-6053-342 / FAX: +39-039-6053-206
Pittsburg, PA Service Satellite
Tampa, FL Service Satellite U.K. Service Center
Miami, FL Satelite TRAVELLERS LANE, HATFIELD, HERTFORDSHIRE, AL10 8XB, U.K.
Lafayette, LA Service Satellite TEL: +44-1707-288-780 / FAX: +44-1707-278-695
Allentown, PA Satelite
Spain Service Center
CTRA. RUBI, 76-80 8174 SAINT CUGAT DEL VALLES, BARCELONA, SPAIN
Western Region Service Center (California) TEL: +34-935-65-2236 / FAX: +34-935-89-1579
5900-B KATELLA AVE. - 5900-A KATELLA AVE. CYPRESS, CALIFORNIA 90630, U.S.A.
TEL: +1-714-699-2625 / FAX: +1-847-478-2650 Poland Service Center
San Francisco, CA Satelite UL.KRAKOWSKA 50, 32-083 BALICE, POLAND
Seattle, WA Service Satellite TEL: +48-12-347-6500 / FAX: +48-12-630-4701
Denver, CO Service Satellite
Hungary Service Center
Canada Region Service Center (Toronto) MITSUBISHI ELECTRIC EUROPE B.V. HUNGARIAN BRANCH
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Parque Tecnolgico Innovacin Quertaro, Lateral Carretera Estatal 431, Km 2+200, Lote 91 Modulos 1 y 2 UMRANIYE, ISTANBUL, TURKEY
hcaM al adneicaH ocixM ,oratreuQ ,suqraM lE ,64267 PC ,arro 74-44-166-612-09+ :XAF / 0052-969-612-09+ :LET
TEL: +52-442-153-6050
Monterrey, NL Service Satellite Czech Republic Service Center
Mexico City, DF Service Satellite MITSUBISHI ELECTRIC EUROPE B.V. PRAGUE OFFICE
Pekask 621/7, 155 00 PRAHA 5, CZECH REPUBLIC
TEL: +420-734-402-587
BRAZIL
Sweden Service Center
MITSUBISHI ELECTRIC DO BRASIL COMRCIO E SERVIOS LTDA. HAMMARBACKEN 14, P.O.BOX 750 SE-19127, SOLLENTUNA, SWEDEN

Votorantim Office TEL: +46-8-6251200 / FAX: +46-8-6251014
AV. GISELE CONSTANTINO,1578, PARQUE BELA VISTA, VOTORANTIM-SP, BRAZIL CEP:18.110-650
TEL: +55-15-3023-9000 Bulgaria Service Center
Blumenau, Santa Catarina Office AKHNATON Ltd. (Service Partner)
4 ANDREJ LJAPCHEV BLVD. POB 21, BG-1756 SOFIA, BULGARIA
TEL: +359-2-8176009 / FAX: +359-2-9744061
Ukraine Service Center (Kiev)
CSC Automation Ltd. (Service Partner)
4 B, YEVHENA SVERSTYUKA STR., 02002 KIEV, UKRAINE
TEL: +380-44-494-3344 / FAX: +380-44-494-3366
South Africa Service Center
Adroit Technologies (Service Partner)
20 WATERFORD OFFICE PARK, WATERFORD DRIVE, CNR OF WITKOPPEN ROAD,
FOURWAYS JOHANNESBURG SOUTH AFRICA
TEL: +27-11-658-8100 / FAX: +27-11-658-8101
ASEAN CHINA
)RETNEC AF NAESA(.DTL .ETP AISA CIRTCELE IHSIBUSTIM)RETNEC AF ANIHC(.DTL)ANIHC(NOITAMOTUA CIRTCELE IHSIBUSTIM
Singapore Service Center CNC Call Center
349951 EROPAGNIS GNIDLIUB CIRTCELE IHSIBUSTIM DAOR ARDNAXELA 703 0315-129-004-68+ :LET
TEL: +65-6473-2308 / FAX: +65-6476-7439
Shanghai Service Center
NO.1386 HONG QIAO ROAD, CHANG NING QU, SHANGHAI 200336, CHINA
PHILIPPINES TEL: +86-21-2322-3030 / FAX: +86-21-2322-3000*8422
Qingdao Service Center
MELCO FACTORY AUTOMATION PHILIPPINES INC. Suzhou Service Center
Head Office Wuhan Service Center
128 LOPEZ RIZAL STREET, BRGY., HIGHWAY HILLS, MANDALUYONG CITY , MM PHILIPPINES 1550 Ningbo Service Center
TEL: +63-2-8256-8042 / FAX: +632-8637-2294 Hefei Service Center
Beijing Service Center
Philippines Service Center Tianjin Service Center
KM.23 WEST SERVICE ROAD SSH, CUPANG ,MUNTINLUPA CITY, PHILIPPINES Xian Service Center
TEL: +63-2-8807-0420 / FAX: +63-2-8842-5202 Dalian Service Center
Chengdu Service Center
VIETNAM Shenzhen Service Center
LEVEL8, GALAXY WORLD TOWER B, 1 YABAO ROAD, LONGGANG DISTRICT,
MITSUBISHI ELECTRIC VIETNAM CO., LTD. SHENZHEN 518129, CHINA
Vietnam Ho Chi Minh Service Center TEL: +86-755-2399-8272 / FAX: +86-755-8229-3686
11TH & 12TH FLOOR, VIETTEL TOWER B, 285 CACH MANG THANG 8 STREET, WARD 12, DISTRICT 10, Dongguan Service Center
HO CHI MINH CITY, VIETNAM Xiamen Service Center
TEL: +84-28-3910-5945 / FAX: +84-28-3910-5947
Vietnam Hanoi Service Center KOREA
14TH FLOOR, CAPITAL TOWER, 109 TRAN HUNG DAO STREET, CUA NAM WARD,
HOAN KIEM DISTRICT, HA NOI CITY, VIETNAM MITSUBISHI ELECTRIC AUTOMATION KOREA CO., LTD. (KOREA FA CENTER)
TEL: +84-24-3937-8075 / FAX: +84-24-3937-8076 Korea Seoul Service Center
8F GANGSEO HANGANG XI-TOWER A, 401 YANGCHEON-RO, GANGSEO-GU,
SEOUL 07528 KOREA
INDONESIA TEL: +82-2-3660-9631 / FAX: +82-2-3664-8668
PT. MITSUBISHI ELECTRIC INDONESIA Korea Daegu Service Center
Indonesia Service Center (Cikarang) 2F KT BLDG. 8, HOGUK-RO, BUK-GU, DAEGU 41518, KOREA
JL. KENARI RAYA BLOK G2-07A, DELTA SILICON 5, LIPPO CIKARANG - BEKASI 17550, INDONESIA TEL: +82-53-382-7401 / FAX: +82-53-382-7412
TEL: +62-21-2961-7797 / FAX: +62-21-2961-7794
Korea Changwon Technical Center
#205, 888, CHANGWON-DAERO, SEONGSAN-GU, CHANGWON-SI,
MALAYSIA GYEONGSANGNAM-DO, 51532, KOREA
TEL: +82-55-261-5559 / FAX: +82-55-261-5558
MITSUBISHI ELECTRIC SALES MALAYSIA SDN. BHD.
Malaysia Service Center (Kuala Lumpur Service Center)
LOT 11, JALAN 219, P.O BOX 1036, 46860 PETALING JAYA, SELANGOR DARUL EHSAN, MALAYSIA TAIWAN
TEL: +60-3-7626-5032
MITSUBISHI ELECTRIC TAIWAN CO., LTD. (TAIWAN FA CENTER)
Johor Bahru Service Center Taiwan Taichung Service Center
.rohoJ 00118 ,nnO otaD radnaB ,6/4 nanarijreP nalaJ ,9 WIAT , 86704 YTIC GNUHCIAT ,.TSID NUTIX ,.DR HT61 UQEYGNOG ,1-8 .ON AN
TEL: 07-3642250 / 2256 TEL: +886-4-2359-0688 / FAX: +886-4-2359-0689
Pulau Pinang Service Center Taiwan Taipei Service Center
25-G, Pusat Perniagaan Perdana Jaya, Jalan Permatang Rawa, 14000 Bukit Mertajam, Pulau Pinang 11F, NO.88, SEC.6, ZHONGSHAN N. RD., SHILIN DIST., TAIPEI CITY 11155, TAIWAN
5381-015-4-06+ :xaF / 8381-015-4-06+ :LET 3345-3382-2-688+ :XAF / 0345-3382-2-688+ :LET
Taiwan Tainan Service Center
THAILAND 11F-1, NO.30, ZHONGZHENG S. RD., YONGKANG DIST., TAINAN CITY 71067, TAIWAN
TEL: +886-6-252-5030 / FAX: +886-6-252-5031
MITSUBISHI ELECTRIC FACTORY AUTOMATION (THAILAND) CO., LTD.
Thailand Service Center (Bangkok)
101, TRUE DIGITAL PARK OFFICE, 5TH FLOOR, SUKHUMVIT ROAD, BANGCHAK, PHRA KHANONG, OCEANIA
BANGKOK, 10260 THAILAND
TEL: +66-2-092-8600 / FAX: +66-2-043-1231-33 MITSUBISHI ELECTRIC AUSTRALIA PTY. LTD.
Oceania Service Center
348 VICTORIA ROAD, RYDALMERE, N.S.W. 2116 AUSTRALIA
INDIA TEL: +61-2-9684-7269/ FAX: +61-2-9684-7245
MITSUBISHI ELECTRIC INDIA PVT., LTD.
Service Head office and South India Service Center (Bangalore)
CNC eXPerience Park, PLOT NO. 57/A, PEENYA PHASE 3,
PEENYA INDUSTRIAL AREA, BANGALORE 560058, KARNATAKA, INDIA
TEL : +91-80-4655-2121
Chennai Service Satellite
Coimbatore Service Satellite
Hyderabad Service Satellite
North India Service Center (Gurgaon)
PLOT 517, GROUND FLOOR, UDYOG VIHAR PHASE-III, GURUGRAM 122008, HARYANA, INDIA
TEL : +91-124-463-0300

Ludhiana Service Satellite
Panthnagar Service Satellite
Delhi Service Satellite
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Manesar Service Satellite
West India Service Center (Pune)
ICC-Devi GAURAV TECHNOLOGY PARK, UNIT NO.402, FOURTH FLOOR, NORTH WING,
SURVEY NUMBER 191-192 (P), NEXT to INDIAN CARD CLOTHING COMPANY Ltd,
OPP. VALLABH NAGAR, PIMPRI, PUNE- 411 018, MAHARASHTRA, INDIA
TEL : +91-20-6819-2274
Kolhapur Service Satellite
Aurangabad Service Satellite
Mumbai Service Satellite
West India Service Center (Ahmedabad)
204-209, 2ND FLOOR, 31FIVE, CORPORATE ROAD PRAHLADNAGAR,
AHMEDABAD -380015, GUJARAT, INDIA
TEL : + 91-79-6777-7888
Rajkot Service Satellite

Notice

Every effort has been made to keep up with software and hardware revisions in the contents described in this manual. However, please understand that in some unavoidable cases simultaneous revision is not possible.
Please contact your Mitsubishi Electric dealer with any questions or comments regarding the use of this product.

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Introduction

This manual describes the alarms and parameters of Mitsubishi Electric CNC.
Improper handling can cause unexpected malfunctions. To use this device correctly, be sure to read this manual before use.
Supported models of this manual are as follows:
Abbreviations for model names used in this manual are as follows:
To safely use this CNC unit, thoroughly study the "Precautions for Safety" before use.
Be sure to keep this manual on hand so that users can refer to it at any time.
Also refer to the manuals on "Manual List" as necessary.

Notes on reading this manual

(1) This manual explains general parameters which are operated on the CNC side.
For information about each machine tool, refer to manuals issued by the machine tool builder.
If the descriptions relating to "restrictions" and "allowable conditions" conflict between this manual and the machine tool builder's manual, the later has priority over the former.
(2) This manual is intended to contain as much descriptions as possible even about special operations.
The operations to which no reference is made in this manual should be considered "impossible".

Details described in this manual

In this manual, the following abbreviations might be used.
L system: Lathe system
M system: Machining center system
MTB: Machine tool builder

Supported models Abbreviations in this manual

M800VW Series M850VW, M830VW
M800VS Series M850VS, M830VS
M80VW Series M80VW
M80V Series M80V TypeA, M80V TypeB

Abbreviations Supported models

M800V, M800V Series M800VW Series/M800VS Series
M80V, M80V Series M80VW Series/M80V Series
M800V/M80V, M800V/M80V Se ries M800VW Series/M800VS Series/M80VW Series/M80V Series
M8V, M8V Series

Manual List

Manuals related to M800V/M80V Series are listed as follows.
These manuals are written on the assumption that all optional functions are added to the targeted model.
Some functions or screens may not be available depending on the machine or specifications set by MTB. (Confirm the specifications before use.)
The manuals issued by MTB take precedence over these manuals.

Manual IB No. Purpose and Contents

M800V/M80V Series
Instruction Manual IB-1501618 Operation guide for NC
Explanation for screen operation, etc.
M800V/M80V Series
Programming Manual
(Lathe System) (1/2)
IB-1501619 G code programming for lathe system
Basic functions, etc.
M800V/M80V Series
Programming Manual
(Lathe System) (2/2)
IB-1501620 G code programming for lathe system
Functions for multi-part system, high-accuracy function, etc.
M800V/M80V Series
Programming Manual
(Machining Center System) (1/2)
IB-1501621 G code programming for machining center system
Basic functions, etc.
M800V/M80V Series
Programming Manual
(Machining Center System) (2/2)

IB-1501622 G code programming for machining center system
Functions for multi-part system, high-accuracy function, etc.
M800V/M80V Series
Alarm/Parameter Manual IB-1501623 Alarms
Parameters
Manuals for MTBs (NC)
Manuals for MTBs (drive section)
Manual IB No. Purpose and Contents
M800V/M80V Series
Specifications Manual (Function) IB-1501610 Model selection
Outline of various functions
M800V/M80V Series
Specifications Manual (Hardware) IB-1501611 Model selection
Specifications of hardware unit
M800VW/M80VW Series
Connection and Setup Manual IB-1501612 Detailed specifications of hardware unit
Installation, connection, wiring, setup (startup/adjustment)
M800VS/M80V Series
Connection and Setup Manual IB-1501613 Detailed specifications of hardware unit
Installation, connection, wiring, setup (startup/adjustment)
M800V/M80V Series
PLC Development Manual IB-1501614
Electrical design
I/O relation (assignment, setting, connection), field network
Development environment (PLC on-board, peripheral
development environment), etc.
M800V/M80V Series
PLC Programming Manual (1/2) IB-1501667
Electrical design
Sequence programming
Explanation for instructions, functions, and parameters
M800V/M80V Series
PLC Programming Manual (2/2) IB-1501668
Electrical design
Sequence programming
Usage examples of instructions
M800V/M80V Series
PLC Interface Manual IB-1501616 Electrical design
Interface signals between NC and PLC
M800V/M80V Series
Maintenance Manual IB-1501617 Cleaning and replacement for each unit
Other items related to maintenance
High Speed Processing Unit User's
Manual IB-1501714 Specifications for high speed processing unit (HPU)
Manual IB No. Contents
MDS-E/EH Series
Specifications Manual IB-1501226 Specifications for power supply regeneration type
MDS-E/EH Series
Instruction Manual IB-1501229 Instruction for power supply regeneration type
MDS-EJ/EJH Series
Specifications Manual IB-1501232 Specifications for regenerative resistor type
MDS-EJ/EJH Series
Instruction Manual IB-1501235 Instruction for regenerative resistor type
MDS-EM/EMH Series
Specifications Manual IB-1501238 Specifications for multi-hybrid, power supply regeneration
type
MDS-EM/EMH Series
Instruction Manual IB-1501241 Instruction for multi-hybrid, power supply regeneration type
DATA BOOK IB-1501252 Specifications of servo drive unit, spindle drive unit, motor, etc.
MDS-EX-CVP Series
Specifications and Instruction
Manual
IB-1501587 Specifications and instruction for the power supply unit with
large capacity
Manuals for MTBs (Others)
Manual No. Purpose and Contents
GOT2000 Series Users Manual
(Hardware) SH-081194ENG Outline of hardware such as part names, external dimensions,
installation, wiring, maintenance, etc. of GOTs
GOT2000 Series Users Manual
(Utility) SH-081195ENG Outline of utilities such as screen display setting, operation
method, etc. of GOTs
GOT2000 Series Users Manual
(Monitor) SH-081196ENG Outline of each monitor function of GOTs
GOT2000 Series Connection Manual
(Mitsubishi Electric Products) SH-081197ENG Outline of connection types and connection method between
GOT and Mitsubishi Electric connection devices
GOT2000 Series Connection Manual
(Non-Mitsubishi Electric Products 1) SH-081198ENG Explanation for connection types and connection method
GOT2000 Series Connection Manual between GOT and other company's devices
(Non-Mitsubishi Electric Products 2) SH-081199ENG
GOT2000 Series Connection Manual
(Microcomputers, MODBUS/Fieldbus
Products, Peripherals)
SH-081200ENG
Explanation for connection types and connection method
between GOT and microcomputers, MODBUS/fieldbus
products, peripherals

GT SoftGOT2000 Version1 Operating
Manual SH-081201ENG
Explanation for system configuration, screen configuration
and operation method of monitoring software GT
SoftGOT2000
GT Designer3 (GOT2000) Screen
Design Manual SH-081220ENG Outline of screen design method using screen creation
software GT Designer3
GOT2000/GOT1000 Series CC-Link
Communication Unit User's Manual IB-0800351 Explanation for handling CC-Link communication unit (for
GOT2000 series/GOT1000 series)
GX Developer Version 8 Operating
Manual (Startup) SH-080372E Explanation for system configuration, installation, etc. of PLC
development tool GX Developer
GX Developer Version 8 Operating
Manual SH-080373E Explanation for operations using PLC development tool GX
Developer
GX Converter Version 1 Operating
Manual IB-0800004 Explanation for operations using data conversion tool GX
Converter
GX Works2 Installation Instructions BCN-P5999-0944 Explanation for the operating environment and installation
method of GX Works2
GX Works2 Version 1 Operating
Manual (Common) SH-080779ENG
Explanation for the system configuration of GX Works2 and
the functions common to Simple project and Structured project
such as parameter setting, operation method for the online
function
GX Works2 Version 1 Operating
Manual (Simple Project) SH-080780ENG Explanation for methods for such as creating and monitoring
programs in Simple project of GX Works2
GX Works2 Version 1 Operating
Manual (Simple Project, Function
Block)
SH-080984ENG
Explanation for methods for such as creating function blocks,
pasting function blocks to sequence programs, and operating
FB library in Simple project of GX Works2
GX Works2 Version 1 Operating
Manual (Structured Project) SH-080781ENG Explanation for methods for such as creating and monitoring
programs in Structured project of GX Works2
GX Works3 Installation Instructions BCN-P5999-0391 Explanation for the operating environment and installation
method of GX Works3
MELSEC-Q/L/F Structured
Programming Manual (Fundamentals) SH-080782ENG Explanation for programming methods, types of programming
languages, etc. required to create structured programs
MELSEC-Q/L Structured
Programming Manual (Application
Functions)
SH-080784ENG
Explanation for specifications and functions related to
application functions which can be used in structured
programs
MELSEC-Q CC-Link System Master/
Local Module Users Manual SH-080394E Explanation for system configuration, installation, wiring, etc.
of master/local modules for CC-Link system
MELSEC iQ-R Programming Manual
(CPU Module Instructions, Standard
Functions/Function Blocks)
SH-081266ENG
Explanation for instructions, general-purpose functions, and
general-purpose function blocks required for programming the
sequencer MELSEC iQ-R series
Reference Manual for MTBs
Manual No. Purpose and Contents
M800/M80 Series Smart safety
observation Specification manual BNP-C3072-022 Explanation for smart safety observation function
M800/M80 Series Interactive cycle
insertion (Customization)
Specification manual
BNP-C3072-121-
0003 Explanation for interactive cycle insertion
M800/M80 Series Synchronous
Control Specifications manual BNP-C3072-074 Explanation for synchronous control
M800/M80 Series Multiple-Axis
Synchronization Control
Specifications manual
BNP-C3072-339 Explanation for multiple-axis synchronization control
M800/M80 Series GOT Connection
Specifications manual BNP-C3072-314 Explanation for GOT connection
M800/M80 Series PROFIBUS-DP
Specification manual BNP-C3072-118 Explanation for PROFIBUS-DP communication function
M800/M80 Series EtherNet/IP
Specifications manual BNP-C3072-263 Explanation for EtherNet/IP
M800/M80 Series FL-net
Specifications manual BNP-C3072-368 Explanation for FL-net
M800/M80 Series CC-Link (Master/
Local) Specification manual BNP-C3072-089 Explanation for CC-Link

M800/M80 Series CC-Link IE Field
(Master/local) Specifications manual BNP-C3072-283 Explanation for CC-Link IE Field
M800/M80 Series CC-Link IE Field
Basic Specifications manual BNP-C3072-337 Explanation for CC-Link IE Field Basic
Precautions for Safety
Always read the specifications issued by the machine tool builder, this manual, related manuals and attached documents
before installation, operation, programming, maintenance or inspection to ensure correct use.
Understand this numerical controller, safety items and cautions before using the unit.
This manual ranks the safety precautions into "DANGER", "WARNING" and "CAUTION".
Note that even items ranked as " CAUTION" may lead to serious consequences depending on the situation. All the
items are important and must always be observed.
The following signs indicate prohibition and compulsory.
The meaning of each pictorial sign is as follows.
Mitsubishi Electric CNC is designed and manufactured solely for applications to machine tools to be used for industrial pur poses.
Do not use this product in any applications other than those specified above, especially those which are substantially influ ential on the public interest or which are expected to have significant influence on human lives or properties.
Not applicable in this manual.
Not applicable in this manual.
DANGER
When the user may be subject to imminent fatalities or major injuries if handling is mistaken.
WARNING
When the user may be subject to fatalities or major injuries if handling is mistaken.
CAUTION
When the user may be subject to medium or minor injuries or when only property damage may occur, if handling is
mistaken.
This sign indicates prohibited behavior (must not do).
For example, indicates "Keep fire away".
This sign indicated a thing that is pompously (must do).
For example, indicates "it must be grounded".

CAUTION

CAUTION
rotated object
CAUTION HOT

Danger
Electric shock risk

Danger
explosive

Prohibited

Disassembly is
prohibited

KEEP FIRE AWAY

General instruction

Earth ground
For Safe Use
 DANGER
 WARNING
(1) Product and manual
For items described as "Restrictions" or "Usable State" in this manual, the instruction manual issued by the machine
tool builder takes precedence over this manual.
Items not described in this manual must be interpreted as "not possible".
This manual is written on the assumption that all the applicable functions are included. Some of them, however, may
not be available for your NC system. Refer to the specifications issued by the machine tool builder before use.
Refer to the Instruction Manual issued by each machine tool builder for details on each machine tool.
 Some screens and functions may differ depending on the NC system (or its version), and some functions may not be
possible. Please confirm the specifications before use.
To protect the availability, integrity and confidentiality of the NC system against cyber-attacks including unauthorized
access, denial-of-service (DoS) (*1) attack, and computer virus from external sources via a network, take security mea sures such as firewall, VPN, and anti-virus software.
(*1) Denial-of-service (DoS) refers to a type of cyber-attack that disrupts services by overloading the system or by ex ploiting a vulnerability of the system.
Mitsubishi Electric assumes no responsibility for any problems caused to the NC system by any type of cyber-attacks
including DoS attack, unauthorized access and computer virus.
(2) Adjustments
Do not adjust or change the parameter settings greatly as operation could become unstable.
In the explanation on bits, set all bits not used, including blank bits, to "0".
(3) Troubleshooting
If the battery low warning is issued in the controller side, save the machining programs, tool data and parameters in an
input/output device, and then replace the battery. When the battery alarm is issued, the machining programs, tool data
and parameters may have been destroyed. Replace the battery and then reload the data.
If the battery low warning is issued in the drive unit side, immediately replace the battery. Replace the batteries while
applying the drive unit's control power.
(4) Maintenance, inspection and part replacement
Do not short-circuit, charge, heat, incinerate or disassemble the battery.
Dispose of the spent battery according to local laws.
 CAUTION
Disposal
(Note) This symbol mark is for EU countries only.
This symbol mark is according to the directive 2006/66/EC Article 20 Information for end-users and
Annex II.
Your MITSUBISHI ELECTRIC product is designed and manufactured with high quality materials and components which can
be recycled and/or reused.
This symbol means that batteries and accumulators, at their end-of-life, should be disposed of separately from your

household waste.
If a chemical symbol is printed beneath the symbol shown above, this chemical symbol means that the battery or accumulator contains a heavy metal at a certain concentration. This will be indicated as follows:
Hg: mercury (0.0005%), Cd: cadmium (0.002%), Pb: lead (0.004%)
In the European Union there are separate collection systems for used batteries and accumulators.
Please, dispose of batteries and accumulators correctly at your local community waste collection/recycling centre.
Please, help us to conserve the environment we live in!

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(/Japanese)
(A)

Handling of our product
(English)
This is a class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

(/Korean)
(A)
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Contents

Alarm
1 Operation Errors (M)..... 3
2 Stop Codes (T)..... 45
3 Servo/Spindle Alarms (S) 55
3.1 Servo Errors (S01/S03/S04) 56
3.2 Initial Parameter Errors (S02) 66
3.3 Safety Function Errors (S05)..... 68
3.4 Parameter Errors (S51)..... 69
3.5 Servo Warnings (S52)..... 70
3.6 Safety Function Warnings (S53) 73
4 MCP Alarms (Y) 75
5 System Alarms (Z)..... 91
6 Absolute Position Detection System Alarms (Z7*) 113
7 Distance-coded Reference Scale Errors (Z8*)..... 117
8 Emergency Stop Alarms (EMG)..... 119
9 Computer Link Errors (L) 123
10 User PLC Alarms (U)..... 125
11 Network Service Errors (N) 137
12 Program Errors (P)..... 141
13 Smart Safety Observation Alarm (V) 183
13.1 Smart Safety Observation Error (V01/V02/V03/V04/V05/V06/V07)..... 184
13.2 Smart Safety Observation Warning (V50/V51/V52/V53/V54) 195
Parameter
14 User Parameters..... 201
14.1 Machining Parameters 202
14.2 Fixed Cycle Parameters..... 220
14.3 Control Parameters 1..... 222
14.4 Control Parameters 2..... 230
14.5 I/O Parameters..... 233
14.6 Axis Parameters..... 253
14.7 Ethernet Parameters..... 257
14.8 Computer Link Parameters 273
14.9 Subprogram Storage Location Parameters..... 276
14.10 Barrier Data (for L system only) 279
14.11 High-accuracy Control Parameters 282
14.12 High-accuracy Control Axis Parameters 291
14.13 Operation Parameters..... 293
14.14 Machining Condition Selection Parameters 314
14.15 Menu Selection Parameters..... 329

14.16 Tolerance Parameters..... 331
14.17 Wireless LAN Parameters..... 333
15 Machine Parameters 337
15.1 Base System Parameters 338
15.2 Base Axis Specification Parameters..... 368
15.3 Base Common Parameters 373
15.4 Axis Specifications Parameters 472
15.5 Zero Point Return Parameters..... 513
15.6 Absolute Position Detection Parameters 519
15.7 Servo Parameters..... 521
15.8 Spindle Specification Parameters..... 555
15.9 Spindle Parameters 595
15.10 Spindle-type Servo Parameters..... 628
15.11 Rotary Axis Configuration Parameters 629
15.12 PLC Timer..... 638
15.13 PLC Integrated Timer 639
15.14 PLC Counter 640
15.15 PLC Constants..... 641
15.16 PLC Bit Selection..... 642
15.17 Machine Error Compensation Parameters 645
15.18 Macro List 647
15.19 Position Switches..... 657
15.20 RIO Device Allocation Parameters 658
15.21 Open Parameters 670
15.22 Device Open Parameters 671
15.23 SRAM Open Parameters 672
15.24 CC-Link Parameters 673
15.25 PLC Axis Indexing Parameters..... 686
15.26 Machine Type Parameters..... 696
15.27 Machining Time Parameters..... 699
15.28 Safety Common Parameters 701
15.29 Safety Axis Parameters 703
15.30 Safety Spindle Parameters 709
15.31 Safety I/O Assignment Parameters 712
15.32 EtherNet/IP Parameters..... 714
15.32.1 EtherNet/IP Parameters Scanner 1..... 714
15.32.2 EtherNet/IP Parameters Scanner 2..... 717
15.32.3 EtherNet/IP Parameters Adapter 1 718
15.32.4 EtherNet/IP Parameters Adapter 2 721
15.33 CC-Link IE Field Parameters 723
15.33.1 CC-Link IE Field Network 1..... 723
15.33.2 CC-Link IE Field Network 2..... 727
15.33.3 CC-Link IE Field Master Parameters 731
15.33.4 CC-Link IE Field Network Basic..... 733
15.34 CC-Link IE TSN (Remote station) Parameters 738
15.35 PROFIBUS-DP Parameters..... 744
15.36 FL-net Parameters..... 745
15.37 Laser Parameters 756
15.38 NC Axis Switch Parameters..... 762
15.39 Spindle Switch Parameters..... 763

1Operation Errors (M)
Details
[Dog overrun]
When returning to the reference position, the near-point detection limit switch did not stop over the dog, but overran the dog.
[Aux ax dog overrun]
When executing dog-type reference position, the zero point return speed is too fast or the dog length is too short.
Remedy
[Dog overrun]
Increase the length of the near-point dog.
Reduce the reference position return speed.
[Aux ax dog overrun]
Lower the zero point return speed or increase the dog length.
Details
One of the axes did not pass the Z-phase during the initial reference position return after the power was turned ON.
Remedy
Move the encoder one rotation or more in the opposite direction of the reference position, and repeat reference position return.
Details
[R-pnt direction illegal]
When manually returning to the reference position, the return direction differs from the axis movement direction selected with the AXIS SELECTION key.
[Aux ax R-pnt direction illegal]
When executing reference position return, the axis was moved in the opposite of the designated direction.
Remedy
[R-pnt direction illegal]

The selection of the AXIS SELECTION key's +/- direction is incorrect. The error is canceled by feeding the axis in the correct direction.
[Aux ax R-pnt direction illegal]
Move the axis in the correct direction.
Details
[External interlock axis exists]
The external interlock function has activated (the input signal is "OFF") and one of the axes has entered the interlock state.
[Aux ax external interlock]
The axis interlock function is valid.
Remedy
[External interlock axis exists]
As the interlock function has activated, release it before resuming operation.
Check the sequence on the machine side.
Check for any broken wires in the "interlock" signal line.
[Aux ax external interlock]
Cancel the interlock signal.
M01 Dog overrun 0001
M01 Some ax does not pass Z phase 0002
M01 R-pnt direction illegal 0003
M01 External interlock axis exists 0004

Details
[Internal interlock axis exists]
The internal interlock state has been entered.
The axis with absolute encoder has been detached.
A command for the manual/automatic simultaneous valid axis was issued from the automatic mode.
The manual speed command was issued while the "tool length measurement 1" signal is ON.
A travel command has been issued to an inclined axis whose basic axis is in control axis synchronization be tween part systems.
Selected an axis other than the 1st axis when the manual speed command was issued.
A travel command has been issued to an axis stopped by the collision detection function.
Positioning or interpolation command was issued during the spindle-mode rotary axis control mode.
[Aux ax internal interlock]
An interlock was established by the servo OFF function.
Remedy
[Internal interlock axis exists]
The servo OFF function is valid, so release it first.
An axis that can be removed has been issued, so perform the correct operations.
The command is issued in the same direction as the direction where manual skip turned ON, so perform the correct operations.
During the manual/automatic simultaneous mode, the axis commanded in the automatic mode became the manual operation axis. Turn OFF the "manual/automatic valid" signal for the commanded axis.
Turn ON the power again, and perform absolute position initialization.
Turn OFF the "tool length measurement 1" signal to start the program by the manual speed command.
Cancel the control axis synchronization between part systems, then issue a travel command to the inclined axis.
Select the 1st axis of each part system when issuing the manual speed command.
Cancel the collision detection alarm.
Check the program after cancelling the error by reset.
[Aux ax internal interlock]
Cancel the servo OFF.
Details
The stroke end function has activated (the input signal is "OFF") and one of the axes is in the stroke end status.
Remedy
Move the machine manually.
Check for any broken wires in the "stroke end" signal line.
Check for any limit switch failure.
Details
[S/W stroke end axis exists]
The stored stroke limit I, II, IIB or IB function has activated.
[Aux ax stored stroke limit]
The stored stroke limit was reached.
Remedy
[S/W stroke end axis exists]
Move the machine manually.
Correct any setting error of the parameters for the stored stroke limit.
[Aux ax stored stroke limit]
Check the stored stroke limit setting and machine position.
Details
The chuck/tail-stock barrier function turned ON, and an axis entered the stroke end state.
Remedy
Reset the alarm with reset, and move the machine in the reverse direction.
M01 Internal interlock axis exists 0005
M01 H/W stroke end axis exists 0006
M01 S/W stroke end axis exists 0007
M01 Chuck/tailstock stroke end ax 0008

Details
2nd reference position return was performed before 1st reference position return has been completed.
Remedy
Execute 1st reference position return.
Details
The operation mode was changed to MDI during single block stop at the middle point of G28/G29/G30.
Remedy

Change the operation mode.
Reset to clear the alarm.
Details
The direction for Tool length measurement cannot be determined.
Remedy
Turn OFF TLM signal, and move the tool away from the sensor.
Maintain a clearance of "#2709 TLM_approach" or more between the tool nose and the sensor.
Turn ON TLM signal, and execute tool length measurement again.
Details
The sensor signal was already ON when the tool measurement mode (TLM) signal was validated.
The sensor signal turned ON when there was no axis movement after the tool measurement mode (TLM) signal
was validated.
The sensor signal turned ON at a position within 100 m from the final entry start position.
Remedy
Turn the tool measurement mode signal input OFF, and move the axis in a safe direction.
Disabling the sensor signal also clears the operation alarm.
(Note) When the "tool length measurement 1" signal is disabled, the axis can be moved in either direction. Pay
attention to the movement direction.
Details
Reference position retract was performed while the coordinates had not been established.
Remedy
Execute reference position return.
Details
Reference position return had been performed during the tool retract and return, which invalidated the tool com pensation amount after the reference position return.
Remedy
The error is cleared if the operation mode is changed to other than reference position return before the axis
performs reference position return.
The error is cleared when the tool return is completed.
The error is cleared if reset 1 is input or the emergency stop button is pushed.
M01 Ref point return No. invalid 0009
M01 Illegal op in mid pt sg block 0013
M01 TLM dir. determine impossible 0017
M01 Sensor signal illegal ON 0019
M01 Ref point retract invalid 0020
M01 Tool ofs invld after R-pnt 0021

Details
[R-pnt ret invld at abs pos alm]
A zero point return signal was input during an absolute position detection alarm.
[Aux ax R ret invld at abs alm]
Reference position return was executed during an absolute position alarm.
Remedy
[R-pnt ret invld at abs pos alm]
Reset the absolute position detection alarm, and then perform zero point return.
[Aux ax R ret invld at abs alm]
Initialize the absolute position reference point and then fix the absolute position coordinates.
Details
[R-pnt ret invld at zero pt ini]
A zero point return signal was input during zero point initialization of the absolute position detection system.
[Aux ax R ret invld at ini]
Reference position return was executed during absolute position initial setting.
Remedy
[R-pnt ret invld at zero pt ini]
Complete zero point initialization, and then perform zero point return.
[Aux ax R ret invld at ini]
Initialize the absolute position reference point and then fix the absolute position coordinates.
Details
The drive unit's hardware or software does not conform to the high-accuracy skip.
Remedy
The software or hardware does not conform to the function. Contact service center.
Details
Failed to retrieve the skip coordinate value from the drive unit.
Remedy
Check the wiring.
Check the parameters.
Details
The "skip input" signal remains enabled when the operation has shifted from skip retract to measurement.
Remedy
Increase the skip retract amount.
Details
Even though the 1st skip was to the correct position, the 2nd skip could not be found.
Remedy
Check whether the measurement target has moved.
M01 R-pnt ret invld at abs pos alm 0024
M01 R-pnt ret invld at zero pt ini 0025
M01 High-accuracy skip disabled 0028
M01 Hi-ac skip coord retrieval err 0029
M01 Now skip on 0030
M01 No skip 0031

Details
Return direction in manual measurement is the opposite of the parameter setting.
Remedy
Check the setting of the parameter "#2169 Rtn dir err in manual measure" (Return direction in manual mea surement).

Move the axis manually in the direction to a safe position, then reset.
Details
The specification is not supported.
Remedy
Check the specifications.
Details
Chopping mode has been entered while the chopping axis has not completed reference position return.
All axes interlock has been applied.
Remedy
Reset the NC or disable the "chopping" signal, and then carry out the reference position return.
Details
The synchronization error of the master and slave axes exceeded the allowable value under synchronous con trol.
A deviation exceeding the synchronization error limit value was found with the synchronization deviation detec tion.
Remedy
Select the correction mode and move one of the axes in the direction in which the errors are reduced.
Check the parameter "#2024 synerr".
Increase the allowable value or reset it to "0" (check disabled).
When using simple C-axis synchronous control, set the contents of the R2589 register to "0".
Details
Synchronous tapping command was issued when the spindle select signals (SWS) for all spindles were OFF
in the multiple-spindle control II.
Remedy
Turn ON the spindle select signal (SWS) responding to the tapping spindle before performing the synchronous
tapping command.
Details
Synchronous tapping command was issued when the spindle that the spindle select signal (SWS) was ON was
not serially connected in the multiple-spindle control II.
Remedy
Make sure the spindle select signal (SWS) for the responding spindle is ON.
Consider the machine construction when issuing the command.
Details
Asynchronous tapping command was issued when M code of the spindle forward/reverse run command, set
by the parameter "#3028 sprcmm", was one of the followings in the multiple-spindle control II.
M0, M1, M2, M30, M98, M99, or M198
M code No. that commands to enable/disable the "macro interrupt" signal
Remedy
Correct the parameter "#3028 sprcmm" (Tap cycle spindle forward run/reverse run M command) setting.
M01 Rtn dir err in manual measure 0033
M01 No specifications 0036
M01 Chopping axis R-pnt incomplete 0050
M01 Synchronous error excessive 0051
M01 No spindle select signal 0053
M01 No spindle serial connection 0054
M01 Spindle fwd/rvs run para err 0055

Details
The command for the pitch or the number of threads is not correct in the synchronous tapping command of the
multiple-spindle control II.
The pitch is too small for the spindle rotation speed.
Thread number is too large for the spindle rotation speed.
Remedy
Correct the pitch, number of threads or rotation speed of the tapping spindle.
Details
The axis travel command is interlocked as the tap retract is being enabled.
Remedy
If tapping is necessary, perform tapping retract in advance. However, tapping retract is not allowed during cy cle start operation. Carry out tapping retract after resetting.
If tapping is not necessary, cancel the tap retract enabled condition by the tap retract enabled cancel signal.
Details
The handle ratio is too large for the handle feed clamp speed.
(The handle feed clamp speed changes according to the rapid traverse rate, external feedrate, maximum
speed outside the soft limit range and etc. (or external deceleration speed when external deceleration is valid))
Too large handle ratio means the ratio with which the machine is unable to move the distance of [iunit * handle
ratio] within 0.1ms at the clamp speed.
Example)
When iunit=B (0.001mm) and clamp speed cs (mm/min)
The operation error (M01 0060) will occur if
ratio M>cs/60(s)*0.1(ms)/0.001(mm)=cs*10/6.
Remedy
Change the settings of the handle feed clamp speed or the handle ratio.
Details
At the start of reference position initial setting, the parameter "#2034 rfpofs" (Distance-coded reference position
detection offset) is not set to "0".
Remedy
Set the parameter "#2034 rfpofs" to "0", then turn the power ON again to perform the reference position initial
setting.
Details
Reference position could not be established within the maximum scan distance.
Remedy
Check the scale to see if it has dirt or damage.
Check if the servo drive unit supports this function.
Details
One of the following operations was attempted during workpiece installation error compensation.
Manual interruption
Automatic operation handle interruption
MDI interruption
PLC interruption

Remedy
Return the operation mode to the original mode to remove the cause. During workpiece installation error com pensation, manual interruption, automatic operation handle interruption, MDI interruption, PLC interruption, etc. is not allowed.
M01 Tap pitch/thread number error 0056
M01 Wait for tap retract 0057
M01 Handle ratio too large 0060
M01 R-pos offset value illegal 0065
M01 R-pos scan distance exceeded 0066
M01 Illegal op in wk instl err cmp 0070

Details
An axis used in the following functions is also used as an axis to perform diameter/radius designation selection.
Chopping
Synchronization control
Or diameter/radius designation selection (G10.9) was issued to the axis in the above mode.
Remedy
Check the program.
Do not carry out the following functions using an axis to perform diameter/radius designation selection.
- Chopping
- Synchronization control
Details
[No operation mode]
No operation mode
[Aux ax no operation mode]
The operation mode is not designated, or the operation mode was changed during axis movement.
Remedy
[No operation mode]
Check for any broken wires in the input mode signal wire.
Check for any failure of the MODE SELECT switch.
Correct the sequence program.
[Aux ax no operation mode]
Correctly designate the operation mode.
Details
The "cutting feed override" switch on the machine operation panel is set to"0".
The override was set to "0" during a single block stop.
Remedy
Set the "cutting feed override" switch to a value other than "0" to clear the error.
If the "cutting feed override" switch has been set to a value other than "0", check for any short circuit in the signal line.
Correct the sequence program.
Details
[External feed rate zero]
The MANUAL FEEDRATE switch on the machine operation panel is set to zero when the machine is in the jog mode or automatic dry run mode.
The "Manual feedrate B speed" signal is set to zero during the jog mode when Manual feedrate B is valid.
The "Each axis manual feedrate B speed" is set to zero during the jog mode when Each axis manual feedrate B is valid.
[Aux ax feedrate 0]
The feedrate set in the operation parameter is zero.
Or the override is enabled but is set to zero.
Remedy
[External feed rate zero]
Set the MANUAL FEEDRATE switch to a value other than "0" to release the error.
If the MANUAL FEEDRATE switch has been set to a value other than "0" check for any short circuit in the signal line.
Correct the sequence program.
[Aux ax feedrate 0]
Set a value other than zero in the feedrate setting or override value.
M01 Illegal op in dia/rad select 0095
M01 No operation mode 0101
M01 Cutting override zero 0102
M01 External feed rate zero 0103

Details
The F1-digit feedrate has been set to "0" when the F1-digit feed command was executed.
Remedy
Set the F1-digit feedrate (the parameter "#1185 spd_F1" (F1 digit feedrate F1) to "#1189 spd_F5" (F1 digit feedrate F5)).
Details
The spindle stopped during the synchronous feed/thread cutting command.
Remedy
Rotate the spindle.
If the workpiece is not being cut, start dry run.
Check for any broken wire in the spindle encoder cable.
Check the connections for the spindle encoder connectors.
Check the spindle encoder pulse.
Correct the program. (commands and addresses)
Details
The axis, designated at handle feed, is out of specifications.
No axis has been selected for handle feed.
Multiple axes in a part system are allocated to a handle.
Remedy
Check for any broken wires in the handle feed axis selection signal line.
Correct the sequence program.

Check the number of axes in the specifications.
Check the axis allocation to the handle.
Details
Spindle rotation speed exceeded the axis clamp speed during the thread cutting command.
Remedy
Lower the commanded rotation speed.
Details
The axis, designated in the manual arbitrary feed, is out of specifications.
The feedrate in manual arbitrary feed mode is illegal.
Remedy
Check for any broken wires in the axis selection signal line or the feedrate line for the manual arbitrary feed mode.
Check the specifications for the manual arbitrary feed mode.
Details
An interlock signal has been input to lock the block start.
Remedy
Correct the sequence program.
Details
An interlock signal has been input to lock the cutting block start.
Remedy
Correct the sequence program.
M01 F 1-digit feed rate zero 0104
M01 Spindle stop 0105
M01 Handle feed ax No. illegal 0106
M01 Spindle rotation speed over 0107
M01 Fixed pnt mode feed ax illegal 0108
M01 Block start interlock 0109
M01 Cutting block start interlock 0110

Details
Restart switch has been turned ON and manual mode has been selected before the restart search is complet ed.
Remedy
Search the block to restart.
Turn the restart switch OFF.
Details
The cycle start button was pressed during program check or in program check mode.
Remedy
Press the reset button to cancel the program check mode.
Details
The cycle start button was pressed during buffer correction.
Remedy
Press the cycle start button after the buffer correction is completed.
Details
The cycle start button was pressed during resetting or tape rewinding.
Remedy
When rewinding the tape, wait for the winding to end, or press the reset button to stop the winding, and then press the cycle start button.
During resetting, wait for the resetting to end, and then press the automatic start button.
Details
The playback switch was turned ON during editing.
Remedy
Cancel the editing by pressing the input or previous screen key before turning ON the playback switch.
Details
The turning angle at the block joint exceeded the limit during normal line control.
In normal line control type I:
The parameter "#1523 C_feed" (Normal line control axis turning speed) has not been set.
In normal line control type II:
When turning in the inside of the arc, the set value for the parameter "#8041 C-rot. R" is larger than the arc radius.
Remedy
Correct the program.
Correct the parameter "#1523 C_feed" (Normal line control axis turning speed) setting.
Correct the parameter "#8041 C-rot. R" setting.
Details
Any of the following conditions are occurring.
a) There is no block to run backward
b) Eight blocks without a travel command continued
Remedy
Execute forward run to clear the alarm.
Reset to clear the alarm.
M01 Restart switch ON 0111
M01 Program check mode 0112
M01 Cycle st. in buffer correct 0113
M01 In reset process 0115
M01 Playback not possible 0117
M01 Turn stop in normal line cntrl 0118
M01 Reverse run impossible 0119

Details
The synchronous correction mode switch was pressed in non-handle mode.
Remedy
Select the handle or manual arbitrary feed mode.
Turn OFF the correction mode switch.
Details

The synchronous control operation method was set (with R2589) while no synchronous control option was pro vided.
Remedy
Set "0" for "synchronous control operation method".
Details
Cycle start was attempted before resetting was completed.
Computer link B operation was attempted at the 2nd or further part system in a multi-part system.
Remedy
Perform the cycle start after resetting has been completed.
Set "#8109 HOST LINK" to "0" and then set to "1" before performing the cycle start.
Computer link B operation cannot be performed at the 2nd or further part system in a multi-part system.
Details
The basic axis corresponding to the inclined axis was started simultaneously in the manual mode while the in clined axis control was valid.
Remedy
Turn the inclined axis and basic axis start OFF for both axes. (This is also applied for manual/automatic simul taneous start.)
Disable the basic axis compensation, or command it to axes one by one.
Details
The RAPID TRAVERSE OVERRIDE switch on the machine operation panel is set to "0".
Override was set to "0" during single block stop.
Remedy
Set the RAPID TRAVERSE OVERRIDE switch to a value other than "0" to clear the error.
If the RAPID TRAVERSE OVERRIDE switch has been set to a value other than "0", check for any short circuit
in the signal line.
Correct the sequence program.
Details
Machine lock was applied on the return axis being manually returned to the restart position.
Remedy
Cancel the machine lock and resume the operation.
M01 In synchronous correction mode 0120
M01 No synchronous control option 0121
M01 Computer link B not possible 0123
M01 X/Z axes simultaneous prohibit 0124
M01 Rapid override zero 0125
M01 Program restart machine lock 0126

Details
Orthogonal coordinate axis name does not exist.
Rotary axis name does not exist.
A duplicate name is used for the designated orthogonal coordinate axis.
The number of axes that were selected to change tool length compensation along the tool axis amount ex ceeds the maximum number of axes.
The designated orthogonal coordinate axis name is the same as the rotary axis name.
There is an invalid rotary axis setting in the rotary axis configuration parameters.
A function that cannot be commanded when the spindle end offset is set was commanded.
Remedy
Correct the rotary axis configuration parameters.
Details
Cycle start was performed with an axis whose return to the restart position was not complete.
Remedy
Perform restart position return manually.
Validate the parameter "#1302 AutoRP" (Automatic return by program restart), then execute cycle start.
Details
After the cycle start, the "PLC interrupt" signal was turned ON during buffer correction, program restart, arbi trary reverse run, tool retract and return, high-speed high-accuracy control II, NURBS interpolation or single block stop at the middle point of G28/G29/G30.
Remedy
By turning OFF the "PLC interrupt" signal, or by resetting the NC the error can be cancelled.
Details
Restart position return was attempted in a mode where the return is disabled.
Remedy
Correct the program restart position.
Details
Compound type fixed cycle program was interrupted with manual zero point return, and cycle start was carried
out without carrying out reset.
Remedy
Cancel the program execution by reset.
Details
During the reverse run in arbitrary reverse run, any one of the part systems reverse-ran for 20 blocks.
Remedy
This error is cancelled by forward run.
Details
Any of the following modes has been turned ON during the manual arbitrary reverse run mode.
MDI interruption mode
Manual/automatic simultaneous valid (MAE1 to 8)
Arbitrary feed mode (PTP)
Arbitrary reverse control mode (RVMD)
Manual speed command enabled
High-speed simple program check mode (SMLK)
Remedy
The error can be cancelled by turning OFF the error-causing mode.
M01 Rot axis parameter error 0127
M01 Restart pos return incomplete 0128
M01 PLC interruption impossible 0129
M01 Restart posn return disabled 0130
M01 Zero point return interruption 0131
M01 Excessive no. of reverse block 0133
M01 Illegal mode in prg check mode 0134

Details
High-accuracy control has been executed in a part system which has 9 or more enabled control axes, except for a slave or synchronized axis.
Remedy
Reduce the number of enabled control axes (except for a slave axis and synchronized axis) of the part system to 8 or less through synchronous control, control axis synchronization between part systems, or mixed control before executing high-accuracy control.
Details
The parameter "#12060 VblAccPreInt" (Variable-acceleration pre-interpolation acceleration/deceleration ON) is set to "1" and the parameter "#8090 SSS ON" is set to "0".
Remedy
To enable the variable acceleration pre-interpolation acceleration/deceleration, set the parameter "#8090 SSS ON" to "1".
To disable the variable acceleration pre-interpolation acceleration/deceleration, set the parameter "#12060 VblAccPreInt" to "0".
Details
Although start of automatic operation is not allowed after a machine groupwise alarm stop ("#1472 mgralmre start"=0), start of automatic operation has been attempted after the said alarm stop.
Remedy
Remove the cause of the stop by alarm.
Set the parameter "#1472 mgralmrestart" to "1".
Details
Cycle start or graphic check has been attempted during sorting of tool management data.
Remedy
Execute cycle start after the tool data sorting is completed.
Execute graphic check after the tool data sorting is completed.
Details
The parameter "#12066 Tolerance ctrl ON" is set to "1", although "#8090 SSS ON" is "0".
Remedy
To enable the tolerance control, set "#8090 SSS ON" to "1".
To disable the tolerance control, set "#12066 Tolerance ctrl ON" to "0".
Details
The following unselectable manual mode was selected during 3-dimensional coordinate conversion.
manual reference position return
Remedy
Cancel the 3-dimensional coordinate conversion modal.
Details
Axis start has been attempted with any of the following operations while the coordinate rotation by parameter for manual feed is enabled.
Tool retract and return
Manual tool length measurement
Manual skip
Remedy
Turn OFF the "Coordinate rotation by parameter: Coordinate switch for manual feed" signal.
M01 Too many active axes per sys 0135
M01 Pre-intrpl variable accel err 0136
M01 Unable to start automatic mode 0137
M01 Tool data sorting in progress 0138
M01 Tolerance control invalid 0139
M01 Ill manualmode select in 3Dcnv 0145
M01 Start err in PRM rot manu feed 0146

Details
Two or more of the three basic axes were started at a time for the coordinate rotation by parameter for manual feed.
Remedy
Disable the coordinate rotation by parameter for manual feed or start one axis at a time.
Details
The searched program has been altered due to the change made to the setting of the location of the program.
An attempt is being made to run a program that is not the one operation search was carried out for.
Remedy
Perform operation search for the program.
Details
The override became "0" in the chopping operation.
Remedy
Check the chopping override (R2503).
Check the rapid traverse override (R2502).
Details
A chopping axis movement command was issued from the program during the chopping mode. (This alarm will not occur for the command with the movement amount "0".)
(All axes interlock state will be applied.)
Remedy
Press the reset button or turn OFF the "chopping" signal. When the "chopping" signal is turned OFF, the axis returns to the reference position and performs the movement command in the program.
Details
The bottom dead center position is set to the same position as the upper dead center position.
Remedy
Correct the bottom dead center position.
Details
Chopping has been attempted while the chopping axis is selected as the handle axis.
Remedy
Select an axis other than the chopping axis as the handle axis, or start chopping after changing the mode to the other mode.
Details
The drive unit's software or hardware does not conform to the direct command mode.
Inclined axis control is active.

Control axis synchronization between part systems is active.
Control axis superimposition was activated during direct command mode.
Remedy
The software or hardware does not conform to the function. Contact service center.
Turn the inclined axis control valid signal OFF.
Turn the synchronous control request signal OFF.
Turn the superimposition control request signal OFF.
M01 Multiaxes in RRM rot manu feed 0147
M01 Unable to start automatic mode 0149
M01 Chopping override zero 0150
M01 Command axis chopping axis 0151
M01 Bottom dead center pos. zero 0153
M01 Chopping disable for handle ax 0154
M01 Dir cmnd mode invalid 0157

Details
Cycle start was carried out without reset after the retract in direct command mode.
Remedy
Finish the machining for now by resetting the NC.
Details
When "#2678 OMRCC_valid" is set to "1", "#2139 omrff_off" is set to "1" or "#2313 SV113 SSF8/bit0" is set to "0".
Remedy
To enable OMR-CC, set "#2139 omrff_off" to "0", and "#2313 SV113 SSF8/bit0" to "1".
To disable OMR-CC, set "#2678 OMRCC_valid" to "0".
Details
[No speed set out of soft limit]
For the axis for which the maximum speed in the outside of the soft limit range has not been specified, an at tempt was made to return the axis from the outside of the soft limit range.
[Aux ax sta No. illegal]
The designated station number is exceeding the number of indexed divisions.
Remedy
[No speed set out of soft limit]
Set the maximum speed for the outside of the soft limit range.
(Parameter "#2021 out_f")
Correct the soft limit range.
(Parameters "#2013 OT-", "#2014 OT+", "#8204 OT-CHECK-N" and "#8205 OT-CHECK-P")
[Aux ax sta No. illegal]
Correctly designate the station No.
Details
Automatic/manual operation was started before reference position return was executed with the incremental system.
Remedy
Execute the reference position return.
Details
The start signal was input while initializing the absolute position reference point.
Remedy
Complete the absolute position reference point initialization.
Details
The start signal was input during an absolute position alarm.
Remedy
Initialize the absolute position reference point and then fix the absolute position coordinates.
Details
The manual operation mode was started during the random positioning mode.
Remedy
Turn the random positioning mode OFF before switching to the manual operation mode.
M01 Dir cmnd mode restart invalid 0158
M01 OMR-CC invalid 0159
M01 No speed set out of soft limit 0160
M01 Aux ax R-pnt ret incomplete 0161
M01 Aux abs position initializing 0162
M01 Aux ax abs position error 0163
M01 Aux ax arbitrary positioning 0164

Details
The commanded station No. was higher than 20 or the number of indexing stations during uneven indexing.
The station No.0 was specified during uneven indexing.
Remedy
Check the commanded station No. and the parameter "#12801 aux_station" setting.
Details
One of the following attempts was made on an axis that is switchable between NC axis and auxiliary axis.
A command intended for an NC axis in manual mode was issued to an auxiliary axis.
NC axis control select signal was turned OFF while the NC axis was in motion.
NC axis control select signal was turned ON while the auxiliary axis was in motion.
Remedy
If you wish to issue a command intended for an NC axis in manual mode, turn ON the NC axis control select signal so as to set the axis as an NC axis.
Do not change NC axis control select signal while the axis is in motion.
Details
Torque limit value of the parameter group to use is "0".
Remedy
Check the torque limit value of the parameter group to use (#12814 aux_TL1, #12824 aux_TL2, #12834 aux-_TL3, or #12844 aux_TL4).
Details
Illegal operation was attempted during tool tip center control.

Remedy
Change the operation mode to the previous one and restart.
Details
An illegal operation was performed during tool cutting point control mode.
Remedy
Revert the system to the state prior to the operation and restart the CNC.
Details
Any of the following operations was performed during spline interpolation 2.
Change to manual mode
Change to MDI mode
PLC interruption
Remedy
Return to the original operation mode, and then remove the error cause.
Details
An illegal operation was attempted during the two-dimensional barcode engraving cycle.
Remedy
Switch the operation back to the previous mode, and remove the error cause.
Details
An illegal operation was attempted during Text engraving cycle.
Remedy
Change the operation mode back to the previous one, and remove the cause of the error.
M01 Aux uneven index sta No. ilgl 0165
M01 Aux axis changeover error 0166
M01 Aux ax torque limit value zero 0167
M01 Ill. op during T tip control 0170
M01 Illegal operation in TCPC 0172
M01 Illegal op in spline interpol2 0180
M01 Ill. op in 2D barcode engrave 0181
M01 Illegal op in text engraving 0182

Details
Any of the following illegal operations was attempted during inclined surface machining mode.
Manual interrupt
Handle interrupt in automatic operation
MDI interrupt
PLC interrupt
Arbitrary reverse run
Remedy
Switch the operation mode back to the previous to remove the cause of this failure.
During inclined surface machining mode, it's impossible to perform manual interrupt, handle interrupt in auto matic operation, MDI interrupt, PLC interrupt, etc.
Details
The operation you input cannot be executed under the axis configuration of the part system.
3D manual feed was attempted.
The rotation center error compensation has been turned ON.
The rotary axis is set to the spindle mode of the spindle position control.
An unavailable function command was given when "Select specifications of rotation direction parameter" is
enabled (#1450/bit3 = 1), and the left-hand screw direction is selected by the rotation direction parameter
(#7923, #7933, #7943, #7953 = 1).
Remedy
Check the rotary axis configuration parameters.
Correct the axis configuration of the part system.
Reset the NC or remove the error cause to cancel the alarm.
Details
The rotary axis configuration parameter switch request signal has turned ON for a part system where any of
the following modes is active.
Tool center point control mode
Tool cutting point control mode
Inclined surface machining mode
Workpiece installation error compensation mode
Tool length compensation along the tool axis mode
Simple inclined surface machining mode
3-dimensional tool radius compensation mode
3-dimensional manual feed
Tool handle feed & interruption
R-Navi mode
Remedy
Cancel the alarm by CNC reset or by turning OFF the rotary axis configuration parameter switch request sig nal.
Details
An illegal operation was performed during motion control release (coordinate transformation).
Remedy
Roll back the operation that caused the error and restart the NC.
Details
Illegal coordinate transformation during motion control release (coordinate transformation).
Remedy
Report this error to the machine tool builder.
M01 Illegal OP in tilted face cut 0185
M01 Invalid axis configuration 0186
M01 Rotary axis para unswitchable 0187
M01 Illegal op in MCR coord TF 0188
M01 MCR calculation error 0189

Details
3D machine interference check is disabled. This alarm is output to NC alarm 5.
Remedy

Enable all the interference check settings.
If there is any axis which has not completed zero point return, establish the zero point first.
Details
It was judged that an interference occurred in the No.1 step interference check and caused a deceleration stop.
When machine interference is detected, the interfered part is highlighted (yellow/red) and the part's name is displayed on the 3D monitor's model display.
Remedy
Move the axis in a direction which does not cause interference.
Press RESET to cancel the alarm.
(In manual operation)
You can move the axis in the same travel direction as before the interference.
But the axis movement is done using the 2nd step interference check distance.
Details
It was judged that an interference occurred in the No.2 step interference check and caused a deceleration stop.
When machine interference is detected, the interfered part is highlighted (red) and the part's name is displayed on the 3D monitor's model display.
Remedy
Move the axis in a direction which doesn't cause interference.
Press RESET to cancel the alarm.
Details
Tool interference check has been disabled.
This alarm is output to the NC alarm 5.
Remedy
Turn ON the [Tool check] menu of 3D monitor.
Set the tool data.
If you prevent an alarm from being output while the tool interference check is disabled, set "0" in "#11100 3D_MChk_ToolAlm".
Details
The given command has caused any axis other than those commanded to move. So the total number of axes to move has exceeded the maximum number of simultaneous contour control axes.
Remedy
Check the maximum number of simultaneous contour control axes of your NC.
Check the machining program to make sure the total number of axes to move will not exceed the maximum number of simultaneous contour control axes.
Details
The PFCHR signal has been switched (from ON to OFF or OFF to ON) during automatic operation.
Remedy
Use G188 to change the program format during automatic operation.
* The warning display is cancelled by changing PFCHR back to the previous state.
M01 Interference check disabled 0200
M01 Machine interference 1 0201
M01 Machine interference 2 0202
M01 Tool interfere. check disabled 0205
M01 Too many simul. control axes 0211
M01 Changing prg format disabled 0215

Details
The following parameters are enabled while there is no option for Rapid traverse block overlap.
"#1442 G0ol" (Enable G00 rapid traverse block overlap)
"#1443 G28ol" (Enable G28 rapid traverse block overlap)
"#12056 I_G0ol" (Enable G00 initial rapid traverse block overlap)
Remedy
Check the specification.
Disable the parameter.
Details
You have set 13 or more axes as the objectives of 3D machine interference check.
Remedy
Correct the setting of "#2673 3D_MChk_Ax".
Details
The commanded function is invalid during 3D machine interference check.
Remedy
Disable interference check before the command.
Details
More than one axis was designated in manual mode while the 3-dimensional manual feed was valid.
Remedy
Command the manual feed to each axis one by one.
Details
More than one of the three bits for selecting hypothetical coordinate system was turned ON.
Virtual coordinate system was selected while the 3-dimensional manual feed was invalidated by the parameter setting.
The manual tool length measurement or workpiece position measurement is being attempted.
Remedy
Check the sequence program.
Enable 3-dimensional tool radius compensation (set the parameter "#7912 NO_MANUAL" to "0").
Finish the manual tool length measurement or workpiece position measurement.
Details
An illegal operation (such as manual interrupt) was attempted during 3-dimensional tool radius compensation (tool vertical direction compensation).
Remedy
Operations such as manual interrupt are disabled while 3-dimensional tool radius compensation (tool vertical direction compensation) is being performed.
Details
Hypothetical coordinate system has been selected although 3D manual feed is not included in the specifica tions.
Remedy
Turn OFF all the 3D manual feed coordinate system selection signals (including MJCT).
M01 Rapid block overlap inv 0216

M01 Too many axes in 3D interf chk 0220
M01 Invalid cmd in 3D interf check 0221
M01 Multi ax for 3D manual feed 0230
M01 3D manual feed coord sys err 0231
M01 Illegal op in 3D tool R comp 0232
M01 Coord select w/o 3D man. Feed 0233

Details
No option of rotation center error compensation is found.
Remedy
Check the specifications.
Details
The calculated compensation amount was excessive, thus the amount was clamped to +/- 1mm.
Compensation for angle deviation was executed although the preset tool length is not in the height-axis direc tion.
Remedy
Check the values of the position deviation and the angle deviation.
Check the tool length value.
Details
You executed cycle start while measurement of rotation center error or workpiece installation error is invalid.
Remedy
Execute cycle start for one part system that is ready for measurement.
Activate memory mode before executing cycle start.
Details
You switched the operation to any mode other than memory during measurement of rotation center error or workpiece installation error.
Remedy
Switch the operation to memory mode.
Manual interruption, automatic operation handle interruption, MDI interruption, etc. are invalid during error mea surement.
Execute cycle start after completion or cancel of the measurement.
Details
Machining surface operation (selection, indexing or cancel) was attempted while the operation is disabled.
Remedy
Cancel the other modes so that the inclined surface machining command (G68.2), tool axis direction control (G53.1) and the inclined surface machining cancel command (G69) can be issued.
Wait until the axes stop completely (until the smoothing for all axes reaches zero).
Perform operation search for machining programs.
Details
Moving a rotary axis was attempted during manual machining surface indexing, when a manual operation mode other than handle mode was selected.
Remedy
Change the operation mode to a handle mode before carrying out the manual surface indexing.
Details
The tool length compensation amount for performing the R-Navi indexing type 2 is 0.
Remedy
Set the tool length compensation amount for performing the indexing type 2 to a value other than 0.
M01 No spec: Rot center error comp 0240
M01 Rot center err comp incorrect 0241
M01 Unable to start measuring err 0245
M01 Invalid op mode in err measure 0246
M01 Machining surface operation disabled 0250
M01 Axs travel n/a in manual index 0251
M01 Tool length compensation amt 0 0252

Details
Manual feed feature coordinate system was selected while two or more handles were ON.
Remedy
Manual feed on a feature coordinate system is disabled while two or more handles are enabled (*).
Press [Manual coord] and select the machine coordinate system.
Reduce the number of enabled handles (*) to one.
(*) An enabled handle means the handle for which "Nth handle valid" signal (HSnS) is ON.
Details
The spatial error compensation option is not available.
Remedy
Check the specifications.
Details
The compensation amount is outside the setting range.
Due to the calculation of the excessive amount, it is clamped by +/-1mm.
Remedy
Set the compensation amount within the setting range.
Details
A measurement condition adjustment or backlash adjustment was attempted to an axis with which automatic backlash adjustment is impossible.
A measurement condition adjustment or backlash adjustment was attempted even though all the axes had not reached the 1st reference position.
The operation mode is other than memory mode.
The slave axis of synchronous control is selected as adjustment axis.
An attempt has been made to start an adjustment by cycle start.
Remedy
Check the adjustment axis.
Start the adjustment after all the axes return to the 1st reference position.
Check the operation mode.
Select the master axis of synchronous control as adjustment axis when adjusting the slave axis.
Start the adjustment by automatic backlash adjustment start signal.
Details

An illegal operation was attempted during measurement condition adjustment or backlash adjustment.
Remedy
Continue the operation after canceling the measurement condition adjustment and backlash adjustment.
Details
The APLC authentication password is inconsistent.
Remedy
Contact the machine tool builder.
M01 Feat coord ill w/ multi-handle 0253
M01 No spec: Spatial error comp 0260
M01 Spatial error comp excessive 0261
M01 Auto backlash adjust illegal 0270
M01 Operating auto backlash adjust 0271
M01 APLC password mismatch 0280

Details
The drive unit's hardware or software does not conform to the high-cycle sampling mode.
High-cycle data are not used even when high-cycle sampling has been set.
High-cycle sampling was attempted while the axis targeted for high-cycle sampling was moving.
High-cycle sampling was attempted during speed monitor mode.
High-cycle sampling was attempted while any of the following operations is being executed: Dog-type zero point return, absolute position setting, synchronous tapping, spindle synchronization, hobbing, tool spindle synchronization IC.
Remedy
The software or hardware does not conform to the function. Contact service center.
Set data for high-cycle sampling.
Execute high-cycle sampling after stopping the axis targeted for high-cycle sampling.
Execute high-cycle sampling after cancelling the speed monitor mode.
Execute high-cycle sampling after stopping the currently executed functions.
Details
An attempt to activate "Speed monitor mode" was made during the high-cycle sampling mode.
An attempt to change the gear signal was made during the high-cycle sampling mode.
An attempt to execute spindle orientation was made during the high-cycle sampling mode.
Spindle detach was attempted during the high-cycle sampling mode.
Any of the following operations was attempted during the high-cycle sampling mode: Dog-type zero point re turn, absolute position setting, spindle/C axis changeover, synchronous tapping, spindle synchronization, hobbing, or tool spindle synchronization IC.
Remedy
Change the speed monitor mode signal back, finish high-cycle sampling, and then select the speed monitor mode.
Change the gear signal back, finish high-cycle sampling, and then change the gear.
Change the spindle orientation signal back, finish high-cycle sampling, and then execute orientation.
Change the spindle detach signal back, finish high-cycle sampling, and then carry out spindle detachment.
Execute the operation after terminating high-cycle sampling.
Details
A function which is unavailable during parameter write was commanded.
Spindle/C axis changeover
Speed observation mode signal ON
High-speed synchronous tapping
PLC axis indexing
Remedy
Cancel the write of the parameter.
Command the following functions after the parameter write is completed.
- Spindle/C axis changeover
- Speed observation mode signal ON
- High-speed synchronous tapping
- PLC axis indexing
Details
Z phase detection has failed to be completed during execution of proximity-switch orientation.
Remedy
Check for a failure of the proximity switch.
Details
Communication with BiSS encoder failed.
Remedy
Check parameters "#11376 BiSS_enc_rate" through "#11380 BiSS_enc1_CRC_init".
M01 High-cycle sampling disabled 0290
M01 N/A during high-cycle sampling 0291
M01 Invalid cmd during param write 0292 (Axis name)
M01 SP orient. Z detection error 0301
M01 BiSS encoder comm error 1 0350

Details
Communication with BiSS encoder failed.
Remedy
Check the cable connected with BiSS encoder.
Details
Communication with BiSS encoder failed.
Remedy
Check the cable connected with BiSS encoder.
Details
The conditions for starting brake wear diagnostics are not met when the brake wear diagnostics start signal (BWDSTm) is turned on.
The cause preventing brake wear diagnostics from starting is displayed.
(If there is more than one cause, the cause with the smallest number is displayed.)
0001: part systems in automatic operation
0002: not in in-position

0003: in servo OFF state
0004: in current limit
0005: synchronous control secondary axis
0006: in superimposition control
0007: in arbitrary axis exchange control
0008: in mixed control
0009: invalid brake wear diagnostics parameters
000A: reference position establishment incomplete
000B: meeting exclusion condition of brake wear diagnostics
000C: secondary axis brake wear diagnostics invalid
000D: secondary axis unable to start brake wear diagnostics
000E: secondary axis in single method
1001: unable to start due to Smart Safety observation
1002: PLC axis unable to start brake wear diagnostics
1003: in brake wear diagnostics alarm reset ON
1004: in coordinate rotation
1005: controlled as auxiliary axis
1007: inclined axis under inclined axis control
1008: multiple-axis synchronization control secondary axis
1009: secondary axis brake wear diagnostics invalid
100A: secondary axis unable to start brake wear diagnostics
100B: axis involved in control axis synchronization between part systems
Remedy
Check the conditions for starting brake wear diagnostics.
Brake wear diagnostics will be started after the cause of the alarm is resolved, and the brake wear diagnostics
start signal is turned on again.
M01 BiSS encoder comm error 2 0351
M01 BiSS encoder comm error 3 0352
M01 Unable to start BrakeWear Diag 0370

Details
The axis travel amount exceeded the allowable value during brake wear diagnostics.
The axis name of the axis where the error occurred is displayed.
Remedy
Move the axis to a safe position with manual operation, turn off the power, and take corrective action for the
brake. This warning is cleared upon successful completion of brake wear diagnostics, which is performed af ter the power is turned back on.
This warning can be cleared by the brake wear diagnostics alarm reset signal. The brake wear diagnostics
incomplete signal (BWDNFm) remains on.
Details
Specifications do not include brake wear diagnostics.
Remedy
Check the specifications.
Details
A machine command was issued to the superimposed axis.
Reference position return was attempted on the superimposed axis.
Skip command was issued to the reference or superimposed axis.
Dog-type reference position return was attempted on the reference axis.
Remedy
Correct the program.
Details
Superimposition start command was issued to the axis which was in any of the following states.
Synchronization control
Milling interpolation
Feed-forward thread cutting control
Superimposition start command was issued to the axis which was under superimposition control.
Superimposition start command was issued to an axis that belongs to the same part system as a reference or
synchronized axis of control axis synchronization between part systems.
Remedy
Correct the program.
Turn OFF the feed-forward control request signal.
Details
G114.n has been commanded during the execution of G114.n.
G51.2 has been commanded when G51.2 spindle-spindle polygon machining mode has been already entered
at another part system.
Multiple spindle synchronization set command is illegal.
Remedy
Command G113 to cancel the operation.
Turn ON the "spindle synchronization cancel" signal (Y18B8: SPSYC) to cancel the operation.
Command G50.2 to cancel the operation.
Turn ON the "spindle-spindle polygon cancel" signal (YCD1) to cancel the operation.
Correct the program.
Details
The spindle is being used in synchronized tapping.
Remedy
Cancel the synchronized tapping.
M01 BrakeWearDiagnostics (Warning) 0371
M01 No spec: Brake wear diagnostics 0372
M01 Illegal movement command during superimposition 1003
M01 Superimposition command illegal 1004
M01 G114.n command illegal 1005
M01 Spindle in-use by synchro tap 1007

Details
A forward run, reverse run, orientation, synchronous tapping, spindle synchronization, tool spindle synchroni zation I, tool spindle synchronization II or C-axis servo ON command was issued to the reference spindle

while the guide bushing spindle synchronization signal was OFF.
The guide bushing spindle synchronization signal was turned OFF during a forward run, reverse run, orienta tion, synchronous tapping, spindle synchronization, tool spindle synchronization I, tool spindle synchroniza tion II or C-axis servo ON command.
Orientation was commanded during the "guide bushing spindle synchronization" signal ON with spindle zero point detection with proximity switch and turret indexing enabled.
C axis servo ON was commanded during the "guide bushing spindle synchronization" signal ON with spindle C axis parameter change enabled.
Remedy
Check the ladder program.
Check the parameters.
Details
An analog spindle is used for the master spindle or the guide bushing spindle.
Spindle-mode servo is used for the master spindle or the guide bushing spindle.
Turret gear change control valid spindle is used for the master spindle or the guide bushing spindle.
Remedy
Check the parameters.
Change the reference spindle or the guide bushing spindle to spindle drive unit.
Change the reference spindle or the guide bushing spindle to turret gear change control invalid.
Details
The guide bushing spindle synchronization phase memory signal was turned ON while the master spindle or guide bushing spindle was rotating.
The guide bushing spindle synchronization phase memory signal was turned ON while the guide bushing spin dle synchronization signal was OFF.
Remedy
Check the ladder program.
Details
The guide bushing spindle synchronization phase alignment signal was turned ON while the master spindle or guide bushing spindle was stopped.
Remedy
Check the ladder program.
Details
When the guide bushing spindle synchronization phase memory signal was ON, the master spindle or guide bushing spindles Z-phase was not passed.
Remedy
Check the ladder program.
Details
Toward the synchronous tapping spindle, the switch to servo-mode is commanded to the spindle-mode rotary axis.
The spindle-mode rotary axis in servo-mode is commanded as the synchronous tapping spindle.
Remedy
Switch to the spindle-mode rotary axis.
M01 GB spindle synchro signal OFF 1014
M01 GB SP sync:Spindle type error 1015
M01 GB SP sync:Phase mem sgnl ilgl 1021
M01 GB SP sync:Phase set sgnl ilgl 1022
M01 GB SP sync:Z phase not pass 1023
M01 Cmnd impsbl in spindle rtry ax 1024

Details
Spindle superimposition control command has been given to an orientation mode spindle with the said spindle treated as either the basic or superimposed spindle.
Orientation command has been given to the basic or superimposed spindle that is under spindle superimpo sition control.
Remedy
Cancel the orientation mode.
Use G113 or the "Spindle sync cancel" signal to cancel spindle superimposition.
Details
C axis mode command has been issued for polygon machining spindle.
C axis mode command has been issued for synchronized tapping spindle.
Polygon command has been issued for synchronized tapping spindle.
Spindle is being used as spindle/C axis.
Remedy
Cancel the C axis command.
Cancel the polygon machining command.
Cancel the C axis with servo OFF.
Details
The lead axis for thread recutting is not present in a thread recut enabled part system.
A variable lead thread cut command has been given in the first thread cut block of thread recutting.
Remedy
Thread recutting is not supported. Disable thread recutting or press RESET to cancel the alarm, and correct the program.
Details
The lead axis and spindle for thread cutting are different from those predetermined.
Remedy
Disable thread recutting or press RESET to cancel the alarm, and correct the settings of lead axis and spindle.
Details
"#8045 Varying spd thread" has been set to "1" to issue a variable speed thread cut command even though the function is not included in the specifications.
A variable speed thread cut command has been given while the feed axis acceleration/deceleration type is soft acceleration/deceleration.
A variable speed thread cut command has been given while the spindle encoder signal is not sent via serial input.
A variable speed thread cut command has been given even though the spindle, lead axis or plane composing axes are controlled by drive other than MDS-E Series.
The spindle intended for thread cutting is executing synchronous tapping, spindle synchronization, guide bushing spindle synchronization or spindle/C axis control.
Remedy
Check the specifications.

Check the parameters.
Check the program.
Check the Encoder selection signal (R register).
M01 Other cmnd disabled in orient. 1025
M01 SP-C ax ctrl runs independntly 1026
M01 Thread recutting impossible 1027
M01 Thread recutting data illegal 1028
M01 Variable speed thread disabled 1029

Details
Different M codes were each commanded as synchronization M code in each of the two part systems.
Synchronization with the "!" code was commanded in another part system during M code synchronization.
Synchronization with the M code was commanded in another part system during synchronization with the "!"
code.
Remedy
Correct the program so that the M codes match.
Correct the program so that the same synchronization codes are commanded.
Details
The "C axis selection" signal has been changed when the multiple C axes selection is not available.
The selected axis by the "C axis selection" signal cannot be controlled for the multiple C axes selection.
Remedy
Correct the parameter settings and program.
Details
Tap retract has been executed with a different spindle selected. Cutting feed is in wait state until synchroniza tion is completed.
Remedy
Select the spindle for which tap cycle was halted before turning ON the "tap retract" signal.
Details
Cutting feed is in wait state until synchronization is completed.
Remedy
Wait for the synchronization to end.
Details
There is a mistake in the settings of mixed control axis parameters (crsax [1] to [8]).
Mixed control was attempted within one and the same part system.
Any of the parameter settings is disabling mixed control.
Remedy
Check the parameter settings for mixed synchronization control.
M01 Synchronization mismatch 1030
M01 Multiple C axes select invalid 1031
M01 Tap retract Sp select illegal 1032
M01 Sp-Sp polygon cut interlock 1033
M01 Mixed sync ctrl prmtr illegal 1034

Details
Mixed synchronization control was commanded for a part system in which mixed synchronization control is dis abled as shown below.
During nose R compensation mode
During pole coordinate interpolation mode
During cylindrical interpolation mode
During balance cut mode
During fixed cycle machining mode
During facing turret mirror image
During constant surface speed control mode
During hobbing mode
During axis name switch
During interference check III alarm (interference detection, interference alarm area intrusion or interference
warning area intrusion)
An axis was transferred to another part system, and mixed control was attempted with the part system's max imum number of control axes exceeded.
An axis was removed from the part system, and mixed control was attempted with the part system's number of
axes zero.
Another axis exchange was attempted to the axis which was already transferred to another part system for
mixed control.
Mixed control was attempted with an axis of a part system not in automatic operation.
Remedy
Correct the program.
Details
The synchronous control operation method selection (R2589 register) was set while the C axis mode was in active.
The synchronous control operation method selection (R2589 register) was set while the zero point was unde termined.
Mirror image disable state
The external mirror image or parameter mirror image was commanded during facing turret mirror image.
Synchronous control was started while either the master or slave axis is in the PLC axis mode due to NC axis/
PLC axis switchover.
The synchronous control mode was switched while the PLC axis mode was active due to NC axis/PLC axis
switchover.
Manual operation was attempted while the setting of the parameter "#2703 manual_acc" (Enable constant gradient acceleration/deceleration in manual feed) is different between the master and slave axes.
Synchronous control operation method (R2589) has been set to the axis in chopping operation.
Remedy
Set the contents of the R2589 register to "0".
Check the program and parameters.
Details
Synchronous control start/cancel command was issued when the start/cancel is disabled.
Remedy
Correct the program and parameters.
Details
A travel command was issued to a synchronized axis in synchronous control.
Remedy

Correct the program.
M01 Mixed sync ctrl disable modal 1035
M01 Synchro ctrl setting disable 1036
M01 Synchro start/cancel disable 1037
M01 Move cmnd invld to synchro ax 1038

Details
When "#1146 Sclamp" has been set to "1", the constant surface speed command (G96) was issued to the spindle which is not selected for the spindle speed clamp command (G92/G50) under Multiple spindle control II.
When "#1146 Sclamp" has been set to "0", both the G96 (Constant surface speed control ON) modal and the spindle forward or reverse rotation signal have turned ON for the spindle, on which the speed clamp command is disabled.
Remedy
Press the reset key and carry out the remedy below.
Issue the G92/G50 command to the spindle that is to be used for the constant surface speed control.
Details
There is a mistake in the setting of the superimposition control reference axis parameter (#2089 bsax_pl).
Superimposition control is not available under the current parameter settings.
Remedy
Correct the parameter.
Details
After a single block stop or automatic operation pause was executed during single block between part systems, cycle start has not been performed on either part system.
Remedy
Perform cycle start for all the part systems where a single block stop or automatic operation pause was exe cuted.
Details
Phase-Z detection speed has not been set in "#3109 zdetspd".
Remedy
Set the phase-Z detection speed in "#3109 zdetspd".
Details
Setting of Interference check across part systems is incorrect.
Remedy
Correct the setting of Interference check across part systems.
Details
Interference is already occurring on the set interfering object.
Remedy
Turn OFF the interference check valid signal, moving the axis to a position where the interfering objects do not collide each other, and then restart Interference check across part systems.
Details
A command has been given that causes the interfering objects to collide each other.
Remedy
Correct the program.
M01 No spindle speed clamp 1043
M01 Cont ax superimpos II prm illg 1044
M01 Sync error btwn part systems 1045
M01 Z detect speed parameter error 1049
M01 Intrf chck across sys: Set err 1050
M01 Intrf chck across sys: Area AL 1051
M01 Intrf check across sys: Alarm 1052

Details
Interference check between part systems had started while zero point return of the part system set interfering object has not completed.
Remedy
Turn OFF the interference check valid signal, and complete zero point return in the all part systems set inter fering object.
Details
Feed-forward control was attempted while any of the following functions was enabled.
Control axis superimposition I/II
Control axis synchronization between part systems I/II
Remedy
Turn OFF the feed-forward control request signal.
Details
Cutting feed clamp rate is unspecified for a superimposition-related axis. Or the specified rate is outside the setting range.
"#2091 plclamp", "#2629 pl3clamp" or "#2630 pl3clamp2"
Rapid traverse rate is unspecified for a superimposition-related axis.
Or the specified rate is outside the setting range.
"#2090 plrapid", "#2621 plrapid2",
"#2626 pl3rapid", "#2627 pl3rapid2" or "#2628 pl3rapid3"
Remedy
Set the cutting feed clamp rate of the superimposition-related axis within the setting range.
Set the rapid traverse rate of the superimposition-related axis within the setting range.
Details
Tool retract and return command has been given in any of the following modes:
Mixed control (Cross axis control) I
Mixed control (Cross axis control) II
Control axis synchronization between part systems I
Control axis synchronization between part systems II
Control axis superimposition I
Control axis superimposition II
Arbitrary axis superimposition control
Tool spindle synchronization IA (spindle - spindle polygon)
Tool spindle synchronization IB (spindle - spindle polygon)

Tool spindle synchronization IC (spindle - NC axis polygon)
Tool spindle synchronization II (hob)
Spindle superimposition control
Remedy
Turn OFF the transit point designation signal.
Details
The axis declared in the arbitrary axis exchange command is incapable of being exchanged.
Remedy
Check both the program of the part system that issues the arbitrary axis exchange command and that of the part system subject to the axis exchange. Correct the program blocks in which the command is issued or the axis exchange is executed, if necessary.
M01 Interfe chk 0pt return incomp 1053
M01 Feed-forward control disabled 1060
M01 Superimposition axis param err 1070
M01 Tool retract & return disabled 1080
M01 Arbitrary axis unexchangeable 1101

Details
A manual travel command has been given to the axis being exchanged when manual interruption is disabled under cross machining control (when "#1435 crsman" = 0).
Remedy
This error can be cancelled by either one of the following operations.
1: Cancel the manual travel command
2: Reset the NC
Details
Arbitrary axis superimposition command has been issued in any part system other than the one that contains either the reference or superimposed axis of arbitrary axis superimposition control.
Arbitrary axis superimposition cancel command has been issued in any part system other than the one that contains the superimposed axis of arbitrary axis superimposition control.
Remedy
Correct the program so that the arbitrary axis superimposition command is given in an appropriate part sys tem.
Details
The actual spindle speed has fluctuated exceeding the allowable range, while spindle speed fluctuation detec tion (G162) is active.
The number following "S", which is output together with this alarm, indicates the spindle where speed fluctua tions were detected.
Remedy
Unnecessarily large load may be applied to the spindle during automatic operation.
Reduce the spindle load.
To prevent this alarm from being output during spindle speed fluctuation detection (G162), set the parameter #1242 set14 BIT2 to ON.
Details
Spindle synchronization phase alignment command was issued while the "phase shift calculation request" sig nal was ON.
Remedy
Correct the program.
Correct the sequence program.
Details
A function that cannot be used with spindle oscillation was commanded during spindle oscillation.
Remedy
Command the function after finishing spindle oscillation.
Details
Spindle oscillation was commanded during executing a function that cannot be used with spindle oscillation.
Remedy
Command spindle oscillation after finishing the function that cannot used with spindle oscillation.
Details
Spindle oscillation was commanded while a value out of range is set as spindle oscillation amplitude or spindle oscillation frequency.
Remedy
Check the setting values of the amplitude and frequency.
M01 Cross control axis exists 1102
M01 Arbitrary ax superimp. sys err 1103
M01 Spindle speed fluctuation 1105
M01 Sp synchro phase calc illegal 1106
M01 Illegal cmd in SP oscillation 1108
M01 SP oscillation cmd illegal 1109
M01 SP oscillation set val illegal 1110

Details
Sub part system control I command (G122) has been given to a part system where the sub part system I op eration mode is deactivated.
Sub part system control I command (G122) has been given to a part system which is not reserved as the sub part system in M80.
Remedy
Activate the sub part system I operation mode for the sub part system before issuing G122.
Part systems marked "SUB" on the monitor screen are under the sub partsystem I operation mode.
Command the sub part system start to the sub part system which is reserved with "#1483 SBS1_sys num" for M80.
Details
When the sub part system control II has been commanded, no part system is left capable of being activated as a sub part system.
Remedy
Do not exceed the maximum number of simultaneously activatable sub part systems when commanding G144.
Set the parameter #1437 SBS2_Spec BIT0 to 0 if you wish to wait until the sub part system becomes capable of being activated.
Details
Constant surface speed is commanded from other part system to the spindle that is in the thread/ thread cycle

or the tapping cycle/ synchronous tapping cycle.
To the spindle in constant surface speed control, the thread/ thread cycle or the tapping cycle/ synchronous tapping cycle are commanded from other part system.
Remedy
Check the program.
Details
Constant torque control is commanded to the axis which the parameter "#2296 SV096(TQC)" (Constant torque control: Stopper-direction torque) setting is "0".
Constant or proportional torque stopper control is commanded to the axis which is in movement by automatic or manual operation.
Constant torque control is canceled to the constant torque control axis in movement by automatic or manual operation.
Constant torque control is commanded to the proportional torque stopper control axis.
Constant torque control is commanded again during the axis movement by constant torque control cancel.
Constant torque control axis is at stroke limit or H/W stroke end.
Remedy
Check the program.
Check the sequence program.
Details
Proportional torque stopper control is commanded to the axis which the parameter "#2296 SV096(TQC)" (Constant torque control: Stopper-direction torque) setting is "0".
Proportional torque stopper control is commanded to the axis which is in movement by automatic or manual operation.
The axis movement is commanded to the axis which is in the proportional torque constant control.
Proportional torque constant control is commanded again during the axis movement by proportional torque constant control cancel.
Proportional torque constant control axis is at stroke limit or H/W stroke end.
Remedy
Check the program.
Check the sequence program.
M01 Sub part system I call error 1111
M01 Sub part system II start error 1112
M01 Constant surface speed rdndnt 1113
M01 Constant torque disabled 1114
M01 P torque stopper disabled 1115

Details
Constant torque control droop cancel is commanded to the axis which is not in the constant/ proportional torque control.
Constant torque control droop cancel is commanded to the axis in movement by automatic or manual opera tion.
Remedy
Check the program.
Check the sequence program.
Details
The axis movement by automatic or manual operation is commanded to the axis which the constant torque con trol droop is being canceled.
Remedy
Check the program.
Check the sequence program.
Details
The equivalent load factor of the spindle motor has exceeded the set threshold that causes the excess warning.
Remedy
Change the operation pattern in a way that decreases the spindle motor load.
Details
Differential speed tap command has been given although any rotation command has not been input to the reference spindle that is under spindle superimposition control.
Synchronous tap command has been given to the reference spindle that is under spindle superimposition con trol.
Remedy
Cancel the synchronous tapping cycle.
Details
A tap cycle or synchronous tap cycle command given to the superimposed spindle has caused the spindle's actual rotation speed to exceed the spindle clamp speed.
Remedy
Correct the spindle rotation speed in synchronous tap cycle.
Details
A constant surface speed control command has been given to the reference or superimposed spindle during differential speed tapping under spindle superimposition control.
A differential speed tapping command has been issued while constant surface speed control is executed on the reference or superimposed spindle that is under spindle superimposition control.
Remedy
Cancel the synchronous tap cycle or constant surface speed control.
M01 Droop cancel disabled 1116
M01 Cmnd disabled in droop cancel 1117
M01 SP equivalent load factor over 1120
M01 Differential tap cmnd disabled 1131
M01 Spd clamp in differential tap 1132
M01 Constant surface spd disabled 1133

Details
Spindle synchronization cancel command has been issued during rotation of C axis under spindle sync C axis control.
G113 (without the address H or D) has been issued during the spindle synchronization for two or more sync sets.
Remedy
This operation error is cancelled when C axis stops. Issue a spindle sync cancel command after C axis has

stopped.
Use G113D or G113H to cancel the spindle synchronization.
Details
The guide bushing spindle synchronization temporary cancel signal was turned ON/OFF when the master spin dle and the guide bushing spindle were in one of the following modes.
During rotation (when not stopped)
During tap cycle synchronization mode
During spindle synchronization mode
During tool-spindle synchronization I (polygon machining) mode
During tool-spindle synchronization II (hobbing) mode
During spindle C axis control C axis mode
During orientation/indexing
Remedy
Check the ladder program.
Details
The reference spindle was commanded as a spindle related to tool spindle synchronization IC (polygon).
The guide bushing spindle was commanded as a synchronous tapping spindle.
The guide bushing spindle was commanded as a spindle related to spindle synchronization/tool spindle syn chronization I (polygon)/tool spindle synchronization II (hobbing).
Remedy
Check the program.
Details
Synchronous tapping was issued for the reference spindle or the synchronized spindle during spindle synchro nization.
Remedy
Cancel the synchronous tapping cycle by reset.
Details
An axis in STO state exists in the part system.
Remedy
Release the STO state and reset the NC.
Details
An axis in SOS state exists in the part system.
Remedy
Release the SOS state and reset the NC.
M01 Spindle sync cancel error 1135
M01 GB SP sync:Cancel sgnl illegal 1137
M01 GB SP sync runs independently 1138
M01 Cmds illegal in spindle synchr 1139
M01 Operation non-continuable(STO) 1151
M01 Operation non-continuable(SOS) 1152

Details
When the NC reset signal is input with the High-speed simple program check: Coordinate position check ON
signal (Y76B) set to ON, the workpiece coordinate position is different from the position at the program start.
Remedy
Correct the machining program.
Details
When the NC reset signal is input with the High-speed simple program check: Coordinate position check ON
signal (Y76B) set to ON, the machine coordinate position is different from the position at the program start.
Remedy
Correct the machining program.
Details
The following operation was performed to an axis which can be switched over between NC axis and PLC axis.
PLC axis switchover signal was turned ON or OFF when it was prohibited to switch over the axis.
Remedy
Make sure the axis switchover status signal is OFF and change the ON/OFF of the axis switchover signal.
Details
You have set the R register for selecting synchronous control operation method, although the option of multiple
axis synchronization control is OFF.
Remedy
Set 0 in R2589 (Synchronous control operation method selection).
Details
For the multiple axis synchronization control, you selected two or more slave axes without selecting any master
axis.
Remedy
Correct the setting of R2589 (Synchronous control operation method selection).
Details
The trigger for NC axis switchover was activated for an axis not in a state where NC axis switchover is per missible.
The trigger for NC axis switchover was activated specifying a number outside the range for the setting of NC axis switchover.
Remedy
Cancel the error by turning off the signal for requesting NC axis switchover (AXCHGCMD/bit8) for the corre sponding axis, and modify the state of the axis before turning on the signal again.
Correct the number for the setting of NC-axis switchover (AXCHGCMD/LO 8bit), and turn on the signal for
requesting NC axis switchover (AXCHGCMD/bit8) again.
Details
The trigger for spindle switchover was activated for a spindle not in a state where spindle switchover is per missible.
The trigger for spindle switchover was activated specifying a number outside the range for the setting of spin dle switchover.
Remedy
Cancel the error by turning off the signal for requesting spindle switchover (SPCHGCMD/bit8) for the corre sponding spindle, and modify the state of the spindle before turning on the signal again.
Correct the number for the setting of spindle switchover (SPCHGCMD/LO 8bit), and turn on the signal for re questing spindle switchover (SPCHGCMD/bit8) again.
M01 Prog check: work posn error 1215
M01 Prog check: machine posn error 1216
M01 NC/PLC axis switch illegal 1250
M01 No spec: Multi axis synch ctrl 1254
M01 Multiple secondary ax selected 1255
M01 NC axis not switchable 1260
M01 Spindle not switchable 1261

Details
Synchronous control operation method (R2589) has been changed for the axis in which Synchronous control and chopping are used together.
Remedy
Change the axis bits of Synchronous control operation method (R2589) back to the previous settings.
Details
Chopping has been started up for the axis in Independent operation.
Remedy
Reset or turn OFF "Chopping" signal (CHPS).
Details
Chopping has been started up for the slave axis in Synchronous control operation.
Remedy
Reset or turn OFF "Chopping" signal (CHPS).
Specify the master axis as the chopping axis.
Details
The issued command is disabled during the vibration cutting mode.
Remedy
Correct the program.
Details
Vibration cutting mode start command has been issued although the command is disabled during the currently active mode.
Remedy
Correct the program.
Details
[When error cause No. is 0001]
Cutting is being performed without vibration cutting control.
[When error cause No. is 0002]
Vibration cutting is being performed with OMR-FF being disabled.
Remedy
[When error cause No. is 0001]
Make sure that the "VCC: Temporary cancel of axis vibration" signal (R22532) is OFF.
Make sure that the spindle speed command is not "0" when the cutting command is issued.
Make sure that neither synchronized axis nor superimposed axis is included in the part system.
[When error cause No. is 0002]
Make sure that the servo parameter "#2313 SV113" bit0 is "1" and bit1 is "0" for the VCC objective axes.
Details
The feedrate command issued during the vibration cutting mode is exceeding "#12571 VibClamp_VCC".
Remedy
Correct the program.
M01 Sync ctrl op method chg dsbl 1270
M01 Independent op ax chop invld 1271
M01 Slave ax set as chopping ax 1272
M01 Cmnd invalid during VCC mode 1300
M01 VCC mode command invalid 1301
M01 VCC invalid 1302 Error cause number
M01 Feedrate limited during VCC 1303

Details
No applicable condition is found during the selection of the vibration cutting condition.
Remedy
Correct the program.
Check the setting of the frequency upper limit "#12131 FrqClmpSys_VCC".
Check the settings of the maximum spindle rotation speed "#3005 smax1" to "#3008 smax4" and the minimum rotation speed "#3023 smini".
Details
You changed the spindle rotation speed during vibration cutting control.
Remedy
Wait for completion of vibration cutting control, or input Reset to cancel the VCC mode.
Details
You stopped the spindle during vibration cutting control, and then attempted to re-run it.
Remedy
If you have stopped the spindle during vibration cutting control, input Reset to cancel the VCC mode before re-running the spindle.
Details
HPU custom module is being registered and deleted.
When this error is being displayed, HPU custom module cannot be input, restored or executed cycle start.
This alarm is exported to NC alarm 5.
Remedy
When the registration and deletion of the HPU custom module is completed, an error will be canceled auto matically.
Details
A command has been given that causes two or more objects to interfere with each other.
yy : Interference object definition number (1)
zz : Interference object definition number (2)
Remedy
Cancel the alarm with reset.
Disable the interference check III mode first before moving the interfering object further in the interference di rection.
Details
Two or more interfering objects are in the interference alarm area.
yy : Interference object definition number (1)
zz : Interference object definition number (2)
Remedy
Disable the interference check III mode before moving.
Check the interference definition and the interference selection.
M01 VCC condition not found 1304
M01 Cannot change SP speed in VCC 1307
M01 Cannot re-run SP during VCC 1308

M01 HPU in preparation 1620
M03 Interference detection 0001 yyzz
M03 Entry in interfere alarm area 0002 yyzz

Details
A command has been given that causes two or more interfering objects to enter the interference warning area.
yy : Interference object definition number (1)
zz : Interference object definition number (2)
Remedy
Interfering objects are in the interference warning area.
If an operational problem is expected to occur, stop moving the axes with feed hold, cancellation of manual axis movement or reset.
Details
You attempted to turn ON the interference check III mode with the interfering object data disabled.
Remedy
Execute the interference data ON command to enable the interference data before turning ON the interference check III mode.
Details
The total number of solid objects used as interfering object has exceeded the maximum.
Remedy
The total number of interfering solid objects set in the system variable or R register has exceeded the maxi mum. Correct the setting.
Details
The allowable process time for interference check III has been exceeded.
Remedy
Turn OFF the interference check III mode.
Correct the interfering object definition.
Details
In the interfering object definition, the IJK control axes have been set as follows:
Nonexistent axis name (an axis not set in the base axis specification parameter "#1022 axname2")
I, J and K axes belong to different part systems
Rotary axis
Remedy
Correct the setting of the IJK control axes in the interfering object definition.
Details
In the interfering object definition, two or more rotary axes have been set for the cylindrical solid definition No.
Remedy
Correct the solid designation and the setting of the IJK axis rotation angle in the interfering object definition.
Details
In the interfering object definition, two or more rotary axes have been set for the cuboidal solid definition No.
Remedy
Correct the setting of the IJK axis rotation angle in the interfering object definition.
M03 Entry in interfere warn area 0003 yyzz
M03 Interference data unspecified 1001
M03 Interf. 3D objects count error 1002
M03 Interfere check III: time over 1003
M03 Interfere: control axis error 2001 Interference object defi nition number
M03 Interf:2 rot axes in cylinder 2002 Interference object defi nition number
M03 Interfere:2 rot axes in cuboid 2003 Interference object defi nition number

Details
In the interfering object definition, the IJK rotary axes have been set as follows:
Nonexistent axis name
(an axis not set in the base axis specification parameter (#1022 axname2))
Linear axis
All three axes are rotary axes
Remedy
Correct the setting of the IJK rotary axes in the interfering object definition.
Details
The solid object set in the interfering object definition is unavailable as an interfering object defined with two rotary axes.
Remedy
Correct the setting of the solid in the interfering object definition.
Details
The solid object set in the interfering object definition is unavailable as an interfering object defined with one rotary axis.
Remedy
Correct the setting of the solid in the interfering object definition.
Details
In the interfering object selection, the interfering object model coordinate system offset 1 has exceeded the set ting.
Remedy
Correct the setting of the interfering object model coordinate system offset 1 in the interfering object selection.
Details
The following selection was made for the rotary interfering objects:
You selected a one-rotary-axis object and two-rotary-axis object at a time.
You selected two or more two-rotary-axis objects.
Remedy
Correct the setting of the n-th interfering object selection.
Details
Any of the following items being selected has not been reflected in the workpiece position counter or in the pro gram position counter: workpiece coordinate system offset, extended workpiece coordinate system offset, ex ternal workpiece coordinate system offset, workpiece coordinate system shift or workpiece base point offset.
Remedy
Perform one of the following actions to cancel the warning.
Cycle start
Reset

Emergency stop
M03 Interfere: rotary axis error 2004 Interference object defi nition number
M03 Interfere:2 rot axes object er 2005 Interference object defi nition number
M03 Interfere:1 rot axis object er 2006 Interference object defi nition number
M03 Interf. selection: offset over 3001 Interference object defi nition number
M03 Interf:rot objects comb. error 3002 Interference object defi nition number
M50 WCS offset not reflected 5000

Details
Multiple key presses were detected.
0xxx: indicates the first detected key-code.
Simultaneous key presses were detected.
No key-code is indicated.
Remedy
Go to the alarm history to check the key-codes.
Clean the keys and check the performance.
Press one key at a time.
Details
Parameter is being written in every PLC scan cycle using a "write window" of the PLC window function. This may affect the performance.
Remedy
Correct the user PLC (ladder sequence).
Details
A displacement occurred when switching axis from spindle mode to C axis mode.
Remedy
Contact our service center.
Cancel the alarm by resetting.
Details
The bit of the register R2589 (Synchronous control operation method) that corresponds to the multiple-axis synchronization control axis has been set to "1" while multiple-axis synchronization control is disabled.
Remedy
Set the bits of R2589 (Synchronous control operation method) that correspond to the multiple-axis synchro nization control axes to "0".
Details
The axis travel amount exceeded the brake wear diagnostics allowable travel amount (Caution) during brake wear diagnostics.
The axis name of the axis where the error occurred is displayed.
Remedy
Move the axis to a safe position with manual operation, turn off the power, and take corrective action for the brake. This warning is cleared upon successful completion of brake wear diagnostics, which is performed af ter the power is turned back on.
This warning can be cleared by the brake wear diagnostics alarm reset signal. The brake wear diagnostics incomplete signal (BWDNFm) remains on.
Details
The brake wear diagnostics parameters are incorrectly configured.
The value of "#12597 BWD_TOL(Caution)" is greater than or equal to "#12596 BWD_TOL(Warning)". The op eration error (M50 5006) is not generated.
Remedy
Correct the parameter settings so that "#12597 BWD_TOL(Caution)" value is smaller than "#12596 BWD_TOL(Warning)" value.
M50 Multiple key inputs invalid 5002
M50 Continuous write of parameter 5003
M50 Spindle/C axis displacement 5004
M50 Cannot start multi-axis sync 5005
M50 BrakeWearDiagnostics (Caution) 5006
M50 Brake wear diag param invalid 5007

Details
The setup parameter lock is released.
Cycle start is disabled when setup parameters can be set.
Remedy
Refer to the manual issued by the machine tool builder.
Details
Only one or no laser processing condition has been set for DR control.
Remedy
Set two or more laser processing conditions with different speeds for DR control.
Details
The laser power command by DR control is less than or equal to 0.
Remedy
Correct the laser processing condition for DR control.
Details
The frequency command by DR control is less than or equal to 0.
Remedy
Correct the laser processing condition for DR control.
Details
The duty command by DR control is less than or equal to 0.
Remedy
Correct the laser processing condition for DR control.
Details
There has been no axis movement with laser being ON for a longer period than specified with "#90005 lsr_-max_stop_t" (Maximum stop time with beam ON).
Remedy
Correct the machining program.
Details
The parameters required for enabling laser processing control have not been configured.
Remedy
Correct the parameters.

"#1026 base_I" (Base axis I) to "#1028 base_K" (Base axis K)
"#8090 SSS ON" = 1
"#12066 Tolerance ctrl ON" = 1
Details
A function that cannot be used in the part system where laser processing is active has been enabled.
Remedy
Correct the parameter.
"#12060 VblAccPreInt" (Variable-acceleration pre-interpolation acceleration/deceleration control while high accuracy control) = 0
"#1190 s_xcnt" (Inclined-axis control) = 0
M90 Parameter set mode
M95 Insuf lsr proc cond in DR ctrl 9501
M95 DR ctrl invalid (Laser power) 9502
M95 DR ctrl invalid (Frequency) 9503
M95 DR ctrl invalid (Duty) 9504
M95 Excess max stop time w beam ON 9505
M95 Laser prcsg initial set error 9506
M95 Laser prcsg parameter error 9507

Details
Laser beam was turned on when beam ON was not permissible.
The "Laser beam irradiation ready" signal is not on.
Miscellaneous function strobe 1 to 4 are ON.
The laser condition change strobe (X1CA6) is ON.
The laser processing function is not included in the specifications.
Remedy
Perform the preparatory operation required for beam ON, and turn on the "Laser beam irradiation ready" sig nal.
When the laser processing condition is switched using an M code, turn on the "M function finish" signal.
When the current laser processing condition was changed using the laser processing condition selection
screen or the laser processing condition setting screen, turn on the "Laser condition change complete" (Y1-
CA6).
Check the specifications.
Details
Monitoring of axis stop time with beam ON has been disabled.
Remedy
After power calibration has completed, turn off the "Axis stop time with beam ON monitoring OFF" signal.
Details
An attempt was made to execute a travel command for the height control axis during height control.
An attempt was made to move the height control axis manually during height control.
Remedy
Correct the program.
Turn off height control before moving the height control axis.
Details
The power calibration data contains a value outside the allowable range.
Remedy
Correct the power calibration data in "#90121 lsr_calib_cmd01" through "#90180 lsr_calib_meas30".
Details
The specified retraction amount for fast retraction control exceeds the parameter "#90107 lsr_HEvac_rise_lim"
(Height control_Fast retraction control lift upper limit).
Remedy
Correct address R for fast retraction control or the parameter "#90107 lsr_HEvac_rise_lim" (Height control_-
Fast retraction control lift upper limit).
Details
Activated maintenance part has not completed the product procedures.
Remedy
Contact our service center.
M95 Beam ON impossible 9508
M95 Ax stop time w beam ON mon OFF 9509
M95 Hgt ctrl ax travel impossible 9510
M95 Power calibration data invalid 9511
M95 Fast retract ctrl: Inv retract 9512
M97 Maintenance part activated

Details
Automatic start is not possible as one of the axes is moving.
Remedy
Try automatic start again after all axes have stopped.
Details
Automatic start is not possible as the NC is not ready.
Remedy
Another alarm has occurred. Check the details and remedy.
Details
Automatic start is not possible as the "reset" signal has been input.
Remedy
Turn OFF the "reset" signal.
Check for any failure of the reset switch which has caused the switch's continuous ON.
Correct the sequence program.
Details
The feed hold switch on the machine operation panel is ON (valid).
Remedy
Correct the feed hold switch setting.

The feed hold switch is B contact switch.
Fix any broken wires in the feed hold signal line.
Correct the sequence program.
Details
Automatic start is not possible as one of the axes is at the stroke end.
Remedy
Manually move any axis whose end is at the stroke end.
Check for any broken wires in the stroke end signal line.
Check for any failure in the stroke end limit switch.
Details
Automatic start is not possible as one of the axes is at the stored stroke limit.
Remedy
Move the axis manually.
If the axis's end is not at the stroke end, check the parameters.
Details
The operation mode has not been selected.
Remedy
Select automatic operation mode.
Check for any broken wires in the signal line for automatic operation mode (memory, tape, MDI).
T01 Axis in motion 0101
T01 NC not ready 0102
T01 Reset signal ON 0103
T01 Auto operation pause signal ON 0104
T01 H/W stroke end axis exists 0105
T01 S/W stroke end axis exists 0106
T01 No operation mode 0107

Details
Two or more automatic operation modes have been selected.
Remedy
Check for any short circuit in the mode (memory, tape, MDI) selection signal line.
Check for any failure in the switch.
Correct the sequence program.
Details
The automatic operation mode has changed to another automatic operation mode.
Remedy
Return to the original automatic operation mode, and execute automatic start.
Details
Automatic start is not possible as tape search is being executed.
Remedy
Wait for the tape search to be completed and then execute the automatic start.
Details
Automatic start is disabled because restart search is in execution.
Remedy
Execute automatic start after the restart search is completed.
Details
Automatic start is not possible because a thermal alarm (Z53 CNC overheat) has occurred.
Remedy
Temperature of the control unit has exceeded the specified temperature.
Take appropriate measures to cool the unit.
Details
Automatic start cannot is not possible because the NC is communicating with the host computer.
Remedy
Wait for the communication with host computer to be ended and then execute the automatic start.
Details
Automatic start is not possible because the voltage of the battery in the NC control unit has dropped.
Remedy
Replace the battery of the NC control unit.
Contact the service center.
Details
Automatic operation is not possible because no reference position offset value has been set.
Remedy
Perform the reference position initialization setting, then set "#2034 rfpofs(Distance-coded reference position detection offset)".
T01 Operation mode duplicated 0108
T01 Operation mode changed 0109
T01 Tape search execution 0110
T01 Cycle start prohibit 0111
T01 CNC overheat 0113
T01 Cycle st. prohibit(Host comm.) 0115
T01 Cycle st prohibit(Battery alm) 0116
T01 R-pnt offset value not set 0117

Details
A start signal was input during an absolute position detection alarm.
Remedy
Clear the absolute position detection alarm, and then input the start signal.
Details
A start signal was input during zero point initialization in the absolute position detection system.
Remedy
Complete zero point initialization before inputting the start signal.
Details
Automatic start is disabled because manual measurement is in execution.
Remedy

Execute automatic start after the manual measurement is completed.
Details
Cycle start signal was input for the part system that has applied Sub-part system I operation mode.
Remedy
Use Sub-part system I operation mode signal to switch whether to start the operation as Sub-part system con trol or to execute cycle start as Main-part system.
Details
Machining interruption related functions cannot be started up.
Remedy
To resume the operation from the state of being stopped at the selected point, set the automatic operation
mode to the memory mode.
To perform the retraction, confirm that retraction is enabled (the "Retraction executable" signal is ON).
To resume the operation from the state of being stopped at a certain block of the retraction program, activate
the memory mode and turn ON the "Retraction start" signal.
Check the sequence program to make sure that multiple start signals are not input at the same time.
(Note) The remedies stated above apply not only to retraction but also to the other machining interruption-re lated functions. (The start signals and ready states are replaced with those for each function.)
Details
Automatic start is disabled because the APLC authentication password is inconsistent.
Remedy
Contact the machine tool builder.
Details
An automatic operation was started in one of the following machining modes during the safe speed clamp:
thread cutting, synchronous tapping, cross machining, superimposition control, tool center point control or SSS
control.
Remedy
Turn ON the safely-limited speed monitoring request signal and press the cycle start button.
Close the door and press the cycle start button.
T01 In absolute position alarm 0138
T01 In abs posn initial setting 0139
T01 In manual measurement 0143
T01 Sub part sys I mode is active 0146
T01 Mach. interrupt non-startable 0147
T01 APLC password mismatch 0160
T01 Cycle st. prohibit(safe speed) 0165

Details
Cycle operation cannot be started because of the operation error "M01 0371 BrakeWearDiagnostics (Warn ing)".
Remedy
Clear the operation error (M01 0371), and then start cycle operation.
Details
Cycle operation cannot be started because there is an axis under brake wear diagnostics in the system.
Remedy
After the completion of brake wear diagnostics, start cycle operation.
Details
Cycle start is disabled while the system alarm Z83 (NC started during SP rotation) is occurring.
Remedy
Turn OFF the power and make sure that the spindle is at a standstill. And then turn the power ON again.
Details
Cycle start cannot be operated because interference check alarm is in progress.
Remedy
Release the interference check alarm before operating the cycle start.
Details
Cycle start cannot be executed for other part systems during measurement of rotation center error or workpiece
installation error.
Remedy
Execute cycle start for one part system that is ready for measurement.
Cancel measurement when error measurement is not executed.
Details
Cycle start was executed during operation error where cycle start cannot be executed.
Remedy
After canceling operation error, execute cycle start.
Details
Cycle start is disabled because the axis in SBT warning exists in the system.
Remedy
After cancelling the SBT warning, execute the cycle start.
Details
Automatic start is not possible because the setting of setup parameters is enabled.
Remedy
Refer to the manual issued by the machine tool builder.
Details
Automatic start was attempted while a file was being deleted/written.
Remedy
Wait for the file to be deleted/written and then execute the automatic start.
T01 Cannot start Cyc OP (BWD WARN) 0166
T01 Cannot start Cyc OP (in BWD) 0167
T01 Cycle start prohibit (AL Z83) 0172
T01 In interference check alarm 0173
T01 Cycle st forbid (measuring err) 0176
T01 Cycle start prohibit (OP error) 0177
T01 Cycle start prohibit(SBT warn) 0185
T01 Cycle start prohibit 0190
T01 Cycle start prohibit 0191

Details
Automatic start is not possible because the valid term has been expired.

Remedy
Obtain a decryption code from the machine tool builder and input it in the NC, then turn the power ON again.
Details
Cycle start is disabled because the break test is being executed for some axes in the system.
Remedy
Execute cycle start after the break test is completed.
Details
Cycle start is disabled because the axis in brake test exists in the system.
Remedy
After the brake test completed, execute the cycle start.
Details
An emergency stop occurred during automatic operation.
Remedy
After the emergency stop is canceled, the operation can be continued.
Details
An axis is at the stroke end.
Remedy
Manually move the axis away from the stroke end limit switch.
Correct the machining program.
Details
An axis is at the stored stroke limit.
Remedy
Manually move the axis.
Correct the machining program.
Details
The reset has been entered.
Remedy
The program execution position has returned to the start of the program. Execute automatic operation from
the start of the machining program.
Details
The "feed hold" switch is ON.
Remedy
Press the CYCLE START switch to resume the automatic operation.
T01 Cycle st. prohibit (Term exp'd) 0193
T01 Cycle start disabled (in SBT) 0194
T01 Cycle start prohibit(in SBT) 0197
T02 EMG stop 0200
T02 H/W stroke end axis exists 0201
T02 S/W stroke end axis exists 0202
T02 Reset signal ON 0203
T02 Auto operation pause signal ON 0204

Details
The operation mode has changed to another mode during automatic operation.
Remedy
Return to the original automatic operation mode, and press the CYCLE START switch to resume the automat ic operation.
Details
The acceleration and deceleration time constants are too large. (This alarm occurs with the system alarm Z59.)
Remedy
Set a larger value for "#1206 G1bF(Maximum speed)".
Set a smaller value for "#1207 G1btL(Time constant)".
Set a lower cutting speed.
Details
An absolute position detection alarm occurred.
Remedy
Clear the absolute position detection alarm.
Details
A travel command was issued to an auxiliary axis.
Remedy
Turn ON the "NC axis control selection" signal and press the CYCLE START switch to restart the automatic
operation with.
Details
SOS axis exists in the system.
Remedy
Cancel SOS state and execute cycle start, and you can continue automatic operation from the stop point.
Details
The SINGLE BLOCK switch on the machine operation panel is ON.
The SINGLE BLOCK or MACHINE LOCK switch changed.
Remedy
Press the CYCLE START switch to resume the automatic operation.
Details
A block stop command was issued in the user macro program.
Remedy
Press the CYCLE START switch to resume the automatic operation.
Details
Automatic mode changed to another automatic mode.
Remedy
Return to the original automatic operation mode, and press the CYCLE START switch to resume the automat ic operation.
T02 Operation mode changed 0205
T02 Acc/dec time cnst too large 0206
T02 Abs posn detect alarm occurred 0215
T02 Aux axis changeover error 0220
T02 FEED HOLD: SOS axis 0221
T03 Single block stop signal ON 0301
T03 Block stop cmnd in user macro 0302
T03 Operation mode changed 0303

Details
MDI operation has ended the last block.
Remedy
Set the MDI operation again, and press the CYCLE START switch to start the MDI operation.
Details
The interlock signal, which locks the block start, is ON.
Remedy
Correct the sequence program.
Details
The interlock signal, which locks the block cutting start, is ON.
Remedy
Correct the sequence program.
Details
One of the following commands was issued during the safe speed clamp:
thread cutting, synchronous tapping, cross machining, superimposition control, tool center point control or SSS control.
Remedy
Turn ON the safely-limited speed monitoring request signal before performing the operation.
Perform the operation with the door closed.
Details
The "inclined axis control: No Z axis compensation" signal has turned ON or OFF during the program operation.
Remedy
Press the CYCLE START switch to resume the automatic operation.
Details
Operation has stopped at the selected point.
Remedy
Perform the automatic start to execute the program from the block.
Details
The "NC axis control selection" signal was turned OFF while a NC axis was traveling.
Remedy
Turn the "NC axis control selection" signal ON and press the CYCLE START switch to resume the automatic operation.
Details
Collation stop occurred.
Remedy
Execute the automatic start to resume the automatic operation.
T03 MDI completed 0304
T03 Block start interlock 0305
T03 Cutting blck start interlock 0306
T03 Safe speed clamp is ON 0308
T03 Inclined Z offset change 0310
T03 Stop at selected point 0320
T03 Aux axis changeover error 0330
T04 Collation stop 0401

Details
The following Nos. are shown during the operation of the corresponding completion wait factor. The numbers will disappear when the operation is completed.
The completion wait factor is indicated with four digits (in hexadecimal).
Display format of completion wait factor
0__ __ __
(a)(b)(c)
Each of the hexadecimal numbers (a), (b) and (c) indicates the following details.
(a)
bit0: In dwell execution
bit3: Unclamp signal wait (Note 1)
(b)
bit0: Waiting for spindle position to be looped
bit3: Door open (Note 2)
(c)
bit0: Waiting for MSTB completion
bit1: Waiting for rapid traverse deceleration
bit2: Waiting for cutting speed deceleration
bit3: Waiting for spindle orientation completion
(Note 1)
For type A (#1282 ext18/bit3 = 0)
Waiting for turning ON or OFF of the unclamp finish signal for the index table indexing.
For type B (#1282 ext18/bit3 = 1)
Waiting for turning ON of the unclamp finish signal for the index table indexing.
Waiting for turning ON of the clamp finish signal for the index table indexing.
(*) The complete standby status is established when the unclamp finish and clamp finish signals are both turned ON. Set the clamp finish signal to OFF after performing required process with the PLC.
(Note 2) This shows the door open state caused by the door interlock function.
Details
The following Nos. are shown during the operation of the corresponding completion wait factor. The numbers will disappear when the operation is completed.
The completion wait factor is indicated with four digits (in hexadecimal).
Display format of completion wait factor
0__ __ __
(a)(b)(c)
Each of the hexadecimal numbers (a), (b) and (c) indicates the following details.

(b)

bit0:Operation alarm display being postponed
Remedy
The parameter "#1342 AlmDly" may be able to postpone displaying a part of an operation alarm, depending
on the setting.
This stop code will remain displayed while any alarm is being postponed.
And it will disappear if the postponed alarm is displayed or canceled.
T10 Fin wait (Factors for waiting com pletion)
T11 Fin wait (Factors for waiting com pletion)

3

Servo alarm is displayed in the following format.
The numerical value in the column of "No." in the table after the following page is the double-digit number displayed
on the LED which is on the front-side of the drive unit.
At the time of the occurrence of the servo errors (S01/S03/S04), this number will be displayed in the last two digits
of the "alarm number".
(Note 1) For the troubleshooting at the time of the occurrence of the servo errors, refer to your drive unit's instruction
manual.
(Note 2) When multiple servo alarms have occurred, only an alarm which occurred first is displayed on the alarm
screen. Refer to the alarm history on the drive monitor screen as necessary.
Axis name
Servo : Axis name
Spindle : "S1", "S2", "S3" ...
Alarm No.
Message
Alarm class
Alarm class Message Reset method Resetting methods
S01 Name or "Servo
alarm"
PR After removing the cause of the alarm, reset the alarm by
turning the NC power ON again.
S03 Name or "Servo
alarm"
NR After removing the cause of the alarm, reset the alarm by
inputting the NC RESET key.
S04 Name or "Servo
alarm"
AR After removing the cause of the alarm, reset the alarm by
turning the NC and drive unit power ON again.
S 0 0

(1) Drive unit alarm
(Note 1) Definitions of terms in the table are as follows.
Main side encoder: Encoder connected to CN2
Sub side encoder: Encoder connected to CN3
(Note 2) Resetting methods
NR: Reset with the NC RESET button. This alarm can also be reset with the PR and AR resetting conditions.
PR: Reset by turning the NC power ON again. This alarm can also be reset with the AR resetting conditions. When the control
axis is removed, this alarm can be reset with the NC RESET button. (Excluding alarms 32 and 37.)
AR: Reset by turning the NC and servo drive unit power ON again.
No. Name Details Reset
method
Servo
stop method
Spindle
stop method
10 Insufficient voltage A drop of bus voltage was detected in main circuit. PR Dynamic stop Coast to a stop
11 Axis selection error The axis selection rotary switch has been incorrectly set. AR Initial error Initial error
12 Memory error 1 A hardware error was detected during the power ON self-check. AR Initial error Initial error
13 Software processing error 1 An error was detected for the software execution state. PR Dynamic stop Coast to a stop
14 Software processing error2 The current processor is not operating correctly. AR Dynamic stop Coast to a stop
16 Initial magnetic pole posi tion detection error
In the built-in motor which uses the absolute position encoder,
the servo ON has been set before the magnetic pole shift
amount is set.
The magnetic pole position, detected in the initial magnetic pole
position detection control, is not correctly set.
PR Dynamic stop Coast to a stop
17 A/D converter error A current feedback error was detected. PR Dynamic stop Coast to a stop
18 Main side encoder:
Initial communication error
An error was detected in the initial communication with the mo tor side encoder.
PR Initial error Initial error
19 Encoder communication er ror in synchronous control
An error of the shared encoder on the machine side was detect ed on the secondary axis of the speed command synchroniza tion control.
PR Dynamic stop -

1A Sub side encoder:
Initial communication error
An error was detected in the initial communication with the ma chine side encoder.
PR Initial error Initial error
1B Sub side encoder: Error 1 An error was detected by the encoder connected to the machine side.
The error details are different according to the encoder type.
Refer to "Encoder alarm" for details.
Dynamic stop Coast to a stop
1C Sub side encoder: Error 2
1D Sub side encoder: Error 3
1E Sub side encoder: Error 4
1F Sub side encoder:
Communication error
An error was detected in the communication with the machine
side encoder.
PR Dynamic stop Coast to a stop
21 Sub side encoder no signal
2
In the machine side encoder, ABZ-phase feedback cannot be
returned even when the motor moves.
PR Dynamic stop Coast to a stop
22 Encoder data error An error was detected in the feedback data from the position
encoder.
AR Dynamic stop Coast to a stop
23 Excessive speed error The state that there is a difference between the actual speed
and command speed continued for longer than the excessive
speed deviation timer setting.
NR - Coast to a stop
24 Grounding The motor power cable is in contact with FG (Frame Ground). PR Dynamic stop Coast to a stop
25 Absolute position data lost The absolute position data was lost in the encoder. AR Initial error -
26 Unused axis error In the multiaxis drive unit, there is an axis set to free, and the
other axis detected a power module error.
PR Dynamic stop Coast to a stop

(Note 1) Definitions of terms in the table are as follows.
Main side encoder: Encoder connected to CN2
Sub side encoder: Encoder connected to CN3
(Note 2) Resetting methods
NR: Reset with the NC RESET button. This alarm can also be reset with the PR and AR resetting conditions.
PR: Reset by turning the NC power ON again. This alarm can also be reset with the AR resetting conditions. When the control
axis is removed, this alarm can be reset with the NC RESET button. (Excluding alarms 32 and 37.)
AR: Reset by turning the NC and servo drive unit power ON again.
No. Name Details Reset
method
Servo
stop method
Spindle
stop method
27 Sub side encoder: Error 5 An error was detected by the encoder connected to the machine side.
The error details are different according to the encoder type.
Refer to "Encoder alarm" for details.
Dynamic stop Coast to a stop
28 Sub side encoder: Error 6
29 Sub side encoder: Error 7
2A Sub side encoder: Error 8
2B Main side encoder: Error 1 An error was detected by the encoder connected to the motor side.
The error details are different according to the encoder type.
Refer to "Encoder alarm" for details.
Dynamic stop Coast to a stop
2C Main side encoder: Error 2
2D Main side encoder: Error 3
2E Main side encoder: Error 4
2F Main side encoder:
Communication error
An error was detected in the communication with the motor side
encoder.
PR Dynamic stop Coast to a stop
30 Over regeneration Over-regeneration level exceeded 100%. The regenerative re sistor is overloaded.
PR Dynamic stop Coast to a stop
31 Overspeed The motor speed exceeded the allowable speed. PR Deceleration
stop
Deceleration
stop
32 Power module error
(overcurrent)
The power module detected the overcurrent. PR Dynamic stop Coast to a stop
33 Overvoltage The bus voltage in main circuit exceeded the allowable value. PR Dynamic stop Coast to a stop
34 NC communication:
CRC error
The data received from the NC was outside the setting range. PR Deceleration
stop
Deceleration
stop
35 NC command error The travel command data received from the NC was excessive. PR Deceleration
stop

Deceleration
stop
36 NC communication:
Communication error
The communication with the NC was interrupted. PR Deceleration
stop
Deceleration
stop
37 Initial parameter error An incorrect set value was detected among the parameters
send from the NC at the power ON.
In the SLS(Safely Limited Speed) function, an error was detect ed in the relation between the safety speed and safety rotation
number in the speed observation mode.
PR Initial error Initial error
38 NC communication:
Protocol error 1
An error was detected in the communication frames received
from the NC.
Or, removing an axis or changing an axis was performed in the
synchronous control.
PR Deceleration
stop
Deceleration
stop
39 NC communication:
Protocol error 2
An error was detected in the axis data received from the NC.
Or, in changing an axis, the parameter setting of the synchro nous control was applied when the axis was installed.
PR Deceleration
stop
Deceleration
stop
3A Overcurrent Excessive motor drive current was detected. PR Dynamic stop Coast to a stop
3B Power module error
(overheat)
The power module detected an overheat. PR Dynamic stop Coast to a stop
3C Regeneration circuit error An error was detected in the regenerative transistor or in the re generative resistor.
PR Dynamic stop -
3D Power supply voltage error
at acceleration/deceleration
A motor control error during acceleration/deceleration, due to a
power voltage failure, was detected.
PR Dynamic stop -
3E Magnetic pole position de tection error
The magnetic pole position, detected in the magnetic pole posi tion detection control, is not correctly detected.
AR Dynamic stop Coast to a stop

(Note 1) Definitions of terms in the table are as follows.
Main side encoder: Encoder connected to CN2
Sub side encoder: Encoder connected to CN3
(Note 2) Resetting methods
NR: Reset with the NC RESET button. This alarm can also be reset with the PR and AR resetting conditions.
PR: Reset by turning the NC power ON again. This alarm can also be reset with the AR resetting conditions. When the control
axis is removed, this alarm can be reset with the NC RESET button. (Excluding alarms 32 and 37.)
AR: Reset by turning the NC and servo drive unit power ON again.
No. Name Details Reset
method
Servo
stop method
Spindle
stop method
41 Feedback error 3 Either a missed feedback pulse in the motor side encoder or an
error in the Z-phase was detected in the full closed loop system.
PR Dynamic stop Coast to a stop
42 Feedback error 1 Either a missed feedback pulse in the position detection or an
error in the Z-phase was detected. Or the distance-coded refer ence check error exceeded the allowable value when the dis tance-coded reference scale was used.
PR Dynamic stop Coast to a stop
43 Feedback error 2 An excessive difference in feedback was detected between the
machine side encoder and the motor side encoder.
PR Dynamic stop Coast to a stop
45 Fan stop An overheat of the power module was detected during the cool ing fan stopping.
PR Dynamic stop Coast to a stop
46 Motor overheat /
Thermal error
Either the motor or the motor side encoder detected an over heat.
Or, the thermistor signal receiving circuit of the linear motor or
direct-drive motor was disconnected.
Or, the thermistor signal receiving circuit was short-circuited.
NR Deceleration
stop
Deceleration
stop
48 Main side encoder: Error 5 An error was detected by the encoder connected to the main side.
The error details are different according to the connected encoder.
Refer to "Encoder alarm".
Dynamic stop Coast to a stop

49 Main side encoder: Error 6
4A Main side encoder: Error 7
4B Main side encoder: Error 8
4C Current error at initial mag netic pole estimate
Current detection failed at the initial magnetic pole estimation. NR Dynamic stop Coast to a stop
4D Dual signal error An error was detected in the signal related to the dual signal.
Refer to "Dual signal error (4D)" for details.
4E NC command mode error An error was detected in the control mode send from the NC. NR Deceleration
stop
Deceleration
stop
4F Instantaneous power inter rupt
The control power supply has remained shut down. NR Deceleration
stop
Deceleration
stop
50 Overload 1 Overload detection level became 100% or more. The motor or
the drive unit is overloaded.
NR Deceleration
stop
Deceleration
stop
51 Overload 2 In a servo system, current command of 95% or more of the
units max. current was given continuously for 1 second or lon ger. In a spindle system, current command of 95% or more of
the motors max. current was given continuously for 1 second
or longer.
NR Deceleration
stop
Deceleration
stop
52 Excessive error 1 A position tracking error during servo ON was excessive. NR Deceleration
stop
Deceleration
stop
53 Excessive error 2 A position tracking error during servo OFF was excessive. NR Dynamic stop -
54 Excessive error 3 There was no motor current feedback when the alarm "Exces sive error 1" was detected.
NR Dynamic stop Coast to a stop
56 Commanded speed error The encoder has detected that the commanded speed exceed ed 1.15 times of the rapid traverse rate (rapid), or the motor ro tation speed exceeded the maximum speed.
NR Deceleration
stop
Deceleration
stop
58 Collision detection 1: G0 A disturbance torque exceeded the allowable value in rapid tra verse modal (G0).
NR Max cap dec
stop
-
59 Collision detection 1: G1 A disturbance torque exceeded the allowable value in the cut ting feed modal (G1).
NR Max cap dec
stop
-
5A Collision detection 2 A current command with the maximum drive unit current value
was detected.
NR Max cap dec
stop
-

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(Note 2) Resetting methods
NR: Reset with the NC RESET button. This alarm can also be reset with the PR and AR resetting conditions.
PR: Reset by turning the NC power ON again. This alarm can also be reset with the AR resetting conditions. When the control
axis is removed, this alarm can be reset with the NC RESET button. (Excluding alarms 32 and 37.)
AR: Reset by turning the NC and servo drive unit power ON again.
No. Name Details Reset
method
Servo
stop method
Spindle
stop method
5B Safely limited: Commanded
speed monitoring error
A commanded speed exceeding the safely limited speed was
detected in the safely limited mode.
PR Deceleration
stop
Deceleration
stop
5D Safely limited:
Door state error
The door state signal input in the NC does not coincide with the
door state signal input in the drive unit in the safely limited
mode. Otherwise, door open state was detected in normal
mode.
PR Deceleration

stop
Deceleration
stop
5E Safely limited: Speed feed back monitoring error
A motor speed exceeding the safely limited speed was detected
in the safely limited mode.
PR Deceleration
stop
Deceleration
stop
5F External contactor error A contact of the external contactor is welding. NR Deceleration
stop
Deceleration
stop
60,
61,
63
to
77
Power supply alarm The power supply unit detected an error.
The error details are different according to the connected power supply
unit. Refer to "Power supply alarm" for details.
Dynamic stop Coast to a stop
62 Power supply:
Frequency error
Deceleration
stop
Deceleration
stop
80 Main side encoder cable er ror
The cable type of the motor side encoder cable is for rectangu lar wave signal.
AR Initial error -
81 Sub side encoder cable er ror
The cable type of the machine side encoder cable does not co incide with the encoder type which is set by the parameter.
AR Initial error -
87 Drivers communication er ror
The communication frame between drive units was aborted. PR Dynamic stop Coast to a stop
88 Watchdog The drive unit does not operate correctly. LED display is fixed as
"88".
"888" is displayed for MDS-EJ/EJH Series.
AR Dynamic stop Coast to a stop
8A Drivers communication data
error 1
The communication data 1 between drivers exceeded the toler able value in the communication between drive units.
PR Dynamic stop Coast to a stop
8B Drivers communication data
error 2
The communication data 2 between drivers exceeded the toler able value in the communication between drive units.
PR Dynamic stop Coast to a stop
M800V/M80V Series Alarm/Parameter Manual
3 Servo/Spindle Alarms (S)
3.1 Servo Errors (S01/S03/S04)
61 IB-1501623-F
Encoder alarm (Servo drive unit)
(Note 1) A drive unit processes all reset types of alarms as "PR". However, "AR" will be applied according to the encoder.
(Note 2) Bit No. in the table refers to a bit assignation for encoder side alarm management data.
Alarm number when the encod er is connected to CN2 side
2B 2C 2D 2E 48 49 4A 4B
Alarm number when the encod er is connected to CN3 side
1B 1C 1D 1E 27 28 29 2A
OSA405
OSA676
OSA24RS
Mitsubishi
Electric
Memory
alarm
LED alarm Data alarm Encoder
thermal error

OSA405ET2AS
OSA676ET2AS
Memory
alarm
LED alarm Data alarm Encoder
thermal error

MDS-EX-HR Memory er ror
- Data error - Scale not
connected

CSW26KS Memory
alarm
LED alarm Data alarm Encoder
thermal error

AT343
AT543

AT545
AT1143
ST748
Mitsutoyo Initialization
error
(bit0)
EEPROM er ror
(bit5)
Photoelec tric type,
static capaci ty type data
mismatch
(bit1)
ROM/RAM
error
(bit6)
CPU error
(bit4)
Photoelec tric type
overspeed
(bit7)
Static capac ity type error
(bit3)
Photoelec tric type error
(bit2)
LC195M,
LC495M,
LC291M,
LIC2197M,
LIC2199M
MC15
RCN2590M,
RCN5390M,
RCN5590M,
RCN8390M
ROC425M,
ROC2390M
ECA4000Series
EIB Series
HEIDENHAIN Initialization
error
(bit0)
EEPROM er ror
(bit5)
Relative/ab solute posi tion data
mismatch
(bit1)
ROM/RAM
error
(bit6)
CPU error
(bit4)
Overspeed
(bit7)
Absolute po sition data
error
(bit3)
Relative po sition data
error
(bit2)
MPRZ scale NIDEC MA CHINE TOOL
Installation
accuracy
fault
(bit4)
- Detection
position de viance
(bit1)
Scale break ing
(bit0)
Absolute po sition detec tion fault
(bit5)
- Gain fault
(bit3)
Phase fault
(bit2)
SR67A,
SR75, SR85
SR74, SR77
SR87, SR84
RU77
RS87
Magnescale Laser diode
error
(bit0)
System
memory er ror
(bit5)
Encoder

mismatch er ror
(bit1)
- - Over speed
(bit7)
Absolute po sition data
error
(bit3)
Relative po sition data
error
(bit2)
SAM/SVAM/
GAM/G2AM/
LAM/G3BM/
HAM/H2AM
Series
FAGOR - - Absolute val ue detection
error
(bit3)
H/W error
(bit1)
CPU error
(bit0)

RL40N/RA/FOR TiS Series
Renishaw Initialization
error
(bit0)
- Absolute po sition data
error
(bit3)
- - Over speed
(bit7)
- -
WMFA/WMBA/
WMRA/LMFA/
LMBA Series
(Note)
AMO Initialization
error
(bit0)
- Relative/ab solute posi tion data
mismatch
(bit2)
- - Over speed
(bit5)
Absolute po sition data
error
(bit6)
-
AMS-ABS-3B
Series
Schneeberg er
-
(bit0)
- - Absolute po sition data
error
(bit3)

MHS-04B Series GUBOA H/W error
(bit0)
Waveform
error
(bit1)
- Power volt age warning
(bit3)

M800V/M80V Series Alarm/Parameter Manual
3 Servo/Spindle Alarms (S)
3.1 Servo Errors (S01/S03/S04)
IB-1501623-F 62
Encoder alarm (Spindle drive unit)
(Note 1) A drive unit processes all reset types of alarms as "PR". However, "AR" will be applied according to the encoder.
(Note 2) Bit No. in the table refers to a bit assignation for encoder side alarm management data.
Alarm number when the encod er is connected toCN2 side
2B 2C 2D 2E 48 49 4A 4B
Alarm number when the encod er is connected to CN3 side
1B 1C 1D 1E 27 28 29 2A
TS5690
TS5691
Mitsubishi
Electric
Memory er ror
Waveform
error
- - - Overspeed - Relative po sition data
error
MDS-EX-HR Initialization
error

- Data error - Connection
error

OSA24RS CPU error Waveform
error
Data alarm Encoder
thermal error

EIB Series HEIDENHAIN Initialization
error
(bit0)
EEPROM er ror
(bit5)
- - CPU error
(bit4)
Overspeed
(bit7)
- Relative po sition data
error
(bit2)
ADB-K70M NIDEC MA CHINE TOOL
Installation
accuracy
fault
(bit4)
- Detection
position de viance
(bit1)
Scale
breaking
(bit0)
- - Gain fault
(bit3)
Phase fault
(bit2)
GEL2449M LE NORD+BAU ER
Waveform
error
(bit0)
Analog sig nal warning
(bit1)
EEPROM er ror
(bit2)
Power volt age warning
(bit3)
H/W error
(bit4)
Overspeed
warning
(bit5)
Count error
(bit6)
Overheat
warning
(bit7)
MHS-04B Series GUBOA H/W error
(bit0)
Waveform
error
(bit1)
- Power volt age warning
(bit3)

M800V/M80V Series Alarm/Parameter Manual
3 Servo/Spindle Alarms (S)
3.1 Servo Errors (S01/S03/S04)
63 IB-1501623-F
Dual signal error (4D)
(Note) Resetting method may be "PR" depending on the sub-number in the decimal place.
No. Name Sub info Details
004D.xxx Dual signal error - An error was detected in the signal related to the dual signal. The name of
the axis with an error is displayed. The number "xxx" in the decimal place
indicates the sub-number.
004D.xxx : Alarm number.Sub-number
Sub-No. Name Details Reset
method
Axis
type
Servo
stop method
Spindle
stop method
1 Power shutoff error Either of the STO signals entered an input
state while the STO function is disabled.
NR Each
axis
Dynamic stop Coast to a stop
2 Illegal power shutoff error Either of the STO signals entered an input

state during servo ON command or during
deceleration and stop with the STO function
enabled.
NR Each
axis
Dynamic stop Coast to a stop
3 STO signal mismatch error Input states of two STO signals were mis matched while the STO function is enabled.
NR Each
axis
Dynamic stop Coast to a stop
15 Safety communication:
Communication error 1
A receiving error was detected in the safety
communication.
NR Each
axis
Dynamic stop Coast to a stop
16 Safety communication:
Initial communication error
1
A receiving error was detected in the initial
communication for the safety communica tion.
PR Each
axis
Dynamic stop Coast to a stop
17 Voltage diagnosis error A power error was detected in the safety
function.
NR Each
axis
Dynamic stop Coast to a stop
19 DRAM diagnosis error A DRAM error was detected in the safety
function.
PR Each
axis
Dynamic stop Coast to a stop
21 Control process error An error was detected in the status of soft ware execution for the safety function.
PR Each
axis
Dynamic stop Coast to a stop
23 Safety encoder:
Initial communication error
1
An error was detected in the initial communi cation with a safety encoder.
PR Each
axis
Initial error Initial error
24 PCB error A PCB error was detected in the safety func tion.
PR Each
axis
Initial error Initial error
25 Synchronization error A synchronization error was detected in the
safety function.
PR Each
axis
Dynamic stop Coast to a stop
26 Flash ROM diagnosis error A Flash ROM error was detected in the safety
function.
PR Each
axis
Initial error Initial error
33 Safety encoder:
Communication error 1
An error was detected in the communication
with a safety encoder.
PR Each
axis
Dynamic stop Coast to a stop
34 Safety encoder:
Diagnosis error 1
A power supply voltage error was detected in
the safety encoder.
PR Each
axis
Dynamic stop Coast to a stop
35 Safety encoder:
Diagnosis error 2
A H/W error was detected in the safety en coder.
PR Each
axis
Dynamic stop Coast to a stop
36 Safety encoder:
Diagnosis error 3
A process error was detected in the safety
encoder.
PR Each
axis
Dynamic stop Coast to a stop
37 Safety encoder:

Diagnosis error 4
An A/D conversion error was detected in the
safety encoder.
PR Each
axis
Dynamic stop Coast to a stop
39 Non-safety encoder:
Position feedback fixation
diagnosis error
The position feedback from the non-safety
encoder remains unchanged.
PR Each
axis
Dynamic stop Coast to a stop
40 Safety encoder:
Thermal error
The safety encoder detected a thermal error. PR Each
axis
Dynamic stop Coast to a stop
53 Safety communication:
Transmission interval mis match error
An error was detected in the transmission in terval setting.
NR Each
axis
Initial error Initial error
54 Safety communication:
Initial communication error
2
A receiving error was detected in the initial
communication for the safety communica tion.
NR Each
axis
Initial error Initial error
55 Safety communication:
Communication error 2
A receiving error was detected in the safety
communication.
NR Each
axis
Dynamic stop Coast to a stop
56 Safety parameter setting
range error
A setting error was detected in the safety pa rameter.
PR Each
axis
Initial error Initial error

57 Safety parameter combina tion error
A combination error was detected in the safe ty parameter.
PR Each
axis
Initial error Initial error
65 Register diagnosis error A resister diagnosis error was detected in the
safety function.
PR Each
axis
Initial error Initial error
66 Calculation device diagno sis error
An error was detected in the calculation de vice diagnosis for the safety function.
PR Each
axis
Initial error Initial error
67 Sequence diagnosis error An error was detected in the sequence diag nosis for the safety function.
PR Each
axis
Dynamic stop Coast to a stop
68 Stack diagnosis error An error was detected in the stack diagnosis
for the safety function.
PR Each
axis
Dynamic stop Coast to a stop
69 Temperature diagnosis er ror
Overheat was detected in the safety function. NR Each
axis
Dynamic stop Coast to a stop
71 Watchdog error The safety function is not operating correctly. PR Each
axis
Dynamic stop Coast to a stop
72 Clock diagnosis error An error was detected in the clock diagnosis
for the safety function.
PR Each
axis
Dynamic stop Coast to a stop
74 DO output compare error An error was detected in the status of DO
output for the safety function.

PR Each
axis
Dynamic stop Coast to a stop
75 ISC communication error An error was detected in the inter-system
communication for the safety function.
PR Each
axis
Dynamic stop Coast to a stop
78 Safety communication:
Initial communication error
3
A receiving error was detected in the initial
communication for the safety communica tion.
PR Each
axis
Dynamic stop Coast to a stop
88 Safety circuit: STO error An error was detected in the read-back diag nosis for STO.
PR Each
axis
Dynamic stop Coast to a stop
91 Safety circuit: SBC error An error was detected in the read-back diag nosis for SBC.
PR Each
axis
Dynamic stop Coast to a stop
126 Safety communication:
Communication error 3
A receiving error was detected in the safety
communication.
PR Each
axis
Dynamic stop Coast to a stop
004D.xxx : Alarm number.Sub-number
Sub-No. Name Details Reset
method
Axis
type
Servo
stop method
Spindle
stop method
M800V/M80V Series Alarm/Parameter Manual
3 Servo/Spindle Alarms (S)
3.1 Servo Errors (S01/S03/S04)
65 IB-1501623-F
(2) Power supply alarm
(Note 1) If a power supply alarm (60 to 77) occurs, all servos will stop with the dynamic brakes, and all spindles will coast to a stop.
(Note 2) "b", "C" and "d" displayed on the power supply unit's LED as a solid light (not flickering) do not indicate an alarm.
(Note 3) Check the LED display of the power backup unit to identify what alarm is occurring to the power backup unit.
** Refer to your drive unit's instruction manual for details.
(Note 4) When the power supply alarm (6F) is detected in the 2nd part system, the reset method differs depending on the detected
power supply alarm.
No. Name Details Reset
method
61 Power supply: Power module overcurrent Overcurrent protection function in the power module has started its operation. PR
62 Power supply: Frequency error The input power supply frequency increased above the specification range. PR
66 Power supply: Process error An error occurred in the process cycle. PR
67 Power supply: Phase interruption An open-phase condition was detected in input power supply circuit. PR
68 Power supply: Watchdog The system does not operate correctly. LED display is fixed as "8". AR
69 Power supply: Grounding The motor power cable is in contact with FG (Frame Ground). PR
6A Power supply: External contactor welding A contact of the external contactor is welding. PR
6B Power supply: Rush circuit error An error was detected in the rush circuit. PR
6C Power supply: Main circuit error An error was detected in charging operation of the main circuit capacitor. PR
6D Parameter setting error An error was detected in the parameter sent from the drive unit. PR
6E Power supply: H/W error An error was detected in the internal memory. AR
A/D error An error was detected in the A/D converter.
Unit ID error An error was detected in the unit identification.
6F Power supply error No power supply is connected to the drive unit, or a communication error was
detected.
AR
(Note 4)
70 Power supply: External emergency stop er ror
A mismatch of the external emergency stop input and NC emergency stop input
continued for 30 seconds.
PR
71 Power supply: Instantaneous power inter ruption
The power was momentarily interrupted. NR
72 Power supply: Fan stop A cooling fan built in the power supply unit stopped, and overheat occurred in
the power module.
PR
73 Power supply: Over regeneration Over-regeneration detection level became over 100%. The regenerative resis tor is overloaded. This alarm cannot be reset for 15 min from the occurrence to
protect the regeneration resistor. Leave the drive system energized for more
than 15 min, then turn the power ON to reset the alarm.
NR
74 Power supply: Option unit error An alarm was detected in the power backup unit (power supply option unit). NR
(Note 3)
75 Power supply: Overvoltage L+ and L- bus voltage in main circuit exceeded the allowable value. As the volt age between L+ and L- is high immediately after this alarm, another alarm may
occur if this alarm is reset in a short time. Wait more than 5 min before resetting
so that the voltage drops.

NR
76 Power supply: Function setting error The rotary switch setting of external emergency stop is not correct, or a wrong external emergency stop signal is input.
AR
Power supply: Function selection error Undefined area for the rotary switch is selected
77 Power supply: Power module overheat Thermal protection function in the power module has started its operation. PR

Details
The servo parameter setting data is illegal.The alarm No. is the No. of the servo parameter where the error occurred.
Remedy
Check the descriptions for the appropriate servo parameters and correct them.
Refer to "Parameter Numbers during Initial Parameter Error" of each drive unit instruction manual for details.
Details
The number of constants to be used in the following functions is too large:
Electronic gears.
Position loop gain.
Speed feedback conversion.
Remedy
Check that all the related parameters are specified correctly.
sv001: PC1, sv002: PC2, sv003: PGN1
sv018: PIT, sv019: RNG1, sv020: RNG2
Details
When high-speed serial incremental encoder (OSE104, OSE105) is connected, parameters for absolute posi tion are set to ON.
Set the parameters for absolute position detection to OFF.
To detect an absolute position, replace the incremental specification encoder with an absolute encoder.
Remedy
Check that all the related parameters are specified correctly.
sv017: SPEC, sv025: MTYP
Details
No servo option is found.
The closed loop (including the ball screw-end detection) or dual feedback control is an optional function.
Remedy
Check that all the related parameters are specified correctly.
sv025: MTYP/pen
sv017: SPEC/dfbx
Details
No servo option is found.
The SHG control is an optional function.
Remedy
Check that all the related parameters are specified correctly.
sv057: SHGC
sv058: SHGCsp
Details
No servo option is found.
The adaptive filtering is an optional function.
Remedy
Check that all the related parameters are specified correctly.
sv027: SSF1/aflt
S02 Initial parameter error 2201-2264 (Axis name)
S02 Initial parameter error 2301 (Axis name)
S02 Initial parameter error 2302 (Axis name)
S02 Initial parameter error 2303 (Axis name)
S02 Initial parameter error 2304 (Axis name)
S02 Initial parameter error 2305 (Axis name)

Details
Parameter error
The spindle parameter setting data is illegal.
The alarm No. is the No. of the spindle parameter where the error occurred.
Remedy
Check the descriptions for the appropriate spindle parameters and correct them.
Even when the parameter is set to a value within the setting range, an error is occurring due to the hardware compatibility or specifications or in relation to several other parameters.
Refer to "Parameter Numbers during Initial Parameter Error" of each drive unit instruction manual for details.
S02 Initial parameter error:PR 13001-13256 (Axis name)

Details
The STO signal has been input through the CN8 connector.
Remedy
Make sure that a short-circuiting connector has been inserted into CN8.
Details
STO signal is input by dedicated wiring STO function during servo ON.
Remedy
Refer to the manual of drive unit.
Details
STO signal is illegally input by dedicated wiring STO function during servo OFF.

(Illegal input : Signal input state for STO1 and STO2 is mismatched.)
Remedy
Refer to the manual of drive unit.
Details
STO signal is illegally input by dedicated wiring STO function during servo ON.
(Illegal input : Signal input state for STO1 and STO2 is mismatched.)
Remedy
Refer to the manual of drive unit.
S05 Safety function error 0001 (Axis name)
S05 Safety function error 0002 (Axis name)
S05 Safety function error 0004 (Axis name)
S05 Safety function error 0006 (Axis name)

3.4 Parameter Errors (S51)
Details
Servo parameter setting data is illegal.The alarm No. is the No. of the servo parameter where the warning oc curred.
Remedy
Check the descriptions for the appropriate servo parameters and correct them.
Details
Spindle parameter setting data is illegal.
The alarm No. is the No. of the spindle parameter where the warning occurred.
Remedy
Check the descriptions for the appropriate spindle parameters and correct them.
Even when the parameter is set to a value within the setting range, an error is occurring due to the hardware compatibility or specifications or in relation to several other parameters.
Refer to "Parameter Numbers during Initial Parameter Error" of each drive unit instruction manual for details.
S51 Parameter error 2201-2264 (Axis name)
S51 Parameter error 13001-13256 (Axis name)

3.5 Servo Warnings (S52)
Servo warning is displayed in the following format.
The numerical value in the column of "No." in the table after the following page is the double-digit number displayed on the LED which is on the front-side of the drive unit.
At the time of the occurrence of the servo warnings (S52), this number will be displayed in the last two digits of the "alarm number".
(Note 1) For the troubleshooting at the time of the occurrence of the servo warnings, refer to your drive unit's instruc tion manual.
(Note 2) When multiple servo alarms have occurred, only an alarm which occurred first is displayed on the alarm screen. Refer to the alarm history on the drive monitor screen as necessary.
Axis name
Servo : Axis name
Spindle : "S1", "S2", "S3" ...
Alarm No.
Message
Alarm class
Alarm class Message
S52 Name or "Servo warning"
S 0 0

(1) Drive unit warning
(Note1) Definitions of terms in the table are as follows.
Main side encoder: Encoder connected to CN2
Sub side encoder: Encoder connected to CN3
(Note 2) Resetting methods
* : Automatically reset once the cause of the warning is removed.
NR: Reset with the NC RESET button. This warning can also be reset with the PR and AR resetting conditions.
PR: Reset by turning the NC power ON again. This warning can also be reset with the AR resetting conditions. When the control axis is removed, this warning can be reset with the NC RESET button. (Excluding warning 93.)
AR: Reset by turning the NC and servo drive unit power ON again.
(Note 3) Servo and spindle motor do not stop when the warning occurs.
(Note 4) When an emergency stop is input, servo and spindle motor decelerate to a stop. (When SV048, SV055 or SV056 is set for servo and when SP055 or SP056 is set for spindle.)
Dual signal warning (A4)
No. Name Details Reset
method
Stop
method
96 Scale feedback error An excessive difference in feedback amount was detected between the main side encoder and the MPI scale in MPI scale absolute position detec tion system.
* -
97 Scale offset error An error was detected in the offset data that is read at the NC power-ON in MPI scale absolute position detection system.
PR -
9B Incremental encoder/
magnetic pole shift warning
The difference between the magnetic pole position after the phase Z has been passed (magnetic pole shift amount:SV028) and the initially detected position is excessive in the built-in motor's incremental control system.The magnetic pole is controlled by the initial detection value.
PR -

9E Absolute position encoder:
Revolution counter error
An error was detected in the revolution counter data of the absolute posi tion encoder. The accuracy of absolute position is not guaranteed.
* -
9F Battery voltage drop The battery voltage to be supplied to the absolute position encoder is drop ping.
NR -
A3 In initial setup of ABS position This warning is detected until the axis reaches the reference position
during the initial setup of the distance-coded reference check function.
This warning turns OFF after the axis has reached the position, thus set
the value displayed on the drive monitor to the parameter.
PR -
A4 Dual signal warning An input was detected in the signal related to the dual signal.
Refer to "Dual signal warning (A4)" for details.
* -
A6 Fan stop warning A cooling fan in the drive unit stopped. * -
E0 Overregeneration warning Over-regeneration detection level exceeded 80%. * -
E1 Overload warning A level of 80% of the Overload 1 alarm state was detected. * -
E4 Parameter warning An incorrect set value was detected among the parameters send from the
NC in the normal operation.
* -
E6 Control axis detachment warning A control axis is being detached. (State display) * -
E7 NC emergency stop In NC emergency stop. (State display) * Dec stop en abled
E8
to
EF
Power supply warning The power supply unit detected a warning.
The error details are different according to the connected power supply
unit.
Refer to "Power supply warning".
* -
*EA:
Dec stop en abled
No. Name Sub info Details
00A4.00 Dual signal warning Axis name The system has been set in the STO state. The STO state is also entered at
the time of emergency stop, but in this case, this warning will not appear be cause the emergency stop has priority.

(2) Power supply warning
(Note 1) Resetting methods
* : Automatically reset once the cause of the warning is removed.
NR: Reset with the NC RESET button. This warning can also be reset with the PR and AR resetting conditions.
PR: Reset by turning the NC power ON again. This warning can also be reset with the AR resetting conditions. When the control
axis is removed, this warning can be reset with the NC RESET button. (Excluding warning 93.)
AR: Reset by turning the NC and servo drive unit power ON again.
(Note 2) Servo and spindle motor do not stop when the warning occurs.
(Note 3) Check the LED display of the power backup unit to identify what warning is occurring to the power backup unit.
** Refer to your drive unit's instruction manual for details.
No. Name Details Reset
method
E9 Instantaneous power interruption warning The power was momentarily interrupted. NR
EA In external emergency stop state External emergency stop signal was input. *
EB Power supply: Over regeneration warning Over-regeneration detection level exceeded 80%. *
EE Power supply: Fan stop warning A cooling fan built in the power supply unit stopped. *
EF Power supply: Option unit warning A warning was detected in the power backup unit (power supply option unit). * (Note
3)

3.6 Safety Function Warnings (S53)
Details
The system has been set in the STO state.
The STO state is also entered at the time of emergency stop, but in this case, this warning will not appear be cause the emergency stop has priority.
S53 Safety function warning 0001 (Axis name)

4

4MCP Alarms (Y)
Details
System alarm: Process time is over.
Remedy
The software or hardware may be damaged.
Contact the service center.
(Note) When two or more alarms (Y02 0051) occur at the same time, only the alarm which has occurred first is
displayed.
Details
A communication error has occurred between controller and drive unit.
x: Channel No. (0 to)
y: Drive unit rotary switch No. (0 to)

Remedy
Take measures against noise.
Check for any failure of the communication cable connectors between controller and drive unit or between two drive units.
Check for any failure of the communication cables between controller and drive unit or between two drive units.
A drive unit may be faulty. Take a note of the 7-segment LED contents of each drive unit and contact the Ser vice Center.
Update the drive unit software version.
(Note) When two or more alarms (Y02 0051) occur at the same time, only the alarm which has occurred first is displayed.
Details
A communication error has occurred between controller and drive unit.
x: Channel No. (from 0)
y: Drive unit rotary switch No. (from 0)
Remedy
Take measures against noise.
Check for any failure of the communication cable connectors between controller and drive unit or between two drive units.
Check for any failure of the communication cables between controller and drive unit or between two drive units.
A drive unit may be faulty. Take a note of the 7-segment LED contents of each drive unit and contact the Ser vice Center.
Update the drive unit software version.
(Note) When two or more alarms (Y02 0051) occur at the same time, only the alarm which has occurred first is displayed.
Details
A communication error has occurred between controller and drive unit.
x: Channel No. (from 0)
Remedy
Take measures against noise.
Check for any failure of the communication cable connectors between controller and drive unit or between two drive units.
Check for any failure of the communication cables between controller and drive unit or between two drive units.
A drive unit may be faulty. Take a note of the 7-segment LED contents of each drive unit and contact the Ser vice Center.
Update the drive unit software version.
(Note) When two or more alarms (Y02 0051) occur at the same time, only the alarm which has occurred first is displayed.
Y02 System alm: Process time over 0050
Y02 SV commu er: Data ID error 0051 xy03
Y02 SV commu er: Recv frame No. 0051 xy04
Y02 SV commu er: Commu error 0051 x005

Details
A communication error has occurred between controller and drive unit.
x: Channel No. (from 0)
Remedy
Take measures against noise.
Check for any failure of the communication cable connectors between controller and drive unit or between two drive units.
Check for any failure of the communication cables between controller and drive unit or between two drive units.
A drive unit may be faulty. Take a note of the 7-segment LED contents of each drive unit and contact the Ser vice Center.
Update the drive unit software version.
(Note) When two or more alarms (Y02 0051) occur at the same time, only the alarm which has occurred first is displayed.
Details
A communication error has occurred between controller and drive unit.
x: Channel No. (from 0)
Remedy
Take measures against noise.
Check for any failure of the communication cable connectors between controller and drive unit or between two drive units.
Check for any failure of the communication cables between controller and drive unit or between two drive units.
A drive unit may be faulty. Take a note of the 7-segment LED contents of each drive unit and contact the Ser vice Center.
Update the drive unit software version.
(Note) When two or more alarms (Y02 0051) occur at the same time, only the alarm which has occurred first is displayed.
Details
A communication error has occurred between controller and drive unit.
A drive unit stopped due to transition failure from initial communication to runtime.
x: Channel No. (from 0)
y: Drive unit rotary switch No. (from 0)
Remedy
Take measures against noise.
Check for any failure of the communication cable connectors between controller and drive unit or between two drive units.
Check for any failure of the communication cables between controller and drive unit or between two drive units.
A drive unit may be faulty. Take a note of the 7-segment LED contents of each drive unit and contact the Ser vice Center.
Update the drive unit software version.
(Note) When two or more alarms (Y02 0051) occur at the same time, only the alarm which has occurred first is displayed.
Y02 SV commu er: Connect error 0051 x006
Y02 SV commu er: Safe posn FB err 0051 x007
Y02 SV commu er : Init commu error 0051 xy20

Details
A communication error has occurred between controller and drive unit.
No response from drive unit to the request from NC when setting network configuration.
x: Channel No. (from 0)
y: Station No. (from 0)
Remedy
Take measures against noise.
Check for any failure of the communication cable connectors between controller and drive unit or between two drive units.
Check for any failure of the communication cables between controller and drive unit or between two drive units.
A drive unit may be faulty. Take a note of the 7-segment LED contents of each drive unit and contact the Ser vice Center.
Update the drive unit software version.
(Note) When two or more alarms (Y02 0051) occur at the same time, only the alarm which has occurred first is displayed.
Details
A communication error has occurred between controller and drive unit.
Drive unit's software version doesn't support the communication mode that the controller requires.
x: Channel No. (from 0)
y: Station No. (from 0)
Remedy
Take measures against noise.
Check for any failure of the communication cable connectors between controller and drive unit or between two drive units.
Check for any failure of the communication cables between controller and drive unit or between two drive units.
A drive unit may be faulty. Take a note of the 7-segment LED contents of each drive unit and contact the Ser vice Center.
Update the drive unit software version.
(Note) When two or more alarms (Y02 0051) occur at the same time, only the alarm which has occurred first is displayed.
Details
The drive unit is not properly connected.
Axis name: NC axis drive unit not mounted
Pn: PLC axis drive unit not mounted (n = axis No.)
Sn: Spindle axis drive unit not mounted
(n = spindle No. or Sp disp name "#43107 S_disp_name")
Remedy
Check the drive unit mounting state.
Check the end of the cable wiring.
Check for any broken wires.
Check the connector insertion.
The drive unit input power has not been ON.
The drive unit axis No. switch is illegal.
Y02 SV commu er: Node detect err 0051 xy30
Y02 SV commu er: Commu not support 0051 xy31
Y03 Drive unit unequipped axis name

Details
There is a problem in the value set for the number of axes or the number of part systems.
Remedy
Correct the value set for the following corresponding parameters:
"#1001 SYS_ON (System validation setup)",
"#1002 axisno (Number of axes)",
"#1039 spinno (Number of spindles)", etc.
"#2187 chgPLCax (PLC axis switchover axis No.)", etc.
Make sure that the parameters unavailable for a switchover axis (#1068 slavno, #12800 chgauxno, etc.) are OFF.
Details
The parameter setting of the multiple axis synchronization control is incorrect.
The sub-number is displayed after the error number.
0002:
More than three sets combining the synchronization control and the multiple axis synchronization control are set.
0003:
The slave axis of multiple axis synchronization control overlaps with the synchronization control axis.
0004:
The master axis of multiple axis synchronization control overlaps with the synchronization control axis.
0005:
The master axis is set to the axis which crosses the part system.
0006:
The slave axis setting is also set to the master axis.
0007:
The function which cannot be used with the multiple axis synchronization control is enabled.
Remedy
Correct the parameter setting.
Details
The axis specified as the height control axis is not valid.
The axis name does not exist.
The axis is a rotary axis.
The axis is the reference axis or the synchronized axis of synchronization control or multiple-axis synchroni zation control.
The axis is the sub axis of simple synchronous control.
The drive unit is not Ver.B9 or newer version of MDS-E/EH-V1 Series (servo).
The axis is being used in NC axis/PLC axis switchover.

Remedy
Correct the value of "#90102 lsr_hight_ax" (Height control axis).
Details
There is a skipped number in the channels.
Remedy
Check the values set for the following parameters.
"#1021 mcp_no (Drive unit I/F channel No. (servo))"
"#3031 smcp_no (Drive unit I/F channel No. (spindle))"
Y05 Initial parameter error (Parameter No.)
Y05 Initial parameter error 2674 (Sub-number)
Y05 Initial parameter error 90102
Y06 mcp_no setting error 0001

Details
There is a duplicate setting for random layout.
Remedy
Check the values set for the following parameters.
"#1021 mcp_no (Drive unit I/F channel No. (servo))"
"#3031 smcp_no (Drive unit I/F channel No. (spindle))"
Details
The drive unit fixed setting "0000" and random layout setting "****" are both set.
Remedy
Check the values set for the following parameters.
"#1021 mcp_no (Drive unit I/F channel No. (servo))"
"#3031 smcp_no (Drive unit I/F channel No. (spindle))"
Details
The spindle/C axis "#1021 mcp_no (Drive unit I/F channel No. (servo))" and "#3031 smcp_no (Drive unit I/F channel No. (spindle))" are not set to the same values.
Remedy
Check the values set for the following parameters.
"#1021 mcp_no (Drive unit I/F channel No. (servo))"
"#3031 smcp_no (Drive unit I/F channel No. (spindle))"
Details
A random layout has been set while "#1154 pdoor" has been set to "1" in two-part system.
Remedy
Check the values set for the following parameters.
"#1021 mcp_no (Drive unit I/F channel No. (servo))"
"#3031 smcp_no (Drive unit I/F channel No. (spindle))"
Details
The channel No. parameter is not within the setting range.
Remedy
Check the values set for the following parameters.
"#1021 mcp_no (Drive unit I/F channel No. (servo))"
"#3031 smcp_no (Drive unit I/F channel No. (spindle))"
Y06 mcp_no setting error 0002
Y06 mcp_no setting error 0003
Y06 mcp_no setting error 0004
Y06 mcp_no setting error 0005
Y06 mcp_no setting error 0006

Details
The drive units more than the number of axes specified with the parameter are connected.
Or the number of axes connected to each channel exceeds the maximum number of connectable axes.
The exceeded number of axes per channel is displayed as alarm No.
x: Exceeded number of axes at drive unit interface channel 2 (0 to F)
y: Exceeded number of axes at drive unit interface channel 1 (0 to F)
This alarm also occurs when the drive unit is connected only with the 2nd channel without connecting with the 1st channel.
Remedy
For the channel whose alarm No. is other than "0", detach the connected axes by the number of indicated alarm No.
The number of connected axes should be less than or equal to the number specified with the parameter or the maximum number of connections.
(Note 1) The number of axes is limited per each drive unit interface channel.
(Note 2) Maximum number of axes that can be connected differs depending on whether or not an expansion unit is available or the setting of "#11012 16 axes for 1ch" (Connecting 16 axes for 1ch).
With the expansion unit, up to eight axes can be connected to a channel. Without the expansion unit, up to eight axes are allowed when "#11012 16 axes for 1ch" (Connecting 16 axes for 1ch) is set to "0", six teen axes when set to "1".
(Note 3) If this alarm occurs, the alarm "Y03 Message: Drive unit unequipped" will not occur.
(Note 4) This alarm is displayed taking precedence over the alarm "Y08 Too many drive units connected" and "Y09 Too many axisno connected".
Details
The number of drive units connected to each channel exceeds 8.
The exceeded number of drive units per channel is displayed as alarm No.
x: Exceeded number of drive units at drive unit interface channel 2 (0 to F)
y: Exceeded number of drive units at drive unit interface channel 1 (0 to F)
Remedy
Remove drive units from the channel whose alarm No. is other than "0" for the number displayed as the alarm No. Keep the number of connected drive units to 8 or less.
(Note 1) The drive unit is not counted when all the axes connected to it are invalid.
(Note 2) If this alarm occurs, the alarm "Y03 Message: Drive unit unequipped" will not occur.
(Note 3) The alarm "Y07 Too many axes connected" and "Y09 Too many axisno connected" are displayed tak ing precedence over this alarm.
Details
The No. of the axis (drive unit's rotary switch No.) connected to each channel is bigger than the No. allowed.

If the axis No. of each channel is bigger than the No. allowed, "1" is displayed for the alarm No.
x: "1" when the axis No. at drive unit interface channel 2 is too big
y: "1" when the axis No. at drive unit interface channel 1 is too big
Remedy
For the channel whose alarm No. is "1", keep the axis No. (drive unit's rotary switch No.) not bigger than the
No. allowed.
(Note 1) The axis No. is limited per each drive unit interface channel.
(Note 2) The biggest allowed connected axis No. differs depending on whether or not an expansion unit is avail able or the setting of "#11012 16 axes for 1ch (Connecting 16 axes for 1ch)". The biggest connectable
axis No. is as shown below.
With the expansion unit, axes No. '0' to '7' can be connected.
Without the expansion unit, axes No. '0' to '7' are allowed when '#11012 16 axes for 1ch (Connecting 16
axes for 1ch)' is set to '0', axes No. '0' to 'F' when set to '1'.
(Note 3) If this alarm occurs, the alarm "Y03 Message: Drive unit unequipped" will not occur.
(Note 4) This alarm is displayed taking precedence over the alarm "Y08 Too many drive units connected".
(Note 5) The alarm "Y07 Too many axes connected" is displayed taking precedence over this alarm.
Y07 Too many axes connected 00xy
Y08 Too many drive units connected 00xy
Y09 Too many axisno connected 00xy

Details
Although the high-speed synchronous tapping option is valid, the connected drive unit doesn't support the op tion.
Remedy
Replace the drive unit with that supports the option.
Set "High-speed synchronous tapping disabled axis" parameter as disabled for the axis to which you don't use
the high-speed synchronous tapping.
Details
Although the high-speed synchronous tapping option is valid, the connected drive unit doesn't support the op tion.
Remedy
Replace the drive unit with that supports the option.
Set "High-speed synchronous tapping disabled axis" parameter as disabled for the spindle to which you don't
use the high-speed synchronous tapping.
Details
RIO station number is too large
Although a non-RIO2.0 unit is connected, 9 or a greater number is set as a station No.
Remedy
If a non-RIO2.0 unit is connected, set the station No. to be 8 or smaller.
If you use 9 or a greater station No., do not connect a non-RIO2.0 unit.
Details
RIO3 connection error
A non-RIO2.0 unit is connected to RIO3.
Remedy
Connect a RIO2.0-compatible or RIO2.0-dedicated unit.
Details
RIO communication processing time exceeded (PC medium speed)
Due to too short DI/DO refresh cycle, the control may not refresh all the DI/DOs connected to one RIO channel
at a time.
Remedy
Correct the setting of "#1334 DI/DO refresh cycl(DI/DO refresh cycle)".
Connect the remote IO units to RIO1, RIO2 and RIO3 dispersedly to reduce the number of RIO stations con nected per RIO channel.
Details
RIO communication processing time exceeded (PC high speed)
Due to too short DI/DO refresh cycle, the control may not refresh all the DI/DOs connected to one RIO channel
at a time.
Remedy
Connect the remote IO units to RIO1, RIO2 and RIO3 dispersedly to reduce the number of RIO stations (which
perform high-speed input/output) per RIO channel.
Y12 No commu. with axis drv unit
Y13 No commu. with sp drv unit
Y15 RIO connection error 0001 (Error channel)
Y15 RIO connection error 0002 (Error channel)
Y15 RIO connection error 0003 (Error channel)
Y15 RIO connection error 0004 (Error channel)

Details
An error was detected for the connection of the laser I/F unit.
The laser I/F unit and another RIO device have been connected to the same channel.
The laser I/F unit has been connected to the station connected to the operation panel.
More than one laser I/F unit is connected.
Laser I/F unit has been failed.
Remedy
Check the connection of the laser I/F unit.
Replace the laser I/F unit.
Details
Five or more RIO connectors of the NC are in use.
Remedy
Modify the RIO configuration so that up to four RIO connectors are in use.
Details
The speed monitoring parameter in the NC does not correspond to the parameter transmitted to the drive unit.
The name of the axis with an error is displayed.
Remedy
The NC or the servo drive unit may be damaged.
Contact the service center.
Details
The speed exceeding the speed set with the parameter was commanded during the speed monitoring mode.

The name of the axis with an error is displayed.
Remedy
Check the speed monitoring parameter and the sequence program.
Restart the NC.
Details
The commanded position, transmitted to the servo drive unit from NC, is totally different from the feedback po sition received from the servo drive unit during the speed monitoring mode.
The name of the axis with an error is displayed.
Remedy
The NC or the servo drive unit may be damaged.
Contact the service center.
Details
Actual rotation speed of the motor is exceeding the speed that has been set with speed monitoring parameter
during the speed monitoring mode.
The name of the axis with an error is displayed.
Remedy
Correct the speed observation parameter and the sequence program.
Restart the NC.
Y15 Laser I/F unit connect error 0005
Y15 Too many RIO channels in use 0006
Y20 Parameter compare error 0001 (Axis name)
Y20 Sfty obsrvation: Cmd spd err 0002 (Axis name)
Y20 Sfty obsrvation: FB pos err 0003 (Axis name)
Y20 Sfty obsrvation: FB speed err 0004 (Axis name)

Details
Door state signals on the NC side and the drive side do not match. It may be caused by the followings:
Cable disconnection
Damaged door switch
Damaged NC or servo drive unit
Remedy
Check the cable.
Check the door switch.
Restart the NC.
Details
The door open state was detected when the speed monitoring mode was invalid.
The causes may be same as the ones for 0005 (Door signal: Input mismatch). Also the sequence program may
not be correct.
Remedy
Correct the sequence program.
Restart the NC.
Details
Two speed monitoring parameters are not matched at the rising edge of the "speed monitor mode" signal.
The name of the axis with an error is displayed.
Remedy
Correct the relevant parameters so that the two speed monitoring parameters match.
Restart the NC.
Details
Contactor welding was detected.
Displays the bit corresponding to the No. of the abnormal contactor for the contactor information.
Some contactors take a while to be shutdown after the servo ready is turned OFF, and the servo ready was
turned ON in the meantime.
Remedy
Make sure that contactor's auxiliary b contact signal is output correctly to the device set on "#1330
MC_dp1(Contactor weld detection device 1)" and "#1331 MC_dp2(Contactor weld detection device 2)".
If welding, replace the contactor.
Restart the NC.
Details
"#2313 SV113 SSF8/bitF (ssc SLS (Safely Limited Speed) function)" and "#13229 SP229 SFNC9/bitF (ssc
SLS (Safely Limited Speed) function)" are set for a system with no safety observation option.
Remedy
Disable "#2313 SV113 SSF8/bitF (ssc SLS (Safely Limited Speed) function)" and "#13229 SP229 SFNC9/bitF
(ssc SLS (Safely Limited Speed) function)".
Then, restart the NC.
Details
24VDC power is not supplied to SDIO connector correctly. (SDIO 4A pin supply voltage was dropped to 16V
or less, or 1ms or more instant power interrupt was detected.)
In this case, "Pw sply:Inst pw interpt(DC24V)" alarm occurs because the contactor control output signal cannot
be controlled.
This state remains until restarting the NC even if the cause of the alarm has been removed.
Remedy
Check the wiring. Supply 24VDC power to the SDIO connector.
Restart the NC.
Y20 Door signal: Input mismatch 0005 Door No.
Y20 No speed observation mode in door open 0006 Door No.
Y20 Speed obsv: Para incompatible 0007 (Axis name)
Y20 Contactor welding detected 0008 Contactor info
Y20 No spec: Safety observation 0009
Y20 SDIO connector input volt err 0010

Details
The device set in the parameter "#1353 MC_ct1" (Contactor shutoff output 1 device) does not exist.
The device set in the parameter "#1353 MC_ct1" (Contactor shutoff output 1 device) is used as an output de vice in PLC program.
Remedy
In the parameter "#1353 MC_ct1" (Contactor shutoff output 1 device), set the device to which a remote I/O is

connected. Use the device to control the contactor.
Confirm that the devices set by the parameter "#1353 MC_ct1" (Contactor shutoff output 1 device) are not used as an output device in PLC program.
Restart the NC.
Details
Contactor's operation is not following the NC's commands.
Displays the No. of the abnormal contactor for the contactor information.
Remedy
Check and correct "#1353 MC_ct1" (Contactor shutoff output 1 device) setting.
Check the wiring for contactor shutoff.
Check for contactor's welding.
Restart the NC.
Details
The drive unit's STO function has failed to work properly.
Remedy
If this alarm has occurred alone, a drive unit failure can be suspected.
If other alarms have been generated at the same time, it is also possible that there is communication problem.
Check the optical cable wiring.
Details
The motor power has not been shut down with the STO function when the NC power was turned ON.
Remedy
If this alarm has occurred alone, a drive unit failure can be suspected.
If other alarms have been generated at the same time, it is also possible that there is communication problem.
Check the optical cable wiring.
Details
A setting of #2118 SscDrSel, #3071 SscDrSelSp, #2180 S_DIN, or #3140 S_DINSp is not correct.
Remedy
- Correct the parameter setting.
Details
The following parameters are not consistent with the check data.
#2180 S_DIN, #3140 S_DINSp
Remedy
Correct the parameter setting.
Restore the backup data, as the parameter or check data may be corrupted.
Details
The speed exceeds the safety speed limit when the "speed monitor mode" signal is ON.
The name of the axis with an error is displayed.
Remedy
Decelerate the speed to reset the warning and start the speed monitor.
Y20 Device setting illegal 0011 Contactor info
Y20 Contactor operation abnormal 0012 Contactor info
Y20 STO function operation illegal 0013
Y20 STO function illegal at pwr ON 0014
Y20 Dual signal: parameter setting error 0027
Y20 Safety observation: parameter memory error 0031 (Parameter No.)
Y21 Speed obsv signal: Speed over 0001 (Axis name)

Details
A machine group-based alarm stop has occurred, or the machine group-based PLC interlock signal has been input.
Remedy
Remove the cause of the stop by alarm.Turn OFF the machine group-based PLC interlock signal.
Details
The time constant has not been set or exceeded the setting range.
Remedy
Correct "#2004 G0tL (G0 time constant (linear))".
Details
The time constant has not been set or exceeded the setting range.
Remedy
Correct "#2007 G1tL (G1 time constant (linear))".
Details
The time constant has not been set or exceeded the setting range.
Remedy
Correct "#2005 G0t1 (G0 time constant (primary delay) / Second-step time constant for soft acceleration/de celeration)".
Details
The time constant has not been set or exceeded the setting range.
Remedy
Correct "#2008 G1t1 (G1 time constant (primary delay)/Second-step time constant for soft acceleration/decel eration)".
Details
The grid space is illegal.
Remedy
Correct "#2029 grspc(Grid interval)".
Details
The time constant has not been set or exceeded the setting range.
Remedy
Correct the parameters from "#3017 stapt1(Tap time constant (Gear: 00))" to "#3020 stapt4(Tap time constant (Gear: 11))".
Details
In the axis synchronization, parameter settings for slave axis have been attempted in different part system from that of master axis.
Remedy
Correct the "#1068 slavno (Slave axis number)" setting.
Y40 Machine group-based stop
Y51 Parameter G0tL illegal 0001
Y51 Parameter G1tL illegal 0002
Y51 Parameter G0t1 illegal 0003

Y51 Parameter G1t1 illegal 0004
Y51 Parameter grid space illegal 0009
Y51 Parameter stapt1-4 illegal 0012
Y51 Slave axis No. illegal 0014

Details
The time constant has exceeded the setting range.
Remedy
Correct "#2102 skip_tL (Skip time constant linear)".
Details
The time constant has exceeded the setting range.
Remedy
Correct "#2103 skip_t1 (Skip time constant primary delay / Second-step time constant for soft acceleration/de celeration)".
Details
"#1205 G0bdcc (Acceleration and deceleration before G0 interpolation)" for the 2nd part system is set to ac celeration/deceleration before G0 interpolation.
Remedy
Correct "#1205 G0bdcc (Acceleration and deceleration before G0 interpolation)".
Details
An illegal setting was found in the OMR-II-related parameters. OMR-II has been disabled.
Remedy
Correct the related parameter settings.
Details
"#12804 aux_tleng (Linear axis stroke length)" has not been set or exceeded the setting range while the linear axis equal indexing is enabled for the PLC indexing axis.
Remedy
Correct "#12804 aux_tleng (Linear axis stroke length)".
Details
High-accuracy acceleration/deceleration time constant extension option is unavailable.
Remedy
Adjust the setting of "#1207 G1btL" to be within the range of when the high-accuracy control time constant extension option is OFF.
High-accuracy acceleration/deceleration time constant extension option is unavailable for a system config ured with multiple part systems. Change the system to be made up of a single part system, or set the said option to OFF.
Details
The time constant has not been set or exceeded the setting range.
Remedy
Check "#2092 plG0tL G0 time constant for superimposition control (linear)".
Details
The time constant has not been set or exceeded the setting range.
Remedy
Check "#2094 plG1tL G1 time constant for superimposition control (linear)".
Y51 Parameter skip_tL illegal 0015
Y51 Parameter skip_t1 illegal 0016
Y51 Parameter G0bdcc illegal 0017
Y51 OMR-II parameter error 0018
Y51 PLC indexing stroke length err 0019
Y51 Hi-acc time const unextendable 0020
Y51 Superimpos linear G0 error 0022
Y51 Superimpos linear G1 error 0023

Details
The time constant has not been set or the set time constant is out of the specified range.
Remedy
Correct "#2093 plG0t1 G0 time constant for superimposition (primary delay)/2nd step of soft acceleration/de celeration".
Details
The time constant has not been set or the set time constant is out of the specified range.
Remedy
Correct "#2095 plG1t1 G1 time constant for superimposition (primary delay)/2nd step of soft acceleration/de celeration".
Details
Setting of "#12051 Jerk_filtG1" is greater than that of "#1568 SfiltG1".
Or setting of "#12052 Jerk_filtG0" is greater than that of "#1569 SfiltG0".
Remedy
Change the setting of "#12051 Jerk_filtG1" to be smaller than "#1568 SfiltG1".
Or change the setting of "#12052 Jerk_filtG0" to be smaller than "#1569 SfiltG0".
Details
The high-accuracy acceleration/deceleration buffer has failed to be allocated.
Remedy
The software or hardware may be damaged. Contact the service center.
Details
The parameter "#8040 High-speed high-accuracy control-enabled part system" is set to 1 for three or more part systems.
Remedy
Set the parameter "#8040 High-speed high-accuracy control-enabled part system" to 1 for up to two part sys tems.
Details
The time constant is out of the specified range.
Remedy
Correct "#2598 G0tL_2 (G0 time constant 2 (linear))".
Details
The time constant is out of the specified range.
Remedy
Correct "#2599 G0t1_2 (G0 time constant 2 (primary delay)/Second-step time constant for soft acceleration/ deceleration)".
Details
The time constant has not been set or the set time constant is out of the specified range.

Remedy
Correct "#2622 pl3G0tL G0 time constant (linear) for 3-axis serial superimposition control".
Y51 Primary delay G0time const err 0028
Y51 Primary delay G1time const err 0029
Y51 Jerk filter time constant err 0030
Y51 Unable to alloc. hi-acc buffer 0031
Y51 Too many hi-speed/accu systems 0032
Y51 Parameter G0tL_2 illegal 0033
Y51 Parameter G0t1_2 illegal 0034
Y51 3ax line accel G0time const er 0035

Details
The time constant has not been set or the set time constant is out of the specified range.
Remedy
Correct "#2624 pl3G1tL G1 time constant (linear) for 3-axis serial superimposition control".
Details
The time constant has not been set or the set time constant is out of the specified range.
Remedy
Correct "#2623 pl3G0t1 G0 time constant (primary delay) for 3-axis serial superimposition control/2nd step of soft acceleration/deceleration".
Details
The time constant has not been set or the set time constant is out of the specified range.
Remedy
Correct "#2625 pl3G1t1 G1 time constant (primary delay) for 3-axis serial superimposition control/2nd step of soft acceleration/deceleration".
Details
The machine group Nos. that are used for the machine groupwise alarm stop function are different among the axes related to inclined axis control and synchronous control.
Remedy
Give an identical machine group No. to all the axes related to inclined axis control and synchronous control.
Details
The machine group-based alarm stop function has been disabled, because both the machine group-based alarm stop and collision detection functions were enabled.
Remedy
Disable the collision detection function if you wish to use the machine group-based alarm stop function.
Details
The 1st letter of name extension axis for 2-letter axis (#1013 axname) is specified to the basic axes I, J, and K (parameter #1026 to #1028).
Remedy
Set the letter other than the 1st letter of name extension axis for 2-letter axis (#1013 axname) to the basic axes I, J and K (parameter #1026 to #1028).
Details
The PC1 and PC2 settings for the rotary axis are too large.
Remedy
Correct "#2201 SV001 PC1 (Motor side gear ratio)" and "#2202 SV002 PC2 (Machine side gear ratio)".
Details
In the absolute/incremental command method using the axis address (L system and when "#1076 AbsInc" = 1), the axis that the same axis address is set in "#1013 axname" and "#1014 incax" exists.
Remedy
Correct the settings so that the same axis address is not set in "#1013 axname" and "#1014 incax".
Y51 3ax line accel G1time const er 0036
Y51 3ax prim delay G0time const er 0037
Y51 3ax prim delay G1time const er 0038
Y51 Machine group No. discrepancy 0039
Y51 M-group alarm stop disabled 0040
Y51 Basic axes I, J, K error 0045
Y51 Values of PC1/PC2 too large 0101
Y51 ABS/INC same axis name 0104

Details
The axis address that is out of the setting range (other than X, Y, Z, U, V, W, A, B, C, H) is set in "#1013 ax name" or "#1014 incax".
Remedy
Set the axis address within the setting range to "#1013 axname" and "#1014 incax".
Details
An error was detected in the spindle encoder during spindle control with pulse train output.
Remedy
Check for spindle encoder problems such as disconnection.
Details
There is an error in the spindle encoder signal.
The data transmission to the drive unit is stopped when this error occurs.
Remedy
Check the spindle encoder's feedback cable and the encoder.
Y51 Axis name initial setting err 0105
Y60 Encoder communication error 0001
Y90 No spindle signal 0001-0007

Details
The operation result is illegal.

Remedy
Contact the service center.
Details
A communication error has occurred in the communication that uses a CC-Link IE field network unit.
n1: Indicates the No. of slot to which the expansion unit with the communication error or diagnostic alarm is
mounted (in hexadecimal format).
n2: Indicates the alarm No. of the slot where the communication error or diagnostic alarm is occurring (in hexa decimal format).
Remedy
For details of the alarm number, refer to the list of messages in "CC-Link IE field network specification manual".
Details
There is an incorrect parameter setting.
Parameter setting of #[Parameter No.] is incorrect.
Remedy
Correct the setting.
Refer to the list of messages in "CC-Link IE field network specification manual".
Details
H/W test is completed for the CC-Link IE field network unit.
Check the test result.
n1: Indicates the H/W test result of slot 1 (in hexadecimal format).
n2: Indicates the H/W test result of slot 2 (in hexadecimal format).
0: H/W test is normally completed or not performed
2: External self-loopback test is completed with connection error
3: External self-loopback test is completed with communication error
FFFF: H/W test is underway
Remedy
Take the following measures according to the test result.
0: Check the communication mode.
If the mode is H/W test, switch it to online, and turn OFF and ON the NC power.
If a mode other than H/W test is active, check the result of the other slot and take the measures.
2: Make sure the connection of Ethernet cable, or exchange the cable. And then perform the test again.
If the error occurs again, exchange the H/W.
3: Exchange the Ethernet cable, and perform the test again.
If the error occurs again, exchange the H/W.
FFFF: Turn OFF and ON the NC power.
If the result is unchanged, exchange the H/W.
Z02 System error
Z11 CC-L IE F communication error n1 n2
Z13 CC-L IE F parameter error (Parameter No.)
Z14 CC-Link IE F H/W test status n1 n2

Details
A communication error has occurred in the master station of CC-Link IE Field Network communication.
n1: indicates the No. of station where a communication error is occurring (in decimal notation).
0: Local station (master station)
Other than 0: Station No. of communication error
n2: indicates the alarm No. of the station where a communication error is occurring (in hexadecimal notation).
Remedy
For details of the alarm number, refer to the list of messages in "CC-Link IE Field Network Basic specifications
manual".
Details
A communication error has occurred in the remote station of CC-Link IE Field Network communication.
n1: indicates the alarm No. (in hexadecimal notation).
Remedy
For details of the alarm number, refer to the list of messages in "CC-Link IE Field Network Basic specifications
manual".
Details
There is an incorrect parameter setting.
Parameter setting of #[Parameter No.] is incorrect.
Remedy
Correct the setting.
Refer to the list of messages in "CC-Link IE Field Network Basic specifications manual".
Details
An abnormality has occurred on the field network communication expansion unit.
n1: Error slot No.
n2: Error No.
Remedy
0 99:
Two Fieldbus communication expansion units which cannot be used simultaneously are mounted simultane ously. Remove either of Fieldbus communication expansion unit.
Other than 0 99:
A failure on the hardware can be speculated. Replace the field network communication expansion unit.
Details
The parameter #[Parameter #] is incorrect.
Remedy
Correct the setting.
Details
The axis not extending the address (1 character axis) exists at the back of the axis extending the address (2
character axis) in the same system.
Remedy
Improve the axis composition. The axis not extending the address can not exist at the back of the axis extend ing the address in the same system.
Z15 CC-L IE F Basic(M) comm. error n1 n2
Z16 CC-L IE F Basic(R) comm. error n1
Z17 CC-L IE F Basic parameter err. #[Parameter No.]
Z18 Network expansion card error n1 n2
Z21 PROFIBUS parameter error (Parameter No.)
Z23 AXIS EX-ADR. ERROR

Details
The SLS observation request signal has been turned OFF in any of the following machining modes:
Thread cutting, synchronous tapping, cross machining, superimposition control, tool center point control or
SSS control
Remedy
Perform the operation with the SLS observation request signal ON.
Perform the operation with the door closed.
Details
NC unit is replaced to the FCU8-MU541, FCU8-MA541, FCU8-MU501, or FCU8-MU502.
Remedy
Contact to your service center.
Press the reset to cancel the warning and continue the operations.
Details
A functional safety expansion card is mounted to the NC unit (FCU8-MU501 or FCU8-MU50).
Remedy
Contact to your service center.
Press the reset to cancel the warning and continue the operations.
Details
Parameter setting of #[Parameter No.] is incorrect.
Refer to the list of messages in" EtherNet/IP specification manual".
Remedy
Correct the setting.
Details
A communication error has occurred in the communication that uses an EtherNet/IP expansion unit.
[n1: Output the device Number (in hexadecimal format)]
FF: Simultaneously mounting two EtherNet/IP expansion units error
Other than FF: Device No. of the connected device
[n2: Output the position No. (in hexadecimal format)]
FF: Simultaneously mounting two EtherNet/IP expansion units error
Other than FF: Device No. of the connected device
[n3: Output the device communication status (IN) (in hexadecimal format)]
[n4: Output the device communication status (OUT) (in hexadecimal format)]
Remedy
For details, refer to "EtherNet/IP Specifications manual".
Details
Socket open error (socket)
Remedy
Set the parameter then turn the power OFF and ON again.
Details
Socket bind error (bind)
Remedy
Set the parameter then turn the power OFF and ON again.
Z25 Unable to start safe spd clamp
Z26 NC unit replacement illegal
Z27 FnctnlSafetyExpnsCard MountErr
Z28 EtherNet/IP parameter error (Parameter No.)
Z29 EtherNet/IP communication err n1 n2 n3 n4
Z31 Socket open error(socket) 0001
Z31 Socket bind error(bind) 0002

Details
Connection wait queue error (listen)
Remedy
Set the parameter then turn the power OFF and ON again.
Details
Connection request error (accept)
Details
Data receive error (socket error)
Details
Data receive error (data error)
Details
Data send error (socket error)
Details
Data send error (data error)
Details
Socket close error (close)
Remedy
Set the parameter then turn the power OFF and ON again.
Details
Any of the following errors has occurred in the DeviceNet unit.
Master function error (X03 is ON)
Slave function error (X08 is ON)
Message communication error (X05 is ON)
If the errors have occurred in more than one unit, the error No. of the unit with the smallest slot No. is displayed.
If the master function, slave function and message communication errors have occurred at the same time, the
error is displayed in the following priority order.
1. Master function error
2. Slave function error
3. Message communication error
Remedy
Select the [Ext. PLC link control] menu on the maintenance screen to open the unit confirmation screen, and
check the unit in error and details to cancel the error.
Details
Connection has failed.

Five or more clients attempted a connection.
Remedy
Check the connection of the network cables, and check for broken wires and a failure of the network connec tion devices such as hub.
When using the Direct Socket communication I/F, connect up to four clients.
Z31 Connection wait queue error(listen) 0003
Z31 Connection request error(accept) 0004
Z31 Data recv error(socket error) 0005
Z31 Data recv error(data error) 0006
Z31 Data send error(socket error) 0007
Z31 Data send error(data error) 0008
Z31 Socket close error(close) 000A
Z34 DeviceNet error
Z35 Direct Socket connection error 0001

Details
Receiving data from a client has failed.
Remedy
Check the connection of the network cables, and check for broken wires and a failure of the network connec tion devices such as hub.
Details
Sending data to a client has failed.
Remedy
Check the connection of the network cables, and check for broken wires and a failure of the network connec tion devices such as hub.
Details
There was no response from client computers, and a timeout error occurred.
Remedy
Check the connection of the network cables, and check for broken wires and a failure of the network connec tion devices such as hub.
Details
The direct Socket communication I/F is OFF.
Remedy
Check the parameter "#11051 Direct Socket ON".
Details
An error has occurred in the communication with EcoMonitorLight.
Remedy
Make sure that the CNC has the same communication settings (station No.,baud rate, parity and stop bit) as
the EcoMonitorLight in error.
Make sure that there are no problems with the serial cable connected to the EcoMonitorLight.
Make sure to place the serial cable in a low-noise environment.
Details
The number of EcoMonitorLight units connected is inconsistent with the setting of the parameter #11061.
Remedy
Make sure that the value set in the parameter #11061 coincides with the number of EcoMonitorLight units con nected to the CNC.
Also make sure all the EcoMonitorLight units connected are powered ON and the station No. is not duplicated.
Z35 Direct Socket receive error 0002
Z35 Direct Socket send error 0003
Z35 Direct Socket timeout error 0004
Z35 Direct Socket comm OFF 0005
Z36 EcoMonitorLight comm. error
Z37 EcoMonitorLight qty discrepant

Details
The motor insulation has been deteriorated.
0001: Motor insulation deterioration: Caution
0002: Motor insulation deterioration: Replacement required
0003: Motor insulation deterioration: Relay welding detected
Remedy
0001: The insulation resistance value of the motor has dropped.
Contact the service center.
0002: The insulation resistance value of the motor is less than or equal to the reference value.
Contact the service center.
When measuring the insulation resistance of the motor and the measured resistance value is less than
or equal to the specified value, the motor may be damaged.
0003: The drive unit may be damaged.
Contact the service center.
Details
E-mail sending with the email notification to operator function failed.
Remedy
Check the e-mail environment setting.
Check the registered e-mail address.
Set "0" in "#8134 E-mail send disabled".
Details
Although SRAM open parameters were changed, formatting has not been performed yet.
Remedy
Perform formatting and restart the NC.
Details
Decryption code for the system lock function is not yet entered, though the encryption key has been entered.
Remedy
If you want to enable system lock, enter the decryption code.
If you do not want, simply turn the power OFF and ON.
Details
An error has occurred in the remote I/O unit.
Remedy
Turn the power ON again.
If this error remains active after the power ON, replace the remote I/O unit.
Details

[Type]
Z51 E2PROM error 0011: Read error
Z51 E2PROM error 0012: Write error
Remedy
If the same alarm is output by the same operation, the cause is an H/W fault. Contact the Service Center.
Z38 Insulation deterioration wrn
Z39 E-mail send error
Z40 Format mismatch
Z41 Decryption code is missing
Z49 RIO watchdog error 0001
Z51 E2PROM error 001x

Details
Low battery voltage has been detected in the CNC unit, the graphic control unit or the personal computer unit.
(The battery for retaining internal data)
x: Graphic control unit or personal computer unit
y: CNC unit
1: Battery warning
3: Battery alarm
(Note) The message "Battery warning" disappears on CNC reset, but the warning remains active until the bat tery is replaced.
Remedy
Replace the battery of the CNC unit, the graphic control unit or the personal computer unit.
Check for disconnection of the battery cable.
After treating the battery, check the machining program.
Details
The controller or operation board temperature has risen above the designated value.
(Note) Temperature warning
When an overheat alarm is detected, the alarm is displayed and the overheat signal is output simultane ously. Automatic operation will be continued, while restarting after resetting or stopping with M02/M30 is not possible. (Restarting after block stop or feed hold is possible.)
The alarm will be cleared and the overheat signal will turn OFF when the temperature drops below the specified temperature.
Z53 CNC overheat 000x
[000x]
(For all models)
0001: The temperature in the control unit is high.
The ambient temperature must be lowered immediately when a "Z53 CNC overheat" alarm occurs. How ever, if the machining needs to be continued, set "#6449/bit7 Control unit temperature alarm ON" to "0". Then the alarm will be invalidated.
Remedy
Cooling measures are required.
Turn OFF the controller power, or lower the temperature with a cooler, etc.
Z52 Low battery 00xy
Z53 CNC overheat

Details
An error occurs in the communication between the control unit and remote I/O unit.
Disconnection of a cable
Fault in remote I/O unit
Fault of power supply to remote I/O unit
The communication interrupted station is displayed in hexadecimal for each RIO channel when an error occurs in the communication between the control unit and remote I/O unit.
When the control displays a communication stop station, it divides the RIO channel stations (up to 64 stations) into groups of 8 stations. If any of the 8 stations has the communication stop error, the number is displayed with the alarm.
Z55 RIO communication stop __ __ __ __ __ __ __ __
(a) (b) (c) (d) (e) (f) (g) (h)
(a)(b): RIO1
(c)(d): RIO2
(e)(f): RIO3
(g)(h): RIO4
(a)(b), (c)(d), (e)(f), and (g)(h) indicate the following stations in hexadecimal.
bit0: 1st to 8th stations
bit1: 9th to 16th stations
bit2: 17th to 24th stations
bit3: 25th to 32nd stations
bit4: 33rd to 40th stations
bit5: 41st to 48th stations
bit6: 49th to 56th stations
bit7: 57th to 64th stations
(Example) Stations #1 and #8 of RIO1 and stations #24 and #64 of RIO3 have the communication error.
Z55 RIO communication stop 0100 8400
The RIO error status can be monitored through the R registers on the self diagnostic or I/F diagnostic screen.
Remedy
Check and replace the cables.
Replace the remote I/O unit.
Check the power supply (existence of supply and voltage).
Details
Program memory capacity has been set over the value that can be formatted.
An expansion device/expansion cassette has not mounted after formatting.
The mounted expansion device/expansion cassette is different from the one that was mounted at formatting.
Remedy
Check the followings.
Program memory capacity
Mounting of an expansion device/expansion cassette
APLC release option

Details
Invalid function table name for motion control release.
Required function is missing from the function table for motion control release.
The add-on module for motion control release cannot be decoded.
Remedy
Check the states of the following items.
Motion control release definition file
Add-on module
Z55 RIO communication stop
Z57 System warning
Z57 System warning 1000

Details
A machine tool builder macro program has not been written to FROM after being registered/ edited/ copied/ condensed/ merged/ the number changed/ deleted.
Remedy
Write the machine tool builder macro program to FROM.
The program does not need to be written to FROM unless the editing operations and so on need to be valid after the NC power OFF.
Details
Acceleration and deceleration time constants are too large.
(This alarm occurs with the stop code (T02 0206).)
Remedy
Set the larger value for "#1206 G1bF(Maximum speed)".
Set the smaller value for "#1207 G1btL(Time constant)".
Set the lower feedrate.
Details
A communication error has occurred on the Fieldbus communication with FCU8-WN563.
[n1: denotes the master station status (in the hexadecimal form).]
00: Offline: In initialization
40: Stop: I/O communication stopped
80: Clear: Resetting the output data of each slave by sending zero data
C0: In operation: In I/O communication
FF: Two Fieldbus expansion units are mounted.
[n2: denotes the error condition (in the hexadecimal form).]
bit0: Control error: Parameter error
bit1: Auto clear error: Communication with all the slave stations was cut because a communication with one slave station had an error.
bit2: Non-exchange error: A slave station has communication error.
bit3: Fatal error: Communication cannot be continued because of severe network failure.
bit4: Not ready: CNC communication is not ready.
bit5: Timeout error: Timeout is detected in communication with each station.
bit6: Not used
bit7: Not used
FF: Two Fieldbus expansion units are mounted.
[n3: denotes the slave station where communication error has occurred(in the hexadecimal form).]
(*) FF is indicated when two Fieldbus expansion units are mounted.
[n4: denotes the error number (in the hexadecimal form).]
This shows the communication state with slave station where error is occurring.
Remedy
For details, refer to "PROFIBUS-DP Specification manual".
Details
The valid term will be expired in less than a week. Remaining valid term is xx days.
Remedy
Obtain a decryption code from the machine tool builder and input it in the NC, then turn the power ON again.
Details
The valid term has been expired with no decryption code input.
Remedy
Obtain a decryption code from the machine tool builder and input it in the NC, then turn the power ON again.
Z58 ROM write not completed
Z59 Acc/dec time cnst too large
Z60 Fieldbus communication error n1 n2 n3 n4
Z64 Valid term soon to be expired xx
Z65 Valid term has been expired

Details
A communication error occurred during CC-Link communication using CC-Link unit.
Remedy
Refer to the list of messages in "CC-Link (Master/Local) Specification manual".
Details
A cable between CC-Link unit and a device is disconnected or broken.
Remedy
Find the unconnected cable by checking SW0080 to SW0083 and connect it.
Details
A FROM/TO instruction was used while the MELSEC-Q interface expansion module is not installed.
Remedy
Install the MELSEC-Q interface expansion module.
Details
A negative value was set for an I/O No. in the FROM/TO instruction.
Remedy
Correct the I/O No.
Details
A negative value was set for transfer size in the FROM/TO instruction.
Remedy

Correct the transfer size.
Details
The number of FROM/TO instructions within one scan has exceeded 50.
Remedy
Correct the user PLC (ladder sequence) so that the number of FROM/TO instructions per scan is 50 or less.
Details
The access to the buffer memory by the FROM/TO instruction has exceeded 12K words per scan.
Remedy
Correct the user PLC (ladder sequence) so that the buffer memory access by the FROM/TO instruction won't
exceed 12K words per scan. (The total size of FROM/TO is up to 12K words.)
Details
A FROM/TO instruction was used in high-speed processing.
Remedy
Delete the FROM/TO instruction from high-speed processing.
Details
The bit device number designated in the FROM/TO instruction is not a multiple of 16.
Remedy
Correct the bit device number designated in the FROM/TO instruction to be a multiple of 16.
Z67 CC-Link communication error
Z68 CC-Link unconnected
Z69 External link error 2
Z69 External link error 3
Z69 External link error 4
Z69 External link error 5
Z69 External link error 6
Z69 External link error 7
Z69 External link error 8

Details
With a FROM/TO instruction, a value out of the address range (negative value, or 0x8000 or over) was set as
the head address of the buffer memory.
Remedy
Correct the head address of the buffer memory.
Details
An alarm occurred in the MELSEC module mounted on the extension base.
Remedy
Check for any disconnection of the MELSEC module and the cables on the extension base. Then turn the
CNC's power ON again.
Details
The I/O No. designated in the FROM/TO instruction is different from the mounted location of the intelligent func tion module on the extension base (the module's I/O No.).
Remedy
Correct the I/O No. Then turn the CNC's power ON again.
Details
Machine model is not registered.
Remedy
Press RESET to cancel the alarm.
Movement can be resumed after the cancellation. However, the 3D machine interference check will become
invalid.
Inform the machine tool builder if an alarm occurs.
Details
Machine model is illegal.
Remedy
Press RESET to cancel the alarm.
Movement can be resumed after the cancellation. However, the 3D machine interference check will become
invalid.
Inform the machine tool builder if an alarm occurs.
Details
The calculation of the interference check took time and caused a deceleration.
Remedy
Inform the machine tool builder.
Restart the axis in case of a manual operation.
In case of an automatic operation, the operation will automatically resume when the processing load of the
interference check decreases.
Details
The interference check failed.
Remedy
Take a note of the failed status and contact the service center.
Press RESET to cancel the alarm. Invalidate the 3D machine interference check to continue the operation.
Z69 External link error 9
Z69 External link error 10
Z69 External link error 11
Z82 3D machine interference/No machine model 0001
Z82 3D machine interference/Machine model illegal 0002
Z82 3D machine Interference check load excess 0003
Z82 3D machine Interference check error 0004

Details
The system is unable to store the data due to lack of free space on the internal memory.
Remedy
Ensure sufficient free space on the internal memory.
Details
No operation panel I/O is connected.
Remedy
Make sure that an operation panel I/O unit is connected.

Make sure that power is supplied to the operation panel I/O unit.
Check for any cable disconnection between the CNC unit and operation panel I/O unit.
(*) If you connect no operation panel I/O unit to the CNC unit, set the parameter "#1261 set33/bit1" to "1".
Details
No display unit is connected to the operation panel I/O unit.
Remedy
Make sure an operation panel I/O unit for M800VW/M80VW Series is connected.
Make sure the display unit is being powered.
Check for any cable disconnection between operation panel I/O and display units.
(*) If operation panel I/O is not connected to display unit in your system configuration, set the parameter "#1261 set33/bit2" to "0".
Details
Power ON sequence has not been executed correctly.
Remedy
Make sure an operation panel I/O unit for M800VW/M80VW Series is connected.
Make sure the operation panel I/O unit is being powered.
Check the power-off wiring of the display unit.
Check for any cable disconnection between CNC and operation panel I/O units.
Make sure the operation panel I/O and display units are connected.
(*) If no operation panel I/O is connected in your system configuration, set the parameter "#1261 set33/bit1" to "1" and "#1261 set33/bit2" to "0".
(*) If operation panel I/O is not connected to display unit in your system configuration, set the parameter "#1261 set33/bit2" to "0".
Details
Power OFF sequence has not been executed correctly.
Remedy
Make sure an operation panel I/O unit for M800VW/M80VW Series is connected.
Make sure the operation panel I/O unit is being powered.
Check the power-off wiring of the display unit.
Check for any cable disconnection between CNC and operation panel I/O units.
Make sure the operation panel I/O and display units are connected.
(*) If no operation panel I/O is connected in your system configuration, set the parameter "#1261 set33/bit1" to "1" and "#1261 set33/bit2" to "0".
(*) If operation panel I/O is not connected to display unit in your system configuration, set the parameter "#1261 set33/bit2" to "0".
Z84 Unable to save all the history
Z85 OP panel I/O not connected 0001
Z85 No display conn. to panel I/O 0002
Z85 Power ON sequence error 0003
Z85 Power OFF sequence error 0004

Details
Timeout has occurred during wait for the display power shutdown when automatic power OFF is being execut ed.
Remedy
Make sure an operation panel I/O unit for M800VW/M80VW Series is connected.
Make sure the operation panel I/O unit is being powered.
Check for any cable disconnection between CNC and operation panel I/O units.
Make sure the operation panel I/O and display units are connected.
(*) If no operation panel I/O is connected in your system configuration, set the parameter "#1261 set33/bit1" to "1" and "#1261 set33/bit2" to "0".
(*) If operation panel I/O is not connected to display unit in your system configuration, set the parameter "#1261 set33/bit2" to "0".
Details
Overvoltage was detected in hardware voltage.
Remedy
If this alarm occurs frequently, check the power supply voltage.
Details
Overvoltage was detected in hardware voltage.
Remedy
Turn OFF and ON the NC power.
If this alarm occurs frequently, check the power supply voltage.
Details
Incorrect data has been read out from the internal memory.
Remedy
Contact the service center.
Details
Synchronization of the image input signal has been lost.
Remedy
Check the HDMI cable for any disconnection.
If synchronization loss occurs frequently, exchange the image input expansion card.
Details
The image input expansion card for M80/M800S is installed.
Remedy
Install the image input expansion card for M80V/M800VS.
Details
The image input expansion card is installed in the expansion slot EXT2.
Remedy
Install the image input expansion card in the expansion slot EXT1.
Z85 Display unit shutoff timeout 0005
Z86 Overvoltage detection warning 0001
Z86 Overvoltage detection alarm 0002
Z92 Memory ECC error 0004
Z95 Image input ex. card sync lost 0001
Z95 Image input ex. card illegal 0002
Z95 Image input ex. slot illegal 0003

Details
The setting of #[Parameter No.] is incorrect.
Remedy
Correct the setting.
For details, refer to the list of messages in "FL-net specifications manual".
Details
A communication error has occurred in FL-net communication.
Error code: indicates the status of CNC (FL-net) (in hexadecimal)
Remedy
For details of the alarm number, refer to the list of messages in "FL-net specifications manual".
Details
An error has occurred on the other node that is participating in FL-net.
Node No.: indicates the number of the node in error (in decimal with three digits)
Error code: indicates the status of the node in error (in hexadecimal)
Remedy
For details of the alarm number, refer to the list of messages in "FL-net specifications manual".
Details
The value of end-user parameter is incorrect.
The value is inconsistent with the multi-project parameter of the built-in PLC, or the sum of the initial device number and the quantity of the devices has exceeded the upper limit.
Remedy
Correct the value of the end-user parameter displayed.
Details
Failed to authenticate the vibration cutting expansion unit.
Remedy
Contact the service center.
Press the reset to cancel the warning and continue the operations.
Details
A communication error occurred in the NC-HPU optical communication while parameter "#1762 cfgPR12/bit1" is set to "0".
bit0: Communication start error
bit1: Initial communication error
bit2: Communication error
Remedy
Check that the cable is properly connected.
Check that the HPU power is turned ON.
Z102 FL-net parameter error (Parameter No.)
Z103 FL-net communication error (Error code)
Z104 FL-net node warning (Node No.) (Error code)
Z105 End-user parameter error
Z106 VCC card authentication error 0001
Z107 NC-HPU optical comm. warning 0001

Details
A communication error occurred in the NC-HPU optical communication while parameter "#1762 cfgPR12/bit1" is set to "1".
bit0: Communication start error
bit1: Initial communication error
bit2: Communication error
Remedy
Check that the cable is properly connected.
Check that the HPU power is turned ON.
Turn OFF/ON the NC power.
Details
An error has arisen in the HPU.
bit0: E0 System/HW/SD/optical communication error
bit1: E1 RIO/AI/DI/SIO error
bit2: E2 Network error
bit3: E3 Analyzing process error
bit4: E4 (spare)
bit5: E5 (spare)
bit6: E6 User customization
bit7: E7 User customization
Remedy
Check the HPU status.
Details
Registration and deletion of the HPU custom module has been failed.
[Error details]
0001: The total size of the HPU custom module exceeded 5 MB.
0002: Failed to load the HPU custom module.
0003: Failed to load the HPU custom module in the HPU.
0004: The HPU custom module was transferred and deleted while the HPU custom module is already loaded.
0005: The HPU custom module to be deleted did not exist in the HPU.
0006: An error has occurred with the SD card in the HPU.
0020 to 00FF: An internal error has occurred.
Remedy
Take the following procedures depending on the details of the error.
0001: Correct the HPU custom module.
0002: Re-register the HPU custom module.
0003: Correct the HPU custom module.
0004: Restart the NC and HPU.
0005: Initialize the MTB password of the HPU.
Re-register the HPU custom module.
0006: Contact the service center.

0020 to 00FF: Restart the NC and HPU.
If the problem persists, contact the service center.
Details
The laser I/F unit FCU8-DX522 is not connected.
Remedy
Connect the laser I/F unit FCU8-DX522, and then reboot the NC.
Z107 NC-HPU optical comm. alarm 0002
Z108 HPU error 0001
Z109 HPU preparation error
Z111 Laser I/F unit not connected 0001

Details
There is no software on the laser I/F unit FCU8-DX522.
Remedy
Set the type of laser oscillator to be connected in parameter "#90001 LASER_UNIT_TYPE", and then reboot the NC.
Set "1" in parameter "#90002 LASER_UNIT_WRITE", and then reboot the NC.
Details
The software of the laser I/F unit FCU8-DX522 does not match parameter "#90001 LASER_UNIT_TYPE".
Remedy
After setting the type of the laser oscillator to be connected in parameter "#90001 LASER_UNIT_TYPE", set "1" in parameter "#90002 LASER_UNIT_WRITE", and reboot the NC.
Details
An error was detected on the laser I/F unit FCU8-DX522.
Remedy
Write the firmware to the laser I/F unit.
A failure of the firmware or hardware is suspected.
Contact the service center.
Details
Laser processing control is not included in the specifications.
Remedy
Check the specifications.
Details
The initialization of motion control release was not processed correctly.
Remedy
Report this error to the machine tool builder.
Details
The NC, the high speed processing unit or the edge PC does not support the high speed processing unit I/F.
[n1: Displays the function for which the request failed. (DEC)]
2: HPU custom module 1
3: HPU custom module 2
4: HPU custom module 3
5: HPU custom module 4
6: HPU custom module 5
[n2: Displays the system that does not support the high speed processing unit I/F. (DEC)]
0: NC
1: High speed processing unit
2: Edge PC
Remedy
Upgrade the system.
Z111 Laser I/F unit has no software 0002
Z111 Laser I/F unit S/W mismatch 0003
Z111 Laser I/F unit H/W error 0004
Z111 No spec: Laser processing ctrl 0005
Z113 MCR init process error
Z115 HPU I/F unsupported

Details
An error occurred in the edge PC for the request by the high speed processing unit I/F.
[n1: Displays the function for which the request failed. (DEC)]
2: HPU custom module 1
3: HPU custom module 2
4: HPU custom module 3
5: HPU custom module 4
6: HPU custom module 5
[n2: Displays the error number detected in the RT Processing unit or the edge PC. (DEC)]
If the error number is between 1 and 9999, look it up in the relevant errors in Edge PC App Specificaton Manual.
If the error number is between 10001 and 19999, look it up in the manual issued by the machine tool builder.
Remedy
Check the state of the RT Processing unit or the edge PC.
Details
The parameter for allocating extended common variables is incorrect.
Remedy
Correct the parameter that designates allocation of the extended common variables.
When this alarm is caused by more than one parameter, the last parameter number is indicated.
Details
Creating the extended common variable data file failed.
Remedy
Ensure that sufficient space is left on the SD card in the control unit (M800VW/M80VW) or on the SD card inserted in the SD card slot on the back of the display unit (M800VS/M80V).
Set the parameter "#11829 exComVar3FileN" to be the same as or smaller than [the number of creatable files].
Details
NC unit detected low 12V power voltage.

Error code: 24V power voltage measurement value (V)
Remedy
Cancel the alarm by resetting.
If this alarm occurs frequently, the hardware may be damaged. Contact our service center.
Details
Communication with the cloud server failed.
Remedy
Correct the remote service-related parameters.
Set "0" in parameter "#8170 Remote Service".
Details
The contents of the diagnosis report configuration file are incorrect.
Remedy
Correct the contents of the diagnosis report configuration file.
Set "0" in parameter "#8170 Remote Service".
Set "0" in parameter "#8171 Diag Report Enable".
Z116 HPU I/F request failed
Z117 Ext com var aloc prmtr invalid
Z118 Can't create ext com var file
Z119 12V power error Error code
Z120 Cloud communication error
Z121 Dign. report config file error

Details
A communication error has occurred in the communication that uses a CC-Link IE TSN remote module.
n1: indicates the alarm No. (in hexadecimal notation).
Alarm No. indicates the details of the communication error.
Refer to the list of messages in "CC-Link IE TSN (remote station) specification manual".
Remedy
Take measures described in the list of messages in "CC-Link IE TSN (remote station) specification manual".
Details
The parameter setting is incorrect.
Parameter setting of #[Parameter No.] is incorrect.
Refer to the list of messages in "CC-Link IE TSN (remote station) specification manual".
Remedy
Take measures described in the list of messages in "CC-Link IE TSN (remote station) specification manual".
Details
The DHCP server setting is invalid.
A value larger than 254 is assigned to the 4th octet of the IP addresses provided by the DHCP server.
(The 4th octet is the last portion in an IP address separated by a dot.)
Remedy
Correct the setting of "#75052 StartIP DHCPserver" or "#75053 IP num DHCPserver" so that a number larger than 254 is not included in the 4th octet of the IP addresses provided by the DHCP server.
Details
The DHCP server setting is invalid.
The IP address of the NC unit and the IP address provided by the DHCP are not in the same network.
"#75052 StartIP DHCPserver" is set to "0.0.0.0" or "255.255.255.255".
Remedy
Correct the setting of "#75001 WLAN IP address" or "#75052 StartIP DHCPserver".
Details
The connect SSID or SSID is not entered.
Remedy
Set "#75003 connect SSID" or "#75005 SSID".
Details
The encryption key is not entered.
Remedy
Set "#75007 Encryption key".
Details
The STA/AP mode setting is invalid.
Remedy
Correct the setting of "#75000 STA/AP mode".
Z123 CCIETSN (remote) comm. error n1
Z124 CCIETSN (remote) param. error Parameter No.
Z125 WLAN_DHCP server error 0001
Z125 WLAN_DHCP IP address invalid 0002
Z125 WLAN_SSID not set 0003
Z125 WLAN_Encryption key not set 0004
Z125 WLAN_STA/AP mode invalid 0005

Details
The frequency band setting is invalid.
Remedy
Correct the setting of "#75009 Frequency band".
Details
The encryption mode setting is invalid.
Remedy
Correct the setting of "#75006 Encryption mode".
Details
The wireless LAN channel setting is invalid.
The channel you set cannot be used in the country corresponding to the country code.
The frequency band corresponding to "#75008 WLAN channel" does not match "#75009 Frequency band".
Remedy
Correct the setting of "#75008 WLAN channel" to match the country.
Correct the setting of "#75008 WLAN channel" or "#75009 Frequency band".
Details

The country code setting is invalid.
Wireless LAN has not been approved in the country corresponding to the country code.
A nonexistent country code is set.
No country code is entered.
Remedy
Reboot the NC. If the alarm continues to occur after reboot, have the machine tool builder set the country
code, and then reboot the NC.
Set "#75000 STA/AP mode" to "0" to disable wireless LAN.
Details
There is an error in the wireless LAN setting.
Remedy
Correct the setting of wireless LAN.
Details
Wireless LAN failed to start.
Remedy
Reboot the NC.
If the alarm continues to occur after reboot, contact your local service center.
Details
An internal error occurred in wireless LAN.
Remedy
Contact the service center.
Set "#75000 STA/AP mode" to "0" to disable wireless LAN.
Z125 WLAN_Frequency band invalid 0006
Z125 WLAN_Encryption mode invalid 0007
Z125 WLAN_Channel invalid 0014
Z125 WLAN_Country code invalid 0015
Z125 WLAN_Setting illegal 0050
Z125 WLAN_Startup error 0051
Z125 WLAN_Internal error 0x00C8 to 0x00FF
M800V/M80V Series Alarm/Parameter Manual
5 System Alarms (Z)
111 IB-1501623-F
Details
A drive unit that does not support OMR-CC is connected to the axis with "#2678 OMRCC_valid" set to "1".
Remedy
To enable OMR-CC, the drive units for all axes with "1" set in "#2678 OMRCC_valid" must be OMR-CC com patible MDS-E series version B3 or later.
To disable OMR-CC, set "#2678 OMRCC_valid" to "0".
Z131 OMR-CC dr unit not spt
M800V/M80V Series Alarm/Parameter Manual
5 System Alarms (Z)
IB-1501623-F 112
6
113 IB-1501623-F
Absolute Position Detection System
Alarms (Z7*)
M800V/M80V Series Alarm/Parameter Manual
6 Absolute Position Detection System Alarms (Z7*)
IB-1501623-F 114
6Absolute Position Detection System Alarms (Z7*)
Details
Zero point initialization is incomplete. Otherwise, the spindle was removed.
Remedy
Complete zero point initialization.
Details
[Absolute position lost]
The absolute position basic point data saved in the NC has been damaged.
[Absolute position lost due to replacement of encoder]
The batteryless encoder has been replaced.
Remedy
[Absolute position lost]
Set the parameters. If the basic point data is not restored by setting the parameters, perform zero point initial ization.
[Absolute position lost due to replacement of encoder]
Initialize the zero point.
Details
Any of the parameters for absolute position detection has been changed.
#1003 iunit
#1017 rot
#1018 ccw
#1040 M_inch
#2049 type
#2201 PC1
#2202 PC2
#2218 PIT
#2219 RNG1
#2220 RNG2
#2225 MTYP
Remedy
Correct the parameter settings. Then turn the power ON again and perform zero point initialization.
Details
The zero point initialization point is not at the grid position.
Remedy
Perform the zero point initialization again.
Details
The data has been restored by inputting the parameters during the alarm No.0001, 0002, and 0003.
Remedy
Turn the power ON again to start the operation.
Details
Deviation of the servo axis with scale when the power is OFF exceeds the set value in "#2051 check" (Check).

Remedy
Search for the factor which led the deviation of the servo axis at the power OFF.
Z70 Abs posn base set incomplete 0001 (Axis name)
Z70 Absolute position lost 0002 (Axis name)
Z70 Abs posn param changed 0003 (Axis name)
Z70 Abs posn initial set illegal 0004 (Axis name)
Z70 Abs posn param restored 0005 (Axis name)
Z70 Abs data error 0006

Details
The absolute position data has been lost. An error of the multi-rotation counter data in the encoder and so on
may be the cause. (Liquid penetrates into encoder connector, etc.)
Remedy
Replace the encoder and complete zero point initialization.
Details
The servo alarm No. 25 was displayed and the power was turned ON again.
Remedy
Perform zero point initialization again.
Details
The servo alarm No. E3 was displayed and the power was turned ON again.
Remedy
Perform zero point initialization again.
Details
Backup voltage in the absolute encoder dropped.
Remedy
Replace the battery, check the cable connections, and check the encoder. Turn the power ON again and per form zero point initialization.
Details
Communication with the absolute encoder has been disabled.
Remedy
Check and replace the cables, card or encoder. Turn the power ON again and perform zero point initialization.
Details
Absolute position data has been changed at the absolute position establishment.
Remedy
Check and replace the cables, card or encoder. Turn the power ON again and perform zero point initialization.
Details
An error of the serial data was found in the absolute encoder.
Remedy
Check and replace the cables, card or encoder. Turn the power ON again and perform zero point initialization.
Details
Servo alarm E3
Absolute position counter warning
Remedy
Operation is possible until the power is turned OFF.
Details
Initial communication with the absolute encoder is not possible.
Remedy
Check and replace the cables, card or encoder. Turn the power ON again and perform zero point initialization.
Z70 Abs posn data lost 0080 (Axis name)
Z70 Abs posn error(servo alm 25) 0101 (Axis name)
Z70 Abs posn error(servo alm E3) 0106 (Axis name)
Z71 AbsEncoder:Backup voltage drop 0001 (Axis name)
Z71 AbsEncoder: Commu error 0003 (Axis name)
Z71 AbsEncoder: Abs data changed 0004 (Axis name)
Z71 AbsEncoder: Serial data error 0005 (Axis name)
Z71 AbsEncoder: Abs/inc posn diffr 0006 (Axis name)
Z71 AbsEncoder: Initial commu er 0007 (Axis name)

Details
This alarm is displayed if an error is detected when comparing the encoder's absolute position and controller
coordinate values in the absolute position system.
Details
Low backup battery
Servo alarm 9F
Low battery voltage
Remedy
If the battery voltage is low or the cable is damaged, there is no need to initialize the absolute position.
Z72 Message: Position check error (Axis name)
Z73 Battery for abs data fault 0001
7

Distance-coded Reference Scale Errors
(Z8*)

7Distance-coded Reference Scale Errors (Z8*)
Details
The basic point data saved in the NC has been damaged.
Remedy
Set the parameters. If the basic point data is not restored by setting the parameters, perform zero point initial ization.
Details
The basic point data has been restored by setting the parameters.
Remedy
Turn the power ON again to start the operation.

Details
The distance-coded reference scale has been set available although this function is out of the specifications.
Remedy
Check the specifications.
If you do not use this function, correct the encoder type with the servo parameter.
Details
Reference position adjustment value data saved in the CNC has been damaged.
Remedy
Set the parameter. If the data is not restored by setting the parameter, establish the reference position again.
Details
After the 'Z81 R-pos adjustment data lost 0001', the data has been recovered by setting the parameter.
Remedy
Establish the reference position to start the operation.
Details
The NC was started while the spindle was rotating.
Remedy
Turn OFF the power once, and make sure that the spindle is stopped before turning ON the power again.
You can select whether or not to stop the spindle forcibly at the occurrence of this alarm by the setting of the
base common parameter "#1284 ext20/bit1" (Spindle control selected in response to Z83 (NC started during
SP rotation)).
If this alarm occurs frequently, check the power supply voltage.
Z80 Basic position lost 0001
Z80 Basic position restore 0002
Z80 No spec: Distance-coded scale 0003
Z81 R-pos adjustment data lost 0001
Z81 R-pos adjustment data restored 0002
Z83 NC started during SP rotation 0001

Details
The "PLC emergency stop" signal is turned ON during the sequence processing of the user PLC.
Remedy
Check the conditions to turn the "Emergency stop" signal ON and remove the cause of the alarm during the
sequence processing of the user PLC.
Details
The "emergency stop" signal is significant (open).
Remedy
Cancel the "emergency stop" signal.
Check for any broken wires.
Details
An alarm occurred in the servo system causing an emergency stop.
Remedy
Investigate and remove the cause of the servo alarm.
Details
The user PLC (ladder sequence) is not running.
Remedy
Check the setting of the control unit rotary switch CS2. Correct it if set to "1".
Check the [RUN/SP] (run/stop) switch on the PLC edit file save screen (onboard function). Turn it OFF if ON.
Details
Spindle drive unit is not mounted.
Remedy
Cancel the causes of the other emergency stop.
Check the "emergency stop" signal input in the spindle drive unit.
Details
Failure in the high-speed PC processing abnormal
Remedy
Correct the sequence program. (To stop monitoring the high-speed PC processing temporarily, set "1" in
"#1219 aux03/bit1 (Stop high-speed PC monitoring function)". Disable the monitoring function only as a tem porary measure.)
Details
Setting of the door open II fixed device is illegal.
Setting of the parameters for dog signal random assignment is illegal.
Remedy
Correct the "#1155 DOOR_m" and "#1156 DOOR_s" settings. (When the door open II fixed device is not used,
set "#1155 DOOR_m" and "#1156 DOOR_s" to "100".)
Correct the "#2073 zrn_dog (Origin dog Random assignment device)", "#2074 H/W_OT+ (H/W OT+ Random
assignment device)", "#2075 H/W_OT- (H/W OT- Random assignment device)" and "#1226 aux10/bit5 (Arbi trary allocation of dog signal)" settings.
EMG Emergency stop PLC
EMG Emergency stop EXIN
EMG Emergency stop SRV
EMG Emergency stop STOP
EMG Emergency stop SPIN
EMG Emergency stop PC_H
EMG Emergency stop PARA

Details
An emergency stop occurs when the FROM/TO instruction is not executed within 500ms.
Remedy
Execute the FROM/TO instruction one or more times every 500ms.
The time in which no interrupt request is issued from MELSEC is measured and stored in the following R reg isters:
R10190: Current timeout counter
R10191: Maximum timeout counter after power ON

R10192: Maximum timeout counter after system is started up (this is backed up)
Details
MELSEC is in error and reset states.
Remedy
Check the MELSEC states.
Details
The contents of MELSEC-specific code area in buffer memory have been damaged.
Remedy
Check the MELSEC states.
Details
PLC serial link communication has stopped.
Remedy
Check the CC-Link card wiring and the external sequencer transmission.
Check the link communication errors shown on the diagnostic screen.
Details
The preparation sequence is not sent from the master station. Otherwise, the contents of the received prepa ration sequence are inconsistent with those of the parameters, so that the usual sequence cannot be started.
Remedy
Check that the CC-Link card switch setting and wiring as well as the external sequencer transmission are nor mal.
Check the diagnostic screen for link communication errors.
Details
The CC-Link card is operating incorrectly.
Switch/parameter settings for the CC-Link card are incorrect.
Remedy
Replace the CC-Link card.
Correct the switch/parameter settings for the CC-Link card.
Details
The sequence program has an illegal code.
Remedy
Correct any illegal device Nos. or constants in the sequence program.
Details
The "emergency stop" signal for power supply is significant (open) because the external emergency stop func tion for power supply is enabled.
Remedy
Cancel the "emergency stop" signal.
Check for any broken wires.
EMG Emergency stop LINK
EMG Emergency stop WAIT
EMG Emergency stop XTEN
EMG Emergency stop LAD
EMG Emergency stop CVIN

Details
The contactor shutoff test is being executed.
Remedy
The emergency stop is reset automatically after the contactor shutoff is confirmed.
If the contactor shutoff is not confirmed within 5 seconds after the "contactor shutoff test" signal has been in put, the "contactor welding detected" alarm occurs and the emergency stop status remains.
Make sure that the contactor's auxiliary b contact signal is correctly output to the device that is set in "#1330
MC_dp1" and "#1331 MC_dp2" (Contactor weld detection device 1 and 2), and then turn the power ON again.
Details
The data backup for power failure might not have been executed successfully at the previous power failure.
Remedy
If this message appears frequently, the power supply may be deteriorated. Contact the service center.
Details
The encoder replacement operation is in progress.
Remedy
Complete the encoder replacement operation on the "ABS. POSITION SET" screen.
EMG Emergency stop MCT
EMG Emergency stop IPWD
EMG Emergency stop ENC

Computer Link Errors (L)

9Computer Link Errors (L)
Details
Communication ended with timeout.
(CNC has a 248-byte receive buffer. The time during which CNC receives 248 bytes exceeds the "TIME-OUT"
value set in the I/O device parameter.)
Remedy
Set a greater timeout value in the input/output device parameter.
Check the software in HOST and make sure that the HOST transmits data in response to DC1 (data request)
from CNC.
Set "#9614 START CODE" to "0".
Details
ER signal in HOST (or DR signal in CNC) is not turned ON.
Remedy
Check for any disconnected cable.
Check for any broke wire.
Make sure that the HOST power is turned ON.
Details
Communication ended with parity H.
Remedy
Check the software in HOST and make sure that the data to be transmitted to CNC is ISO code.
Details
Communication ended with parity V.

Remedy
Correct the data to transmit to CNC.
Details
CNC received 10 bytes or more data from HOST in spite of DC3 (request to stop data transfer) transmission
from CNC to the HOST, which terminated the communication.
CNC received 10 bytes or more data from HOST during the data transmission from CNC to the HOST.
Remedy
Check the software in HOST and make sure that the HOST stops transmitting data within 10 bytes after re ceiving DC3.
Correct the software in HOST not to transmit data such as a command or header to CNC during receiving a
machining program.
L01 Timeout error 0004
L01 Host ER signal OFF 0010
L01 Parity H error 0015
L01 Parity V error 0016
L01 Overrun error 0017

(Note) U10 Illegal PLC (User PLC is illegal)
- "xx" in the lower 16 bits of the sub-status 1 indicates the program No. (0x01 to 0x78(in the hexadecimal
form))
- The sub-alarm No. "yy" of sub- status 1 indicates the project No. ("yy" is not displayed when the maximum
number of projects is 1)
(Note) For details of user PLC alarms, refer to "PLC Development Manual".
Details
No sequence program is included in the built-in ROM or temporary memory area.
(1) Sequence program is not stored in the built-in ROM.
(2) Sequence program is not written from the GX Developer/GX Works2 or internal PLC edit function.
(3) Sequence program cannot be read due to broken built-in ROM.
(4) No large capacity PLC additional specifications.
Remedy
(1) Write the sequence program from the GX Developer/GX Works2 or internal PLC edit function, and then ex ecute the built-in ROM writing.
(2) Check the presence of additional specification "Large PLC capacity" and reconsider the storable size.
(3) If (1) or (2) does not solve the problem, there is a possibility that built-in ROM is broken.
Details
Software instruction interruption illegal
An error was found in data for the sequence program in execution.
(1) Sequence program stored in the built-in ROM is broken.
(2) Sequence program under development (before writing into F-ROM) is broken.
Remedy
Contact Mitsubishi Electric.
Details
A H/W error was detected during the PLC execution.
Remedy
Contact Mitsubishi Electric.
Details
The PLC system execution preparation failed.
Remedy
Contact Mitsubishi Electric.
Details
Number of ladder over (at PLC system startup)
The total number of "ladder files" stored in built-in ROM exceeded the maximum.
Remedy
Write "sequence program", "comment file", "PLC message file", and "symbolic information file" again.
U01 No user PLC - -
U10 Illegal PLC 0x04xx.yy Step No.
U10 Illegal PLC 0x100* -
U10 Illegal PLC 0x110* -
U10 Illegal PLC 0x120* -

Details
Number of data over (at PLC system startup)
The total number of "comment files", "PLC message files", and "symbolic information files" stored in built-in
ROM exceeded the maximum.
Remedy
Remedy the error in either of the following methods.
(1) Select [Format PLC memory] with GX Developer/GX Works2 and format the memory after setting [Target
memory] to [Memory card(RAM)]. After that, write "comment file", "PLC message file", and "symbolic infor mation file" again.
(2) Create a ladder with [Add New Data] in built-in PLC editing function and execute "Format". After that, write
"sequence program", "comment file", "PLC message file", and "symbolic information file" again.
Details
Label branching error (Before executing PLC)
Occurs only when the bit selection parameter (#6452 bit6) "branch destination label check valid" is set to "1".
(1) The CJ and CALL instructions were placed to a nonexistent label.
(2) The CJ instruction was placed to the global label. (Branching is possible only with the CALL instruction.)
Remedy
Check the branch destination of the CJ and CALL instructions existing in the steps occurred.
Details
Label duplication error (Before executing PLC)
(1) When using the multi-programming method:
- Labels of common pointer are duplicated.
- Labels of local pointer are duplicated within the same file.

(2) When using the independent program method, labels are duplicated.
Remedy
Correct the duplication of the labels existing in the steps occurred.
Details
Local label over (Before executing PLC)
(*) "Local label" is as "labels of local pointer".
The boundary value set with the PC parameter (common pointer boundary value) has been exceeded by the total number of labels of local pointer.
Remedy
(1) Reduce the number of local labels used.
- Use as sequentially as possible from P0.
(2) Reset the PC parameter (common pointer boundary value).
Details
Global label boundary value error (Before executing PLC)
(*) "Global label" is as "labels of common pointer".
The content of PC parameter (common pointer boundary value) is not normal.
(1) When using the multi-programming method, a value greater than the maximum value is set.
(2) When using the independent program method, the label boundary value of common pointer is set.
Remedy
(1) When using the multi-programming method, correct the common pointer boundary value to an appropriate value.
(2) When using the independent program method, delete the common pointer boundary value.
U10 Illegal PLC 0x130* -
U10 Illegal PLC 0x20xx.yy Step No.
U10 Illegal PLC 0x21xx.yy Step No.
U10 Illegal PLC 0x22xx.yy -
U10 Illegal PLC 0x230*.yy -

Details
Reserved label error (Before executing PLC)
(1) When using the multi-programming method, disabled reserved label exists.
(2) When using the independent program method, reserved labels are duplicated.
Remedy
(1) When using the multi-programming method, delete the reserved label.
(2) When using the independent program method:
- Delete the PC parameter program settings.
- Correct the duplication of reserved labels.
Details
Program setting error (Before executing PLC)
(1) When using the multi-programming method, PC parameter setting is not correct.
- PC parameter (program setting) is not set.
- Unstored program name is set.
- The contents of the program name is abnormal.
- More than the maximum number of programs that can be set (120 programs) are set.
(2) When using the independent program method, multiple programs are stored.
(3) When the multi-project is valid, the sum of all projects exceeds the number of the programs which can be set (120 programs).
Remedy
(1) When using the multi-programming method, check the PC parameter program settings.
- Check the program settings.
- Check the program name stored in the NC.
- Review the program name and rename it if necessary.
 e.g. The program name and the M device number in the PLC program are overlapped.
- Set the number to 120 or less.
(2) When using the independent program method:
- Store only one program file.
(3) When the multi-project is valid, set the number of programs that can be set to be less than 120 programs as the sum of all projects.
Details
RET instruction error
(1) RET instruction was not executed at the branch destination of the CALL instruction.
(2) RET instruction was executed without execution of CALL instruction.
Remedy
Check the following matters for the entire sequence program to be executed.
(1) Check if RET instruction is programmed at the end of sub-routine.
(2) Check if diverged to the other operation in the middle of sub-routine and RET instruction is not executed.
(3) Check if jumped to the END reservation label (P4005) in the middle of sub-routine.
(4) Check if there is delimiter (FEND instruction) between adjacent program and sub-routine program.
U10 Illegal PLC 0x24xx.yy Step No.
U10 Illegal PLC 0x25xx.yy -
U10 Illegal PLC 0x26xx.yy -

Details
Ladder code error (Before executing PLC)
An error was found in data for the sequence program to be executed.
(1) Disabled PLC instruction is used.
(2) Devices/labels are used for indexes in array labels.
(3) Sequence program stored in the built-in ROM is broken.
(4) Sequence program under development (before writing into the built-in ROM) is broken.
Remedy
(1) Check the sequence programs and delete disabled PLC commands.
(2) When devices/labels are used for indexes in array labels, set "#4671/bit1" to "1".
(3)(4) Transferring, storing and ROM writing of the sequence program must be re-executed with the GX Devel oper or PLC onboard edit function.
Details

No main processing ladders (Before executing PLC)
Main processing program to be executed cannot be identified.
(1) When using the multi-programming method, main processing "scan" is not set in the PC parameter (pro gram setting).
(2) When using the independent program method, no reservation ladder for the main processing ladder is avail able.
Remedy
(1) When using the multi-programming method, check the PC parameter program settings.
(2) When using the independent program method, add the reservation label (P4002) for the medium speed lad der.
Details
Execution area over (Before executing PLC)
The total number of steps for the ladder to be executed has exceeded the size of PLC processor execution
area.
Remedy
Check the PC parameter (program setting) and set so that the total number of steps for the ladder to be exe cuted does not exceed the PLC processor execution area.
Details
FOR instruction nesting over
17th level of nesting for FOR instruction was executed.
Remedy
Check the number of FOR instruction's nesting depth in the steps to which the error occurred, and limit the num ber to 16 or less.
Details
NEXT instruction error
(1) NEXT instruction was executed before FOR instruction.
(2) After FOR instruction, END (FEND) was executed before NEXT instruction.
Remedy
(1) Check and correct the NEXT instruction in the step to which the error occurred.
(2) Check and correct the ladder circuit of the program to which the error occurred. (Note that the step No. at
the error position is displayed as "0".)
- Check if JMP,CALL,CJ instructions were executed between FOR and NEXT instruction, and NEXT in struction was jumped.
- Check if FOR instruction and NEXT instruction are all paired.
U10 Illegal PLC 0x27xx.yy Step No.
U10 Illegal PLC 0x280* -
U10 Illegal PLC 0x29xx.yy -
U10 Illegal PLC 0x30xx.yy Step No.
U10 Illegal PLC 0x31xx.yy Step No.

Details
BREAK instruction error
BREAK was executed outside the range between FOR and NEXT instruction.
Remedy
Check and correct the BREAK instruction in the step to which the error occurred.
Details
Structured ladder error
When sequence programs created using structured project are executed.
Remedy
Check if the target sequence program is not created using structured project.
Details
Data command range error
Description of specified device exceeds command range set on each instruction.
Remedy
Check and correct the usage of instructions existing in the steps occurred.
Details
Real number calculation data error
When descriptions of specified device are the following values.
Outside the range of the following
[single float] 2 to the power of -126 Specified device < 2 to the power of 128
[double float] 2 to the power of -1022 Specified device < 2 to the power of 1024
-0, Denormalized number, Non-number,
Remedy
Check and correct the usage of instructions existing in the steps occurred.
Details
Real number calculation data error
When the real number calculation result exceeds the following range.
[single float] Calculation result < 2 to the power of 128
[double float] Calculation result < 2 to the power of 1024
Remedy
Check and correct the usage of instructions existing in the steps occurred.
Details
PLC system error
Remedy
Contact Mitsubishi Electric.
U10 Illegal PLC 0x32xx.yy Step No.
U10 Illegal PLC 0x33xx.yy -
U10 Illegal PLC 0x34xx.yy Step No.
U10 Illegal PLC 0x35xx.yy Step No.
U10 Illegal PLC 0x36xx.yy Step No.
U10 Illegal PLC 0x400* -

Details
Maximum project No. illegal (at PLC system startup)
Multi-project parameter setting is illegal (due to the following reason).
The value outside the setting range (1 to number of usable project) was detected.
Remedy
(1) Check the presence of the expansion project additional specification and reconsider the setting range.
(2) The multi-project parameter (maximum project No.) setting is illegal. Set the multi-project parameter again.
(3) If (1) or (2) does not solve the problem, there is a possibility that the NC system is broken. Contact Mitsubishi

Electric.
Details
Project ratio illegal
Multi-project parameter setting is illegal (due to the following reason).
It was detected that the total of ratios of all projects was outside the range from 0 to 100.
Remedy
(1) The multi-project parameter (project ratio) setting is illegal. Set the multi- project parameter again.
(2) If (1) does not solve the problem, there is a possibility that the NC system is broken. Contact Mitsubishi
Electric.
Details
Temporary memory area over (at the PLC system startup)
Multi-project parameter setting is illegal (due to the following reason).
The ratio to which the area after the project ratio setting is smaller than the size of ladder stored in the tempo rary memory area was detected.
Remedy
(1) Check the presence of the large-capacity PLC additional specification and reconsider the size that can be
stored.
(2) The multi-project parameter (project ratio) setting is illegal. Set the multi- project parameter again.
(3) If (1) or (2) does not solve the problem, there is a possibility that the NC system is broken. Contact Mitsubishi
Electric.
Details
Built-in ROM area over (at the PLC system startup)
Multi-project parameter setting is illegal (due to the following reason).
The ratio to which the area after the project ratio setting is smaller than the size of ladder stored in the built-in
ROM area was detected.
Remedy
(1) Check the presence of the large-capacity PLC additional specification and reconsider the size that can be
stored.
(2) The multi-project parameter (project ratio) setting is illegal. Set the multi- project parameter again.
(3) If (1) or (2) does not solve the problem, there is a possibility that the NC system is broken. Contact Mitsubishi
Electric.
U10 Illegal PLC 0x500* -
U10 Illegal PLC 0x510* -
U10 Illegal PLC 0x520* -
U10 Illegal PLC 0x530* -

Details
Comment area over (at the PLC system startup)
Multi-project parameter setting is illegal (due to the following reason).
The ratio to which the area after the project ratio setting is smaller than the size of comment and message
stored in the built-in ROM area.
Remedy
(1) The multi-project parameter (project ratio) setting is illegal. Set the multi- project parameter again.
(2) If (1) does not solve the problem, there is a possibility that the NC system is broken. Contact Mitsubishi
Electric.
Details
Execution project illegal (at the PLC system startup)
Multi-project parameter setting is illegal (due to the following reasons).
The value outside the setting range (ON/OFF) was detected.
All execution projects are OFF.
Remedy
(1) The multi-project parameter (execution project) setting is illegal. Set the multi-project parameter again.
(2) If (1) does not solve the problem, there is a possibility that the NC system is broken. Contact Mitsubishi
Electric.
Details
Project execution order illegal (at the PLC system startup)
Multi-project parameter setting is illegal (due to the following reasons).
The value outside the setting range (1 to 6) was detected.
The redundant project execution order number was detected.
Remedy
(1) The multi-project parameter (project execution order) setting is illegal. Set the multi-project parameter
again.
(2) If (1) does not solve the problem, there is a possibility that the NC system is broken. Contact Mitsubishi
Electric.
Details
Parameter setting illegal for the number of common device points (at PLC system startup)
Multi-project parameter setting is illegal (due to the following reasons).
The value outside the setting range (0 to the minimum number of points in all projects) was detected.
It was detected that the number of points was not a multiple of 16.
Remedy
(1) Check the presence of the expansion project additional specification and reconsider the setting range.
(2) The multi-project parameter setting is illegal. Set the multi-project parameter again.
(3) If (1) or (2) does not solve the problem, there is a possibility that the NC system is broken. Contact Mitsubishi
Electric.
U10 Illegal PLC 0x540* -
U10 Illegal PLC 0x550* -
U10 Illegal PLC 0x560* -
U10 Illegal PLC 0x570* -

Details
Parameter setting illegal for number of device points (at PLC system startup)
The parameter setting for the number of device points is illegal (due to the following reasons).
The total number of points in one project 29K or more was set.
The illegal value (-1 point or less, or 61441 points or more) for the number of device points was detected.
It was detected that the number of device points was not a multiple of 16.

The number outside the usable number of device points in whole projects was detected.
Remedy
(1) The parameter setting for the number of device points is illegal. Set the parameter of the number of device points again and reboot the system.
(2) If (1) does not solve the problem, there is a possibility that the NC system is broken. Contact Mitsubishi Electric.
Details
Caution; Ladder program writing during RUN is disabled (In independent program method)
With RUN write ON, sequence program is operated in independent program method. Run write is not available with this condition.
Remedy
The ladder program writing (RUN write) can not be used in independent program method.
Disable RUN write, or change the method into multi-program one.
Details
Caution; Ladder program writing during RUN is disabled (common pointer is used in high-speed processing)
With RUN write is ON, high-speed program with common pointer is running. RUN write is not available with this condition.
Remedy
RUN write is not available when high-speed processing with common pointer is running. Change the high speed processing program to the one without common pointer.
Details
Caution; Ladder program writing during RUN is disabled (high-speed processing size is exceeding)
With RUN write ON, the execution size of high-speed processing program has exceeded 4000 steps. RUN write is not available with this condition.
Remedy
RUN write is not available when execution size of high-speed processing program exceeds 4000 steps. Edit the high-speed processing program to reduce the execution size to 4000 steps or less.
(When multi-project is valid, edit the program to reduce the execution size to 4000 steps or less in total of all the project.)
Details
Caution; Ladder program writing during RUN is disabled (number of labels in high-speed processing is beyond the capacity)
(*) "Local label" is as "labels of local pointer".
With RUN write ON, the number of labels of local pointer in high-speed processing program has exceeded 256.
RUN write is not available with this condition.
Remedy
RUN write is not available when the number of labels of local pointer in high-speed processing program ex ceeds 256. Edit the high-speed program to reduce the number of labels of local pointer to less than 256.
(When multi-project is valid, edit the program to reduce the number of labels of local pointer to less than 256 per project.)
U10 Illegal PLC 0x580*.yy -
U10 Illegal PLC 0x700*.yy -
U10 Illegal PLC 0x71xx.yy Step No.
U10 Illegal PLC 0x720* -
U10 Illegal PLC 0x730*.yy -

Details
Software exceptional interruption (BCD instruction error) has occurred.
With BCD and DBCD instructions, BIN value outside its input range was attempted to be converted into BCD.
Remedy
Check the usage of BCD, DBCD instructions existing in the steps occurred.
Details
Software exceptional interruption (BIN instruction error) has occurred.
With BIN and DBIN instructions, BCD value outside its input range was attempted to be converted into BIN.
Remedy
Check the usage of BIN, DBIN instructions existing in the steps occurred.
Details
Software exceptional interruption (Bus error) has occurred.
When the specified device exceeds the range of the device
Remedy
(1) Check and correct the device range that the instruction in the step of which the error occurred accesses.
(2) Contact Mitsubishi Electric.
Details
Software exceptional interruption (Unmounted instruction error) has occurred.
(1) When the bit selection parameter (#6452 bit6) "branch destination label check valid" is set to "0", jumped to an undefined label.
(2) Sequence program in execution is broken.
Remedy
(1) Set the bit selection parameter (#6452 bit6) "branch destination label check valid" to "1" and check the branching step to the undefined label.
(2) Contact Mitsubishi Electric.
Details
Software exceptional interruption (Instruction format error) has occurred.
Remedy
Contact Mitsubishi Electric.
Details
Software exceptional interruption (Instruction bus error) has occurred.
(1) When the bit selection parameter (#6452 bit6) "branch destination label check valid" is set to "0", jumped to an undefined label.
(2) Sequence program in execution is broken.
Remedy
(1) Set the bit selection parameter (#6452 bit6) "branch destination label check valid" to "1" and check the branching step to the undefined label.
(2) Contact Mitsubishi Electric.
Details
Software exceptional interruption (CALL/RET instruction error) has occurred.
Remedy
Contact Mitsubishi Electric.

U10 Illegal PLC 0x80xx.yy Step No.
U10 Illegal PLC 0x81xx.yy Step No.
U10 Illegal PLC 0x82xx.yy Step No.
U10 Illegal PLC 0x83xx.yy Step No.
U10 Illegal PLC 0x84xx.yy Step No.
U10 Illegal PLC 0x85xx.yy Step No.
U10 Illegal PLC 0x86xx.yy Step No.

Details
Software exceptional interruption (memory area error) has occurred.
Remedy
Contact Mitsubishi Electric.
Details
Software exceptional interruption (ASYNC BUS error) has occurred.
Remedy
Contact Mitsubishi Electric.
Details
The ladder is stopped.
Remedy
Run the PLC.
Details
The ladder is stopped and the edited sequence program is not stored in the built-in ROM.
(The contents of temporary memory area and sequence program in the built-in ROM are mismatched.)
Remedy
Run the PLC.
Use GX Developer/GX Works2 or the built-in PLC edit function to perform write to the built-in ROM.
Details
The edited sequence program is not stored in the built-in ROM.
(The contents of temporary memory area and sequence program in the built-in ROM are mismatched.)
Remedy
Use GX Developer/GX Works2 or the built-in PLC edit function to perform write to the built-in ROM.
U10 Illegal PLC 0x87xx.yy Step No.
U10 Illegal PLC 0x8Bxx.yy Step No.
U50 PLC stopped
U55 PLC stopped / is not saved
U60 Ladder is not saved

11

11Network Service Errors (N)
Details
An error occurred in the modem connection at the power ON.
Remedy
Check the connection between the NC and modem, connection port and power supply to modem.
Details
The number of redials exceeded due to the dial transmission failure.
Remedy
Wait a while, and then dial again.
Details
The phone line is not connected.
Remedy
Check for any disconnection in the modem's phone line.
Details
An error other than the above occurred during communication.
Remedy
Note down how the error occurred and contact the service center.
Details
The modem connection port is being used for another function such as input/output.
The modem connection port settings are incorrect.
Remedy
Stop using the modem connection port with the other function, and then turn the power ON again.
Correct the settings of the modem connection port.
Details
A diagnosis data file has been received.
Remedy
Clear the message.
Details
A file larger than Anshin-net server capacity (64Kbyte) has been transmitted in machining data sharing.
Remedy
Reduce the size of machining program file so that it won't exceed the capacity of Anshin-net server.
Details
The file reception failed in machining data sharing because no file exists on Anshin-net server.
Remedy
Confirm that a machining program file exists on Anshin-net server before receiving it.
N001 Modem initial error
N002 Redial over
N003 TEL unconnect
N004 Net communication error
N005 Invalid net communication
N006 Received result of diagnosis

N007 Send data size over
N008 No file on server

Details
The file reception failed in machining data sharing due to a wrong password.
Remedy
Input the password again.
Details
The file reception failed in machining data sharing due to a wrong customer number.
Remedy
Input the customer number again.
Details
The file reception failed in machining data sharing because the size of the file to be received is bigger than
free space in the NC.
Remedy
Ensure sufficient free space in the NC.
Details
A file on Anshin-net server cannot be deleted in machining data sharing.
Remedy
Confirm that the file exists on Anshin-net server.
Note down how the error occurred and contact the service center.
N009 Password error
N010 Customer number error
N011 Storage capacity over
N012 File deletion error

12

12Program Errors (P)
These alarms occur during automatic operation and the causes of these alarms are mainly program errors which
occur for instance when mistakes have been made in the preparation of the machining programs or when programs
which conform to the specification have not been prepared.
Details
The number of axis addresses programmed in a block exceeds the specified maximum.
Remedy
Divide the command programmed in the block into two blocks.
Check the specifications.
Details
The axis address commanded by the program does not match any of the ones set by the parameter.
Remedy
Correct the axis names in the program.
Details
The issued axis command cannot be divided by the command unit.
A cutting feed command has been issued to the index table indexing axis when the parameter "#2580 index_
Gcmd" is set to "1".
Remedy
Correct the program.
Details
The command has been issued when it is impossible.
The normal line control command (G40.1, G41.1, G42.1) has been issued during the modal in which the nor mal line control is not acceptable.
The command has been issued during the modal in which the two-part system simultaneous thread cutting is
not acceptable.
A workpiece coordinate system preset command (G92.1) has been issued during tool length compensation,
nose R compensation or tool radius compensation.
Remedy
Correct the program.
Details
The number of holes per character on the paper tape is even for EIA code and odd for ISO code.
Remedy
Check the paper tape.
Check the tape puncher and tape reader.
Details
The number of characters per block on the paper tape is odd.
Remedy
Make the number of characters per block on the paper tape even.
Set the parameter parity V selection OFF.
P10 No. of simultaneous axes over
P11 Illegal axis address
P20 Division error
P29 Not accept command
P30 Parity H error
P31 Parity V error

Details
An address not listed in the specifications has been used.
Remedy
Correct the program address.
Correct the parameter settings.

Check the specifications.
Details
The command format in the program is not correct.
Remedy
Correct the program.
Details
The commanded G code is not in the specifications.
An illegal G code was commanded during the coordinate rotation command.
G51.2 or G50.2 was commanded when the rotary tool axis No. (the parameter "#1501polyax") was set to "0".
G51.2 or G50.2 was commanded when the tool axis was set to the linear axis (the parameter "#1017 rot" = 0).
Remedy
Check and correct the G code address in the program.
Check the parameter setting values.
Details
The setting range for the addresses has been exceeded.
Remedy
Correct the program.
Details
"EOR" has been read during tape and memory mode.
Remedy
Enter the M02 and M30 command at the end of the program.
Enter the M99 command at the end of the subprogram.
Details
"0" has been specified for program or sequence No.
Remedy
Designate program Nos. within a range from 1 to 99999999.
Designate sequence Nos. within a range from 1 to 99999999.
Details
"/n" has been issued while the optional block skip addition is not in the specifications.
Remedy
Check the specifications.
P32 Illegal address
P33 Format error
P34 Illegal G code
P35 Setting value range over
P36 Program end error
P37 O, N number zero
P38 No spec: Add. Op block skip

Details
A non-specified G code was commanded.
The selected operation mode is out of the option setting.
The selected operation mode is out of the parameter setting.
Remedy
Check the specifications.
Check the parameter setting values.
Details
When tool radius compensation is executed, there is an error in the pre-read block and so the interference
check is disabled.
Remedy
Reconsider the program.
Details
The combination of G codes in a block is inappropriate.
A part of unmodal G codes and modal G codes cannot be commanded in a same block.
Remedy
Correct the combination of G codes.
Separate the incompatible G codes into different blocks.
Details
A travel command other than G00 (positioning) was issued when all the following conditions were met.
Parameter "#1247 set19/bit0" (Movement by tool length compensation command) is "1"
Multiple-axis synchronization control is active
Tool length compensation is not yet applied after G43 H** command (without axis position command)
Remedy
When using tool length compensation during Multiple-axis synchronization control, issue a positioning com mand (G00) before performing cutting.
Details
A travel command was issued before the execution of the block that had been restart-searched.
Remedy
Carry out program restart again.
Travel command cannot be executed before the execution of the block that has been restart-searched.
Details
Restart search was attempted for a block that comes after any of the following command blocks:
3-dimensional circular interpolation, cylindrical interpolation, polar coordinate interpolation, milling interpola tion, tool center point control, tool cutting point control, simple tool center point control, inclined surface machin ing, simple inclined surface machining, workpiece installation error compensation, axis name switch, mixed
control, sub part system control I, sub part system control II, direct command mode, or arbitrary axis exchange
control.
Remedy
Modify the position for restart search.
Details
Inch/Metric changeover (G20/G21) command was issued while the function is out of specifications.
Remedy
Check the specifications.
P39 No specifications
P40 Pre-read block error
P45 G code combination error
P46 Cutting command invalid
P48 Restart pos return incomplete

P49 Invalid restart search
P50 No spec: Inch/Metric change

Details
The commanded movement distance is excessive (over 231).
Remedy
Correct the command range for the axis address.
Details
Unidirectional positioning (G60) was commanded while the function is out of specifications.
Remedy
Check the specifications.
Details
No feed rate command has been issued.
There is no F command in the cylindrical interpolation or polar coordinate interpolation immediately after the G95 mode is commanded.
Remedy
The default movement modal command at power ON is G01. This causes the machine to move without a G01 command if a movement command is issued in the program, and an alarm results. Use an F command to specify the feed rate.
Specify F with a thread lead command.
Details
High-speed mode III (G05 P3) was commanded while the function is out of specifications.
Remedy
Check whether the specifications are provided for the high-speed mode III.
Details
F's value in an F or ",F" command is exceeding the command range.
Remedy
Check and correct F or ",F" command in the program.
Details
There is an error in the arc start and end points as well as in the arc center.
The difference of the involute curve through the start point and the end point is large.
When arc was commanded, one of the two axes configuring the arc plane was a scaling valid axis.
Remedy
Correct the numerical values of the addresses that specify the start and end points, arc center as well as the radius in the program.
Correct the "+" and "-" directions of the address numerical values.
Check for the scaling valid axis.
Details
An arc center cannot be obtained in R-specified circular interpolation.
A curvature center of the involute curve cannot be obtained.
Remedy
Correct the numerical values of the addresses in the program.
Correct the start and end points if they are inside of the base circle for involute interpolation. When carrying out tool radius compensation, make sure that the start and end points after compensation will not be inside of the base circle for involute interpolation.
Correct the start and end points if they are at an even distance from the center of the base circle for involute interpolation.
P60 Compensation length over
P61 No spec: Unidirectional posit.
P62 No F command
P65 No spec: High speed mode 3
P67 F value is exceeding the limit
P70 Arc end point deviation large
P71 Arc center error

Details
A helical command has been issued though it is out of specifications.
Remedy
Check whether the specifications are provided for the helical cutting.
An Axis 3 command has been issued by the circular interpolation command. If there is no helical specification, move the linear axis to the next block.
Details
A spiral command was issued though it is out of specifications.
Remedy
Issue the G02.1 and G03.1 commands for circular interpolation.
Check whether the specifications are provided for the spiral cutting.
Details
The 3-dimension circular cannot be obtained because the end block was not specified during 3-dimension cir cular interpolation supplementary modal.
The 3-dimension circular cannot be obtained due to an interruption during 3-dimension circular interpolation supplementary modal.
Remedy
Correct the program.
Details
An illegal G code was issued during 3-dimension circular interpolation modal.
Otherwise, 3-dimension circular interpolation command was issued during a modal for which a 3-dimension cir cular interpolation command cannot be issued.
Remedy
Correct the program.
Details
G02.4/G03.4 was commanded though there is no 3-dimension circular interpolation specification.
Remedy
Check the specifications.
Details
A thread cutting command was issued though it is out of specifications.
Remedy

Check the specifications.
Details
An illegal thread lead (thread pitch) was specified at the thread cutting command.
Remedy
Correct the thread lead for the thread cutting command.
Details
A cylindrical interpolation command was issued though it is out of specifications.
Remedy
Check the specifications.
P72 No spec: Herical cutting
P73 No spec: Spiral cutting
P74 Can't calculate 3DIM arc
P75 3DIM arc illegal
P76 No spec: 3DIM arc interpolat
P90 No spec: Thread cutting
P93 Illegal pitch vaule
P100 No spec: Cylindric interpolat

Details
Plane selection (G17/G18/G19) was commanded during figure rotation.
Remedy
Correct the machining program.
Details
Plane selection commands (G17, G18, G19) were issued during a coordinate rotation was being commanded.
Remedy
Always command coordinate rotation cancel after the coordinate rotation command, and then issue a plane selection command.
Details
Plane selection commands (G17, G18, G19) were issued while tool radius compensation (G41, G42) and nose R compensation (G41, G42, G46) commands were being issued.
Plane selection commands were issued after completing nose R compensation commands when there were no further axis movement commands after G40, and compensation has not been cancelled.
Remedy
Issue plane selection commands after completing (axis movement commands issued after G40 cancel com mand) tool radius compensation and nose R compensation commands.
Details
The circular command axis does not correspond to the selected plane.
Remedy
Select a correct plane before issuing a circular command.
Details
The axis specified in the fixed cycle for turning machining does not coincide with the selected plane.
One or both of the selected plane axes have no travel when the fixed cycle for turning machining is command ed.
Remedy
Correct the plane selection before issuing the fixed cycle for turning machining.
Correct the program so that the two axes of the selected plane are involved in the movement of the fixed cycle for turning machining.
Details
Feed per rotation (G95) was commanded though it is out of specifications.
Remedy
Check the specifications.
Details
F0 (F 1-digit feed) was commanded during the arc modal (G02/G03).
Remedy
Correct the machining program.
Details
An auto corner override command (G62) was issued though it is out of specifications.
Remedy
Check the specifications.
Delete the G62 command from the program.
P110 Plane select during figure rot
P111 Plane selected while coord rot
P112 Plane selected while R compen
P113 Illegal plane select
P114 Plane axis command error
P120 No spec: Feed per rotation
P121 F0 command during arc modal
P122 No spec: Auto corner override

Details
High-accuracy control command was issued though it is out of specifications.
Remedy
Check the specifications.
Details
The inverse time option is not provided.
Remedy
Check the specifications.
Details
The issued G code command is illegal during G93 mode.
G93 command was issued during a modal for which inverse time feed cannot be performed.
Remedy
Correct the program.
Details
An illegal command was issued during the high-accuracy control mode.
A G code group 13 command was issued during the high-accuracy control mode.
Milling, cylindrical interpolation or pole coordinate interpolation was commanded during the high-accuracy

control mode.
Remedy
Correct the program.
Details
The SSS control valid parameter has been set although there is no SSS control specification.
Remedy
Check the specifications. Set "#8090 SSS ON" to "0" when there is no SSS control specification.
Details
Machining condition selection I was commanded during the mode where the selection command is unavailable.
Remedy
Check the program and see whether any unavailable mode is included during machining condition selection
I. If any, cancel that mode.
Details
Both the high-accuracy control mode and high-speed machining mode are commanded simultaneously in a
part system where the simultaneous use of the two modes is disabled.
Remedy
Correct the setting of "#8040 High-speed high-accuracy control-enabled part system".
Correct the machining program so that the high-accuracy control mode is not used together with high-speed
machining mode.
Details
The 2nd miscellaneous function address, commanded in the program, differs from the address set in the pa rameters.
Remedy
Correct the 2nd miscellaneous function address in the program.
P123 No spec: High-accuracy control
P124 No spec: Inverse time feed
P125 G93 mode error
P126 Invalid cmnd in high-accuracy
P127 No spec: SSS Control
P128 Machin condtn select I disable
P129 Hi-speed Hi-accuracy both ON
P130 2nd M function code illegal

Details
A constant surface speed control command (G96) was issued though it is out of specifications.
Remedy
Check the specifications.
Issue a rotation speed command (G97) instead of the constant surface speed control command (G96).
Details
No spindle rotation speed command has been issued.
Remedy
Correct the program.
Details
The illegal No. was specified for the constant surface speed control axis.
Remedy
Correct the parameter settings and program that specify the constant surface speed control axis.
Details
The constant surface speed control command (G96) was issued without commanding the spindle speed clamp
(G92/G50).
Remedy
Press the reset key and carry out the remedy below.
Check the program.
Issue the G92/G50 command before the G96 command.
Command the constant surface speed cancel (G97) to switch to the rotation speed command.
Details
The position compensation command (G45 to G48) is out of specifications.
Remedy
Check the specifications.
Details
Position compensation was commanded during the figure rotation or coordinate rotation command.
Remedy
Correct the program.
Details
Position compensation cannot be executed with the issued arc command.
Remedy
Correct the program.
Details
Tool radius compensation commands (G41 and G42) were issued though they are out of specifications.
Nose R compensation commands (G41, G42, and G46) were issued though they are out of specifications.
Remedy
Check the specifications.
P131 No spec: Cnst surface ctrl G96
P132 Spindle rotation speed S=0
P133 Illegal P-No. G96
P134 G96 Clamp Err.
P140 No spec: Pos compen cmd
P141 Pos compen during rotation
P142 Pos compen invalid arc
P150 No spec: Nose R compensation

Details
A compensation command (G40, G41, G42, G43, G44, or G46) has been issued in the arc modal (G02 or G03).
Remedy
Issue the linear command (G01) or rapid traverse command (G00) in the compensation command block or
cancel block.

(Set the modal to linear interpolation.)
Details
In interference block processing during execution of a tool radius compensation (G41 or G42) or nose R com pensation (G41, G42, or G46) command, the intersection point after one block is skipped cannot be deter mined.
The 3-dimensional tool radius compensation value (tool vertical direction compensation) (G41.2 or G42.2)
cannot be determined.
Remedy
Correct the program.
Details
An interference error has occurred while the tool radius compensation command (G41 or G42) or nose R com pensation command (G41, G42 or G46) was being executed.
Remedy
Correct the program.
Details
A three-dimensional compensation command was issued though it is out of specifications.
Remedy
Check the specifications.
Details
A fixed cycle command has been issued in the radius compensation mode.
Remedy
Issue a radius compensation cancel command (G40) to cancel the radius compensation mode that has been
applied since the fixed cycle command was issued.
Details
A shift vector with undefined compensation direction was found at the start of G46 nose R compensation.
Remedy
Change the vector to that which has the defined compensation direction.
Change the tool to that which has a different tip point No.
Details
During G46 nose R compensation, the compensation direction is reversed.
Remedy
Change the G command to that which allows the reversed compensation direction (G00, G28, G30, G33, or
G53).
Change the tool to that which has a different tip point No.
Enable "#8106 G46 NO REV-ERR".
P151 Radius compen during arc mode
P152 No intersection
P153 Compensation interference
P154 No spec: 3D compensation
P155 Fixed cyc exec during compen
P156 R compen direction not defined
P157 R compen direction changed

Details
An illegal tip point No. (other than 1 to 8) was found during G46 nose R compensation.
Remedy
Correct the tip point No.
Details
3-dimensional tool radius compensation (tool vertical direction compensation) is not included in the specifica tions.
Remedy
Check the specifications.
Details
A command (G or T command, etc.) was issued during 3-dimensional tool radius compensation (tool vertical
direction compensation), although it is disabled during the compensation.
Remedy
Cancel 3-dimensional tool radius compensation (tool vertical direction compensation).
Details
3-dimensional tool radius compensation (tool vertical direction compensation) was commanded in a mode
where the command is disabled.
Remedy
Cancel the mode that disables the command.
Details
No compensation No. (DOO, TOO or HOO) command was given when the radius compensation (G41, G42,
G43 or G46) command was issued. Otherwise, the compensation No. is larger than the number of sets in the
specifications.
H99 or D99 is commanded with the parameter "#1227 aux11/bit1" enabled when the length compensation
method and radius compensation method are set to "1" or "2" for the M system tool life management II.
Remedy
Add the compensation No. command to the compensation command block.
Check the number of sets for the tool compensation Nos. and correct the compensation No. command to be
within the number of sets.
H99 and D99 commands cannot be used when the length compensation method and radius compensation
are set to "1" or "2". Set the length compensation method and radius compensation method to "0".
Details
Compensation data input by program (G10) was commanded though it is out of specifications.
Remedy
Check the specifications.
Details
An address of G10 command is not correct.
Remedy
Correct the address L No. of the G10 command.
P158 Illegal tip point
P161 No spec: 3D tool R comp
P162 Disable Cmd in 3D tool R comp
P163 3D tool R comp is disabled
P170 No offset number
P171 No spec:Comp input by prog G10
P172 G10 L number error

Details
The compensation No. at the G10 command is not within the permitted number of sets in the specifications.
Remedy
Check the number of sets for the tool compensation Nos. and correct the address P designation to be within the number of sets.
Details
Compensation data input by program cancel (G11) was commanded though there is no specification of com pensation data input by program.
Remedy
Check the specifications.
Details
Registration of tool life management data with G10 was attempted when the "usage data count valid" signal was ON.
Remedy
The tool life management data cannot be registered during the usage data count. Turn the "usage data count valid" signal OFF.
Details
The number of registration groups, total number of registered tools or the number of registrations per group exceeded the range in the specifications.
Remedy
Correct the number of registrations.
Details
A duplicate group No. was found at the registration of the tool life management data with G10.
A group No. that was not registered was designated during the T****99 command.
An M code command, which must be issued as a single command, coexists in the same block as that of an other M code command.
The M code commands set in the same group exist in the same block.
Remedy
Register the estimated tool life data/cumulative usage data once for one group: commanding with a duplicate group No. is not allowed.
Correct to the group No.
Details
A fixed cycle command (G72 - G89) was issued though it is out of specifications.
Remedy
Check the specifications.
Correct the program.
Details
Spindle rotation speed (S) has not been commanded in synchronous tapping.
Remedy
Command the spindle rotation speed (S) in synchronous tapping.
When "#8125 Check Scode in G84" is set to "1", enter the S command in the same block where the synchro nous tapping command is issued.
P173 G10 P number error
P174 No spec:Comp input by prog G11
P177 Tool life count active
P178 Tool life data entry over
P179 Illegal group No.
P180 No spec: Drilling cycle
P181 No spindle command (Tap cycle)

Details
Connection to the main spindle unit was not established.
The synchronous tapping was attempted with the spindle not serially connected under the multiple-spindle control I.
Synchronous tapping command was given to the analog spindle while analog spindle synchronous tapping was unavailable.
Punch Tap cycle command was given with no-load operation mode during manual arbitrary reverse run mode.
Remedy
Check connection to the main spindle.
Check that the main spindle encoder exists.
Set 1 to the parameter #3024 (sout).
Correct the program.
Enable actual cutting mode to command Punch Tap cycle with manual arbitrary reverse run mode.
Details
The pitch or number of threads has not been commanded in the tap cycle of a fixed cycle for drilling command.
Remedy
Specify the pitch data and the number of threads by F or E command.
Details
The pitch or the number of threads per inch is illegal in the tap cycle of the fixed cycle for drilling command.
The pitch is too small for the spindle rotation speed.
The thread number is too large for the spindle rotation speed.
Remedy
Correct the pitch or the number of threads per inch.
Details
Synchronous tapping cycle (G84/G74) was commanded though it is out of specifications.
Remedy
Check the specifications.
Details
S command was issued during synchronous tapping modal.
Remedy
Cancel the synchronous tapping before issuing the S command.
Details
A G185 command was issued when one of the following conditions was true, which disables a hole edge cham fering command.
The selected plane is not G19 plane.
The configuration of parameters "#1026 base_ I" through "#1031 aux_K" is one that does not allow hole edge chamfering cycle.
The "Longitudinal hole drilling axis selection" signal (YCD4) is ON.

The axis name switch (G111) modal is active.
Remedy
Ensure that G19 plane is selected when G185 is issued.
Turn off the "Longitudinal hole drilling axis selection" signal (YCD4).
Cancel axis name switch (G111) before issuing G185.
P182 Synchronous tap error
P183 No pitch/thread number
P184 Pitch/thread number error
P185 No spec: Sync tapping cycle
P186 Illegal S cmnd in synchro tap
P188 Hole edge chamfering invalid

Details
A lathe cutting cycle command was issued though it is out of specifications.
Remedy
Check the specification.
Delete the lathe cutting cycle command.
Details
In the lathe cutting cycle, the specified length of taper section is illegal.
Remedy
Set the smaller radius value than the axis travel amount in the lathe cycle command.
Details
Chamfering in the thread cutting cycle is illegal.
Remedy
Set a chamfering amount not exceeding the cycle.
Details
A turning tool shape compensation was commanded while a tool other than turning tool has been selected.
Remedy
Select "Lathing" for tool type in tool management data before giving the turning tool shape compensation com mand.
Details
The compound type fixed cycle for turning machining I (G70 to G73) was commanded though it is out of spec ifications.
Remedy
Check the specifications.
Details
The subprogram, called with a compound type fixed cycle for turning machining I command, has at least one of the following commands: reference position return command (G27, G28, G29, G30); thread cutting (G33, G34); fixed cycle skip-function (G31, G31.n).
An arc command was found in the first movement block of the finished shape program in compound type fixed cycle for turning machining I.
Remedy
Delete G27, G28, G29, G30, G31, G33, G34, and fixed cycle G codes from the subprogram called with the compound type fixed cycle for turning machining I commands (G70 to G73).
Delete G02 and G03 from the first movement block of the finished shape program in compound type fixed cycle for turning machining I.
Details
The number of blocks in the shape program of the compound type fixed cycle for turning machining I is over 50 or 200 (the maximum number differs according to the model).
Remedy
Set a 50/200 or less value for the number of blocks in the shape program called by the compound type fixed cycle for turning machining I commands (G70 to G73). (The maximum number differs according to the model).
P190 No spec: Turning cycle
P191 Taper length error
P192 Chamfering error
P199 Tool selection is incorrect
P200 No spec: MRC cycle
P201 Program error (MRC)
P202 Block over (MRC)

Details
A proper shape will not obtained by executing the shape program for the compound type fixed cycle for turning machining I (G70 to G73).
Remedy
Correct the shape program for the compound type fixed cycle for turning machining I (G70 to G73).
Details
A command value of the compound type fixed cycle for turning machining (G70 to G76) is illegal.
Remedy
Correct the command value of the compound type fixed cycle for turning machining (G70 to G76).
Details
A compound type fixed cycle for turning machining II (G74 to G76) command was commanded though it is out of specifications.
Remedy
Check the specifications.
Details
There are no special fixed cycle specifications.
Remedy
Check the specifications.
Details
"0" has been specified for the number of holes in special fixed cycle mode.
Remedy
Correct the program.
Details
A G36 command specifies "0" for angle intervals.
Remedy
Correct the program.

Details
The radius value specified with a G12 or G13 command is below the compensation amount.
Remedy
Correct the program.
Details
There are no circular cutting specifications.
Remedy
Check the specifications.
P203 D cmnd figure error (MRC)
P204 E cmnd fixed cycle error
P210 No spec: Pattern cycle
P220 No spec: Special fixed cycle
P221 No. of special fixed holes = 0
P222 G36 angle error
P223 G12/G13 radius error
P224 No spec: Circular (G12/G13)

Details
Illegal character string was commanded during character string input.
Word count exceeded the command range during character string input.
Remedy
Correct character string.
Sub error number indicates which character is causing the alarm.
If the word count exceeds the command range, sub error number will be "0".
Details
The diameter of arc for the text is smaller than half the character height or than the character spacing.
Remedy
Correct the values programmed with the addresses H, I, J and L.
Details
Over 10 times of subprogram calls have been done in succession from a subprogram.
A M198 command was found in the program in the data server.
Remedy
Correct the program so that the number of subprogram calls does not exceed 10 times.
Details
The sequence No., commanded at the return from the subprogram or by GOTO in the subprogram call, was not set.
Remedy
Specify the sequence Nos. in the call block of the subprogram.
Details
The machining program has not been found when the machining program is called.
Remedy
Enter the machining program.
Check the subprogram storage destination parameters.
Ensure that the external device (including SD card/USB memory) that contains the file is mounted.
Details
Operation was attempted for the file under program editing.
Remedy
Execute the program again after completion of program editing.
Details
A variable command (with #) was issued though it is out of specifications.
Remedy
Check the specifications.
Details
The variable No. commanded is out of the range specified in the specifications.
Remedy
Check the specifications.
Correct the program variable No.
P225 Illegal character input
P229 Illegal arc rad. of engraving
P230 Subprogram nesting over
P231 No sequence No.
P232 No program No.
P235 Program editing
P240 No spec: Variable commands
P241 No variable No.

Details
The "=" sign has not been commanded when a variable is defined.
Remedy
Designate the "=" sign in the variable definition of the program.
Details
An invalid variable has been specified in the left or right side of an operation expression.
Assignment to a write-protected variable has been commanded.
Remedy
Correct the program.
Details
Date or time was set earlier than current date or time in the system variables (#3011, #3012) when the system lock was valid.
Remedy
Date or time cannot be changed.
Correct the program.
Details
Tool data read/write command has been executed without selecting the tool command method.
Tool command method (#68000) or tool selection No. (#68001) is incorrect.

(1) The tool specified as "Tool in use" is not installed.
(2) Any unregistered tool No. has been designated.
(3) Tool selection No. (#68001) has not been designated.
Write of "Tool No." has been commanded using #68001 while tool No. is being designated.
Write of "Tool No." has been commanded for an already registered tool No.
Remedy
Check the program to make sure that the tool command method (#68000) and tool selection No. (#68001) are correct.
Make sure, if you wish to designate a tool in use, that the said tool No. is nonzero and is already registered on the tool management screen.
Make sure, if you wish to designate a tool No., that the tool No. registered on the tool management screen has been commanded using #68001.
#68001 is unable to write the same tool No. as that already registered on the tool management screen.
Details
The extended common variable data file for the specified number does not exist.
Remedy
Correct the extended common variable data file number in the machining program.
Ensure that an SD card is inserted.
Details
Extended common variable data file is not loaded.
Remedy
Load the extended common variable data file.
Ensure that an SD card is inserted.
P242 = not defined at vrble set
P243 Can't use variables
P244 Invalid set date or time
P245 Tool No. error
P246 Ext common var file not found
P247 Ext common var file not loaded

Details
Extended common variable data file cannot be loaded, because the number of real/integer data in the file is different from the number of real/integer data set in the parameter.
Remedy
Load the extended common variable data file with the same allocation as the number of real/integer data set in the parameter.
Details
An attempt was made to pre-read a system variable (position data) that cannot be read during travel without waiting for the end point of the previous block to be reached.
Remedy
Use position data that can be pre-read.
Program the reading of the system variable (position data) and a travel command in separate blocks.
Details
Figure rotation (M98 I_J_P_H_L_) was commanded though it is out of specifications.
Remedy
Check the specifications.
Details
Figure rotation command was issued during figure rotation.
Remedy
Correct the program.
Details
A coordinate rotation related command (G68, G69) was issued during figure rotation.
Remedy
Correct the program.
Details
A coordinate rotation command was issued though it is out of specifications.
Remedy
Check the specifications.
Details
Another G code or a T command has been issued in the block of coordinate rotation command.
Remedy
Correct the program.
Details
A coordinate rotation command has been issued during modal in which coordinate rotation is not allowed.
Remedy
Correct the program.
Details
A macro specification was commanded though it is out of specifications.
Remedy
Check the specifications.
P248 Ext com vrble file load invld
P249 Position data unreadable
P250 No spec: Figure rotation
P251 Figure rotation overlapped
P252 Coord rotate in fig. rotation
P260 No spec: Coordinates rotation
P261 G code illegal (Coord rot)
P262 Illegal modal (Coord rot)
P270 No spec: User macro

Details
A macro interruption command has been issued though it is out of specifications.
Remedy
Check the specifications.

Details
An executable statement and a macro statement exist together in the same block.
Remedy
Place the executable statement and macro statement in separate blocks in the program.
Details
The number of macro call nests exceeded the limit imposed by the specifications.
Remedy
Correct the program so that the macro calls do not exceed the limit imposed by the specifications.
Details
The number of argument sets in the macro call argument type II has exceeded the limit.
Remedy
Correct the program.
Details
A G67 command was issued though it was not during the G66 command modal.
Remedy
Correct the program.
Issue G66 command before G67 command, which is a call cancel command.
Details
An alarm command has been issued in #3000.
Remedy
Refer to the operator messages on the diagnosis screen.
Refer to the instruction manual issued by the machine tool builder.
Details
Over five times have the parentheses "[" or "]" been used in a single block.
Remedy
Correct the program so that the number of "[" or "]" is five or less.
Details
A single block does not have the same number of commanded parentheses "[" as that of "]".
Remedy
Correct the program so that "[" and "]" parentheses are paired up properly.
Details
The arithmetic formula is incorrect.
Remedy
Correct the formula in the program.
P271 No spec: Macro interrupt
P272 NC and macro texts in a block
P273 Macro call nesting over
P275 Macro argument over
P276 Illegal G67 command
P277 Macro alarm message
P280 Brackets [ ] nesting over
P281 Brackets [ ] not paired
P282 Calculation impossible

Details
The denominator of the division is zero.
Remedy
Correct the program so that the denominator for division in the formula is not zero.
Details
The multiplicity of the IF statement exceeded 10 times.
Remedy
The program is reviewed so that the multiplicity of the IF statement does not exceed 10 times.
Details
IF and ENDIF are not in pairs.
THEN/ELSE is ordered in the absence of IF command.
Remedy
The program is reviewed so that IF and ENDIF become pairs.
Before THEN/ELSE command, IF[<conditional expression>]command is given.
Details
There is an error in the "IF[<conditional>]GOTO(" statement.
Remedy
Correct the program.
Details
There is an error in the "WHILE[<conditional>]DO(-END(" statement.
Remedy
Correct the program.
Details
There is an error in the "SETVN(" statement when the variable name setting was made.
Remedy
Correct the program.
The number of characters in the variable name of the SETVN statement must be 7 or less.
Details
The number of DO-END nesting levels in the "WHILE[<conditional>]DO(-END(" statement has exceeded 27.
Remedy
Correct the program so that the nesting levels of the DO-END statement does not exceed 27.
Details
The DOs and ENDs are not paired off properly.
Remedy
Correct the program so that the DOs and ENDs are paired off properly.
P283 Divided by zero
P288 IF EXCESS
P289 IF-ENDIF MMC.
P290 IF sentence error
P291 WHILE sentence error
P292 SETVN sentence error
P293 DO-END nesting over

P294 DO and END not paired

Details
There is a WHILE or GOTO statement on the tape during tape operation.
Remedy
Apply memory mode operation instead of tape mode that does not allow the execution of the program with a WHILE or GOTO statement.
Details
A required address has not been specified in the user macro.
Remedy
Correct the program.
Details
The user macro does not use address A as a variable.
Remedy
Correct the program.
Details
User macro G200, G201, or G202 was specified during tape or MDI mode.
Remedy
Correct the program.
Details
The variable names have not been commanded properly.
Remedy
Correct the variable names in the program.
Details
A duplicate variable name was found.
Remedy
Correct the program so that no duplicate name exists.
Details
G, M, S, T, or B macro code was called during fixed cycle.
Remedy
Correct the program.
Correct the parameter settings.
Details
The scaling command (G50, G51) was issued though it is out of specifications.
Remedy
Check the specifications.
Details
A mirror image command (G50.1 or G51.1) has been issued though the programmable mirror image specifica tions are not provided.
Remedy
Check the specifications.
P295 WHILE/GOTO in tape
P296 No address (macro)
P297 Address-A error
P298 G200-G202 cmnd in tape
P300 Variable name illegal
P301 Variable name duplicated
P310 Not use GMSTB macro code
P350 No spec: Scaling command
P360 No spec: Program mirror

Details
The facing turret mirror image specifications are not provided.
Remedy
Check the specifications.
Details
Mirror image for facing tool posts was commanded to an axis in external mirror image or parameter mirror image.
The commanded mirror image for facing tool posts enables the mirror image for a rotary axis.
Remedy
Correct the program.
Correct the parameter settings.
Details
The corner R/C was issued though it is out of specifications.
Remedy
Check the specifications.
Delete the corner chamfering/corner rounding command in the program.
Details
Corner chamfering II or corner rounding II was commanded in the arc interpolation block though it is out of specifications.
Remedy
Check the specifications.
Details
The block next to corner chamfering/ corner rounding is not a travel command.
Remedy
Replace the block succeeding the corner chamfering/ corner rounding command by G01 command.
Details
The travel distance in the corner chamfering/corner rounding command was shorter than the value in the corner chamfering/corner rounding command.
Remedy
Set the smaller value for the corner chamfering/corner rounding than the travel distance.
Details
The travel distance in the following block in the corner chamfering/corner rounding command was shorter than the value in the corner chamfering/corner rounding command.
Remedy

Set the smaller value for the corner chamfering/corner rounding than the travel distance in the following block.
Details
A block with corner chamfering/corner rounding was given during G00 or G33 modal.
Remedy
Correct the program.
P370 No spec: Facing t-post MR
P371 Facing t-post MR illegal
P380 No spec: Corner R/C
P381 No spec: Arc R/C
P382 No corner movement
P383 Corner movement short
P384 Corner next movement short
P385 Corner during G00/G33

Details
A geometric command was issued though it is out of specifications.
Remedy
Check the specifications.
Details
There are no geometric IB specifications.
Remedy
Check the specifications.
Details
The angular difference between the geometric line and line is 1 or less.
Remedy
Correct the geometric angle.
Details
The second geometric block has a command with an incremental value.
Remedy
Issue a command with an absolute value in the second geometric block.
Details
The second geometric block contains no linear command.
Remedy
Issue the G01 command.
Details
The geometric format is invalid.
Remedy
Correct the program.
Details
A plane switching command was issued during geometric command processing.
Remedy
Complete the plane switching command before geometric command processing.
Details
In geometric IB, the arc end point does not contact or intersect the start point of the next block.
Remedy
Correct the first and second commands containing a circular arc command for geometric.
Details
A geometric command was issued though the geometric IB specifications are not provided.
Remedy
Check the specifications.
P390 No spec: Geometric
P391 No spec: Geometric arc
P392 Angle < 1 degree (GEOMT)
P393 Inc value in 2nd block (GEOMT)
P394 No linear move command (GEOMT)
P395 Illegal address (GEOMT)
P396 Plane selected in GEOMT ctrl
P397 Arc error (GEOMT)
P398 No spec: Geometric1B

Details
G111 was issued during milling mode.
G111 was issued during nose R compensation mode.
G111 was issued during constant surface speed.
G111 was issued during mixed control (cross axis control).
G111 was issued during fixed cycle.
G111 was issued during polar coordinate interpolation.
G111 was issued during cylindrical interpolation mode.
Remedy
Before commanding G111, cancel the following commands.
Milling mode
Nose R compensation
Constant surface speed
Mixed control (cross axis control)
Fixed cycle
Polar coordinate interpolation
Cylindrical interpolation
Details
Axis name switch (G111) was issued though it is out of specifications.
Remedy
Check the specifications.
Details
Parameter input by program (G10) was commanded though it is out of specifications.
Remedy

Check the specifications.
Details
The specified parameter No. or set data is illegal.
An illegal G command address was input in parameter input mode.
A parameter input command was issued during fixed cycle modal or nose R compensation.
G10 L50, G10 L70, G10 L100, G11 were not commanded in independent blocks.
Remedy
Correct the program.
Details
G10 L100, G10 L101 or G11 has been given together with any other command in a block.
Address P or T has been omitted from G10 L100.
Address C has been omitted from G10 L101.
Remedy
Correct the program.
P411 Illegal modal G111
P412 No spec: Axis name switch
P420 No spec: Para input by program
P421 Parameter input error
P422 Tool/Work shape input error

Details
G10 L110, G10 L111 or G11 has been given together with any other command in a block.
Address Q has been omitted from G10 L110.
Address P, Q or D has been omitted from G10 L111.
Machining surface parameter input command has been issued for an undefined workpiece.
An index angle command has been given to any axis other than Z when using the coordinate axis direction setting method.
Neither the workpiece registration No. nor surface registration No. has been selected when setting a machin ing surface.
Remedy
Correct the program.
Correct the setting of workpiece to machine.
Details
A command was issued to move an axis, which has not returned to the reference position, away from that reference position.
A command was issued to an axis removal axis.
Remedy
Execute reference position return manually.
Disable the axis removal on the axis for which the command was issued.
Details
A command for second, third or fourth reference position return was issued though there are no such command specifications.
Remedy
Check the specifications.
Details
Start position return (G29) was commanded though it is out of specifications.
Remedy
Check the specifications.
Details
Reference position check (G27) was commanded though it is out of specifications.
Remedy
Check the specifications.
Details
One of the axes did not return to the reference position when the reference position check command (G27) was executed.
Remedy
Correct the program.
Details
An M command was issued simultaneously in the G27 command block.
Remedy
Place the M code command, which cannot be issued in a G27 command block, in separate block from G27 command block.
P423 R-Navi input error
P430 R-pnt return incomplete
P431 No spec: 2,3,4th R-point ret
P432 No spec: Start position return
P433 No spec: R-position check
P434 Compare error
P435 G27 and M commands in a block

Details
An M command was issued simultaneously in the G29 command block.
Remedy
Place the M code command, which cannot be issued in a G29 command block, in separate block from G29 command block.
Details
A local coordinate system command was issued during execution of the G54.1 command.
Remedy
Correct the program.
Details
The chuck barrier on command (G22) was specified although the chuck barrier is out of specifications.
Remedy
Check the specifications.
Details
Stroke check before travel (G22/G23) was commanded though it is out of specifications.

Remedy
Check the specifications.
Details
An illegal command, which places the axis travel start/end point in the prohibited area or moves the axis through the prohibited area, was detected when Stroke check before travel (G22) was commanded.
Remedy
Correct the coordinate values of the axis address commanded in the program.
Details
An error has occurred in the tape reader. Otherwise an error has occurred in the printer during macro printing.
Remedy
Check the power and cable of the connected devices.
Correct the I/O device parameters.
Details
A file of the machining program cannot be read.
Unable to write to an external file.
Remedy
In memory mode, the programs stored in memory may have been destroyed. Output all of the programs and tool data and then format the system.
Ensure that the external device (including SD card/USB memory) that contains the file is mounted.
Correct the parameter settings for HD operation, SD card operation or USB memory operation.
Details
A communication error occurred during the BTR operation.
Remedy
"L01 Computer link error" is displayed simultaneously. Take the remedy corresponding to the error No.
P436 G29 and M commands in a block
P438 G52 invalid during G54.1
P450 No spec: Chuck barrier
P451 No spec: Stroke chk bef travel
P452 Limit before travel exists
P460 Tape I/O error
P461 File I/O error
P462 Computer link commu error

Details
Any of the following commands has been given during 3D machine interference check.
Program format switch (G188/G189)
Diameter/Radius designation switch (G10.9)
Remedy
Before the command, correct the program or disable interference check.
Use the PLC I/F method to switch the program format.
Details
Milling was commanded though it is out of specifications.
Polar coordinate interpolation was commanded though it is out of specifications.
Remedy
Check the specifications.
Details
An illegal G code was used during the milling mode.
An illegal G code was used during cylindrical interpolation or polar coordinate interpolation.
The G07.1 command was issued during the tool radius compensation.
Remedy
Correct the program.
Details
A rotary axis was commanded during the milling mode.
Milling was executed though an illegal value was set for the milling axis No.
Cylindrical interpolation or polar coordinate interpolation was commanded during mirror image.
Cylindrical interpolation or polar coordinate interpolation was commanded before the tool compensation was completed after the T command.
G07.1 was commanded when cylindrical interpolation was not possible (there is no rotary axis, or external mir ror image is ON).
An axis other than a cylindrical coordinate system axis was commanded during cylindrical interpolation.
Remedy
Correct the machining program, parameters and PLC interface signals.
Details
Movement was commanded to an axis that had not completed reference position return during the milling mode.
Movement was commanded to an axis that had not completed reference position return during cylindrical in terpolation or polar coordinate interpolation.
Remedy
Carry out manual reference position return.
P470 Invalid cmd in 3D interf check
P480 No spec: Milling
P481 Illegal G code (mill)
P482 Illegal axis (mill)
P484 R-pnt ret incomplete (mill)

Details
The milling mode was turned ON during nose R compensation or constant surface speed control.
A T command was issued during the milling mode.
The mode was switched from milling to cutting during tool compensation.
Cylindrical interpolation or polar coordinate interpolation was commanded during the constant surface speed control mode (G96).
The command unacceptable in the cylindrical interpolation was issued.
A T command was issued during the cylindrical interpolation or polar coordinate interpolation mode.
A movement command was issued when the plane was not selected just before or after the G07.1 command.
A plane selection command was issued during the polar coordinate interpolation mode.
Cylindrical interpolation or polar coordinate interpolation was commanded during tool radius compensation.

The G16 plane in which the radius value of a cylinder is "0" was specified.
A cylindrical interpolation or polar coordinate interpolation command was issued during coordinate rotation by program.
Remedy
Correct the program.
Issue G40 or G97 before issuing G12.1.
Issue a T command before issuing G12.1.
Issue G40 before issuing G13.1.
Specify the radius value of a cylinder other than "0", or specify the X axis's current value other than "0" before issuing G12.1/G16.
Details
The milling command was issued during the mirror image (when parameter or external input is turned ON).
Polar coordinate interpolation, cylindrical interpolation or milling interpolation was commanded during mirror image for facing tool posts.
The start command of the cylindrical interpolation or polar coordinate interpolation was issued during the nor mal line control.
Remedy
Correct the program.
P485 Illegal modal (mill)
P486 Milling error

Details
Mixed control command (G110), Arbitrary axis exchange command (G140), Arbitrary axis exchange return command (G141) or Base axis configuration restore command (G142) has been given to a part system that is under any of the following state.
Cylindrical interpolation mode
Polar coordinate interpolation mode
Milling interpolation mode
Constant surface speed control mode
Polygon cut mode
Hob machining mode
Nose R compensation mode
Tool radius compensation mode
During axis name switch
Fixed cycle for drilling
Fixed cycle for lathe turning
Compound-type fixed cycle mode
Special fixed cycle mode
Facing turret mirror image mode
Balance cut mode
Chuck barrier/Tailstock barrier
Stroke check before travel
During Macro modal call (G66.1)
Hypothetical axis interpolation mode
Figure rotation mode
During scaling
Coordinate rotation by parameter mode
Polar coordinate command mode
Normal line control mode
Circular cutting mode
Tool direction tool length compensation mode
Remedy
Correct the program.
Details
Any of the following commands was given to an axis that is under the following conditions: Mixed control com mand, Arbitrary axis exchange command, Arbitrary axis exchange return command or Basic axis configuration return command.
The commanded axis does not exist.
The command caused the maximum number of axes per part system to be exceeded.
The command was given to an axis for which axis exchange is disabled.
Remedy
Correct the program.
Details
Two or more synchronization M codes were commanded in the same block.
The synchronization M code and "!" code were commanded in the same block.
Synchronization with the M code was commanded in 3rd part system or more. (Synchronization with the M code is valid only in 1st part system or 2nd part system.)
Remedy
Correct the program.
Details
The axis designated as the reference or superimposed axis is not available for superimposition.
Remedy
Correct the program.
P501 Cross (G110) impossible
P503 Illegal G110 axis
P511 Synchronization M code error
P520 Control axis superimposition/Designated axis illegal

Details
The axis specified as the reference or synchronized axis of synchronization between part systems cannot be synchronized.
Remedy
Correct the program.
Details
The main axis for the simple synchronous control has been designated as tap axis for synchronous tapping.
Remedy

Correct the program.
Details
G54.2 was commanded when workpiece position offset for rotary axis was OFF.
Remedy
Check the workpiece position offset for rotary axis.
Details
The workpiece installation error compensation function is out of the specifications.
Remedy
Check the specifications.
Details
During workpiece installation error compensation, a command impossible to issue (such as G command) was
issued.
Remedy
Check the program. If you wish to issue a command impossible to issue (such as G command) during work piece installation error compensation, cancel workpiece installation error compensation once.
Details
Workpiece installation error compensation was commanded in a G modal in which commanding it is not al lowed.
An illegal G command was issued in the block that has a workpiece installation error compensation command.
Remedy
Check the program. Also check the G modals which were issued at commanding the workpiece installation
error compensation, and cancel illegal ones.
Issue the G command in a separate block.
Details
A command in which the rotary axis's travel distance exceeds 180 degrees was issued.
Remedy
Divide the travel command so that the rotary axis's travel distance per block is less than 180 degrees.
Details
There is no NURBS interpolation option.
Remedy
Check the specifications.
P521 Illegal synchronization axis
P522 Simple sync ax setting invalid
P540 No spec: G54.2
P544 No spec: Wk instl err cmp
P545 Invld cmd in wk instl err cmp
P546 Wk instl err cmp cmd invalid
P547 Illegal wk instl err cmp cmd
P550 No spec: G06.2(NURBS)

Details
The knot (k) command value is smaller than the value for the previous block.
Remedy
Correct the program.
Specify the knot by monotone increment.
Details
The block end point immediately before the G06.2 command and the G06.2 first block command value do not
match.
Remedy
Match the G06.2 first block coordinate command value with the previous block end point.
Details
Manual interruption was executed in a block that applies the G06.2 mode.
Remedy
Execute the manual interruption in the block that does not apply the G06.2 mode.
Details
Restart was attempted from the block that applies G06.2 mode.
Remedy
Restart from the block other than in G06.2 mode.
Details
A command to enable the fairing function was given while the smooth fairing function was ON.
A command to enable the smooth fairing function was given while the fairing function was ON.
Remedy
Correct the program.
Details
The option "selection of axis (axes) for feedrate command" is invalid.
Remedy
Check the specifications.
Details
The command "selection of axis (axes) for feedrate command" has been issued while the mode that disables
the command is active.
Remedy
Correct the program.
Details
The command issued is invalid while selection of axis (axes) for feedrate command is ON.
Remedy
Correct the program.
P551 G06.2 knot error
P552 Start point of 1st G06.2 err
P554 Invld manual interrupt in G6.2
P555 Invalid restart during G06.2
P560 Fairing changeover disabled
P580 No spec: Axis selection for F
P581 Axis selection for F invalid
P582 Invalid cmd in F ax selection

Details

No axis or more than 2 axes was/were issued to torque limitation skip command block.
An axis during synchronous control was issued as the skip axis.
An axis during inclined axis control was issued as the skip axis.
Geometric command, corner R, or corner chamfering was issued in the same block as torque limitation skip command.
A torque skip was commanded to the axis which is in the constant torque control or the proportional torque stopper control.
Remedy
Issue only an axis to the skip axis.
Review the program.
Details
An automatic tool length measurement command (G37) was issued though it is out of specifications.
Remedy
Check the specifications.
Details
A skip command (G31) was issued though it is out of specifications.
Remedy
Check the specifications.
Details
A multiple skip command (G31.1, G31.2, G31.3 or G31 Pn) was issued though it is out of specifications.
Remedy
Check the specifications.
Details
The skip speed is "0".
Remedy
Specify the skip speed.
Details
No axis was specified in the automatic tool length measurement block. Otherwise, two or more axes were spec ified.
Remedy
Specify only one axis.
Details
The T code is in the same block as the automatic tool length measurement block.
Remedy
Specify the T code before the automatic tool length measurement block.
Details
The T code was not yet specified in automatic tool length measurement.
Remedy
Specify the T code before the automatic tool length measurement block.
P595 Skip axis illegal
P600 No spec: Auto TLM
P601 No spec: Skip
P602 No spec: Multi skip
P603 Skip speed 0
P604 TLM illegal axis
P605 T & TLM command in a block
P606 T cmnd not found before TLM

Details
The measurement position arrival signal turned ON before the area specified by the D command or "#8006 ZONE d". Otherwise, the signal remained OFF to the end.
Remedy
Correct the program.
Details
A skip command was issued during radius compensation processing.
Remedy
Issue a radius compensation cancel (G40) command or remove the skip command.
Details
The parameter setting is not correct.
- G114.1 was commanded while the spindle synchronization was selected with the PLC interface signal.
- G110 was commanded while the mixed control (cross axis control) was selected with the PLC interface sig nal.
- G125 was commanded while the control axis synchronization between part systems was selected with the PLC interface signal.
- G126 was commanded while the control axis superimposition was selected with the PLC interface signal.
Remedy
Correct the settings of "#1514 expLinax (Exponential function interpolation linear axis)" and "#1515 expRotax (Exponential function interpolation rotary axis)".
- Correct the program.
- Correct the parameter settings.
Details
There is no specification for the exponential interpolation.
Remedy
Check the specifications.
Details
A travel command for exponential interpolation was issued during mirror image for facing tool posts.
Remedy
Correct the program.
Details
The identification No. specified in the address B of G122 or G144 is that of the part system where G122 is given.
The identification No. specified in the sub part system control I command (G122) is not set in the parameter #12049 SBS_no.
Remedy
Change the address B of G122 or G144 to be any identification No. other than that of the part system where G122 is given.
Select the identification No. for the sub part system control I command (G122) from among the available Nos.
Specify the identification No. you wish to use for the sub part system control I command (G122) in the param eter #12049 SBS_no.

Details
G122 or G144 has been given together with any other G code command in a block.
Remedy
Do not command G122 or G144 together with any other G code command in a block.
P607 TLM illegal signal
P608 Skip during radius compen
P610 Illegal parameter
P611 No spec: Exponential function
P612 Exponential function error
P650 Sub sys identification # error
P651 Other G code in sub sys block

Details
G122 or G144 has been commanded in any of the following modes.
User macro modal call (G66, G66.1)
Fixed cycle mode
High-speed mode (G5, G5.1)
Remedy
Cancel the following modes before commanding G122 or G144.
User macro modal call (G66, G66.1)
Fixed cycle mode
High-speed mode (G5, G5.1)
Details
High-speed mode command (G5, G5.1) has been given in a sub part system.
Remedy
Do not use the high-speed mode (G5, G5.1) in a sub part system.
Details
Specified the device other than R register/D register.
Specified the odd numbered device when 4 byte is specified.
Specified the device number that is out of the command range.
Specified the data length that is out of the command range.
Specified the bit number that is out of the command range.
Omitted the device number.
Omitted the project number after ",P".
Omitted the data length after ",".
Omitted the bit number after ".".
Remedy
Check the program.
Details
Multiple assignment expressions which include the PLC direct interface command are commanded to the same
block.
Remedy
Command the assignment command using PLC direct interface by itself.
Details
Spindle synchronization was commanded to a spindle that is not connected serially.
Remedy
Correct the program.
Correct the parameter settings.
Details
G10.9 was commanded during a modal in which diameter/radius designation selection is not available.
Remedy
Check the program.
Details
A G code impossible to command was issued during switching between diameter and radius using the diame ter/radius designation selection.
Remedy
Check the program.
P652 Illegal mode (sub part system)
P653 Illegal G code (sub part sys)
P656 Illegal PLC device
P657 PLC Device too much
P700 Illegal command value
P705 Dia/Rad selection cmd invalid
P706 Invld cmd in dia/rad selection

Details
The following commands were executed while there is no option for Rapid traverse block overlap.
G0.5 command
Reference position return command while "#1443 G28ol" (Enable G28 rapid traverse block overlap) is en abled
G0 command while "#12056 I_G0ol" (Enable G00 initial rapid traverse block overlap) is enabled
Remedy
Check the specification.
Disable the parameter.
Details
G26 (Return to selected point) has been given in a program other than a machining interruption program.
Remedy
Correct the program.
Details
The command order of the selected point is incorrect.
Remedy
Correct the program.
Details
The executed command is unavailable in a machining interruption program.
Remedy
Correct the program.

Details
The command in the retraction program cannot be executed prior to the tap retraction command (G26).
Remedy
Place the command after the tap retraction (G26) block.
Details
The position (end point) given to the drill axis in the tap retraction command (G26) is lower than the R-point (closer to the hole bottom).
Remedy
Correct the coordinates of the drill axis command.
Details
The issued command is disabled during multiple-axis synchronization control.
Remedy
Cancel the multiple-axis synchronization control before issuing the command.
Details
The issued command cannot be used during the vibration cutting mode.
Remedy
Correct the program.
P709 No Rapid block overlap
P721 No selected point for return
P727 Selected point error
P728 Invalid cmnd in mach interrupt
P729 Invalid cmd before tap retract
P730 Invalid end pt for tap retract
P740 Invalid cmd in multi-axis sync
P790 Illegal command in VCC mode

Details
Vibration cutting mode start command has been given although the command is disabled during the currently active mode.
Remedy
Correct the program.
Details
Any of the following commands has been given during the G43.7 mode.
Mirror image by G code
Mirror image by parameter setting
Mirror image by external input
Tool length compensation along the tool axis
Automatic tool length measurement
A G43.7 command has been given in any of the following modes.
Mirror image by G code
Mirror image by parameter setting
Mirror image by external input
Fixed cycle for drilling
Remedy
Check the program. If you use the mirror image, tool length compensation along the tool axis, automatic tool length measurement or fixed cycle for drilling, use a G49 command to cancel the tool position offset.
Details
Any of the following commands has been given during nose R compensation for machining center system.
Mirror image by G code
Mirror image by parameter setting
Mirror image by external input
Nose R compensation for machining center system has been executed in any of the following modes.
Mirror image by G code
Mirror image by parameter setting
Mirror image by external input
Remedy
Check the program. If you use the mirror image, use a G40 command to cancel the nose R compensation for machining center system.
Details
The commanded G code has disabled the program check.
Remedy
Delete the G code that disables the program check, and then retry the program check.
(Note that deleting the G code may affect the operation of the subsequent blocks.)
Details
A command that is invalid during motion control release (coordinate transformation) was issued.
Remedy
Correct the program.
P791 VCC mode command illegal
P801 Turning tool offset disabled
P802 Nose R compensation disabled
P803 Proceed of prog check disabled
P811 Invalid cmd in MCR coord TF

Details
An invalid command was executed during F-CUT.
Possible commands are as follows.
The M code for F-CUT ON/OFF command during beam ON
The M code for beam ON/OFF command in the same block as the M code for F-CUT ON/OFF command
A movement G code command other than G00, G01, G02, G03, G28, and G30
An axis command other than the axes set as base axes I and J
G04, G64 command
Remedy
Correct the machining program.
Details

A rotary axis command was executed while F-CUT was active.
Remedy
Correct the machining program.
Details
A command (G command, etc.) not executable in the part system where the laser processing control was active was issued.
Remedy
Correct the program.
Details
The M code for laser processing condition selection was specified when changing laser processing conditions was not permissible.
The M code for laser processing condition selection was specified in the same block as the M code for laser beam ON/OFF.
Remedy
Correct the program.
Details
A normal line control command (G40.1, G41.1, or G42.1) was issued though it is out of specifications.
Remedy
Check the specifications.
Details
A coordinate system preset command (G92) was issued to a normal line control axis during normal line control.
Remedy
Correct the program.
Details
The normal line control axis was set to a linear axis.
The normal line control axis was set to the linear type rotary axis II axis.
The normal line control axis has not been set.
The normal line control axis is the same as the plane selection axis.
Remedy
Correct the normal line control axis setting.
P890 Invalid command during F-CUT
P891 Rotary ax cmd invalid in F-CUT
P892 Invalid cmd in laser part sys
P893 Simul laser prcsg cond chg cmd
P900 No spec: Normal line control
P901 Normal line control axis G92
P902 Normal line control axis error

Details
The plane selection command (G17, G18, or G19) was issued during normal line control.
Remedy
Delete the plane selection command (G17, G18, or G19) from the program of the normal line control.
Details
The option for tool cutting point control is not set.
Remedy
Check the specifications.
Details
Tool cutting point control was programmed during a modal where tool cutting point control is not permissible.
Tool cutting point control was programmed in the same block as a G code that cannot be used with tool cutting point control.
Remedy
Correct the program.
Deactivate the function that cannot be used together.
Details
A G code not executable during tool cutting point control mode was programmed.
Remedy
Correct the program.
Deactivate tool cutting point control.
Details
Tool cutting point control was programmed with incorrect tool data.
Remedy
Correct the tool data.
Modify the parameter.
Details
There is no specification for 3-dimensional coordinate conversion.
Remedy
Check the specifications.
Details
The commanded G code cannot be performed during 3-dimensional coordinate conversion modal.
Remedy
Refer to "Programming Manual" for usable G commands.
When the parameter "#8158 Init const sur spd" is enabled, disable the parameter or issue the constant surface speed control cancel (G97) command.
Details
A 3-dimensional coordinate conversion command was issued during a modal for which 3-dimensional coordi nate conversion cannot be performed.
Remedy
Refer to "Programming Manual" for usable G commands.
P903 Plane chg in Normal line ctrl
P910 No spec: tool cutting pnt ctrl
P911 Illegal TCPC command
P912 Illegal cmd during TCPC
P913 TCPC tool data illegal
P920 No spec: 3D coord conv
P921 Illegal G code at 3D coord
P922 Illegal mode at 3D coord

Details
A G code and G68 was commanded in a block though the G code cannot be commanded with G68.
Remedy
Refer to "Programming Manual" for usable G commands.
Details
An incorrect travel command has been given during the 3D coordinate conversion mode.
Remedy
Correct the program.
Details
The end point of a travel command given during "G68.1 ,E1" is not on the tool path.
Remedy
Correct the program.
Details
There is an error in the 3-dimensional coordinate conversion command.
Check the following:
Not all IJK commands are described in the 3-dimensional coordinate conversion command block.
Remedy
Correct the program.
Details
A tool length compensation along the tool axis command was issued though it is out of specifications.
Remedy
Check the specifications.
Details
There is a G code that cannot be commanded during tool length compensation along the tool axis.
Remedy
Correct the program.
Details
There is an invalid orthogonal axis name or rotary axis name set in the rotary axis configuration parameters.
There is an invalid setting related to axis configuration in the rotary axis configuration parameters.
A function that cannot be commanded when the spindle end offset is set was commanded.
Remedy
Set the correct value and reboot.
Check the program.
P923 Illegal addr in 3D coord blk
P924 Travel cmd error in 3Dconvert
P925 End point err in 3D conversion
P926 3D coordinate cnv format error
P930 No spec: Tool axis compen
P931 Executing tool axis compen
P932 Rot axis parameter error

Details
The function cannot be executed under the axis configuration of the part system.
An unavailable G code was given when "Select specifications of rotation direction parameter" is enabled (#1450/bit3 = 1), and the left-hand screw direction is selected by the rotation direction parameter (#7923, #7933, #7943, #7953 = 1).
The axis with the axis address H for absolute dimension command is included in the machine configuration.
Remedy
Correct the program.
Check and correct the rotary axis configuration parameters so that the function can be executed in the axis configuration.
Details
There is no specification for tool tip center control.
Remedy
Check the specifications.
Details
A tool tip center control command was issued during a modal for which a tool tip center control command can not be issued.
Remedy
Correct the program.
Details
A G code that cannot be commanded was issued during tool tip center control.
Remedy
Correct the program.
Details
For tool center point control/tool cutting point control type 1, if the signs are different between the start point and end point of the tool-side rotary axis or table base-side rotary axis, the tool base-side rotary axis or the table workpiece-side rotary axis rotation exists in the same block, and does not pass a singular point.
For tool center point control/tool cutting point control type 2, IJK command is incorrect.
Remedy
Correct the program.
Details
Inclined surface machining option is not supported.
Remedy
Check the specifications.
Details
A forbidden command (G command, etc.) was issued during inclined surface machining.
Remedy
Check the program. If you want to execute a command (G command, etc.) that is unavailable during inclined surface machining, cancel the inclined surface machining.
P934 Invalid axis configuration
P940 No spec: Tool tip control
P941 Invalid T tip control command
P942 Invalid cmnd during T tip ctrl
P943 Tool posture command illegal

P950 No spec: Tilt face machining
P951 Ill cmd in tilt face machining

Details
Inclined surface machining was commanded during the mode where the machining is unavailable.
Inclined surface machining was commanded during interruption.
Remedy
Check the program and see whether any unavailable mode is included during inclined surface machining com mand. If any, cancel that mode.
Details
Tool axis direction control was commanded during the mode where the control is unavailable.
Remedy
Check the program and see whether any unavailable mode is included during tool axis direction control. If any,
cancel that mode.
Details
The address to issue the inclined surface machining command is incorrect.
Remedy
Check the program.
Details
Impossible to define an inclined surface with the values you specified.
Remedy
Check the program.
Details
The coordinate system for the machining surface selected with G68.2P10 has not been defined.
Remedy
Set the machining surface so that the coordinate system can be defined.
Details
When the tool axis direction control type 2 (G53.6) was commanded, a tool length compensation No. whose
compensation amount is 0 was commanded.
Remedy
Correct the program. Set the tool length compensation amount, or command a tool length compensation No.
whose compensation amount is not 0.
Details
The command was issued with an angle with which tool axis direction control of 4-axis configuration is not avail able.
Remedy
Check the feature coordinate system defined in inclined surface machining command.
Details
Simple inclined surface machining is not included in the specifications.
Remedy
Check the specifications.
P952 Inclined face cut prohibited
P953 Tool axis dir cntrl prohibited
P954 Inclined face command error
P955 Inclined face coord illegal
P956 G68.2P10 surface not defined
P957 Tool axis dir ctrl cmp amt 0
P958 Tool axis dir ctrl axis illeg
P959 No spec: Simple inclined face

Details
G05 P4 was commanded while direct command mode option is OFF.
Remedy
Check the specifications.
Details
A G code other than G05 P0 was commanded in direct command mode.
A sequence No. command, F code command, MSTB command or variable command was issued.
A corner chamfering command or corner R command was issued.
A travel command was issued to an axis that had not been command in the G05 P4 block.
Remedy
Check the program.
Details
G05 P4 was commanded in a modal where direct command mode is not available.
Remedy
Check the program.
Details
The commanded coordinate value was beyond the maximum travel distance in direct command mode.
Remedy
Correct the coordinate value in direct command mode.
Details
Combining commands that required pre-reading (nose R offset, corner chamfering/corner rounding, geometric
I, geometric IB, and compound type fixed cycle for turning machining) resulted in eight or more pre-read blocks.
Remedy
Delete some or all of the combinations of commands that require pre-reading.
P960 No spec: Direct command mode
P961 Invalid during dir cmnd mode
P962 Dir cmnd mode cmnd invalid
P963 Illegal direct cmnd mode cmnd
P990 PREPRO error

13Smart Safety Observation Alarm (V)
13.1 Smart Safety Observation Error (V01/V02/V03/V04/V05/V06/V07)
Details
Safety function is not carried out in specified cycle.
Remedy
CPU may be faulty. Contact our service center.
Details
Each operation result of redundant CPU is different value.
Remedy
CPU may be faulty. Contact our service center.
Details
An error has occurred in the NCs internal process during execution of a safety function.
The screen displays which safety function has been executed at the time of error, using the following numbers.
0001: Safely-limited speed (SLS)
0002: Safely-limited position (SLP)
0003: Safe speed monitor (SSM)
0004: Safe cam (SCA)
0005: Safe operating stop (SOS)
0006: Safe stop 1 (SS1)
0007: Safe stop 2 (SS2)
0008: Safe torque off (STO)
0009: Safe brake control (SBC)
000A: Diagnostic function
000B: Safety I/O-related observation
Remedy
CPU may be faulty. Contact our service center.
Details
Safety parameter (for internal processing) which is saved in the memory is illegal value.
Remedy
Input Safety parameter file and turn power ON again.
Clear the memory. (All data on the memory will be initialized. Back up the data as needed.)
When the above action does not help restoring, memory may be faulty. Contact our service center.
Details
Safety parameter which is saved in the memory is illegal value.
Remedy
Input Safety parameter file and turn power ON again.
Clear the memory. (All data on the memory will be initialized. Back up the data as needed.)
When the above action does not help restoring, memory may be faulty. Contact our service center.
Details
The initialization process of the safety function at power ON is not completed within specified time.
Remedy
CPU may be faulty. Contact our service center.
V01 Safety watchdog error 0001
V01 Cross-check error 0002
V01 Safe sys internal process err 0003 Function No.
V01 Safe para storage memory err 1 0004
V01 Safe para storage memory err 2 0005
V01 Safety initial process timeout 0006

Details
The initial communication between NC unit and drive unit is incorrect. Displays the name of axis with error.
Remedy
Check if there is no contact failure or no cable fracture after NC/Drive power OFF.
NC unit or drive unit may be faulty. Contact our service center.
Details
The safety I/O initialization process at power-up has not completed within the specified time.
Displays the information of the unit with an error.
bit24-27: Unit No.
(*) The unit No. indicates the unit in which an alarm occurs.
The channel No. and station No. to which the unit is connected can be confirmed by the following parame ters.
Channel No.: #51501 + 10 (Unit No. - 1)
Station No.: #51502 + 10 (Unit No. - 1)
Remedy
Safety I/O unit may be faulty. Exchange the safety I/O unit.
Details
The feedback position received from drive unit is incorrect.
Displays the name of axis with error.
Remedy
Encoder may be faulty. Contact our service center.
Details
The communication between NC unit and drive unit is incorrect.
Displays the name of axis with error.
Remedy
Check if there is no contact failure or no cable fracture after NC/Drive power OFF.
NC unit or drive unit may be faulty. Contact our service center.
Details
[Saved position at power shut OFF] and [restored position at power ON] are inconsistent in SLP/SCA encoder
diagnosis during power OFF.
Displays the name of axis with error.
Remedy
There are two causes of this alarm; one is "the axis being moved during power OFF" and the other is "the in correct restoring of the position at power ON".
When it is likely with the cause "the axis being moved during power OFF", the alarm can be cancelled by turn ing ON the Safety reset signal while the Special safety alarm cancel signal is ON.
When it is likely with the cause "the incorrect restoring of the position at power ON", encoder may be faulty.
Contact our service center.
V01 NC-DRV initial safe comm error 0007 Axis name

V01 Safe IO init. process timeout 0008 Unit info
V02 Encoder error 0001 Axis name
V02 NC-DRV safe communication err 0004 Axis name
V02 Excess movement during pwr OFF 0005 Axis name

Details
The data received by the safety I/O unit is incorrect.
Displays the information of the unit with an error.
bit24-27: Unit No.
Safety observation target axes are stopped, and all the DOs of the safety I/O unit concerned are turned OFF.
(*) The unit No. indicates the unit in which an alarm occurs.
The channel No. and station No. to which the unit is connected can be confirmed by the following parame ters.
Channel No.: #51501 + 10 (Unit No. - 1)
Station No.: #51502 + 10 (Unit No. - 1)
Remedy
NC unit or safety I/O unit may be faulty. Exchange the NC unit or safety I/O unit.
Details
The data received by the safety I/O unit is incorrect.
Displays the information of the unit with an error.
bit24-27: Unit No.
Safety observation target axes are stopped, and all the DOs of the safety I/O unit concerned are turned OFF.
(*) The unit No. indicates the unit in which an alarm occurs.
The channel No. and station No. to which the unit is connected can be confirmed by the following parame ters.
Channel No.: #51501 + 10 (Unit No. - 1)
Station No.: #51502 + 10 (Unit No. - 1)
Remedy
NC unit or safety I/O unit may be faulty. Exchange the NC unit or safety I/O unit.
Details
The data received by the safety I/O unit is incorrect.
Displays the information of the unit with an error.
bit24-27: Unit No.
Safety observation target axes are stopped, and all the DOs of the safety I/O unit concerned are turned OFF.
(*) The unit No. indicates the unit in which an alarm occurs.
The channel No. and station No. to which the unit is connected can be confirmed by the following parame ters.
Channel No.: #51501 + 10 (Unit No. - 1)
Station No.: #51502 + 10 (Unit No. - 1)
Remedy
NC unit or safety I/O unit may be faulty. Exchange the NC unit or safety I/O unit.
V03 Slave station comm. error 1 0001 Unit info
V03 Slave station comm. error 2 0002 Unit info
V03 Slave station comm. error 3 0003 Unit info

Details
The data received by the safety I/O unit is inconsistent.
Displays the information of the unit with an error.
bit24-27: Unit No.
Safety observation target axes are stopped, and all the DOs of the safety I/O unit concerned are turned OFF.
(*) The unit No. indicates the unit in which an alarm occurs.
The channel No. and station No. to which the unit is connected can be confirmed by the following parame ters.
Channel No.: #51501 + 10 (Unit No. - 1)
Station No.: #51502 + 10 (Unit No. - 1)
Remedy
Check the user safety sequence circuit to see if the output signal control circuit is correct.
Data corruption may have been caused due to noise. Take anti-noise measures on the connection between the NC unit and safety I/O unit.
NC unit or safety I/O unit may be faulty. Exchange the NC unit or safety I/O unit.
Details
Output signal of the safety I/O unit fails to be OFF.
Displays the information of the unit with an error.
bit24-27: Unit No.
bit0-15: Signal BIT
Safety observation target axes are stopped.
(*) The unit No. indicates the unit in which an alarm occurs.
The channel No. and station No. to which the unit is connected can be confirmed by the following parame ters.
Channel No.: #51501 + 10 (Unit No. - 1)
Station No.: #51502 + 10 (Unit No. - 1)
Remedy
NC unit or safety I/O unit may be faulty. Exchange the NC unit or safety I/O unit.
Details
Loop-back signals of the outputs from the safety I/O unit are inconsistent between PLC1 and PLC2.
Displays the information of the unit with an error.
bit24-27: Unit No.
bit0-15: Signal BIT
Safety observation target axes are stopped.
(*) The unit No. indicates the unit in which an alarm occurs.
The channel No. and station No. to which the unit is connected can be confirmed by the following parame ters.
Channel No.: #51501 + 10 (Unit No. - 1)
Station No.: #51502 + 10 (Unit No. - 1)
Remedy
Check the user safety sequence circuit to see if the output signal control circuit is correct.
NC unit or safety I/O unit may be faulty. Exchange the NC unit or safety I/O unit.
V03 Slave station data compare err 0004 Unit info

V03 Output OFF check error 0005 Unit info
V03 Output signal cross-check err 0006 Unit info

Details
Output signals are inconsistent between the user safety sequence and safety I/O unit.
Displays the information of the unit with an error.
bit24-27: Unit No.
bit0-15: Signal BIT
Safety observation target axes are stopped.
(*) The unit No. indicates the unit in which an alarm occurs.
The channel No. and station No. to which the unit is connected can be confirmed by the following parame ters.
Channel No.: #51501 + 10 (Unit No. - 1)
Station No.: #51502 + 10 (Unit No. - 1)
Remedy
Check the user safety sequence circuit to see if the output signal control circuit is correct.
NC unit or safety I/O unit may be faulty. Exchange the NC unit or safety I/O unit.
Details
Input signals from the safety I/O unit are inconsistent between PLC1 and PLC2.
Displays the information of the unit with an error.
bit24-27: Unit No.
bit0-15: Signal BIT
Safety observation target axes are stopped.
(*) The unit No. indicates the unit in which an alarm occurs.
The channel No. and station No. to which the unit is connected can be confirmed by the following parame ters.
Channel No.: #51501 + 10 (Unit No. - 1)
Station No.: #51502 + 10 (Unit No. - 1)
Remedy
Any input device (emergency stop button, for example) connected to the safety I/O unit may be faulty. Check the input devices.
NC unit or safety I/O unit may be faulty. Exchange the NC unit or safety I/O unit.
Details
The data received from the safety I/O unit is incorrect.
Displays the information of the unit with an error.
bit24-27: Unit No.
Safety observation target axes are stopped.
(*) The unit No. indicates the unit in which an alarm occurs.
The channel No. and station No. to which the unit is connected can be confirmed by the following parame ters.
Channel No.: #51501 + 10 (Unit No. - 1)
Station No.: #51502 + 10 (Unit No. - 1)
Remedy
Data corruption may have been caused due to noise. Take anti-noise measures on the connection between the NC unit and safety I/O unit.
NC unit or safety I/O unit may be faulty. Exchange the NC unit or safety I/O unit.
V03 Transmission cross-check error 0007 Unit info
V03 Reception cross-check error 0008 Unit info
V03 Host station comm. error 1 0009 Unit info

Details
The data received from the safety I/O unit is incorrect.
Displays the information of the unit with an error.
bit24-27: Unit No.
Safety observation target axes are stopped.
(*) The unit No. indicates the unit in which an alarm occurs.
The channel No. and station No. to which the unit is connected can be confirmed by the following parame ters.
Channel No.: #51501 + 10 (Unit No. - 1)
Station No.: #51502 + 10 (Unit No. - 1)
Remedy
NC unit or safety I/O unit may be faulty. Exchange the NC unit or safety I/O unit.
Details
The data received from the safety I/O unit is incorrect.
Displays the information of the unit with an error.
bit24-27: Unit No.
Safety observation target axes are stopped.
(*) The unit No. indicates the unit in which an alarm occurs.
The channel No. and station No. to which the unit is connected can be confirmed by the following parame ters.
Channel No.: #51501 + 10 (Unit No. - 1)
Station No.: #51502 + 10 (Unit No. - 1)
Remedy
The cable connecting between the NC unit and safety I/O unit may be disconnected or loosened. Check the cable.
NC unit or safety I/O unit may be faulty. Exchange the NC unit or safety I/O unit.
Details
The input signals from the drives safety function are inconsistent.
The screen displays the No. of device ZR with an error.
Safety observation target axes are stopped.
Remedy
NC unit may be faulty. Exchange the NC unit.
Details
An error has occurred in User safety sequence 1.
The screen displays the error cause by the number.
Safety observation target axes are stopped.
User safety sequences 1 and 2 are both stopped.

All the DOs of the connected safety I/O unit are turned OFF.
Remedy
Refer to the list of user safety sequence error details in Smart safety observation Specification manual. Cancel the error based on the displayed error cause, and then turn OFF and ON the NC power.
Details
An error has occurred in User safety sequence 2. The screen displays the error cause.
Safety observation target axes are stopped.
User safety sequences 1 and 2 are both stopped.
All the DOs of the connected safety I/O unit are turned OFF.
Remedy
Refer to the list of user safety sequence error details in Smart safety observation Specification manual. Cancel the error based on the displayed error cause, and then turn OFF and ON the NC power.
V03 Host station comm. error 2 0010 Unit info
V03 Host station comm. error 3 0011 Unit info
V03 Drv safe receive crosscheck er 0012 ZR device No.
V03 User safety sequence 1 error 0013 Error cause number
V03 User safety sequence 2 error 0014 Error cause number

Details
The signals output to the safety I/O unit are unmatched between PLC1 and PLC2.
Displays the information of the unit with an error.
bit24-27: Unit No.
bit0-15: Signal BIT
The axes covered by safety function come to a standstill.
(*) The unit No. indicates the unit in which an alarm occurs.
The channel No. and station No. to which the unit is connected can be confirmed by the following parame ters.
Channel No.: #51501 + 10 (Unit No. - 1)
Station No.: #51502 + 10 (Unit No. - 1)
Remedy
Check the user safety sequence to make sure the output signal control circuit is correct.
Set tolerable time more than 300ms, when an output signal is controlled with 100ms timer.
NC unit may be faulty. Replace the NC unit.
Details
The system has both an axis for which Safety observation is enabled (the parameter "#2313 SV113(SSF8)/bitF" or "#13229 SP229(SFNC9)/bitF" is "1") and an axis for which Smart safety observation is enabled (the parameter "#51101 SF_Disable" or "#51301 SF_SDisable" is "0").
Remedy
Disable Safety observation for all the axes (Set the parameters "#2313 SV113(SSF8)/bitF" and "#13229 SP229(SFNC9)/bitF" to "0"), and turn ON the NC reset signal.
Disable Smart safety observation for all the axes (Set the parameters "#51101 SF_Disable" and "#51301 SF_SDisable" to "1"), and turn the power OFF and ON.
Details
A safety I/O unit has been connected with the smart safety observation option OFF or with the parameters "#51101 SF_Disable" and "#51301 SF_SDisable" set to "1" for all the axes.The screen displays the channel to which the safety I/O unit is connected by the bit number.
bit0: Operation panel
bit1: RIO 1CH
bit2: RIO 2CH
bit3: RIO 3CH
bit4: RIO 4CH
Remedy
Disconnect the safety I/O unit, and then turn OFF and ON the power.
If you wish to use Smart safety observation, implement the following and then turn the power OFF and ON.
- Enable the option.
- Turn "0" the axis parameter of Smart safety observation ("#51101 SF_Disable" / "#51301 SF_SDisable").
V03 Output sig. cross check error 0015 Unit info
V04 Safety observation & Smart both ON 0001
V04 Safety IO device unconnectable 0002 Safety I/O unit-connect ed channel

Details
A safety I/O unit has been connected to the I/O connection channel where RIO1.0 unit is connected.
The screen displays the I/O connection channel to which the safety I/O unit is connected using a bit number.
bit0: Operation panel
bit1: RIO 1CH
bit2: RIO 2CH
bit3: RIO 3CH
bit4: RIO 4CH
Remedy
For the I/O connection channel where the safety signal input/output is conducted, no devices other than RIO2.0 unit or safety I/O unit can be connected.
If you are unable to change the I/O device configuration immediately, set the parameters "#51101 SF_Dis able" and "#51301 SF_SDisable" to "1" for all the axes, and turn OFF and ON the power. This prevents oc currence of this alarm.
Details
None of the I/O connection channels is connected to a safety I/O unit.
Remedy
Connect a safety I/O unit to the I/O connection channel through which the safety signals are input/output.
If you are unable to change the I/O device configuration immediately, set the parameters "#51101 SF_Dis able" and "#51301 SF_SDisable" to "1" for all the axes, and turn OFF and ON the power. This prevents oc currence of this alarm.
Details
Safety PLC has not been written.
Remedy
Write safety PLC and turn the power OFF and ON.
If safety PLC is not ready, set the parameters "#51101 SF_Disable" and "#51301 SF_SDisable" to "1" for all the axes, and then turn the power OFF and ON. This prevents occurrence of this alarm.

Details
The optical channel connected to an axis for which the parameter "#51101 SF_Disable" or "#51301 SF_SDis able" is set to "0" is configured with any drive unit other than MDS-E Series. (MDS-D Series drive unit is con nected to the said channel.)
The screen displays the No. of optical communication channel of this error.
Remedy
Do not connect any drive unit other than MDS-E Series to the optical channel of the axis for which the param eter "#51101 SF_Disable" or "#51301 SF_SDisable" is set to "0".
If an MDS-E Series drive unit is not ready, set the parameters "#51101 SF_Disable" / "#51301 SF_SDisable"
to "1" for all the axes of the said channel, and then turn OFF and ON the power.
This prevents occurrence of this alarm.
V04 Safe IO disabled: connect err 0003 Safety I/O unit-connect ed channel
V04 Safe IO disabled: no safe I/Os 0004
V04 Safety PLC is not yet written 0005
V04 NC-DRV safety comm. Disabled 0006 Optical channel No.

Details
The channel No. or station No. of the emergency stop signal device (set by parameters) does not coincide with
any contact point (channel/station No. specified by the safety I/O assignment parameters RIO CH No and RIO
Station No.) of the safety I/O unit. The screen displays the index No. of the incorrectly set emergency stop sig nal device.
0001: EMG_Dev1_ch to EMG_Dev1_bit
0002: EMG_Dev2_ch to EMG_Dev2_bit
Remedy
Change the channel, station or bit No. of emergency stop signal device to be one of the contact points of the
safety I/O unit. And then turn OFF and ON the power.
When you change the setting of emergency stop signal device channel No. (EMG_Dev1_ch / EMG_Dev2_ch)
to 0, and turn OFF and ON the power, the designation of emergency stop signal device is disabled, so this
alarm is cleared.
Details
Safety I/O device assignment parameter is incorrect.
The safety I/O device assignment parameter of the connected safety I/O unit is not set.
The safety I/O device assignment parameter is set for any disconnected safety I/O unit.
The set channel No. or station No. is overlapped.
Remedy
Make sure which safety I/O unit is connected, set the safety I/O device assignment parameters, and then turn
OFF and ON the power.
Details
During SLS observation, the command/FB speed has exceeded the safely-limited speed(*) and has not
dropped below the speed limit within the SLS detection delay time (set by parameter).
The screen displays the name of axis of this error.
(*)Safely-limited speed = SLS speed tolerance x SLS speed override / 100
Remedy
This error can be cancelled by the safety reset signal while motor speed is under SLS limit.
If the SLS speed tolerance or SLS speed override (set by parameter) is lower than the assumption, change
the parameter setting and turn OFF and ON the power.
If the SLS detection delay time (set by parameter) is shorter than the assumption, change the parameter set ting.
Check the safety ladder to make sure that SLS speed tolerance and SLS speed override are changed in a
timely manner.
Details
The command/FB speed has failed to decelerate to the safely-limited speed(*) or lower within a period of SLS
deceleration observation time (set by parameter) after start of SLS observation.
The screen displays the name of axis of this error.
(*)Safely-limited speed = SLS speed tolerance x SLS speed override / 100
Remedy
This error can be cancelled by the safety reset signal while motor speed is under SLS limit.
If the SLS speed tolerance or SLS speed override (set by parameter) is lower than the assumption, change
the parameter setting and turn OFF and ON the power.
If the SLS deceleration observation time (set by parameter) is shorter than the assumption, change the pa rameter setting.
V04 EMG stop signal device illegal 0007 Emergency stop device
index No.
V04 Safe IO assign para setting er 0009 Channel No.
V05 SLS speed error 0001 Axis name
V05 SLS deceleration error 0002 Axis name

Details
The command position/FB position has gone out of the SLP position tolerance range (set by parameter) during
the SLP observation, and failed to return to the tolerance range within the SLP detection delay time (set by
parameter).
The screen displays the name of axis of this error.
Remedy
This error can be cancelled by the safety reset signal while the axis is in the SLP position range.
If the axis is out of the SLP position range, deactivate SLP observation, cancel this error using the safety reset
signal, and then move the axis to a safe position in a manual mode.
If the safely-limited position range (specified by the SLP position tolerance parameters) is smaller than the
assumption, change the parameter settings and turn OFF and ON the power.
If the SLP detection delay time (set by parameter) is shorter than the assumption, change the parameter set ting.
Check the safety ladder to make sure that SLP position tolerance is changed in a timely manner.
Details
The command/FB speed, which had exceeded the SOS stop speed (set by parameter) during SOS, has failed
to drop to the SOS stop speed or lower within the SOS_V detection delay time (set by parameter).
The screen displays the name of axis of this error.
*If the conditions of two or more SOS-related alarms are met at a time, the notification priority order is as fol lows: SOS position deviation error > SOS travel distance error > SOS speed error.
Remedy
This error can be cancelled by the safety reset signal while In SOS stop is ON.

If In SOS stop is OFF, deactivate SOS, cancel this error using the safety reset signal, and then move the axis
to a safe position in a manual mode.
If the parameter of SOS stop speed is lower than the assumption, change the setting and turn OFF and ON
the power.
If the SOS_V detection delay time (set by parameter) is shorter than the assumption, change the parameter
setting.
Details
The position deviation (difference between the command and FB positions), which had exceeded the SOS po sition deviation tolerance (set by parameter) during SOS, has failed to reduce to the SOS position deviation
tolerance or smaller within the SOS_PD detection delay time (set by parameter).
The screen displays the name of axis of this error.
*If the conditions of two or more SOS-related alarms are met at a time, the notification priority order is as fol lows: SOS position deviation error > SOS travel distance error > SOS speed error.
Remedy
Refer to the corrective actions of "SOS speed error" for how to cancel this error.
If the SOS position deviation tolerance (set by parameter) is smaller than the assumption, change the setting
and turn OFF and ON the power.
If the SOS_PD detection delay time (set by parameter) is shorter than the assumption, change the parameter
setting.
V05 SLP position error 0003 Axis name
V05 SOS speed error 0004 Axis name
V05 SOS position deviation error 0005 Axis name
M800V/M80V Series Alarm/Parameter Manual
13 Smart Safety Observation Alarm (V)
13.1 Smart Safety Observation Error (V01/V02/V03/V04/V05/V06/V07)
IB-1501623-F 194
Details
The command/FB travel distance, which had exceeded the SOS travel distance tolerance (+/-) (set by param eter) during SOS, has failed to reduce to the SOS travel distance tolerance (+/-) or smaller within the SOS_P
detection delay time (set by parameter).
The screen displays the name of axis of this error.
*If the conditions of two or more SOS-related alarms are met at a time, the notification priority order is as fol lows: SOS position deviation error > SOS travel distance error > SOS speed error.
Remedy
Refer to the corrective actions of "SOS speed error" for how to cancel this error.
If the SOS travel distance tolerance (+/-) (set by parameter) is smaller than the assumption, change the setting
and turn OFF and ON the power.
If the SOS_P detection delay time (set by parameter) is shorter than the assumption, change the parameter
setting.
Details
The SS1 deceleration observation time (set by parameter) has elapsed with the command/FB speed exceeding
the SOS stop speed (set by parameter) since the start of SS1.
The screen displays the name of axis of this error.
Remedy
This error can be cancelled by the safety reset signal while In SS1 stop is ON.
If the SS1 deceleration observation time (set by parameter) is shorter than the assumption, change the pa rameter setting.
Details
The command/FB speed has been exceeding the SOS stop speed (set by parameter) for a period of SS2 de celeration observation time (set by parameter) since the start of SS2.
The screen displays the name of axis of this error.
Remedy
Deactivate SS2, cancel this error using the safety reset signal, and then move the axis to a safe position in a
manual mode.
If the SS2 deceleration observation time (set by parameter) is shorter than the assumption, change the pa rameter setting.
Details
Emergency stop signal is OFF (open status), although Safety external emergency stop is enabled.
Remedy
Ensure the safety of the machine, and then turn the emergency stop signal ON (close status).
Details
The drive unit's internal safety circuit has caused abnormal operation.
The error number corresponding to the contents of abnormal operation appears.
Remedy
Drive unit may be damaged. Replace the drive unit.
V05 SOS travel distance error 0006 Axis name
V05 SS1 deceleration error 0007 Axis name
V05 SS2 deceleration error 0008 Axis name
V06 Safety external EMG stop is ON 0001
V07 DRV safe circuit error Error No. Axis name
M800V/M80V Series Alarm/Parameter Manual
13 Smart Safety Observation Alarm (V)
13.2 Smart Safety Observation Warning (V50/V51/V52/V53/V54)
195 IB-1501623-F
13.2 Smart Safety Observation Warning (V50/V51/V52/V53/V54)
Details
The SSM hysteresis width (set by parameter) is greater than the SSM speed (set by parameter).
The screen displays the name of axis of this error.
Remedy
Change the SSM hysteresis width parameter to be a smaller value than the SSM speed.
Details
After enabling SLP/SCA (Parameter SLP_Enable/SCA_Enable is 1), the Safety absolute position has never
been established.
In SLP/SCA encoder diagnosis during power OFF, [saved position at power shut OFF] and [restored position
at power ON] are inconsistent.
While this alarm is ON, SLP/SCA will not operate. Displays the name of axis of this error.
Remedy
This alarm can be cancelled by turning ON the Safety absolute position check signal. Before turning ON the
Safety absolute position check signal, however, move the axis by manual operation to the position where the
coordinate value is clear (the position that is marked or the reference position etc.) (When in the relative po sition detection system, it requires to operate reference position return to establish the reference position.)
then compare the actual position and the displayed position to confirm the both position is corresponding.
Details
When turning ON the SBT start signal (SBTSTEXm / SBTSTMOm), the test start condition are not met.
Displays the factor why the brake test start is impossible
* When there are multiple factors, the smaller item is shown.

0001: part systems in automatic operation
0002: not in in-position
0003: in servo OFF state.
0004: in current limit
0005: the secondary axis in the synchronous control
0006: in superimposition control
0007: in arbitrary axis exchange control
0008: in mixed control
0009: Parameter for SBT error
000A: reference position establishment incomplete
000B: applies exclusive control of SBT
000C: the secondary axis SBT disabled
000D: the secondary axis SBT start disabled
000E: the secondary axis in single method
Remedy
Check the start-enabled condition of the brake test. Eliminate the cause of the alarm, then enable the SBT start signal to start the brake test.
Details
The axis movement amount exceeded the tolerable value in external brake test pattern 1.
Displays the name of axis with the error.
Remedy
Move the axis to safe position by manual operation. Take corrective action to the brake after the power OFF.
Then turn power ON and carry out the brake test again. This alarm will be cancelled when the test completes normally.
This alarm can be cancelled with the safety reset signal. The external brake SBT incomplete signal (SBTN FEXm), however, remains ON.
V50 SSM hysteresis setting error 0001 Axis name
V50 Safe absol. posn unestablished 0002 Axis name
V51 SBT start disabled 0001 Factor No.
V51 SBT warning 1 0002 Axis name

Details
The axis movement amount exceeded the tolerable value in the test pattern 1 of motor brake test.
Displays the name of axis with the error.
Remedy
Move the axis to safe position by manual operation. Take corrective action to the brake after the power OFF.
Then turn power ON and carry out the brake test again. This alarm will be cancelled when the test completes normally.
This alarm can be cancelled with the safety reset signal. The external brake SBT incomplete signal (SBTN FEXm), however, remains ON.
When this alarm is cancelled with the safety reset signal, however, the motor brake SBT incomplete signal (SBTNFMOm) remains ON.
Details
The axis movement amount exceeded the tolerable value in the test pattern 2 of motor brake test.
Displays the name of axis with the error.
Remedy
Move the axis to safe position by manual operation. Take corrective action to the brake after the power OFF.
Then turn power ON and carry out the brake test again. This alarm will be cancelled when the test completes normally.
This alarm can be cancelled with the safety reset signal. The external brake SBT incomplete signal (SBTN FEXm), however, remains ON.
When this alarm is cancelled with the safety reset signal, however, the motor brake SBT incomplete signal (SBTNFMOm) remains ON.
Details
The axis movement amount exceeded the tolerable value in the test pattern 3 of motor brake test.
Displays the name of axis with the error.
Remedy
Move the axis to safe position by manual operation. Take corrective action to the brake after the power OFF.
Then turn power ON and carry out the brake test again. This alarm will be cancelled when the test completes normally.
This alarm can be cancelled with the safety reset signal. The external brake SBT incomplete signal (SBTN FEXm), however, remains ON.
When this alarm is cancelled with the safety reset signal, however, the motor brake SBT incomplete signal (SBTNFMOm) remains ON.
Details
A PLC input signal "Safe stop 1 request" or "Safe torque off request" is OFF (normal close).
The screen displays the name of axis for which the said signal is OFF.
Remedy
Ensure the safety of the machine, and then turn ON either Safe stop 1 request signal or Safe torque off request signal.
V51 SBT warning 4 0005 Axis name
V51 SBT warning 5 0006 Axis name
V51 SBT warning 6 0007 Axis name
V52 PLC safety stop is active 0001 Axis name

Details
Output signal of the safety I/O unit has been kept ON for 24 hours or longer.
Displays the information of the unit which is subject to the warning.
bit24-27: Unit No.
bit0-15: Signal BIT
(*) The unit No. indicates the unit in which an alarm occurs.
The channel No. and station No. to which the unit is connected can be confirmed by the following parame ters.
Channel No.: #51501 + 10 (Unit No. - 1)
Station No.: #51502 + 10 (Unit No. - 1)
Remedy
Turn OFF the output signal concerned through the user safety sequence, or use the output OFF check func tion to make sure that the output signal turns OFF.

Details
Smart safety observation target axis (the parameters "#51101 SF_Disable" = 0 / "#51301 SF_SDisable" = 0) is defined as a hypothetical axis (the parameter "#51015 safe_drv_test" = 1). In this case some alarms fail to occur, thus avoid this setting while a drive unit is being connected.
NC system is set to a simulation mode (the parameter "#1168 test" = 1). During this mode some alarms fail to occur, thus do not use this mode while a safety I/O unit is connected.
Remedy
Connect MDS-E Series drive to all the axes subject to safety observation, set the parameter ("#51015 safe_drv_test" = 0) and then turn OFF and ON the power.
Connect a safety I/O unit, set the parameter ("#1168 test" = 0) and then turn OFF and ON the power.
V53 Warning on 24Hr continuous ON 0001 Unit info
V54 Simple test mode is active 0001

The parameters with "(PR)" requires the CNC to be turned OFF after the settings. Turn the power OFF and ON to enable the parameter settings.
14.1 Machining Parameters
Set the names of the basic axes that compose the plane.
Set the axis name set in "#1013 axname".
If all three items ("base_I", "base_J" and "base_K") do not need to be set, such as for 2-axis specifications, input "0", and the parameter will be blank.
Normally, when X, Y and Z are specified respectively for base_I, _J, _K, the following relation will be estab lished:
G17: X-Y
G18: Z-X
G19: Y-Z
Or specify any other axis name desired.
---Setting range---
Axis names such as X, Y or Z
Set the names of the basic axes that compose the plane.
Set the axis name set in "#1013 axname".
If all three items ("base_I", "base_J" and "base_K") do not need to be set, such as for 2-axis specifications, input "0", and the parameter will be blank.
Normally, when X, Y and Z are specified respectively for base_I, _J, _K, the following relation will be estab lished:
G17: X-Y
G18: Z-X
G19: Y-Z
Or specify any other axis name desired.
---Setting range---
Axis names such as X, Y or Z
Set the names of the basic axes that compose the plane.
Set the axis name set in "#1013 axname".
If all three items ("base_I", "base_J" and "base_K") do not need to be set, such as for 2-axis specifications, input "0", and the parameter will be blank.
Normally, when X, Y and Z are specified respectively for base_I, _J, _K, the following relation will be estab lished:
G17: X-Y
G18: Z-X
G19: Y-Z
Or specify any other axis name desired.
---Setting range---
Axis names such as X, Y or Z
Set the axis name when there is an axis parallel to "#1026 base_I".
---Setting range---
Axis names such as X, Y or Z
#1026 base_I Base axis I
#1027 base_J Base axis J
#1028 base_K Base axis K
#1029 aux_I Flat axis I

Set the axis name when there is an axis parallel to "#1027 base_J".
---Setting range---
Axis names such as X, Y or Z
Set the axis name when there is an axis parallel to "#1028 base_K".
---Setting range---
Axis names such as X, Y or Z
Set the tolerable error range when the end point deviates from the center coordinate in the circular command.
---Setting range---
0 to 1.000 (mm)
Set the tap return override value for the synchronous tapping.
When "0" is set, it will be regarded as 100%.
---Setting range---
0 to 100 (%)

Set the feedrate for the F command in the F 1-digit command ("#1079 F1digit" is set to "1").
Feedrate when F1 is issued (mm/min).
When "#1246 set08/bit6" is set to "1" and F 1-digit feed is commanded, the feedrate can be increased/de creased by operating the manual handle.
---Setting range---
0 to 1000000 (mm/min)
Set the feedrate for the F command in the F 1-digit command ("#1079 F1digit" is set to "1").
Feedrate when F2 is issued (mm/min).
When "#1246 set08/bit6" is set to "1" and F 1-digit feed is commanded, the feedrate can be increased/de creased by operating the manual handle.
---Setting range---
0 to 1000000 (mm/min)
Set the feedrate for the F command in the F 1-digit command ("#1079 F1digit" is set to "1").
Feedrate when F3 is issued (mm/min).
When "#1246 set08/bit6" is set to "1" and F 1-digit feed is commanded, the feedrate can be increased/de creased by operating the manual handle.
---Setting range---
0 to 1000000 (mm/min)
Set the feedrate for the F command in the F 1-digit command ("#1079 F1digit" is set to "1").
Feedrate when F4 is issued (mm/min).
When "#1246 set08/bit6" is set to "1" and F 1-digit feed is commanded, the feedrate can be increased/de creased by operating the manual handle.
---Setting range---
0 to 1000000 (mm/min)
#1030 aux_J Flat axis J
#1031 aux_K Flat axis K
#1084 RadErr Arc error
#1171 taprov Tap return override
#1185 spd_F1 F1 digit feedrate F1
#1186 spd_F2 F1 digit feedrate F2
#1187 spd_F3 F1 digit feedrate F3
#1188 spd_F4 F1 digit feedrate F4

Set the feedrate for the F command in the F 1-digit command ("#1079 F1digit" is set to "1").
Feedrate when F5 is issued (mm/min).
When "#1246 set08/bit6" is set to "1" and F 1-digit feed is commanded, the feedrate can be increased/de creased by operating the manual handle.
---Setting range---
0 to 1000000 (mm/min)
Set the maximum value up to which the F 1-digit feedrate can be changed.
---Setting range---
0 to 1000000 (mm/min)
Set the constant that determines the speed change rate per manual handle graduation in F 1-digit feedrate change mode.
---Setting range---
0 to 32767
Set the M code for counting the number of the workpiece repeated machining.
The number of the M-codes set by this parameter is counted.
The No. will not be counted when set to "0".
---Setting range---
0 to 999
Set the initial value of the number of workpiece machining. The number of current workpiece machining is displayed.
---Setting range---
0 to 999999
Set the maximum number of workpiece machining.
A signal will be output to PLC when the number of machining times is counted to this limit.
---Setting range---
0 to 999999
Set the feedrate during automatic tool length measurement.
---Setting range---
1 to 1000000 (mm/min)
Set the distance between the measurement point and deceleration start point.
---Setting range---
0 to 99999.999 (mm)
Set the tolerable range of the measurement point.
An alarm will occur when the sensor signal turns ON before the range, set by this parameter, has not been reached from the measurement point, or when the signal does not turn ON after the range is passed.
---Setting range---
0 to 99999.999 (mm)
#1189 spd_F5 F1 digit feedrate F5
#1506 F1_FM Upper limit of F 1-digit feedrate
#1507 F1_K F 1-digit feedrate change constant
#8001 WRK COUNT M
#8002 WRK COUNT
#8003 WRK COUNT LIMIT
#8004 SPEED
#8005 ZONE r
#8006 ZONE d

Set the override value for automatic corner override.
---Setting range---
0 to 100 (%)
Set the maximum corner opening angle where deceleration should start automatically.
When the angle is larger than this value, deceleration will not start.
---Setting range---
0 to 180 ()

Set the position where deceleration starts at the corner.
Designate at which length point before the corner deceleration should start.
---Setting range---
0 to 99999.999 (mm)
Set the maximum value when inputting the tool compensation amount.
A value exceeding this setting value cannot be set.
Absolute value of the input value is set.
(If a negative value is input, it is treated and set as a positive value.)
When "0" is set, this parameter is disabled.
---Setting range---
0 to 9999.999 (mm)
(Input setting increment applies)
Set the maximum value for when inputting the tool compensation amount in the incremental mode.
A value exceeding this setting value cannot be set.
Absolute value of the input value is set.
(If a negative value is input, it is treated and set as a positive value.)
When "0" is set, this parameter is disabled.
---Setting range---
0 to 9999.999 (mm)
(Input setting increment applies)
Path recognition range
Specify the range to recognize the tool paths adjoining to the command position when the smooth fairing function is ON.
If "0" is set, the range will be 1.000 (mm).
---Setting range---
0 to 100.000 (mm)
Compensation distance tolerance
Specify the upper limit of the distance between the command position and compensation position when the smooth fairing function is ON.
If you specify a negative value, operation is conducted with no tolerance limit.
If "0" is set, the tolerance will be 0.005 (mm).
---Setting range---
-1.000 to 100.000 (mm)
#8007 OVERRIDE
#8008 MAX ANGLE
#8009 DSC. ZONE
#8010 ABS. MAX.
#8011 INC. MAX.
#8038 Path recog. range
#8039 Comp. range limit

Set the length from the center of the normal line control axis to the tool tip. This is used to calculate the turning speed at the block joint.
This is enabled during the normal line control type II.
---Setting range---
0.000 to 99999.999 (mm)
Set the radius of the arc to be automatically inserted into the corner during normal line control.
This is enabled during the normal line control type I.
---Setting range---
0.000 to 99999.999 (mm)
Set the length from the tool holder to the tool tip.
---Setting range---
0.000 to 99999.999 (mm)
Set the command increment scale.
The scale will be "1" when "0" is set.
---Setting range---
0 to 10000 (fold)
0: One fold
Select whether to enable the variable speed thread cutting function.
0: Disable
1: Enable
Set the minimum cutting amount for compound type thread cutting cycle (G76).
The value set in this parameter will be applied when the cutting amount in compound thread cutting cycle (G76) without Q command is smaller than that in this parameter.
This parameter is valid only when "#1222 aux06/bit4" is set to "1".
---Setting range---
0.000 to 99999.999 (mm)
Not used. Set to "0.000".
1: If a zero-travel distance block is given during turning cycle mode (G90, G92 or G94), the turning cycle is executed again.
0: If a zero-travel distance block is given during turning cycle mode (G90, G92 or G94), the turning cycle is not executed.
Set the value of the denominator constants for 3-dimensional tool radius compensation.
Set the value of "p" in the following formula.
Vx = i x r/p, Vy = j x r/p, Vz = k x r/p
Vx, Vy, Vz: X, Y, and Z axes or vectors of horizontal axes
i, j, k: Program command value
r: Offset
p =(i2 + j2 + k2) when the set value is "0".
---Setting range---
0 to 99999.999
#8041 C-rot.R
#8042 C-ins.R
#8043 Tool HDL FD OFS
#8044 UNIT*10

#8045 Varying spd thread
#8061 G76 THICK
#8069 G76G78in-posn wdt.
#8070 Turning cycle mode
#8071 3-D CMP (for M system only)

Set the scale factor for reduction or magnification in the machining program specified by G50 or G51 com mand.
This parameter will be valid when the program specifies no scale factor.
---Setting range---
-99.999999 to 99.999999
Set the tolerable error range (absolute value) when the end point position, commanded by the spiral or con ical interpolation command with the command format type 2, differs from the end point position obtained from the speed and increment/decrement amount.
---Setting range---
0 to 99999.999 (mm)
Set the tolerable error between the involute curve through the start point and the involute curve through the end point.
---Setting range---
0.000 to 99999.999 (mm)
Set the period of time before turn-OFF of the display unit backlight.
When "0" is set, the backlight is not turned OFF.
It is possible to turn OFF the backlight of the monitor screen as well by using the [SHIFT] + [C.B] keys, unless its window is displayed.
---Setting range---
1 to 60 (min)
0: The backlight is not turned OFF
Set the rotation angle when the coordinate rotation by program is commanded.
This parameter is enabled when "1" is set in "#1270 ext06/bit5" (Coordinate rotation angle without com mand).
This parameter is set as absolute command regardless of the "#8082 G68.1 R INC" setting. If the rotation angle is designated by an address R in G68.1 command, the designation by program will be applied.
---Setting range---
-360.000 to +360.000 ()
Select absolute command or incremental command to use for the rotation angle command R at L-system coordinate rotation.
0: Use absolute command in G90 modal, incremental command in G91 modal
1: Always use incremental command
(Note) If G91 does not exist in the G code system, the command type is decided by this parameter only.
Specify the reverse speed of chip removal operation.
When "0" is set, this setting is disabled.
The reverse speed will be limited with the parameters "the maximum spindle rotation speed" "#3005 smax1" to "#3008 smax4" of the selected gear.
---Setting range---
0 to 999999 (r/min)
Set the plane (horizontal axis) for coordinate rotation control.
Usually, set the name of the 1st axis.
When this parameter is not set, the coordinate rotation function will not work.
---Setting range---
Axis name
#8072 SCALING P (for M system only)
#8075 SpiralEndErr (for M system only)
#8077 Invlute error
#8078 Screen Saver Timer
#8081 Gcode Rotat (for L system only)
#8082 G68.1 R INC (for L system only)
#8100 Chip removal speed
#8621 Coord rot plane (H)

Set the plane (vertical axis) for coordinate rotation control.
Usually, set the name of the 2nd axis.
When this parameter is not set, the coordinate rotation function will not work.
---Setting range---
Axis name
Set the center coordinates (horizontal axis) for coordinate rotation control.
---Setting range---
-99999.999 to 99999.999 (mm)
Set the center coordinates (vertical axis) for coordinate rotation control.
---Setting range---
-99999.999 to 99999.999 (mm)
Set the vector components (horizontal axis) for coordinate rotation control.
When this parameter is set, the coordinate rotation control angle (#8627) will be automatically calculated.
---Setting range---
-99999.999 to 99999.999 (mm)
Set the vector components (vertical axis) for coordinate rotation control.
When this parameter is set, the coordinate rotation control angle (#8627) will be automatically calculated.
---Setting range---
-99999.999 to 99999.999 (mm)
Set the rotation angle for coordinate rotation control.
When this parameter is set, the coordinate rotation vector (#8625, #8626) will be "0".
---Setting range---
-360.000 to 360.000 ()
Specify the name of base axis for the graphics.
Select an alphabetical letter from A to Z.
When there is no need to set all three parameters (GraphicsBaseAxis_I, GraphicsBaseAxis_J and Graphics BaseAxis_K) (e.g. for two-axis specifications), enter "0" to leave the parameter blank.

Normally, when X, Y and Z are specified in "GraphicsBaseAxis_I", "GraphicsBaseAxis_J" and "GraphicsBa seAxis_K" respectively, the following relationship will be established:
G17: X-Y
G18: Z-X
G19: Y-Z
Or specify any other axis name desired.
---Setting range---
0 or from A to Z
#8622 Coord rot plane (V)
#8623 Coord rot centr (H)
#8624 Coord rot centr (V)
#8625 Coord rot vctr (H)
#8626 Coord rot vctr (V)
#8627 Coord rot angle
#8631 GraphicsBaseAxis_I

Specify the name of base axis for the graphics.
Select an alphabetical letter from A to Z.
When there is no need to set all three parameters (GraphicsBaseAxis_I, GraphicsBaseAxis_J and Graphics BaseAxis_K) (e.g. for two-axis specifications), enter "0" to leave the parameter blank.
Normally, when X, Y and Z are specified in "GraphicsBaseAxis_I", "GraphicsBaseAxis_J" and "GraphicsBa seAxis_K" respectively, the following relationship will be established:
G17: X-Y
G18: Z-X
G19: Y-Z
Or specify any other axis name desired.
---Setting range---
0 or from A to Z
Specify the name of base axis for the graphics.
Select an alphabetical letter from A to Z.
When there is no need to set all three parameters ("GraphicsBaseAxis_I", "GraphicsBaseAxis_J" and "GraphicsBaseAxis_K") (e.g. for two-axis specifications), enter "0" to leave the parameter blank.
Normally, when X, Y and Z are specified in "GraphicsBaseAxis_I", "GraphicsBaseAxis_J" and "GraphicsBa seAxis_K" respectively, the following relationship will be established:
G17: X-Y
G18: Z-X
G19: Y-Z
Or specify any other axis name desired.
---Setting range---
0 or from A to Z
Set the length to the touch tool tip.
---Setting range---
-99999.999 to 99999.999 (mm)
Set the diameter of the sphere at the touch tool tip.
---Setting range---
-99999.999 to 99999.999 (mm)
This sets the deviation amount (X direction) from the touch tool center to the spindle center.
---Setting range---
-99999.999 to 99999.999 (mm)
Set the deviation amount (Y direction) from the touch tool center to the spindle center.
---Setting range---
-99999.999 to 99999.999 (mm)
Set the one-time return distance for contacting again.
---Setting range---
0 to 99999.999 (mm)
Set the feedrate when contacting again.
---Setting range---
1 to 60000 (mm/min)
#8632 GraphicsBaseAxis_J
#8633 GraphicsBaseAxis_K
#8701 Tool length
#8702 Tool Dia
#8703 OFFSET X
#8704 OFFSET Y
#8705 RETURN
#8706 FEED

Set the difference (horizontal axis direction) between the skip read value and actual skip position.
---Setting range---
-99999.999 to 99999.999 (mm)
Set the difference (vertical axis direction) between the skip read value and actual skip position.
---Setting range---
-99999.999 to 99999.999 (mm)
Reverse the sign of external workpiece coordinate.
Select when using the external workpiece coordinate system with Z shift.
0: External workpiece offset without sign reversal
1: External workpiece offset with sign reversal
Set whether to enable external workpiece offset subtraction when setting the workpiece coordinate offset.
0: Not subtract the external workpiece offset. (Conventional specification)
1: Subtract the external workpiece offset.
Set the tool length measurement axis.
Set the "#1022 axname2" axis name.
---Setting range---
Axis name
(Note) If the axis name is illegal or not set, the 3rd axis name will be set as default.
Set the tool diameter measurement axis.

Set the "#1022 axname2" axis name.
---Setting range---
Axis name
(Note) If the axis name is illegal or not set, the 1st axis name will be set as default.
Select the coordinate system for reading skip coordinate value.
Select whether to read the skip coordinate in the workpiece coordinate system or in the feature coordinate system during inclined surface machining command.
Select whether to read the skip coordinate in the workpiece coordinate system or in the workpiece installation coordinate system during workpiece installation error compensation.
0: Workpiece coordinate system
1: Feature coordinate system/Workpiece installation coordinate system
Specify the name of lead axis that performs thread recutting.
If any nonexistent axis name is specified, the 1st axis of the part system is used as a lead axis for thread recutting.
If the parameter "#8714 Thrdrecut lead ax" is unspecified, Z axis is set as the parameter value at power ON.
---Setting range---
A,B,C,H,U,V,W,X,Y,Z
Specify the No. or name of spindle that performs thread recutting.
If 0 or any nonexistent spindle No. or name is specified, the 1st spindle is used for thread recutting.
---Setting range---
Spindle No. method: 0 to 8
Spindle name method: 0 to 9
(Default: 0)
#8707 Skip past amout (H)
#8708 Skip past amout (V)
#8709 EXT work sign rvs
#8710 EXT work ofs invld
#8711 TLM L meas axis
#8712 TLM D meas axis
#8713 Skip coord. Switch (For M system only)
#8714 Thrdrecut lead ax
#8715 Thread recut SP#

Set this parameter to "1" if you wish to disable the external workpiece coordinate system offset.
This parameter is enabled when "#11056 Workshift invalid" (Workpiece coordinate system shift OFF) is "0".
0: Use the external work coordinate offset (EXT) to implement compensation
1: Implement compensation without using the external work coordinate offset (EXT)
Specify the workpiece zero position that is used for measuring the workpiece installation error.
0: Workpiece center
1: Apex in X-, Y- direction
2: Apex in X+, Y- direction
3: Apex in X+, Y+ direction
4: Apex in X-, Y+ direction
Specify the workpiece coordinate system in which you input the workpiece coordinates for workpiece instal lation error measurement.
Set the number part of the coordinate system modal. (54, 54.1, 55, 56, 57, 58 or 59)
---Setting range---
0, 54 to 59
If workpiece installation error measurement is performed in the extended workpiece coordinate system, specify the address P value of G54.1.
If "#8718 WE meas. wk coord" is not 54.1, there is no need for setting this parameter.
---Setting range---
0 to 300
Specify the X direction width of the rectangular workpiece for which workpiece installation error measurement is performed.
If the sensor's accessible range is small due to jig etc., specify the width of the portion that is stuck out of the jig.
---Setting range---
0.000 to 99999.999 (mm)
Specify the Y direction width of the rectangular workpiece for which workpiece installation error measurement is performed.
If the sensor's accessible range is small due to jig etc., specify the width of the portion that is stuck out of the jig.
---Setting range---
0.000 to 99999.999 (mm)
Specify the Z direction width of the rectangular workpiece for which workpiece installation error measurement is performed.
If the sensor's accessible range is small due to jig etc., specify the width of the portion that is stuck out of the jig.
---Setting range---
0.000 to 99999.999 (mm)
Specify the workpiece installation error No. for write during the workpiece installation error measurement.
Set "1" for G54.4 P1.
---Setting range---
0 to 7
(PR) #8716 EXT/Wrksft Share (for L system only)
#8717 WE measure wk zero
#8718 WE meas. wk coord
#8719 WE meas. ext wk No
#8720 WE mea. wk X-width
#8721 WE mea. wk Y-width
#8722 WE mea. wk Z-width
#8723 WK inst. err comp#

Specify the tool length compensation No. of the touch probe to be used for measurement of rotation center error and workpiece installation error.
Set the touch probe offset in the said number before measurement.
If the specified offset is significantly large, the probe may be damaged.
---Setting range---
0 to 999
Select whether to enable the tolerance control.
0: Disable
1: Enable
(Note) Tolerance control is available only under SSS control.
To enable this function, set "#8090 SSS ON" to "1".
Set the compensation coefficient to adjust a path error or clamp speed in the corner while tolerance control is ON.
This parameter is enabled during tolerance control. Thus set this parameter if you wish to use different clamp speed according to ON/OFF of tolerance control.
When "0" is set in this parameter, the standard value (100%) is applied.
---Setting range---
0 to 2000 (%)
Spline interpolation 2: Smoothing range
Normally set "0" in this parameter.
If you run a program with micro segments and its reciprocating paths are uneven, set the parameter to about 3 to 5 times the length of the programmed segments.
---Setting range---
0.000 to 10.000 (mm)
Tolerance control: Corner recognition angle
Specify the corner recognition angle. Normally set to "0".
---Setting range---
0.000 to 180.000 ()
0: Retain the spindle speed (,S) in synchronous tap return
1: Cancel the spindle speed (,S) in synchronous tap return with G80
The same value as "#1223 aux07/bit6" will be reflected. When either setting changes, the other will change accordingly.
Select the position for displaying the zero point mark in the graphic trace and 2D check.
0: Machine coordinates zero point (same as conventional method)
1: Workpiece coordinate zero point
The same value as "#1231 set03/bit4" will be reflected. When either setting changes, the other will change accordingly.
Select the start point of the first travel command after coordinate rotation by program is commanded.
0: Calculate the end position using the current position on the local coordinate system before rotating, with out rotating the start point in accordance with the coordinates rotation.
1: Calculate the end position, assuming that the start point rotates in accordance with the coordinates ro tation.
#8724 Sensor T L comp No
#12066 Tolerance ctrl ON
#12067 Tolerance spd coef
#12068 Smoothing range
#12069 Corner angle
#19001 Syn.tap(,S)cancel
#19002 Zero-point mark
#19003 PRG coord rot type

Set the upper limit of the cutting feed rate in synchronous tapping.
---Setting range---
0 to 1000 (mm/rev)
(Note) Setting "0" disables this parameter.
When the commanded cutting feed rate in synchronous tapping exceeds this setting, a program error (P184) will occur.
Set a clamp speed coefficient (%) for manual speed command 2.
The feed rate is clamped at the command feed rate or rapid traverse rate for automatic operation, which was multiplied by this parameter's value.
(Note) This setting is valid only for manual speed command 2.
---Setting range---
0 to 1000 (%)
0: 100% (Default value)
Set whether to handle an EOR(%) in machining program as the end of program in automatic operation, graphic check, program transfer to NC memory/NC memory2, program editing, and buffer correction.
Tape operation, Computer Link B, and serial input/output are not included.
0: An EOR(%) is handled as the end of machining program.
1: An EOR(%) is not handled as the end of machining program. The program will be read to the end of file.
Set the speed constant to be used for the program check operation function.
---Setting range---
0 to 60000
Select the start point of the initial travel command after parameter coordinate rotation.
0: Calculate the end position, assuming that the start point rotates in accordance with the coordinates ro tation.
1: Calculate the end position using the current position on the local coordinate system before rotating, with out rotating the start point in accordance with the coordinates rotation.
Corner deceleration check angle
Specify the internal angle formed by two blocks, at or below which the block joint is determined as a corner and the latter block's start timing is controlled accordingly while the automatic error detect is ON.
---Setting range---
0 to 180 ()
#19004 Tap feedrate limit
#19005 manual Fcmd2 clamp
(PR) #19006 EOR Disable
#19007 Prg check constant
#19008 PRM coord rot type
#19009 Corner check angle

N002
N001

Corner deceleration check width
When deceleration of the currently executed block has started and a position error width between the pro grammed end point and machine position has reduced to this parameter or less, the control starts execution of the next block.
---Setting range---
0 to 99.999 (mm)
Analog spindle synch tap: Voltage output magnification (at cutting)
Specify the spindle speed magnification to be applied during cutting in analog spindle synchronous tapping.
When 0 is set, the magnification is taken as 100%.
If the spindle fails to rotate as commanded due to such as cutting load, set this parameter to correct the speed.
---Setting range---
0 to 200 (%)
Analog spindle synch tap: Voltage output magnification (at retract)
Specify the spindle speed magnification to be applied during retract in analog spindle synchronous tapping.
When 0 is set, the magnification is taken as 100%.
If the spindle fails to rotate as commanded due to such as cutting load, set this parameter to correct the speed.
---Setting range---
0 to 200 (%)
The value of address P of G04 with no decimals is multiplied by the value determined by this parameter.
This parameter is only relevant only when "#8112 DECIMAL PNT-P" is "0", or when "#1078 Decpt2" is "0".
The value is determined as 10n (n = -3 to 3).
-3: 1/1000
-2: 1/100
-1: 1/10
0: 1
1: 10
2: 100
3: 1000
Select whether to enable the setting of "#19014 G04 P factor" for G04 commands in a fixed cycle subpro gram.
0: Disable
1: Enable
Specify the diameter of stylus sphere that is used for measurement of rotation center error or workpiece in stallation error.
If the set value is significantly different from the actual diameter, the sensor may be damaged.
---Setting range---
0.000, 0.100 to 10.000 (mm)
#19010 Corner check width
#19012 Ana-Tap-Voltage1
#19013 Ana-Tap-Voltage2
#19014 G04 P factor
#19019 fixpro G04P factor Fixed cycle G04 P factor valid
#19101 Stylus sphere dia.
N002
N001 Machine position

Specify the length of stylus that is used for workpiece installation error measurement.
If the set value is significantly different from the actual length, the sensor may be damaged.
---Setting range---
0.000 to 99999.999 (mm)
Specify the over-travel distance of the sensor that is used for measurement of rotation center error or work piece installation error. (allowable excess of sensor, over-stroke)
Set the smallest over-travel distance among all the axes.
The initial approaching speed to the reference sphere is determined according to the over-travel distance.
If the set over-travel distance is greater than the actual distance, the sensor may be damaged.
---Setting range---
0.000 to 100.000 (mm)
Select whether to retain the rotation direction of C axis when circular interpolation takes place near the work piece zero during milling interpolation or during polar coordinate interpolation.
0: Not retain (the direction requiring the smaller amount of rotation)
1: Retain the rotation direction
Specify the range to be determined as workpiece zero when #19104 is set to "1".
---Setting range---
0 to 1.000 (mm)
Specify the desired load during the cutting load control. (n = 1 to 8)
During the cutting load control, feedrate is controlled so that the cutting load becomes the set value.
---Setting range---
0 to 327 (%)
Specify the minimum load to be treated as in cutting state. (n = 1 to 8)
When the spindle load value is equal to or greater than the setting value, cutting load control is executed.
---Setting range---
0 to 327 (%)
Specify the maximum feedrate during the cutting load control as a percentage (%) of the command speed.
(n = 1 to 8)
When "0" is set, it is assumed that 120% is set.
---Setting range---
0 to 300 (%)
0: 120% (default value)
Specify the minimum feedrate during the cutting load control as a percentage (%) of the command speed.
(n = 1 to 8)
When "0" is set, it is assumed that 90% is set.
---Setting range---

0 to 300 (%)
0: 90% (default value)
Not used.
#19102 Stylus length
#19103 Sensor over-travel
#19104 G12.1 no reversal
#19105 G12.1 zero range
#19200+5(n-1) CLC desired load n
#19201+5(n-1) CLC detect.load n
#19202+5(n-1) CLC max.feedrate n
#19203+5(n-1) CLC min.feedrate n
#19401 G33.n chamfer spd

Specify this parameter to draw a path of C axis (rotary axis) according to its rotation in the graphic trace and 2D graphic trace.
When "#1013 axname" is set to "C", the axis is handled as a rotary axis.
By setting this parameter to "C", a rotation path around the Z axis on actual workpiece can be expressed.
When the Graphic check rotary axis drawing option or Graphic trace rotary axis drawing option is disabled, this parameter is ignored.
C: Enable this function
0: Disable this function
(Setting is cleared when "0" is set)
Select whether to enable the retract at an alarm during hobbing.
0: Disable
1: Enable
(Standard value: 0)
Select whether to disable the acceleration/deceleration of a retract.
0: Enable
1: Disable
(Standard value: 0)
This is enabled when #1253 set25 bit2 is 1.
The operation at the hole bottom and the hole drilling stop position is as below.
0: Perform no deceleration check.
1: Perform command deceleration check.
2: Perform in-position check.
<Target fixed cycles>
Machining center: G81, G82, G83, G73
Lathe: G83, G87, G83.2
Set the minimum value of arc inside override.
R1/R2 come close to zero and the tool feed stops when the radius of tool center path(R1) is very smaller than the radius of program path (R2).
When this parameter is set and R1/R2<=(parameter setting value), tool feed is F* (parameter setting value).
When this parameter is "0" or "100", the arc inside override is disabled.
---Setting range---
0 to 100 (%)
Specify the counterpart part system for timing synchronization or for balance cut when the part system No. is omitted.
Set the part system No. in a way that reflects the combination of two part systems as follows.
(Example) Timing synchronization between Part systems 1 and 3
Enter 3 for the 1st part system, and enter 1 for the 3rd part system.
(Note) When 0 is set, timing synchronization is carried out between Part systems 1 and 2.
---Setting range---
0 to 8
#19405 Rotary ax drawing
#19406 Hob retract ON at alarm
#19407 Hob retract acceleration deceleration OFF
#19417 Hole dec check 2
#19418 Arc inside min ovr (for M system only)
#19419 Timing sync system

Select the enable conditions for the arc inside override.
0: Enable during tool radius compensation
1: Enable during tool radius compensation and automatic corner override
(Note) When M2 format is in use, the arc inside override enables during tool radius compensation, regardless of the setting value of this parameter.
Specify the type of arc inside override.
0: Type 1
Arc inside override during circular cutting is invalid.
1: Type 2
Arc inside override during circular cutting is valid.
This parameter specifies the factor (%) for calculating the pick feed amount that is used when address A (pick feed amount) and address E (number of chamfering cycles) are omitted from G185 (hole edge chamfering cycle).
The pick feed amount is calculated through the following formula.
Tool radius (mm) * G185 factor (%)
---Setting range---
0 to 100 (%)
0: 20% (default value)
Set a radius used as standard for the rotary axis speed.
When the setting value of #19425 is larger than that of "#19427 ManualB Std R2", #19425 setting will be used as surface speed control standard radius 2: #19427 setting will be used as surface speed control standard radius 1.

---Setting range---
0 to 99999.999 (mm)
This sets the rotary axis speed for surface speed control standard radius 1 (ManualB Std R1).
When the setting value of #19426 is larger than that of "#19428 ManualB Std F2", #19426 setting will be used
as surface speed control standard speed 2: #19427 setting will be used as surface speed control standard
speed 1.
---Setting range---
1 to 1000000 (/min)
Set a radius used as standard for the rotary axis speed.
When the same value is set as "#19425 ManualB Std R1", the surface speed control standard speed 1 (Man ualB Std F1) will be selected as the rotary axis speed if the radius is less than that value. The surface speed
control standard speed 2 (ManualB Std F2) is selected if larger than the set value.
---Setting range---
0 to 99999.999 (mm)
Set the rotary axis speed for surface speed control standard radius 2 (ManualB Std R2).
---Setting range---
1 to 1000000 (/min)
Select whether to switch the display of numeric part that follows each address in the currently executed pro gram.
0: Display the program as originally programmed.
1: Replace the numeric part (variable, operation or function) that follows each address with the calculated
value.
#19420 Arc inside ovr ON (for M system only)
#19421 Arc inside ovr typ (for M system only)
#19424 G185 factor
#19425 ManualB Std R1
#19426 ManualB Std F1
#19427 ManualB Std R2
#19428 ManualB Std F2
#19431 Num display in prg

Specify whether to execute roughing along finishing shape in roughing cycle (G71, G72) when pocket ma chining is OFF.
0: Execute roughing along finishing shape
1: Not execute roughing along finishing shape
Specify whether to execute roughing along finishing shape in roughing cycle (G71, G72) when pocket ma chining is ON.
0: Not execute roughing along finishing shape
1: Execute roughing along finishing shape
When roughing along finishing shape is enabled in roughing cycle (G71,G72), select the path to move to the
cycle command point after the completion of roughing along finishing shape.
0: Move to the cycle command point without passing through the start point of roughing.
1: Move to the cycle command point via the start point of roughing.
For ZX plane, the move to the start point of roughing is performed with one axis at a time in the following
order:
G71: in the order of Z axis and X axis
G72: in the order of X axis and Z axis
Specify whether to retract after roughing along finishing shape when roughing along finishing shape is en abled in rough cutting cycle (G71, G72).
0: Not retract
1: Retract
This parameter is valid when "#19442 Path at G71 comp." is set to "1".
Specify the cutting reduction amount in Fixed cycle for drilling using the cutting reduction amount specifica tion method.
This parameter is enabled when address J is omitted.
When "0" is set, the cutting amount reduction method is disabled.
---Setting range---
0 to 99999.999 (mm)
Specify the minimum cutting amount in Fixed cycle for drilling using the cutting reduction amount specifica tion method.
This parameter is enabled when address ,K is omitted.
When "0" is set, the cutting amount specification method is disabled.
---Setting range---
0 to 99999.999 (mm)
Specify the threshold angle to determin whether the tool is near a singular point in tool cutting point control.
(Note) When "0" is specified, the behavior is the same as when 0.001 (deg) is set.
---Setting range---
0.000 to 5.000 (deg)
Select which point is treated as the cutting point during singular orientation in tool cutting point control.
0: Type 1
The tool center point
1: Type 2
The point on the end face of the tool nearest the cutting point before the singular point.
#19437 Skip fin in rough1
#19438 Skip fin in rough2
#19442 Path at G71 comp.
#19443 Retract aft rough
#19444 Drill cut reduce
#19445 Drill cut min.amt
#19601 TCPC sing pt agl
#19602 TCPC sing pt posn

Specify the corner R of the end mill tool used in tool cutting point control.
(Note) When a square end mill is used, set "0".
---Setting range---
0.000 to 99999.999 (mm)
0.000 to 9999.9999 (inch)
This parameter specifies the clearance from the outer diameter of the workpiece using the radius value.
---Setting range---

0 to 65535 (0.001 mm/0.0001 inch)
This parameter specifies the clearance from the inner diameter of the workpiece using the radius value.
---Setting range---
0 to 65535 (0.001 mm/0.0001 inch)
This parameter specifies the clearance from the front face of the workpiece.
---Setting range---
0 to 65535 (0.001 mm/0.0001 inch)
This parameter specifies the clearance from the rear face of the workpiece.
---Setting range---
0 to 65535 (0.001 mm/0.0001 inch)
#19603 TCPC corner R
#79601 Safety clrn: O.D.
#79602 Safety clrn: I.D.
#79603 Safety clrn: front
#79604 Safety clrn: rear

Set the return amount for G73 (step cycle).
---Setting range---
0 to 99999.999 (mm)
Set the return amount for G83 (deep hole drilling cycle).
---Setting range---
0 to 99999.999 (mm)
Set the chamfering amount for G76, G78 (thread cutting cycle).
---Setting range---
0 to 127 (0.1 lead)
Set the chamfering angle for G76, G78 (thread cutting cycle).
---Setting range---
0 to 89 ()
Set the minimum value of the last cutting amount by the rough cutting cycle (G71, G72).
The cutting amount of the last cutting will be the remainder. When the remainder is smaller than this param eter setting, the last cycle will not be executed.
---Setting range---
0 to 999.999 (mm)
Set the change amount of the rough cutting cycle.
The rough cutting cycle (G71, G72) cutting amount repeats x+dx, x, x-dx using the value (x) commanded with
D as a reference. Set the change amount dx.
---Setting range---
0 to 999.999 (mm)
Set the retract amount m in a G84/G74/G88 pecking tapping cycle.
(Note) In the case of a normal tapping cycle, set to "0".
---Setting range---
0 to 999.999 (mm)
Set the amount of cut-in by the rough cutting cycle (G71, G72)
---Setting range---
0 to 99999.999 (mm)
Set the amount of pull-up when returning to the cutting start point for the rough cutting cycle (G71. G72).
---Setting range---
0 to 99999.999 (mm)
Set the X-axis cutting margin of the forming rough cutting cycle (G73).
---Setting range---
-99999.999 to 99999.999 (mm)
#8012 G73n (for M system only)
#8013 G83 n
#8014 CDZ-VALE (for L system only)
#8015 CDZ-ANGLE (for L system only)
#8016 G71 MINIMUM (for L system only)
#8017 G71 DELTA-D (for L system only)
#8018 G84/G74 n
#8051 G71 THICK
#8052 G71 PULL UP
#8053 G73 U

Set the Z-axis cutting margin of the forming rough cutting cycle (G73).
---Setting range---
-99999.999 to 99999.999 (mm)
Set how many times cutting will be performed in the forming rough cutting cycle (G73).
---Setting range---
0 to 99999 (times)
Set the amount of retract in the cut-off cycle (G74, G75).
---Setting range---
0 to 999.999 (mm)
Set the amount of final cut-in by the compound type thread cutting (G76).
---Setting range---
0 to 999.999 (mm)
Set how many times the amount of final cut-in cycle (G76 finish margin) will be divided in the compound type
thread cutting (G76).
---Setting range---
0 to 99 (times)
Set the angle (thread angle) of the tool nose in the compound type thread cutting (G76).
---Setting range---
0 to 99 ()
Set the M command code for changing to the small diameter deep hole drilling cycle mode.

---Setting range---
1 to 99999999
Set the clearance amount for the small diameter deep hole drilling cycle (G83).
---Setting range---
0 to 999.999 (mm)
Set the feedrate from the R point to the cutting start position in the small diameter deep hole drilling cycle
(G83).
---Setting range---
0 to 99999 (mm/min)
Set the speed for returning from the hole bottom during the small diameter deep hole drilling cycle (G83).
---Setting range---
0 to 99999 (mm/min)
#8054 G73 W
#8055 G73 R
#8056 G74 RETRACT
#8057 G76 LAST-D
#8058 G76 TIMES
#8059 G76 ANGLE
#8083 G83S modeM (for M system only)
#8084 G83S Clearance (for M system only)
#8085 G83S Forward F (for M system only)
#8086 G83S Back F (for M system only)

Select the unit system for the program travel amount when the power is turned ON or reset and for position
display.
0: Metric system
1: Inch system
(Note) The units of the following data are converted by "#1041 I_inch".
- Command unit at power ON and reset (Inch/metric command mode)
But under the following conditions, the unit will follow G20/G21 command modal even at reset.
When reset modal is retained ("#1151 rstint"="0")
When G code group 06 reset modal is retained ("#1210 RstGmd/bit5" ON)
- Unit system for position display (counter, user parameter, tool, work offset)
- User parameter I/O unit
- Parameter unit of user parameters concerning length and speed
- Arc error parameter (#1084 RadErr)
Select the increment of position commands that do not have a decimal point.
0: Minimum input command unit (follows "#1015 cunit")
1: 1mm (or 1inch) unit (For the dwell time, 1s unit is used.)
Select a fixed cycle hole drilling axis.
0: Use an axis vertical to the selected plane as hole drilling axis.
1: Use the Z axis as the hole drilling axis regardless of the selected plane.
Select how to handle the middle point during G28 and G30 reference position return.
0: Pass the middle point designated in the program and move to the reference position.
1: Ignore the middle point designated in the program and move straight to the reference position.
Select whether to use the tool life management.
0: Not use tool life management.
1: Use tool life management.
Select how to handle the tool command in the program when "#1103 T_Life" is set to "1".
0: Handle the command as group No.
1: Handle the command as tool No.
(Note) In the case of the tool life management III, the program tool command will be handled as the tool No.
regardless of the setting.
Select the tool selection method when "#1103 T_Life" is set to "1".
0: Select in order of registered No. from the tools used in the same group.
1: Select the tool with the longest remaining life from the tools used or unused in the same group.
Select the input method when address N is omitted in inputting the data (G10 L3 command) for tool life man agement function II.
0: Time specified input
1: Number of times specified input
(PR) #1041 I_inch Initial state (inch)
#1078 Decpt2 Decimal point type 2
#1080 Dril_Z Drilling Z fixed
#1091 Mpoint Ignore middle point
#1103 T_Life Validate life management
#1104 T_Com2 Tool command method 2
#1105 T_sel2 Tool selection method 2
#1106 Tcount Life management (for L system only)

Select the method to command the playback travel amount in the playback editing.
0: Incremental value
1: Absolute value
Select how to handle the common variables when resetting.
0: Common variables won't change after resetting.
1: Common variables will be cleared #100 to #199 by resetting.
Select how to handle the common variables when the power is turned ON.
0: The common variables are in the same state as before turning the power OFF.
1: Common variables will be cleared #100 to #199 when the power is turned ON.
Select the method to move to the restart position when restarting the program.
0: Move the system to the restart position manually.
1: For program restarting, the first activation automatically moves the system to the restart position.
Select how to control the blocks where the user macro command continues.

0: Do not stop while macro blocks continue.
1: Stop every block during signal block operation.
Select the interference control to the workpiece from the tool diameter during tool radius compensation and nose R compensation.
0: An alarm will be output and operation stops when an interference is judged.
1: Changes the path to avoid interference.
Select the interference control to the workpiece from the tool diameter during tool radius compensation and nose R compensation.
0: Performs interference check.
1: Does not perform interference check.
Select the edit lock for program Nos. 8000 to 9999 in the memory.
0: Editing possible
1: Prohibit the editing of above programs.
When "1" is set, the file cannot be opened.
Select the control for the compensation direction reversal in G46 (nose R compensation).
0: An alarm will be output and operation will stop when the compensation direction is reversed (G41 -> G42' G42 -> G41).
1: An alarm won't occur when the compensation direction is reversed, and the current compensation direc tion will be maintained.
Select whether to move to the inside because of a delay in servo response to a command during arc cutting mode.
0: Move to the inside, making the arc smaller than the command value.
1: Compensate the movement to the inside.
#1126 PB_G90 Playback G90
#1128 RstVCl Clear variables by resetting
#1129 PwrVCl Clear variables by power-ON
#1302 AutoRP Automatic return by program restart
#8101 MACRO SINGLE
#8102 COLL. ALM OFF
#8103 COLL. CHK OFF
#8105 EDIT LOCK B
#8106 G46 NO REV-ERR (for L system only)
#8107 R COMPENSATION

Select the arc radius error compensation target.
0: Perform compensation over all axes.
1: Perform compensation axis by axis.
(Note) This parameter is effective only when "#8107 R COMPENSATION" is "1".
Select whether to enable computer link B instead of the RS-232C port.
0: Disable (Enable normal RS-232C communication.)
1: Enable (Disable normal RS-232C communication.)
Select whether to enable the pocket machining when there is a dimple (pocket) in the rough cutting cycle (G71, G72) finishing program.
0: OFF
1: ON
Select the diameter and radius of the linear axis for milling (cylindrical/pole coordinate) interpolation.
0: All axes radius command
1: Each axis setting (follows "#1019 dia")
(Note) This parameter is valid only in the milling (cylindrical/polar coordinate) interpolation mode.
Select whether to enable the decimal point command for G04 address P.
0: Disable
1: Enable
Set which plane to execute for milling machining after the power is turned ON or reset.
#8113: 0, #8114: 0 ---> G17 plane
#8113: 0, #8114: 1 ---> G19 plane
#8113: 1, #8114: 0 ---> G16 plane
#8113: 1, #8114: 1 ---> G16 plane
0: Not G16 plane
1: G16 plane
(Note) This parameter is valid for the G code system 2, 3, 4 or 5 ("#1037 cmdtyp"="3", "4", "5" or "6").
Set which plane to execute for milling machining after the power is turned ON or reset.
#8113: 0, #8114: 0 ---> G17 plane
#8113: 0, #8114: 1 ---> G19 plane
#8113: 1, #8114: 0 ---> G16 plane
#8113: 1, #8114: 1 ---> G16 plane
0: Not G19 plane
1: G19 plane
(Note) This parameter is valid for the G code system 2, 3, 4 or 5 ("#1037 cmdtyp"="3", "4", "5" or "6").
#8108 R COMP Select
#8109 HOST LINK
#8110 G71/G72 POCKET
#8111 Milling Radius
#8112 DECIMAL PNT-P
#8113 Milling Init G16
#8114 Milling Init G19

Select the operation upon the completion of each step in deep hole drilling cycle (G83, G87).
0: Returns to R point before performing next step.
1: Returns by the amount of d (parameter setting) setting value before performing next step.
Select whether to enable the coordinate rotation by the parameters.
0: Enable
1: Disable
Select tool radius or tool diameter compensation amount to be specified.

0: Tool radius compensation amount
1: Tool diameter compensation amount
Select the setting unit of compensation amount that has no decimal point.
0: 1mm (or 1inch) unit
1: The minimum command unit (follows "#1003 iunit")
Select the font when Simplified Chinese is selected for "#1043 lang".
0: MITSUBISHI CNC GOTHIC font
1: Standard Windows font
(Note) This parameter is enabled for M800VW/M80VW with Windows-based display.
Select whether to enable the screen capture function.
0: Invalid
1: Valid (Screenshots are saved on USB memory or on front-side SD card)
2: Valid (Screenshots are saved on back-side SD card)
(Note 1) By setting this parameter to "1" or "2", and by keeping pushing the [SHIFT] key, screen capture will be executed.
(Note 2) This parameter is valid for M800VS and M80V.
(Note 3) If an USB memory is inserted, it takes precedence over other devices.
(*) This parameter is reset to "0" (Invalid) when the power is turned ON again.
Select whether to keep the tool length offset by high speed manual reference position return during tool length offset.
0: Will not be kept (Cancel)
1: Hold
Select whether to enable high-speed retract while fixed cycle for drilling is running.
0: Disable
1: Enable
Select the operation type of the mirror image by parameter setting and the mirror image by external input.
0: The current mirror image is canceled, and new mirror image will start with the machine position at reset as the mirror center.
1: The mirror center is kept to continue the mirror image.
Select how to operate when there is no S command in synchronous tapping block.
0: Use the spindle function modal value as S-command value.
1: Output a program error (P181).
#8115 G83/87 RAPID
#8116 CoordRotPara invd
#8117 OFS Diam DESIGN
#8119 Comp. unit switch
(PR) #8120 FONT SELECTION
#8121 Screen Capture
#8122 Keep G43 MDL M-REF
#8123 H-spd retract ON
#8124 Mirr img at reset
#8125 Check Scode in G84

Disable operation tones when operating the keyboard/touch panel.
0: Enable the operation tones
1: Disable the operation tones
(Note) This parameter is enabled for M800VS, M80V, non-Windows-based display of M800VW/M80VW.
Select the initial value of the coordinate system for a manual feed while a machining surface is selected in the R-Navi function.
0: Feature coordinate system
1: Machine coordinate system
Select the subprogram No. to be called preferentially in subprogram control.
0: Commanded program No.
1: Four-digit program No. beginning with O No.
2: Eight-digit program No. beginning with O No.
(Note) The program to be called in user macro, figure rotation, macro interruption and compound type fixed cycle also follows this setting.
Select the type of dwell for G04.
0: Dwell time is specified in seconds, irrespective of the synchronous feed mode (G95) or the asynchro nous feed mode (G94). For G04D, the dwell specified in spindle revolutions is applied.
1: Dwell time is specified in spindle revolutions while the synchronous feed mode (G95) is ON, whereas it is specified in seconds while the asynchronous feed mode (G94) is ON.
Select how to treat high-speed high-accuracy II and III commands.
0: As specified in G05P command
1: Treat G05 P2 during high-accuracy mode or G05P10000 as high-speed high-accuracy control III com mand (G05P20000).
2: Treat G05P20000 as high-speed high-accuracy control II command (G05P10000).
Select whether to execute a single block stop at the completion of rotation of each axis when G53.6 is given with the number of simultaneous contour control axes limited to 4.
0: Not execute a single block stop
1: Execute a single block stop
Specify the interactive macro to call from the cycle of interactive cycle insertion.
0: Call standard interactive macro
1: Call interactive macro in the machining program area
When a program, whose name is same as standard interactive macro, exists in the machining program area, the program in the machining program area is called preferentially if "1" is set to this parameter.
When a program, whose name is same as standard interactive macro, does not exist in the machining pro gram area, standard interactive macro is called even if "1" is set to this parameter.
E-mail sending by the email notification to operator can be disabled.
0: Enable
1: Disable
Single block stop is disabled during direct command mode.
0: Not disable single block stop
1: Disable single block stop
#8126 Disable op tone
#8127 R-Navi manu F coor
#8129 Subpro No. select
#8130 Dwell in rev.

#8131 High speed/accu 3
#8132 G53.6 block stop
#8133 Intrctv macro call
#8134 Email send disable
#8135 G5P4 single block

Select whether to enable the turning-tool shape compensation in compound type fixed cycle for turning ma chining I.
0: Disable
1: Enable
Select whether to display the pre-compensation finish shape of the turning-tool shape compensation for com pound type fixed cycle for turning machining I in 2D graphic check.
0: Display
1: Not display
Select whether to temporarily cancel the interpolation of linear axes that results from the rotation of the table
for a G0 command during tool center point control/tool cutting point control.
0: Not temporarily cancel the interpolation
1: Temporarily cancel the interpolation
(Note 1) This parameter is valid for a machine with a rotary axis on the table side.
(Note 2) This parameter is valid when "#7908 SLCT_PRG_COORD" = 1 (when programming is done with
respect to the workpiece coordinate system).
This parameter enables the tool wear compensation amounts to be reserved with the machining being per formed.
The reserved tool wear compensation values can be written and executed using the PLC signal.
With this function, the following five types of tool wear compensation amounts can be reserved:
Tool nose wear compensation amount for the 1st axis (normally X axis)
Tool nose wear compensation amount for the 2nd axis (normally Z axis)
Tool wear compensation amount for the additional axis
Tool wear compensation amount for the 2nd additional axis
Tool nose radius wear compensation amount
0: Disable the reserved memory for tool wear compensation.
1: Enable the reserved memory for tool wear compensation.
Select the type of Restart search to be performed when Restart search is executed with specified ONBP No.
in the multi-part system program management.
0: Restart search through a program individually for each part system.
1: Restart search through a program for all part systems at once.
(Program No., sequence No., block No. and number of repetitions will be common to all part systems.)
(Note) This parameter is only valid when "#1285 ext21/bit0" (Multi-part system program management) is set
to "1" and "#1285 ext21/bit1" (program search is performed for all part systems) is set to "1".
Select the time unit for the value specified for PLC timer.
0: The time unit is determined by the PLC program instruction.
1: 1 ms units
Select the time unit for the value specified for PLC integrated timer.
0: The time unit is determined by the PLC program instruction.
1: 1 ms units
2: 10 ms units
#8137 T. tool shape comp
#8138 Pre-compens. shape
#8139 TCP G0 temp.cancel
(PR) #8140 Reserve T wear com
#8141 Restart srch ONBP
#8142 PLC timer unit
#8143 PLC int.timer unit

Select whether to search only the displayed part systems or search through for all part systems at once when
operation/check search is executed with specified NB No. in the Multi-part system program management.
0: Search through NB No. only for displayed part systems.
1: Search through NB No. for all part systems at once.
(Note) This parameter is enabled only when "#1285 ext21/bit0" (Multi-part system program management)
and "#1285 ext21/bit1" (Switching of program search type) are set to "1".
Select whether to execute the F command with a 1-digit code command or with a direct numerical command.
(The same value as "#1079 F1digt" will be reflected. When either setting changes, the other will change ac cordingly.)
0: Direct numerical command (command feedrate during feed per minute or rotation)
1: 1-digit code command (with the feedrate specified by the parameters "#1185 spd_F1" to "#1189 sp d_F5")
Select the type of the user macro interrupt.
(The same value as "#1229 set01/bit0" will be reflected. When either setting changes, the other will change
accordingly.)
0: The user macro interrupt of macro type
1: The user macro interrupt of sub-program type
Select what is to be specified with the address E.
(The same value as "#1229 set01/bit1" will be reflected. When either setting changes, the other will change
accordingly.)
0: Specify the number of threads per inch for inch screw cutting.
1: Specify the precision lead for inch screw cutting.
For M system
Select the method of the arithmetic processing for the intersection point when the start-up or cancel com mand is operated during radius compensation.
(The same value as "#1229 set01/bit2" will be reflected. When either setting changes, the other will change
accordingly.)
0: The processing does not handle the start-up or cancel command block: handle the offset vector in the
direction vertical to that of the command instead.
1: The processing is executed for the intersection point between the command block and the next block.
For L system
Select the method of the arithmetic processing for the intersection point when the start-up or cancel com mands are operated during nose R or radius compensation.
(The same value as "#1229 set01/bit2" will be reflected. When either setting changes, the other will change
accordingly.)

0: The processing does not handle the start-up or cancel command block: handle the offset vector in the direction vertical to that of the command instead.
1: The processing is executed for the intersection point between the command block and the next block.
Select the initial state after the power-ON.
(The same value as "#1229 set01/bit3" will be reflected. When either setting changes, the other will change accordingly.)
0: Constant surface speed control cancel mode
1: Constant surface speed control mode
#8144 OP srch NB all Operation/check search with specified NB No. for all
part systems at once
#8145 Validate F1 digit
#8155 Sub-pro interrupt
#8156 Fine thread cut E
#8157 Radius comp type B (M system) / Nose R comp type B (L system)
#8158 Init const sur spd

Select whether to use the floating tap chuck in G74 and G84 tap cycles.
(The same value as "#1229 set01/bit4" will be reflected. When either setting changes, the other will change accordingly.)
0: With a floating tapping chuck
1: Without a floating tapping chuck
Select an operation when the operation start point cannot be found while moving to the next block of G117.
(The same value as "#1229 set01/bit5" will be reflected. When either setting changes, the other will change accordingly.)
0: The auxiliary function is enabled after the block for the movement has finished.
1: The program error (P33) occurs.
Select how to count a fixed cycle for drilling when the tool is managed based on the number of uses in tool life management.
0: Add one when the change from rapid traverse to cutting feed takes place
1: Add the number of drilled holes
Not used. Set to "0".
Not used. Set to "0".
Not used. Set to "0".
Not used. Set to "0".
Select whether to enable the Remote service function.
0: Disable
1: Enable
Select whether to enable the Diagnosis report function of Remote service.
0: Disable
1: Enable
Select whether to enable Machine condition monitoring report for the remote service gateway function.
0: Disable
1: Enable
Specify whether to enable or disable SPRINT.
0: Disable
1: Enable
When SPRINT is enabled
M codes for SPRINT control are executable.
SKIP8 is assigned to the SPRINT connector of the expansion unit FCU8-EX543.
#8159 Synchronous tap
#8160 Start point alarm
(PR) #8165 Tlife_DrillCnt
#8166 operation mode 1
#8167 operation mode 2
#8168 operation mode 3
#8169 operation mode 4
(PR) #8170 Remote Service
(PR) #8171 Diag Report Enable
(PR) #8172 Enable Cond Report
#11801 SPRINT ON SPRINT ON

14.4 Control Parameters 2
Select the plane to be selected when the power is turned ON or reset.
When 0 is specified, 1 is assumed (X-Y plane).e model and specifications.
1: X-Y plane (G17 command state)
2: Z-X plane (G18 command state)
3: Y-Z plane (G19 command state)
Set the G code list and compensation type for programs.
1: List1 (for M) Type I (one compensation amount for one compensation No.)
2: List1 (for M) Type II (shape and wear compensation amounts for one comp. No.)
3: List2 (for L) Type III (shape and wear compensation amounts for one comp. No.)
4: List3 (for L) Ditto
5: List4 (for special L) Ditto
6: List5 (for special L) Ditto
7: List6 (for special L) Ditto
8: List7 (for special L) Ditto
9: List8 (for M) M2 form at type Type I
(one compensation amount for one compensation No.)
10: List8 (for M) M2 form at type Type II
(shape and wear compensation amounts for one compensation No.)
There are some items in the specifications that can be used or cannot be used according to the value set in this parameter.

The file structure may also change depending on the compensation data type.
(Note) When this parameter is changed, the file system will be changed after the power is turned ON.
So always execute format.
The new format will be enabled after turning the power ON again.
Setting order
(1) cmdtyp changeover -> (2) Turn power ON again -> (3) Format -> (4) Turn power ON again
(Note) Compensation type III can be selected for M system by setting #1046.
Select the mode (absolute or incremental) at turning ON the power or reset.
0: Incremental setting
1: Absolute setting
Select the feedrate mode at turning ON the power or reset.
0: Asynchronous feed (feed per minute)
1: Synchronous feed (feed per revolution)
Select the linear command mode at turning ON the power or reset.
0: Linear interpolation (G01 command state)
1: Positioning (G00 command state)
Select the command method for the absolute and incremental commands.
The absolute command/incremental command can be issued by using the absolute command address and
incremental command address for the same axis.
0: Use G command for the absolute and incremental commands.
1: Use axis name for the absolute and incremental commands.
(The axis name in "#1013 axname" will be the absolute command, "#1014 incax" will be the incremental
command.)
#1025 I_plane Initial plane selection
(PR) #1037 cmdtyp Command type
#1073 I_Absm Initial absolute setting
#1074 I_Sync Initial synchronous feed
#1075 I_G00 Initial G00
#1076 AbsInc ABS/INC address (for L system only)

Select whether to apply dry run (feed at manual setting speed instead of command feedrate) to the G00 com mand.
0: Not apply to G00. (move at rapid traverse rate)
1: Apply to G00. (move at manual setting speed)
Select the G00 travel path type.
0: Move linearly toward the end point. (interpolation type)
1: Move to the end point of each axis at the rapid traverse feedrate for each axis. (non-interpolation)
(Note) If this parameter is set to "1", neither of the following functions will be available: rapid traverse con stant-gradient acceleration/deceleration and rapid traverse constant-gradient multi-step acceleration/decel eration.
Select the modal state at power ON from among the following: high-accuracy control mode, high-speed high accuracy control I mode, high-speed high-accuracy control II mode or high-speed high-accuracy control III
mode.
0: G08P0/G64 (cutting) mode
1: G08P1/G61.1 (high-accuracy control) mode
2: G05.1Q1 (high-speed high-accuracy control I) mode
3: G05P10000 (high-speed high-accuracy control II) mode
4: G05P20000 (high-speed high-accuracy control III) mode
Select whether to clear or hold the interruption amount after the "NC reset 1 (or 2)" signal is ON when the
manual ABS switch is OFF.
0: Clear (Reset the coordinate deviation due to the interruption)
1: Hold
Select the measurement operation for mirror-imaged axes during the manual tool length measurement 1 or 2.
0: Set the measurement result as the tool length.
1: Reverse the sign of measurement result and set it as the tool length.
Select when the stroke limit before travel function should determine a command as entering the forbidden
area set by the stored stroke limit.
0: Operation stops by the stroke check before travel function only when the end point of the command is
in the forbidden area.
1: Operation stops by the stroke check before travel function when the command path passes through the
forbidden area. For a command other than given below, the operation stops only when the end point is
in the forbidden area.
Corresponding commands: G00, G01, G02, G03, G28, G30, G33 and G53
Set the modal state to Spline interpolation2 when power is turned ON.
0: Disable
1: Enable
(Note) This function is only valid while SSS control and Tolerance control are enabled.
To enable the setting, set "#8090 SSS ON" and "#12066 Tolerance ctrl ON" to "1".
#1085 G00Drn G00 dry run
#1086 G0Intp G00 non-interpolation
#1148 I_G611 Initial hi-precis
#8173 Hold intr amount
#8174 T meas. in mirror
#8179 Stroke_prechkTYPE
#8180 Ini spline intrpl2

This parameter specifies the position where the tool change command is issued.
0: X: clearance, Z: clearance
1: X: machine zero, Z: clearance
2: X: clearance, Z: machine zero
3: X: machine zero, Z: machine zero
4: X: 2nd reference position, Z: 2nd reference position
5: X: clearance, Z: end point of previous process
6: X: machine zero, Z: end point of previous process
7: X: end point of previous process, Z: clearance
8: X: end point of previous process, Z: machine zero

This parameter specifies the clearance in X axis direction using the radius value. This clearance is used to avoid interference with the workpiece while the tool is turning.
---Setting range---
0 to 65535 (0.001 mm/0.0001 inch)
This parameter specifies the clearance in Z axis direction. This clearance is used to avoid interference with the workpiece while the tool is turning.
---Setting range---
0 to 65535 (0.001 mm/0.0001 inch)
#79801 Tool turn posn
#79802 Tool turn clrn X
#79803 Tool turn clrn Z

14.5 I/O Parameters
Select the port for inputting the data such as machine program and parameters.
1: ch1
2: ch2
Select the device No. for inputting the data. (The device Nos. correspond to the input/output device param eters.)
---Setting range---
0 to 4
Select the port for outputting the data such as machine program and parameters.
1: ch1
2: ch2
Select the device No. for outputting the data. (The device Nos. correspond to the input/output device param eters.)
---Setting range---
0 to 4
Select the input port for running with the tape mode.
1: ch1
2: ch2
Select the device No. to be run with the tape mode. (The device Nos. correspond to the input/output device parameters.)
---Setting range---
0 to 4
Select the output port used for the user macro DPRINT command.
1: ch1
2: ch2
9: Memory card
Select the device No. used for the DPRINT command. (The device Nos. correspond to the input/output de vice parameters.)
---Setting range---
0 to 4
Select the port for inputting/outputting various data with PLC.
1: ch1
2: ch2
Select the device No. used for the PLC input/output. (The device Nos. correspond to the input/output device parameters.)
---Setting range---
0 to 4
#9001 DATA IN PORT
#9002 DATA IN DEV.
#9003 DATA OUT PORT
#9004 DATA OUT DEV.
#9005 TAPE MODE PORT
#9006 TAPE MODE DEV.
#9007 MACRO PRINT PORT
#9008 MACRO PRINT DEV.
#9009 PLC IN/OUT PORT
#9010 PLC IN/OUT DEV.

Select the port for inputting remote programs.
1: ch1
2: ch2
Select the device No. used to input remote programs. (The device Nos. correspond to the input/output device parameters.)
---Setting range---
0 to 4
Select the port for communication with an external unit.
1: ch1
2: ch2
Select the unit No. used for communication with an external unit (The device Nos. correspond to the input/output device parameters.)
---Setting range---
0 to 4
Select the port for communication with a handy terminal.
1: ch1
2: ch2
Select the device No. used for communication with a handy terminal. (The device Nos. correspond to the input/output device parameters.)
---Setting range---
0 to 4
Not used.
Set the file name to save the output data to a memory card with the DRPNT command for the user macro.
If this parameter is not set, the data will be output under the following name.
dprt$-MMDDhhmmssff

$ is the part system No. in which DPRNT is commanded, MMDDhhmmssff is the current date. (MM: month, DD: day, hh: hour, mm: minute, ss: second, ff: millisecond)
(Note) This parameter is enabled when "#9007 Macro print directory" is set to "9".
---Setting range---
Program name or file name (up to 32 characters)
Set the device name corresponding to the device No.
Set a simple name for quick identification.
---Setting range---
Use three or less characters consisting of alphabet characters, numerals and symbols.
#9011 REMOTE PRG IN PORT
#9012 REMOTE PRG IN DEV.
#9013 EXT UNIT PORT
#9014 EXT UNIT DEV.
#9017 HANDY TERMINAL PORT
#9018 HANDY TERMINAL DEV.
#9053 M2 macro converter
#9054 MACRO PRINT FILE
#9101 DEV0 DEVICE NAME

Select the serial communication speed.
0: 19200 (bps)
1: 9600
2: 4800
3: 2400
4: 1200
5: 600
6: 300
7: 110
Select the stop bit length used in the start-stop system.
Refer to "#9104 DEV0 PARITY CHECK". At the output of data, the number of characters is always adjusted for the parity check.
1: 1 (bit)
2: 1.5
3: 2
Select whether to add a parity check bit to the data.
Set this parameter in accordance with the I/O device specifications.
0: Not add a parity bit at the input/output
1: Add a parity bit at the input/output
Select odd or even when parity is added to the data. This parameter is ignored when no parity is added.
0: Odd parity
1: Even parity
Set the length of the data bit.
Refer to "#9104 DEV0 PARITY CHECK".
0: 5 (bit)
1: 6
2: 7 (NC connection not supported)
3: 8
Select the code to terminate data reading.
0, 3: EOR
1, 2: EOB or EOR
(*) When M800VW display side serial port is selected
0: No terminator
1: EOR
2: EOB
3: EOB or EOR
#9102 DEV0 BAUD RATE
#9103 DEV0 STOP BIT
#9104 DEV0 PARITY CHECK
#9105 DEV0 EVEN PARITY
#9106 DEV0 CHR. LENGTH
#9107 DEV0 TERMINATR TYP
Start bit Data bit Parity bit Stop bit
1character ON
OFF b1 b2 b3 b4 b5 b6 bn

Select the transmission control method.
No handshaking will be used when a value except 1 to 3 is set.
1: RTS/CTS method
2: No handshaking
3: DC code method
Select the DC code type when the DC code method is selected.
0: Not add parity to DC code. (DC3 = 13H)
1: Add parity to DC code. (DC3 = 93H)
Select the DC code handling when outputting data to the output device.
DC2 / DC4
0: None / None
1: Yes / None
2: None / Yes
3: Yes / Yes
Select whether to add the (CR) code just before the EOB (L/F) code during output.
0: Not add
1: Add

Select ISO or EIA code for data output.
In data input mode, the ISO and EIA codes are identified automatically.
0: ISO code output
1: EIA code output
Set the length of the tape feed to be output at the start and end of the data during tape output.
---Setting range---
0 to 999 (characters)
Select whether to perform the parity check for the number of characters in a block at the input of data.
At the output of data, the number of characters is always adjusted for the parity check.
0: Not perform parity V check
1: Perform parity V check
Set the time out time to detect an interruption in communication.
Time out check will not be executed when set to "0".
---Setting range---
0 to 30 (s)
Select whether to enable the DR data check in data I/O mode.
0: Enable
1: Disable
Select the code of the output data.
0: ISO/EIA code
(Depends on whether #9113, #9213, #9313, #9413 or #9513 EIA output parameter is set up.)
1: ASCII code
#9108 DEV0 HAND SHAKE
#9109 DEV0 DC CODE PRTY
#9111 DEV0 DC2/4 OUTPUT
#9112 DEV0 CR OUTPUT
#9113 DEV0 EIA OUTPUT
#9114 DEV0 FEED CHR.
#9115 DEV0 PARITY V
#9116 DEV0 TIME-OUT (sec)
#9117 DEV0 DR OFF
#9118 DEV0 DATA ASCII

Select the mode for input (verification).
0: Standard input (Data from the very first EOB is handled as significant information.)
1: EOBs following the first EOB of the input data are skipped until data other than EOB is input.
Select the buffer size of the output data which is output to output device using NC side serial port.
If the output device has a transmission error (overrun error), decrease the buffer size with this parameter.
If the buffer size is decreased, output time will prolong according to the size.
0: 250 bytes (default)
1: 1 byte
2: 4 bytes
3: 8 bytes
4: 16 bytes
5: 64 bytes
Set the code in hexadecimal, which does not duplicate the existing EIA codes, for the special code " [".
When output with EIA code, data can be output using the alternate code in which the special ISO code, not included in EIA, is specified.
---Setting range---
0 to FF (hexadecimal)
Set the code in hexadecimal, which does not duplicate the existing EIA codes, for the special code "] ".
When output with EIA code, data can be output using the alternate code in which the special ISO code, not included in EIA, is specified.
---Setting range---
0 to FF (hexadecimal)
Set the code in hexadecimal, which does not duplicate the existing EIA codes, for the special code "#".
When output with EIA code, data can be output using the alternate code in which the special ISO code, not included in EIA, is specified.
---Setting range---
0 to FF (hexadecimal)
Set the code in hexadecimal, which does not duplicate the existing EIA codes, for the special code "*".
When output with EIA code, data can be output using the alternate code in which the special ISO code, not included in EIA, is specified.
---Setting range---
0 to FF (hexadecimal)
Set the code in hexadecimal, which does not duplicate the existing EIA codes, for the special code "=".
When output with EIA code, data can be output using the alternate code in which the special ISO code, not included in EIA, is specified.
---Setting range---
0 to FF (hexadecimal)
Set the code in hexadecimal, which does not duplicate the existing EIA codes, for the special code ":".
When output with EIA code, data can be output using the alternate code in which the special ISO code, not included in EIA, is specified.
---Setting range---
0 to FF (hexadecimal)
#9119 DEV0 INPUT TYPE
#9120 DEV0 OUT BUFFER
#9121 DEV0 EIA CODE [
#9122 DEV0 EIA CODE]
#9123 DEV0 EIA CODE #
#9124 DEV0 EIA CODE *
#9125 DEV0 EIA CODE =
#9126 DEV0 EIA CODE:

Set the code in hexadecimal, which does not duplicate the existing EIA codes, for the special code "$".
When output with EIA code, data can be output using the alternate code in which the special ISO code, not included in EIA, is specified.
---Setting range---
0 to FF (hexadecimal)
Set the code in hexadecimal, which does not duplicate the existing EIA codes, for the special code "!".
When output with EIA code, data can be output using the alternate code in which the special ISO code, not included in EIA, is specified.
---Setting range---
0 to FF (hexadecimal)
Set the device name corresponding to the device No.
Set a simple name for quick identification.
---Setting range---
Use three or less characters consisting of alphabet characters, numerals and symbols.
Select the serial communication speed.
0: 19200 (bps)
1: 9600
2: 4800
3: 2400
4: 1200
5: 600
6: 300
7: 110
Select the stop bit length used in the start-stop system.
Refer to "#9204 DEV1 PARITY CHECK". At the output of data, the number of characters is always adjusted for the parity check.
1: 1 (bit)
2: 1.5
3: 2
Select whether to add a parity check bit to the data.
Set this parameter in accordance with the I/O device specifications.
0: Not add a parity bit at the input/output
1: Add a parity bit at the input/output
Select odd or even when parity is added to the data. This parameter is ignored when no parity is added.
0: Odd parity
1: Even parity
#9127 DEV0 EIA CODE $
#9128 DEV0 EIA CODE !
#9201 DEV1 DEVICE NAME
#9202 DEV1 BAUD RATE
#9203 DEV1 STOP BIT
#9204 DEV1 PARITY CHECK
#9205 DEV1 EVEN PARITY
Start bit Data bit Parity bit Stop bit
1character ON
OFF b1 b2 b3 b4 b5 b6 bn

Set the length of the data bit.
Refer to "#9204 DEV1 PARITY CHECK".
0: 5 (bit)
1: 6
2: 7 (NC connection not supported)
3: 8
Select the code to terminate data reading.
0, 3: EOR
1, 2: EOB or EOR
(*) When M800VW display side serial port is selected
0: No terminator
1: EOR
2: EOB
3: EOB or EOR
Select the transmission control method.
No handshaking will be used when a value except 1 to 3 is set.
1: RTS/CTS method
2: No handshaking
3: DC code method
Select the DC code type when the DC code method is selected.
0: Not add parity to DC code. (DC3 = 13H)
1: Add parity to DC code. (DC3 = 93H)
Select the DC code handling when outputting data to the output device.
DC2 / DC4
0: None / None
1: Yes / None
2: None / Yes
3: Yes / Yes
Select whether to add the (CR) code just before the EOB (L/F) code during output.
0: Not add
1: Add
Select ISO or EIA code for data output.
In data input mode, the ISO and EIA codes are identified automatically.
0: ISO code output
1: EIA code output
Set the length of the tape feed to be output at the start and end of the data during tape output.

---Setting range---
0 to 999 (characters)
#9206 DEV1 CHR. LENGTH
#9207 DEV1 TERMINATR TYP
#9208 DEV1 HAND SHAKE
#9209 DEV1 DC CODE PRTY
#9211 DEV1 DC2/4 OUTPUT
#9212 DEV1 CR OUTPUT
#9213 DEV1 EIA OUTPUT
#9214 DEV1 FEED CHR.

Select whether to perform the parity check for the number of characters in a block at the input of data.
At the output of data, the number of characters is always adjusted for the parity check.
0: Not perform parity V check
1: Perform parity V check
Set the time out time to detect an interruption in communication.
Time out check will not be executed when set to "0".
---Setting range---
0 to 30 (s)
Select whether to enable the DR data check in data I/O mode.
0: Enable
1: Disable
Select the code of the output data.
0: ISO/EIA code
(Depends on whether #9113, #9213, #9313, #9413 or #9513 EIA output parameter is set up.)
1: ASCII code
Select the mode for input (verification).
0: Standard input (Data from the very first EOB is handled as significant information.)
1: EOBs following the first EOB of the input data are skipped until data other than EOB is input.
Select the buffer size of the output data which is output to output device using NC side serial port.
If the output device has a transmission error (overrun error), decrease the buffer size with this parameter.
If the buffer size is decreased, output time will prolong according to the size.
0: 250 bytes (default)
1: 1 byte
2: 4 bytes
3: 8 bytes
4: 16 bytes
5: 64 bytes
Set the code in hexadecimal, which does not duplicate the existing EIA codes, for the special code " [".
When output with EIA code, data can be output using the alternate code in which the special ISO code, not included in EIA, is specified.
---Setting range---
0 to FF (hexadecimal)
Set the code in hexadecimal, which does not duplicate the existing EIA codes, for the special code "] ".
When output with EIA code, data can be output using the alternate code in which the special ISO code, not included in EIA, is specified.
---Setting range---
0 to FF (hexadecimal)
#9215 DEV1 PARITY V
#9216 DEV1 TIME-OUT (sec)
#9217 DEV1 DR OFF
#9218 DEV1 DATA ASCII
#9219 DEV1 INPUT TYPE
#9220 DEV1 OUT BUFFER
#9221 DEV1 EIA CODE [
#9222 DEV1 EIA CODE]

Set the code in hexadecimal, which does not duplicate the existing EIA codes, for the special code "#".
When output with EIA code, data can be output using the alternate code in which the special ISO code, not included in EIA, is specified.
---Setting range---
0 to FF (hexadecimal)
Set the code in hexadecimal, which does not duplicate the existing EIA codes, for the special code "*".
When output with EIA code, data can be output using the alternate code in which the special ISO code, not included in EIA, is specified.
---Setting range---
0 to FF (hexadecimal)
Set the code in hexadecimal, which does not duplicate the existing EIA codes, for the special code "=".
When output with EIA code, data can be output using the alternate code in which the special ISO code, not included in EIA, is specified.
---Setting range---
0 to FF (hexadecimal)
Set the code in hexadecimal, which does not duplicate the existing EIA codes, for the special code ":".
When output with EIA code, data can be output using the alternate code in which the special ISO code, not included in EIA, is specified.
---Setting range---
0 to FF (hexadecimal)
Set the code in hexadecimal, which does not duplicate the existing EIA codes, for the special code "$".
When output with EIA code, data can be output using the alternate code in which the special ISO code, not included in EIA, is specified.
---Setting range---
0 to FF (hexadecimal)

Set the code in hexadecimal, which does not duplicate the existing EIA codes, for the special code "!".
When output with EIA code, data can be output using the alternate code in which the special ISO code, not included in EIA, is specified.
---Setting range---
0 to FF (hexadecimal)
Set the device name corresponding to the device No.
Set a simple name for quick identification.
---Setting range---
Use three or less characters consisting of alphabet characters, numerals and symbols.
Select the serial communication speed.
0: 19200 (bps)
1: 9600
2: 4800
3: 2400
4: 1200
5: 600
6: 300
7: 110
#9223 DEV1 EIA CODE #
#9224 DEV1 EIA CODE *
#9225 DEV1 EIA CODE =
#9226 DEV1 EIA CODE:
#9227 DEV1 EIA CODE $
#9228 DEV1 EIA CODE !
#9301 DEV2 DEVICE NAME
#9302 DEV2 BAUD RATE

Select the stop bit length used in the start-stop system.
Refer to "#9304 DEV2 PARITY CHECK". At the output of data, the number of characters is always adjusted for the parity check.
1: 1 (bit)
2: 1.5
3: 2
Select whether to add a parity check bit to the data.
Set this parameter in accordance with the I/O device specifications.
0: Not add a parity bit at the input/output
1: Add a parity bit at the input/output
Select odd or even when parity is added to the data. This parameter is ignored when no parity is added.
0: Odd parity
1: Even parity
Set the length of the data bit.
Refer to "#9304 DEV2 PARITY CHECK".
0: 5 (bit)
1: 6
2: 7 (NC connection not supported)
3: 8
Select the code to terminate data reading.
0, 3: EOR
1, 2: EOB or EOR
(*) When M800VW display side serial port is selected
0: No terminator
1: EOR
2: EOB
3: EOB or EOR
Select the transmission control method.
No handshaking will be used when a value except 1 to 3 is set.
1: RTS/CTS method
2: No handshaking
3: DC code method
Select the DC code type when the DC code method is selected.
0: Not add parity to DC code. (DC3 = 13H)
1: Add parity to DC code. (DC3 = 93H)
#9303 DEV2 STOP BIT
#9304 DEV2 PARITY CHECK
#9305 DEV2 EVEN PARITY
#9306 DEV2 CHR. LENGTH
#9307 DEV2 TERMINATR TYP
#9308 DEV2 HAND SHAKE
#9309 DEV2 DC CODE PRTY
Start bit Data bit Parity bit Stop bit
1character ON
OFF b1 b2 b3 b4 b5 b6 bn

Select the DC code handling when outputting data to the output device.
DC2 / DC4
0: None / None
1: Yes / None
2: None / Yes
3: Yes / Yes
Select whether to add the (CR) code just before the EOB (L/F) code during output.
0: Not add
1: Add

Select ISO or EIA code for data output.
In data input mode, the ISO and EIA codes are identified automatically.
0: ISO code output
1: EIA code output
Set the length of the tape feed to be output at the start and end of the data during tape output.
---Setting range---
0 to 999 (characters)
Select whether to perform the parity check for the number of characters in a block at the input of data.
At the output of data, the number of characters is always adjusted for the parity check.
0: Not perform parity V check
1: Perform parity V check
Set the time out time to detect an interruption in communication.
Time out check will not be executed when set to "0".
---Setting range---
0 to 30 (s)
Select whether to enable the DR data check in data I/O mode.
0: Enable
1: Disable
Select the code of the output data.
0: ISO/EIA code
(Depends on whether #9113, #9213, #9313, #9413 or #9513 EIA output parameter is set up.)
1: ASCII code
Select the mode for input (verification).
0: Standard input (Data from the very first EOB is handled as significant information.)
1: EOBs following the first EOB of the input data are skipped until data other than EOB is input.
#9311 DEV2 DC2/4 OUTPUT
#9312 DEV2 CR OUTPUT
#9313 DEV2 EIA OUTPUT
#9314 DEV2 FEED CHR.
#9315 DEV2 PARITY V
#9316 DEV2 TIME-OUT (sec)
#9317 DEV2 DR OFF
#9318 DEV2 DATA ASCII
#9319 DEV2 INPUT TYPE

Select the buffer size of the output data which is output to output device using NC side serial port.
If the output device has a transmission error (overrun error), decrease the buffer size with this parameter.
If the buffer size is decreased, output time will prolong according to the size.
0: 250 bytes (default)
1: 1 byte
2: 4 bytes
3: 8 bytes
4: 16 bytes
5: 64 bytes
Set the code in hexadecimal, which does not duplicate the existing EIA codes, for the special code " [".
When output with EIA code, data can be output using the alternate code in which the special ISO code, not included in EIA, is specified.
---Setting range---
0 to FF (hexadecimal)
Set the code in hexadecimal, which does not duplicate the existing EIA codes, for the special code "] ".
When output with EIA code, data can be output using the alternate code in which the special ISO code, not included in EIA, is specified.
---Setting range---
0 to FF (hexadecimal)
Set the code in hexadecimal, which does not duplicate the existing EIA codes, for the special code "#".
When output with EIA code, data can be output using the alternate code in which the special ISO code, not included in EIA, is specified.
---Setting range---
0 to FF (hexadecimal)
Set the code in hexadecimal, which does not duplicate the existing EIA codes, for the special code "*".
When output with EIA code, data can be output using the alternate code in which the special ISO code, not included in EIA, is specified.
---Setting range---
0 to FF (hexadecimal)
Set the code in hexadecimal, which does not duplicate the existing EIA codes, for the special code "=".
When output with EIA code, data can be output using the alternate code in which the special ISO code, not included in EIA, is specified.
---Setting range---
0 to FF (hexadecimal)
Set the code in hexadecimal, which does not duplicate the existing EIA codes, for the special code ":".
When output with EIA code, data can be output using the alternate code in which the special ISO code, not included in EIA, is specified.
---Setting range---
0 to FF (hexadecimal)
#9320 DEV2 OUT BUFFER
#9321 DEV2 EIA CODE [
#9322 DEV2 EIA CODE]
#9323 DEV2 EIA CODE #
#9324 DEV2 EIA CODE *
#9325 DEV2 EIA CODE =
#9326 DEV2 EIA CODE:

Set the code in hexadecimal, which does not duplicate the existing EIA codes, for the special code "$".
When output with EIA code, data can be output using the alternate code in which the special ISO code, not included in EIA, is specified.
---Setting range---
0 to FF (hexadecimal)
Set the code in hexadecimal, which does not duplicate the existing EIA codes, for the special code "!".
When output with EIA code, data can be output using the alternate code in which the special ISO code, not included in EIA, is specified.
---Setting range---
0 to FF (hexadecimal)
Set the device name corresponding to the device No.
Set a simple name for quick identification.
---Setting range---
Use three or less characters consisting of alphabet characters, numerals and symbols.
Select the serial communication speed.
0: 19200 (bps)
1: 9600
2: 4800
3: 2400
4: 1200
5: 600
6: 300
7: 110
Select the stop bit length used in the start-stop system.
Refer to "#9404 DEV3 PARITY CHECK". At the output of data, the number of characters is always adjusted for the parity check.
1: 1 (bit)
2: 1.5
3: 2
Select whether to add a parity check bit to the data.
Set this parameter in accordance with the I/O device specifications.
0: Not add a parity bit at the input/output
1: Add a parity bit at the input/output
Select odd or even when parity is added to the data. This parameter is ignored when no parity is added.
0: Odd parity
1: Even parity
#9327 DEV2 EIA CODE $
#9328 DEV2 EIA CODE !
#9401 DEV3 DEVICE NAME
#9402 DEV3 BAUD RATE
#9403 DEV3 STOP BIT
#9404 DEV3 PARITY CHECK
#9405 DEV3 EVEN PARITY
Start bit Data bit Parity bit Stop bit
1character ON
OFF b1 b2 b3 b4 b5 b6 bn

Set the length of the data bit.
Refer to "#9404 DEV3 PARITY CHECK".
0: 5 (bit)
1: 6
2: 7 (NC connection not supported)
3: 8
Select the code to terminate data reading.
0, 3: EOR
1, 2: EOB or EOR
(*) When M800VW display side serial port is selected
0: No terminator
1: EOR
2: EOB
3: EOB or EOR
Select the transmission control method.
No handshaking will be used when a value except 1 to 3 is set.
1: RTS/CTS method
2: No handshaking
3: DC code method
Select the DC code type when the DC code method is selected.
0: Not add parity to DC code. (DC3 = 13H)
1: Add parity to DC code. (DC3 = 93H)
Select the DC code handling when outputting data to the output device.
DC2 / DC4
0: None / None
1: Yes / None
2: None / Yes
3: Yes / Yes
Select whether to add the (CR) code just before the EOB (L/F) code during output.
0: Not add
1: Add
Select ISO or EIA code for data output.
In data input mode, the ISO and EIA codes are identified automatically.
0: ISO code output
1: EIA code output
Set the length of the tape feed to be output at the start and end of the data during tape output.
---Setting range---
0 to 999 (characters)

#9406 DEV3 CHR. LENGTH
#9407 DEV3 TERMINATR TYP
#9408 DEV3 HAND SHAKE
#9409 DEV3 DC CODE PRTY
#9411 DEV3 DC2/4 OUTPUT
#9412 DEV3 CR OUTPUT
#9413 DEV3 EIA OUTPUT
#9414 DEV3 FEED CHR.

Select whether to perform the parity check for the number of characters in a block at the input of data.
At the output of data, the number of characters is always adjusted for the parity check.
0: Not perform parity V check
1: Perform parity V check
Set the time out time to detect an interruption in communication.
Time out check will not be executed when set to "0".
---Setting range---
0 to 30 (s)
Select whether to enable the DR data check in data I/O mode.
0: Enable
1: Disable
Select the code of the output data.
0: ISO/EIA code
(Depends on whether #9113, #9213, #9313, #9413 or #9513 EIA output parameter is set up.)
1: ASCII code
Select the mode for input (verification).
0: Standard input (Data from the very first EOB is handled as significant information.)
1: EOBs following the first EOB of the input data are skipped until data other than EOB is input.
Select the buffer size of the output data which is output to output device using NC side serial port.
If the output device has a transmission error (overrun error), decrease the buffer size with this parameter.
If the buffer size is decreased, output time will prolong according to the size.
0: 250 bytes (default)
1: 1 byte
2: 4 bytes
3: 8 bytes
4: 16 bytes
5: 64 bytes
Set the code in hexadecimal, which does not duplicate the existing EIA codes, for the special code " [".
When output with EIA code, data can be output using the alternate code in which the special ISO code, not included in EIA, is specified.
---Setting range---
0 to FF (hexadecimal)
Set the code in hexadecimal, which does not duplicate the existing EIA codes, for the special code "] ".
When output with EIA code, data can be output using the alternate code in which the special ISO code, not included in EIA, is specified.
---Setting range---
0 to FF (hexadecimal)
#9415 DEV3 PARITY V
#9416 DEV3 TIME-OUT (sec)
#9417 DEV3 DR OFF
#9418 DEV3 DATA ASCII
#9419 DEV3 INPUT TYPE
#9420 DEV3 OUT BUFFER
#9421 DEV3 EIA CODE [
#9422 DEV3 EIA CODE]

Set the code in hexadecimal, which does not duplicate the existing EIA codes, for the special code "#".
When output with EIA code, data can be output using the alternate code in which the special ISO code, not included in EIA, is specified.
---Setting range---
0 to FF (hexadecimal)
Set the code in hexadecimal, which does not duplicate the existing EIA codes, for the special code "*".
When output with EIA code, data can be output using the alternate code in which the special ISO code, not included in EIA, is specified.
---Setting range---
0 to FF (hexadecimal)
Set the code in hexadecimal, which does not duplicate the existing EIA codes, for the special code "=".
When output with EIA code, data can be output using the alternate code in which the special ISO code, not included in EIA, is specified.
---Setting range---
0 to FF (hexadecimal)
Set the code in hexadecimal, which does not duplicate the existing EIA codes, for the special code ":".
When output with EIA code, data can be output using the alternate code in which the special ISO code, not included in EIA, is specified.
---Setting range---
0 to FF (hexadecimal)
Set the code in hexadecimal, which does not duplicate the existing EIA codes, for the special code "$".
When output with EIA code, data can be output using the alternate code in which the special ISO code, not included in EIA, is specified.
---Setting range---
0 to FF (hexadecimal)
Set the code in hexadecimal, which does not duplicate the existing EIA codes, for the special code "!".
When output with EIA code, data can be output using the alternate code in which the special ISO code, not

included in EIA, is specified.
---Setting range---
0 to FF (hexadecimal)
Set the device name corresponding to the device No.
Set a simple name for quick identification.
---Setting range---
Use three or less characters consisting of alphabet characters, numerals and symbols.
Select the serial communication speed.
0: 19200 (bps)
1: 9600
2: 4800
3: 2400
4: 1200
5: 600
6: 300
7: 110
#9423 DEV3 EIA CODE #
#9424 DEV3 EIA CODE *
#9425 DEV3 EIA CODE =
#9426 DEV3 EIA CODE:
#9427 DEV3 EIA CODE $
#9428 DEV3 EIA CODE !
#9501 DEV4 DEVICE NAME
#9502 DEV4 BAUD RATE

Select the stop bit length used in the start-stop system.
Refer to "#9504 DEV4 PARITY CHECK". At the output of data, the number of characters is always adjusted for the parity check.
1: 1 (bit)
2: 1.5
3: 2
Select whether to add a parity check bit to the data.
Set this parameter in accordance with the I/O device specifications.
0: Not add a parity bit at the input/output
1: Add a parity bit at the input/output
Select odd or even when parity is added to the data. This parameter is ignored when no parity is added.
0: Odd parity
1: Even parity
Set the length of the data bit.
Refer to "#9504 DEV4 PARITY CHECK".
0: 5 (bit)
1: 6
2: 7 (NC connection not supported)
3: 8
Select the code to terminate data reading.
0, 3: EOR
1, 2: EOB or EOR
(*) When M800VW display side serial port is selected
0: No terminator
1: EOR
2: EOB
3: EOB or EOR
Select the transmission control method.
No handshaking will be used when a value except 1 to 3 is set.
1: RTS/CTS method
2: No handshaking
3: DC code method
Select the DC code type when the DC code method is selected.
0: Not add parity to DC code. (DC3 = 13H)
1: Add parity to DC code. (DC3 = 93H)
#9503 DEV4 STOP BIT
#9504 DEV4 PARITY CHECK
#9505 DEV4 EVEN PARITY
#9506 DEV4 CHR. LENGTH
#9507 DEV4 TERMINATR TYP
#9508 DEV4 HAND SHAKE
#9509 DEV4 DC CODE PRTY
Start bit Data bit Parity bit Stop bit
1character ON
OFF b1 b2 b3 b4 b5 b6 bn

Select the DC code handling when outputting data to the output device.
DC2 / DC4
0: None / None
1: Yes / None
2: None / Yes
3: Yes / Yes
Select whether to add the (CR) code just before the EOB (L/F) code during output.
0: Not add
1: Add
Select ISO or EIA code for data output.
In data input mode, the ISO and EIA codes are identified automatically.

0: ISO code output
1: EIA code output
Set the length of the tape feed to be output at the start and end of the data during tape output.
---Setting range---
0 to 999 (characters)
Select whether to perform the parity check for the number of characters in a block at the input of data.
At the output of data, the number of characters is always adjusted for the parity check.
0: Not perform parity V check
1: Perform parity V check
Set the time out time to detect an interruption in communication.
Time out check will not be executed when set to "0".
---Setting range---
0 to 30 (s)
Select whether to enable the DR data check in data I/O mode.
0: Enable
1: Disable
Select the code of the output data.
0: ISO/EIA code
(Depends on whether #9113, #9213, #9313, #9413 or #9513 EIA output parameter is set up.)
1: ASCII code
Select the mode for input (verification).
0: Standard input (Data from the very first EOB is handled as significant information.)
1: EOBs following the first EOB of the input data are skipped until data other than EOB is input.
#9511 DEV4 DC2/4 OUTPUT
#9512 DEV4 CR OUTPUT
#9513 DEV4 EIA OUTPUT
#9514 DEV4 FEED CHR.
#9515 DEV4 PARITY V
#9516 DEV4 TIME-OUT (sec)
#9517 DEV4 DR OFF
#9518 DEV4 DATA ASCII
#9519 DEV4 INPUT TYPE

Select the buffer size of the output data which is output to output device using NC side serial port.
If the output device has a transmission error (overrun error), decrease the buffer size with this parameter.
If the buffer size is decreased, output time will prolong according to the size.
0: 250 bytes (default)
1: 1 byte
2: 4 bytes
3: 8 bytes
4: 16 bytes
5: 64 bytes
Set the code in hexadecimal, which does not duplicate the existing EIA codes, for the special code " [".
When output with EIA code, data can be output using the alternate code in which the special ISO code, not included in EIA, is specified.
---Setting range---
0 to FF (hexadecimal)
Set the code in hexadecimal, which does not duplicate the existing EIA codes, for the special code "] ".
When output with EIA code, data can be output using the alternate code in which the special ISO code, not included in EIA, is specified.
---Setting range---
0 to FF (hexadecimal)
Set the code in hexadecimal, which does not duplicate the existing EIA codes, for the special code "#".
When output with EIA code, data can be output using the alternate code in which the special ISO code, not included in EIA, is specified.
---Setting range---
0 to FF (hexadecimal)
Set the code in hexadecimal, which does not duplicate the existing EIA codes, for the special code "*".
When output with EIA code, data can be output using the alternate code in which the special ISO code, not included in EIA, is specified.
---Setting range---
0 to FF (hexadecimal)
Set the code in hexadecimal, which does not duplicate the existing EIA codes, for the special code "=".
When output with EIA code, data can be output using the alternate code in which the special ISO code, not included in EIA, is specified.
---Setting range---
0 to FF (hexadecimal)
Set the code in hexadecimal, which does not duplicate the existing EIA codes, for the special code ":".
When output with EIA code, data can be output using the alternate code in which the special ISO code, not included in EIA, is specified.
---Setting range---
0 to FF (hexadecimal)
#9520 DEV4 OUT BUFFER
#9521 DEV4 EIA CODE [
#9522 DEV4 EIA CODE]
#9523 DEV4 EIA CODE #
#9524 DEV4 EIA CODE *
#9525 DEV4 EIA CODE =
#9526 DEV4 EIA CODE:

Set the code in hexadecimal, which does not duplicate the existing EIA codes, for the special code "$".
When output with EIA code, data can be output using the alternate code in which the special ISO code, not

included in EIA, is specified.
---Setting range---
0 to FF (hexadecimal)
Set the code in hexadecimal, which does not duplicate the existing EIA codes, for the special code "!".
When output with EIA code, data can be output using the alternate code in which the special ISO code, not
included in EIA, is specified.
---Setting range---
0 to FF (hexadecimal)
#9527 DEV4 EIA CODE $
#9528 DEV4 EIA CODE !

Select the manual reference position return method for the second return (after the coordinate system is es tablished) and later.
The initial reference position return after the power ON is performed with dog-type return, and the coordinate
system will be established.
(This setting is not required when the absolute position detection is used.)
0: High speed return
1: Dog-type
Select the function to remove the control axis from the control target.
0: Control as normal.
1: Remove from control target.
Select whether to enable or disable the stored stroke limit II function set with #8204 and #8205.
0: Enable
1: Disable
Select whether or not the stored stroke limit (I, II, IIB, IB and IC) is enabled for the axis for which the simple
absolute position method is selected ("#2049 type" is "9") until the first reference position return after power
on is completed.
0: Enable (determined by #8202 and #8230 for II and IIB)
1: Disable
Set the coordinates of the (-) direction in the movable range of the stored stroke limit II or the lower limit co ordinates of the prohibited range of stored stroke limit IIB.
If the sign and value are the same as #8205, the stored stroke limit II (or IIB) set with #8204 and #8205 will
be invalid.
If the stored stroke limit IIB function is selected, the prohibited range will be between two points even when
#8204 and #8205 are set in reverse.
When II is selected, the entire range will be prohibited if #8204 and #8205 are set in reverse.
---Setting range---
-99999.999 to 99999.999 (mm)
Set the coordinates of the (+) direction in the movable range of the stored stroke limit II or the upper limit
coordinates of the prohibited range of stored stroke limit IIB.
---Setting range---
-99999.999 to 99999.999 (mm)
Set the coordinates of the tool change position for G30. n (tool change position return).
Set with coordinates in the basic machine coordinate system.
---Setting range---
-99999.999 to 99999.999 (mm)
Select whether to enable the shift operation at G76 (fine boring) and G87 (back boring).
0: Shift effective
1: No shift
Select the shift direction at G76 and G87.
0: Shift to (+) direction
1: Shift to (-) direction
#1063 mandog Manual dog-type
#8201 AX. RELEASE
#8202 OT-CHECK OFF
#8203 OT-CHECK-CANCEL
#8204 OT-CHECK-N
#8205 OT-CHECK-P
#8206 TOOL CHG. P
#8207 G76/87 IGNR (for M system only)
#8208 G76/87 (-) (for M system only)

Set the last positioning direction and distance for a G60 (unidirectional positioning) command.
---Setting range---
-99999.999 to 99999.999 (mm)
Select whether the stored stoke limit function set by #8204 and #8205 prevents the machine from moving to
the inside or outside of the specified range.
0: Inhibits outside area (Select stored stroke limit II.)
1: Inhibits inside area (Select stored stroke limit IIB.)
Select whether to enable the parameter mirror image function.
0: Disable
1: Enable
Select the rotation type (short-cut valid/invalid) or linear type (workpiece coordinate linear type/all coordinate
linear type).
This parameter is enabled only when "#1017 rot" is set to "1". (Note)
0: Short-cut invalid
1: Short-cut valid
2: Workpiece coordinate linear type
3: All coordinate linear type
(Note) The movement method is as follows by the specified rotation axis type.
<Workpiece coordinate value>
0, 1: Display range 0 to 359.999
2, 3: Display range 0 to 99999.999

<Machine coordinate value/relative position>
0, 1, 2: Display range 0 to 359.999
3: Display range 0 to 99999.999
<ABS command>
0: The incremental amount from the end point to the current position is divided by 360, and the axis moves by the remainder amount according to the sign.
1: Moves with a short-cut to the end point.
2, 3: In the same manner as the normal linear axis, moves according to the sign by the amount obtained by subtracting the current position from the end point.
<INC command>
0, 1, 2, 3: Moves in the direction of the commanded sign by the commanded incremental amount starting at the current position.
<Reference position return>
0, 1, 2: The movement to the middle point applies to the ABS command or the INC command.
Returns with movement within 360 degrees from the middle point to reference position.
3: The movement to the middle point applies to the ABS command or the INC command.
Moves and returns in the reference position direction for the difference from the current position to the ref erence position.
Set the TLM standard length.
TLM standard length is the distance from a tool replacement point (reference position) to the measurement basic point (surface) which is used to measure the tool length.
(The same value as "#2016 tlml+" will be reflected. When either setting changes, the other will change ac cordingly.)
---Setting range---
-99999.999 to 99999.999 (mm)
#8209 G60 SHIFT (for M system only)
#8210 OT INSIDE
#8211 MIRR. IMAGE
(PR) #8213 Rotation axis type
#8215 TLM std length

Select the performance after establishing the reference position in reference position return command.
0: Moves to the reference position.
1: Won't move to the reference position.
Set a drawing start position in graphic check of each axis.
Set a distance from actual machine position by an incremental value.
When "0" is set, an actual machine position will be regarded as a start point in graphic check.
---Setting range---
-99999.999 to 99999.999 (mm)
Set in which direction and how much the tool escapes when the operation is halted during direct command mode. (Radius value)
The tool does not escape when "0" is set.
---Setting range---
-99999.999 to 99999.999 (mm)
Set the retract amount using the radius value when the Hob retract amount selection signal is OFF. (Radius value)
Retract is carried out in the negative direction if a negative value is set.
---Setting range---
-99999.999 to 99999.999 (mm)
Set the retract amount using the radius value when the Hob retract amount selection signal is ON. (Radius value)
Retract is carried out in the negative direction if a negative value is set.
---Setting range---
-99999.999 to 99999.999 (mm)
Set the retract speed during hobbing.
---Setting range---
1 to 1000000 (mm/min)
Current position display range
Select the display range of the current position.
0: 0 to 359.999 deg
1: -99999.999 to 99999.999 deg
Workpiece coordinate position displayed right after automatic reference position return
Select whether to apply a range of 0 to 360 degrees to the workpiece coordinate position displayed right after automatic reference position return if the said position is out of the range of 0 to 360 degrees.
0: Display the position in a range of 0 to 360 degrees
1: Not display the position in a range of 0 to 360 degrees
Workpiece position check
Select whether to check a difference of workpiece coordinate position between when NC is reset and when program operation is started, when both High-speed simple program check mode ON (X712) and High speed simple program check: Coordinate position check ON (X713) are set to ON.
0: Disable the check
1: Enable the check
#8216 Type in G28 return
#8217 Check start point
#8218 Dir cmd retrct amt
#8219 Hob retract amount 1
#8220 Hob retract amount 2
#8221 Hob retract speed
(PR) #8224 Posn display range
(PR) #8225 Wk coord at R ret.
#8226 Wk position check

Machine position check
Select whether to check a difference of machine coordinate command position between when NC is reset and when program operation is started, when both High-speed simple program check mode ON (X712) and

High-speed simple program check: Coordinate position check ON (X713) are set to ON.
0: Disable the check
1: Enable the check
Select whether to enable or disable the stored stroke limit IIB function set with #8231 and #8232.
0: Enable
1: Disable
(Note) This parameter is valid when "#8210 OT INSIDE" is "1".
Set the coordinates of the lower limit of the prohibited area of the stored stroke limit IIB.
If the same value is set for both the sign and numeral value as #8232, the stored stroke limit IIB function set with #8231 and #8232 will be disabled.
If #8231 and #8232 are set in reverse, the area between the two points is still a prohibited area.
(Note) This parameter is valid when "#8210 OT INSIDE" is "1" and "#8230 OT-CHECK[2] OFF" is "0".
---Setting range---
-99999.999 to 99999.999 (mm)
Set the coordinates of the upper limit of the prohibited area of the stored stroke limit IIB.
(Note) This parameter is valid when "#8210 OT INSIDE" is "1" and "#8230 OT-CHECK[2] OFF" is "0".
---Setting range---
-99999.999 to 99999.999 (mm)
#8227 Machine posn check
#8230 OT-CHECK[2] OFF
#8231 OT-CHECK[2]-N
#8232 OT-CHECK[2]-P

14.7 Ethernet Parameters
Set the main CPU's IP address.
Set the NC IP address seen from an external source.
---Setting range---
Set these parameters in accordance with the network rules in the connection environment.
Set the subnet mask for the IP address.
---Setting range---
Set these parameters in accordance with the network rules in the connection environment.
Set the IP address for the gateway.
---Setting range---
Set these parameters in accordance with the network rules in the connection environment.
Set the HMI side CPU's IP address.
(Note) This parameter is dedicated to M800VW/M80VW with Windows-based display.
---Setting range---
Set these parameters in accordance with the network rules in the connection environment.
Set the HMI side CPU's subnet mask.
(Note) This parameter is dedicated to M800VW/M80VW with Windows-based display.
---Setting range---
Set these parameters in accordance with the network rules in the connection environment.
Specify the IP address of the file server (NFS server).
If "0.0.0.0" is set in this parameter, network drive (NET1) cannot be used (disabled).
---Setting range---
0.0.0.0 to 255.255.255.255
Specify the IP address of the file server (NFS server).
If "0.0.0.0" is set in this parameter, network drive (NET2) cannot be used (disabled).
---Setting range---
0.0.0.0 to 255.255.255.255
Specify the IP address of the file server (NFS server).
If "0.0.0.0" is set in this parameter, network drive (NET3) cannot be used (disabled).
---Setting range---
0.0.0.0 to 255.255.255.255
Specify the IP address of the file server (NFS server).
If "0.0.0.0" is set in this parameter, network drive (NET4) cannot be used (disabled).
---Setting range---
0.0.0.0 to 255.255.255.255
(PR) #1926 Global IP address IP address
(PR) #1927 Global Subnet mask Subnet mask
(PR) #1928 Global Gateway Gateway
(PR) #1934 Local IP address
(PR) #1935 Local Subnet mask
(PR) #1937 NET1 IP Address NET1 IP address
(PR) #1938 NET2 IP Address NET2 IP address
(PR) #1939 NET3 IP Address NET3 IP address
(PR) #1940 NET4 IP Address NET4 IP address

Files stored on file server are managed based on the system time (GMT: Greenwich Mean Time).
This parameter is used to specify the correction time for converting the time obtained through custom API library from the system time basis to local time basis.
When this parameter is set to 0, the NC determines the correction time based on the language selected by "#1043 lang".
---Setting range---
-12 to 12 [hour]
Specify the IP address on the non-Windows-based display unit (LAN1) side.
---Setting range---
Set these parameters in accordance with the network rules in the connection environment.
Specify the IP address of subnet mask on the non-Windows-based display unit (LAN1) side.
---Setting range---
Set these parameters in accordance with the network rules in the connection environment.
Specify the gateway IP address on the non-Windows-based display unit (LAN1) side.

---Setting range---
Set these parameters in accordance with the network rules in the connection environment.
This parameter specifies the IP address of LAN3.
The specified address serves as the external IP address of the CNC.
(Note) This parameter is enabled for M800VW/M80VW Series.
---Setting range---
Set the parameter in accordance with the network requirements.
This parameter specifies the subnet mask of LAN3.
(Note) This parameter is enabled for M800VW/M80VW Series.
---Setting range---
Set the parameter in accordance with the network requirements.
The IP address is automatically assigned from the server.
0: Manual setting
1: Automatic setting
(Note) When the automatic setting is selected, "#11005 PC IP address, PC Subnet, PC Gateway" will be in valid.
Select the No. of the host to be used from host 1 to host 4.
---Setting range---
1 to 4: Host No.
#1941 Local time compen Local time correction
(PR) #1953 Intra IP address IP address on non-Windows-based display unit (LAN1)
side
(PR) #1954 Intra Subnet mask Subnet mask on non-Windows-based display unit
(LAN1) side
(PR) #1955 Intra Gateway Gateway on non-Windows-based display unit (LAN1)
side
(PR) #1956 Global IP address3 IP address 3
(PR) #1957 Global Subnetmask3 Subnet mask 3
(PR) #9701 IP addr auto set
#9706 Host No.

Set the host computer name.
This parameter allows the NC to easily recognize the host computer on the network. Set the host computer's
name (name registered in C:\windows\hosts) or the IP address.
<Setting example>
For host name: mspc160
For IP address: 150.40.0.111
(Note) Set the host computer's TCP/IP address if communication is not carried out correctly.
---Setting range---
15 characters (alphanumeric) or less
Set the user name when logging into the host computer.
---Setting range---
15 characters (alphanumeric) or less
Set the password when logging into the host computer.
---Setting range---
15 characters (alphanumeric) or less
Set the directory name of the host computer.
The directory released to the client (NC unit) with the host computer's server is handled as the root directory
by the NC unit.
---Setting range---
31 characters (alphanumeric) or less
Select the type of the host computer.
0: UNIX/PC automatic judgment
1: UNIX
2: PC (DOS)
(Note) When "0" is set, the settings for the following parameters will be invalid.
- #9716 Wrd pos: name
- #9717 Wrd pos: size
- #9718 Wrd pos: Dir
- #9719 Wrd pos: cmnt
- #9720 Wrd num: cmnt
Set the file name display position (nth word from left) of the list displayed when the ftp command "dir" is ex ecuted.
(Note) One word designates a character string divided by one or more spaces.
---Setting range---
0 to 100
0: Default value
#9711 Host1 host name
#9712 Host1 user name
#9713 Host1 password
#9714 Host1 directory
#9715 Host1 host type
#9716 Host 1 Wrd pos: name

Set the size display position (nth word from left) of the list displayed when the ftp command "dir" is executed.
(Note) One word designates a character string divided by one or more spaces.
---Setting range---
0 to 100
0: Default value
Set the <DIR> display position (nth word from left) of the list displayed when the ftp command "dir" is execut ed.
(Note) One word designates a character string divided by one or more spaces.
---Setting range---
0 to 100
0: Default value

Set the comment (date, time, etc.) display position (nth word from left) of the list displayed when the ftp com mand "dir" is executed.
(Note) One word designates a character string divided by one or more spaces.
---Setting range---
0 to 100
0: Default value
Set the number of words to be displayed as a comment.
(Note) One word designates a character string divided by one or more spaces.
---Setting range---
0 to 100
0: Default value
Set whether to display the total number of characters registered in the machining programs of host1 when
displaying the file list.
If there are many files in the directory to be referred to, the list can be updated quickly by setting "1".
0: Display
1: Not display
Set the host computer name.
This parameter allows the NC to easily recognize the host computer on the network. Set the host computer's
name (name registered in C:\windows\hosts) or the IP address.
<Setting example>
For host name: mspc160
For IP address: 150.40.0.111
(Note) Set the host computer's TCP/IP address if communication is not carried out correctly.
---Setting range---
15 characters (alphanumeric) or less
Set the user name when logging into the host computer.
---Setting range---
15 characters (alphanumeric) or less
#9717 Host 1 Wrd pos: size
#9718 Host 1 Wrd pos: Dir
#9719 Host 1 Wrd pos: cmnt
#9720 Host 1 Wrd num: cmnt
#9721 Host 1 no total siz
#9731 Host2 host name
#9732 Host2 user name

Set the password when logging into the host computer.
---Setting range---
15 characters (alphanumeric) or less
Set the directory name of the host computer.
The directory released to the client (NC unit) with the host computer's server is handled as the root directory
by the NC unit.
---Setting range---
31 characters (alphanumeric) or less
Select the type of the host computer.
0: UNIX/PC automatic judgment
1: UNIX
2: PC (DOS)
(Note) When "0" is set, the settings for the following parameters will be invalid.
- #9736 Wrd pos: name
- #9737 Wrd pos: size
- #9738 Wrd pos: Dir
- #9739 Wrd pos: cmnt
- #9740 Wrd num: cmnt
Set the file name display position (nth word from left) of the list displayed when the ftp command "dir" is ex ecuted.
(Note) One word designates a character string divided by one or more spaces.
---Setting range---
0 to 100
0: Default value
Set the size display position (nth word from left) of the list displayed when the ftp command "dir" is executed.
(Note) One word designates a character string divided by one or more spaces.
---Setting range---
0 to 100
0: Default value
Set the <DIR> display position (nth word from left) of the list displayed when the ftp command "dir" is execut ed.
(Note) One word designates a character string divided by one or more spaces.
---Setting range---
0 to 100
0: Default value
#9733 Host2 password
#9734 Host2 directory
#9735 Host2 host type
#9736 Host 2 Wrd pos: name
#9737 Host 2 Wrd pos: size
#9738 Host 2 Wrd pos: Dir

Set the comment (date, time, etc.) display position (nth word from left) of the list displayed when the ftp com mand "dir" is executed.
(Note) One word designates a character string divided by one or more spaces.
---Setting range---
0 to 100
0: Default value
Set the number of words to be displayed as a comment.
(Note) One word designates a character string divided by one or more spaces.

---Setting range---
0 to 100
0: Default value
Set whether to display the total number of characters registered in the machining programs of host1 when
displaying the file list.
If there are many files in the directory to be referred to, the list can be updated quickly by setting "1".
0: Display
1: Not display
Set the host computer name.
This parameter allows the NC to easily recognize the host computer on the network. Set the host computer's
name (name registered in C:\windows\hosts) or the IP address.
<Setting example>
For host name: mspc160
For IP address: 150.40.0.111
(Note) Set the host computer's TCP/IP address if communication is not carried out correctly.
---Setting range---
15 characters (alphanumeric) or less
Set the user name when logging into the host computer.
---Setting range---
15 characters (alphanumeric) or less
Set the password when logging into the host computer.
---Setting range---
15 characters (alphanumeric) or less
Set the directory name of the host computer.
The directory released to the client (NC unit) with the host computer's server is handled as the root directory
by the NC unit.
---Setting range---
31 characters (alphanumeric) or less
#9739 Host 2 Wrd pos: cmnt
#9740 Host 2 Wrd num: cmnt
#9741 Host 2 no total siz
#9751 Host3 host name
#9752 Host3 user name
#9753 Host3 password
#9754 Host3 directory

Select the type of the host computer.
0: UNIX/PC automatic judgment
1: UNIX
2: PC (DOS)
(Note) When "0" is set, the settings for the following parameters will be invalid.
- #9756 Wrd pos: name
- #9757 Wrd pos: size
- #9758 Wrd pos: Dir
- #9759 Wrd pos: cmnt
- #9760 Wrd num: cmnt
Set the file name display position (nth word from left) of the list displayed when the ftp command "dir" is ex ecuted.
(Note) One word designates a character string divided by one or more spaces.
---Setting range---
0 to 100
0: Default value
Set the size display position (nth word from left) of the list displayed when the ftp command "dir" is executed.
(Note) One word designates a character string divided by one or more spaces.
---Setting range---
0 to 100
0: Default value
Set the <DIR> display position (nth word from left) of the list displayed when the ftp command "dir" is execut ed.
(Note) One word designates a character string divided by one or more spaces.
---Setting range---
0 to 100
0: Default value
Set the comment (date, time, etc.) display position (nth word from left) of the list displayed when the ftp com mand "dir" is executed.
(Note) One word designates a character string divided by one or more spaces.
---Setting range---
0 to 100
0: Default value
Set the number of words to be displayed as a comment.
(Note) One word designates a character string divided by one or more spaces.
---Setting range---
0 to 100
0: Default value
#9755 Host3 host type
#9756 Host 3 Wrd pos: name
#9757 Host 3 Wrd pos: size
#9758 Host 3 Wrd pos: Dir
#9759 Host 3 Wrd pos: cmnt
#9760 Host 3 Wrd num: cmnt

Set whether to display the total number of characters registered in the machining programs of host1 when
displaying the file list.
If there are many files in the directory to be referred to, the list can be updated quickly by setting "1".
0: Display

1: Not display
Set the host computer name.
This parameter allows the NC to easily recognize the host computer on the network. Set the host computer's name (name registered in C:\windows\hosts) or the IP address.
<Setting example>
For host name: mspc160
For IP address: 150.40.0.111
(Note) Set the host computer's TCP/IP address if communication is not carried out correctly.
---Setting range---
15 characters (alphanumeric) or less
Set the user name when logging into the host computer.
---Setting range---
15 characters (alphanumeric) or less
Set the password when logging into the host computer.
---Setting range---
15 characters (alphanumeric) or less
Set the directory name of the host computer.
The directory released to the client (NC unit) with the host computer's server is handled as the root directory by the NC unit.
---Setting range---
31 characters (alphanumeric) or less
Select the type of the host computer.
0: UNIX/PC automatic judgment
1: UNIX
2: PC (DOS)
(Note) When "0" is set, the settings for the following parameters will be invalid.
- #9776 Wrd pos: name
- #9777 Wrd pos: size
- #9778 Wrd pos: Dir
- #9779 Wrd pos: cmnt
- #9780 Wrd num: cmnt
Set the file name display position (nth word from left) of the list displayed when the ftp command "dir" is ex ecuted.
(Note) One word designates a character string divided by one or more spaces.
---Setting range---
0 to 100
0: Default value
#9761 Host 3 no total siz
#9771 Host4 host name
#9772 Host4 user name
#9773 Host4 password
#9774 Host4 directory
#9775 Host4 host type
#9776 Host 4 Wrd pos: name

Set the size display position (nth word from left) of the list displayed when the ftp command "dir" is executed.
(Note) One word designates a character string divided by one or more spaces.
---Setting range---
0 to 100
0: Default value
Set the <DIR> display position (nth word from left) of the list displayed when the ftp command "dir" is execut ed.
(Note) One word designates a character string divided by one or more spaces.
---Setting range---
0 to 100
0: Default value
Set the comment (date, time, etc.) display position (nth word from left) of the list displayed when the ftp com mand "dir" is executed.
(Note) One word designates a character string divided by one or more spaces.
---Setting range---
0 to 100
0: Default value
Set the number of words to be displayed as a comment.
(Note) One word designates a character string divided by one or more spaces.
---Setting range---
0 to 100
0: Default value
Set whether to display the total number of characters registered in the machining programs of host1 when displaying the file list.
If there are many files in the directory to be referred to, the list can be updated quickly by setting "1".
0: Display
1: Not display
Set the IP address of the connection destination database.
---Setting range---
0.0.0.0 to 255.255.255.255
Set the service port No. of the connection destination database connector.
---Setting range---
1024 to 65535
Set the communication timeout time (in seconds) with the connection destination database. When "0" is set, the time will be regarded as 60 seconds.
---Setting range---
0 to 3600
#9777 Host 4 Wrd pos: size
#9778 Host 4 Wrd pos: Dir
#9779 Host 4 Wrd pos: cmnt
#9780 Host 4 Wrd num: cmnt
#9781 Host 4 no total siz
(PR) #9800 MES-IF DB IP addr DB IP address

(PR) #9801 MES-IF DB Port No DB PORT No.
(PR) #9802 MES-IF DB timeout DB communication time-out (sec)

Select the type of the connection destination database.
0: Oracle or none specified
1: Microsoft SQL Server
2: Microsoft Access
---Setting range---
0 to 2
Set the name of the connection destination database.
---Setting range---
Up to 15 characters including alphanumeric characters and '_' (underscore)
Set the user name for connecting the database.
(The omission of the user name is possible in MS Access. Enter "0" if omitted.)
---Setting range---
Up to 15 characters including alphanumeric characters and '_' (underscore)
Set the password for the user name.
(The omission of the user name is possible in MS Access. Enter "0" if omitted.)
---Setting range---
Up to 15 characters including alphanumeric characters and '_' (underscore)
Set the table name registered by the registration function of each database. Register the table name to which the following suffix is added in the database.
_FIN: Machining information database registration
_ALM: Alarm information database registration
_USR: User arbitrary information database registration
---Setting range---
Up to 15 characters including alphanumeric characters and '_' (underscore)
This parameter specifies whether to allow or block access from IP addresses within the specified range for the LAN1 network.
When IP filter setting is not used, enter "0".
0: Disable IP filter setting
1: Allow
2: Block
This parameter specifies the IP address of the beginning of the 1st IP address range to be filtered on LAN1.
---Setting range---
0.0.0.0 to 255.255.255.255
This parameter specifies the IP address of the end of the 1st IP address range to be filtered on LAN1.
---Setting range---
0.0.0.0 to 255.255.255.255
This parameter specifies the IP address of the beginning of the 2nd IP address range to be filtered on LAN1.
---Setting range---
0.0.0.0 to 255.255.255.255
(PR) #9803 MES-IF DB Type DB type
(PR) #9804 MES-IF DB Name Database name
(PR) #9805 MES-IF DB User User name
(PR) #9806 MES-IF DB Password Password
(PR) #9807 MES-IF DB Table DB table name
(PR) #9810 IP Filter for LAN1
(PR) #9811 StartFiltIP LAN1-1
(PR) #9812 EndFilterIP LAN1-1
(PR) #9813 StartFiltIP LAN1-2

This parameter specifies the IP address of the end of the 2nd IP address range to be filtered on LAN1.
---Setting range---
0.0.0.0 to 255.255.255.255
This parameter specifies the IP address of the beginning of the 3rd IP address range to be filtered on LAN1.
---Setting range---
0.0.0.0 to 255.255.255.255
This parameter specifies the IP address of the end of the 3rd IP address range to be filtered on LAN1.
---Setting range---
0.0.0.0 to 255.255.255.255
This parameter specifies the IP address of the beginning of the 4th IP address range to be filtered on LAN1.
---Setting range---
0.0.0.0 to 255.255.255.255
This parameter specifies the IP address of the end of the 4th IP address range to be filtered on LAN1.
---Setting range---
0.0.0.0 to 255.255.255.255
This parameter specifies the IP address of the beginning of the 5th IP address range to be filtered on LAN1.
---Setting range---
0.0.0.0 to 255.255.255.255
This parameter specifies the IP address of the end of the 5th IP address range to be filtered on LAN1.
---Setting range---
0.0.0.0 to 255.255.255.255
This parameter specifies the IP address of the beginning of the 6th IP address range to be filtered on LAN1.
---Setting range---
0.0.0.0 to 255.255.255.255
This parameter specifies the IP address of the end of the 6th IP address range to be filtered on LAN1.
---Setting range---
0.0.0.0 to 255.255.255.255
This parameter specifies the IP address of the beginning of the 7th IP address range to be filtered on LAN1.
---Setting range---
0.0.0.0 to 255.255.255.255

This parameter specifies the IP address of the end of the 7th IP address range to be filtered on LAN1.
---Setting range---
0.0.0.0 to 255.255.255.255
This parameter specifies the IP address of the beginning of the 8th IP address range to be filtered on LAN1.
---Setting range---
0.0.0.0 to 255.255.255.255
(PR) #9814 EndFilterIP LAN1-2
(PR) #9815 StartFiltIP LAN1-3
(PR) #9816 EndFilterIP LAN1-3
(PR) #9817 StartFiltIP LAN1-4
(PR) #9818 EndFilterIP LAN1-4
(PR) #9819 StartFiltIP LAN1-5
(PR) #9820 EndFilterIP LAN1-5
(PR) #9821 StartFiltIP LAN1-6
(PR) #9822 EndFilterIP LAN1-6
(PR) #9823 StartFiltIP LAN1-7
(PR) #9824 EndFilterIP LAN1-7
(PR) #9825 StartFiltIP LAN1-8

This parameter specifies the IP address of the end of the 8th IP address range to be filtered on LAN1.
---Setting range---
0.0.0.0 to 255.255.255.255
This parameter specifies whether to allow or block access from IP addresses within the specified range for the LAN2/GDI network.
When IP filter setting is not used, enter "0".
0: Disable IP filter setting
1: Allow
2: Block
This parameter specifies the IP address of the beginning of the 1st IP address range to be filtered on LAN2/GDI.
---Setting range---
0.0.0.0 to 255.255.255.255
This parameter specifies the IP address of the end of the 1st IP address range to be filtered on LAN2/GDI.
---Setting range---
0.0.0.0 to 255.255.255.255
This parameter specifies the IP address of the beginning of the 2nd IP address range to be filtered on LAN2/GDI.
---Setting range---
0.0.0.0 to 255.255.255.255
This parameter specifies the IP address of the end of the 2nd IP address range to be filtered on LAN2/GDI.
---Setting range---
0.0.0.0 to 255.255.255.255
This parameter specifies the IP address of the beginning of the 3rd IP address range to be filtered on LAN2/GDI.
---Setting range---
0.0.0.0 to 255.255.255.255
This parameter specifies the IP address of the end of the 3rd IP address range to be filtered on LAN2/GDI.
---Setting range---
0.0.0.0 to 255.255.255.255
This parameter specifies the IP address of the beginning of the 4th IP address range to be filtered on LAN2/GDI.
---Setting range---
0.0.0.0 to 255.255.255.255
This parameter specifies the IP address of the end of the 4th IP address range to be filtered on LAN2/GDI.
---Setting range---
0.0.0.0 to 255.255.255.255
(PR) #9826 EndFilterIP LAN1-8
(PR) #9830 IP Filter for LAN2
(PR) #9831 StartFiltIP LAN2-1
(PR) #9832 EndFilterIP LAN2-1
(PR) #9833 StartFiltIP LAN2-2
(PR) #9834 EndFilterIP LAN2-2
(PR) #9835 StartFiltIP LAN2-3
(PR) #9836 EndFilterIP LAN2-3
(PR) #9837 StartFiltIP LAN2-4
(PR) #9838 EndFilterIP LAN2-4

This parameter specifies the IP address of the beginning of the 5th IP address range to be filtered on LAN2/GDI.
---Setting range---
0.0.0.0 to 255.255.255.255
This parameter specifies the IP address of the end of the 5th IP address range to be filtered on LAN2/GDI.
---Setting range---
0.0.0.0 to 255.255.255.255
This parameter specifies the IP address of the beginning of the 6th IP address range to be filtered on LAN2/GDI.
---Setting range---
0.0.0.0 to 255.255.255.255
This parameter specifies the IP address of the end of the 6th IP address range to be filtered on LAN2/GDI.
---Setting range---
0.0.0.0 to 255.255.255.255
This parameter specifies the IP address of the beginning of the 7th IP address range to be filtered on LAN2/

GDI.
---Setting range---
0.0.0.0 to 255.255.255.255
This parameter specifies the IP address of the end of the 7th IP address range to be filtered on LAN2/GDI.
---Setting range---
0.0.0.0 to 255.255.255.255
This parameter specifies the IP address of the beginning of the 8th IP address range to be filtered on LAN2/
GDI.
---Setting range---
0.0.0.0 to 255.255.255.255
This parameter specifies the IP address of the end of the 8th IP address range to be filtered on LAN2/GDI.
---Setting range---
0.0.0.0 to 255.255.255.255
This parameter specifies whether to allow or block access from IP addresses within the specified range for
the LAN3 network.
When IP filter setting is not used, enter "0".
0: Disable IP filter setting
1: Allow
2: Block
(Note) This parameter is enabled for M800VW/M80VW Series.
This parameter specifies the IP address of the beginning of the 1st IP address range to be filtered on LAN3.
(Note) This parameter is enabled for M800VW/M80VW Series.
---Setting range---
0.0.0.0 to 255.255.255.255
(PR) #9839 StartFiltIP LAN2-5
(PR) #9840 EndFilterIP LAN2-5
(PR) #9841 StartFiltIP LAN2-6
(PR) #9842 EndFilterIP LAN2-6
(PR) #9843 StartFiltIP LAN2-7
(PR) #9844 EndFilterIP LAN2-7
(PR) #9845 StartFiltIP LAN2-8
(PR) #9846 EndFilterIP LAN2-8
(PR) #9850 IP Filter for LAN3
(PR) #9851 StartFiltIP LAN3-1

This parameter specifies the IP address of the end of the 1st IP address range to be filtered on LAN3.
(Note) This parameter is enabled for M800VW/M80VW Series.
---Setting range---
0.0.0.0 to 255.255.255.255
This parameter specifies the IP address of the beginning of the 2nd IP address range to be filtered on LAN3.
(Note) This parameter is enabled for M800VW/M80VW Series.
---Setting range---
0.0.0.0 to 255.255.255.255
This parameter specifies the IP address of the end of the 2nd IP address range to be filtered on LAN3.
(Note) This parameter is enabled for M800VW/M80VW Series.
---Setting range---
0.0.0.0 to 255.255.255.255
This parameter specifies the IP address of the beginning of the 3rd IP address range to be filtered on LAN3.
(Note) This parameter is enabled for M800VW/M80VW Series.
---Setting range---
0.0.0.0 to 255.255.255.255
This parameter specifies the IP address of the end of the 3rd IP address range to be filtered on LAN3.
(Note) This parameter is enabled for M800VW/M80VW Series.
---Setting range---
0.0.0.0 to 255.255.255.255
This parameter specifies the IP address of the beginning of the 4th IP address range to be filtered on LAN3.
(Note) This parameter is enabled for M800VW/M80VW Series.
---Setting range---
0.0.0.0 to 255.255.255.255
This parameter specifies the IP address of the end of the 4th IP address range to be filtered on LAN3.
(Note) This parameter is enabled for M800VW/M80VW Series.
---Setting range---
0.0.0.0 to 255.255.255.255
This parameter specifies the IP address of the beginning of the 5th IP address range to be filtered on LAN3.
(Note) This parameter is enabled for M800VW/M80VW Series.
---Setting range---
0.0.0.0 to 255.255.255.255
This parameter specifies the IP address of the end of the 5th IP address range to be filtered on LAN3.
(Note) This parameter is enabled for M800VW/M80VW Series.
---Setting range---
0.0.0.0 to 255.255.255.255
(PR) #9852 EndFilterIP LAN3-1
(PR) #9853 StartFiltIP LAN3-2
(PR) #9854 EndFilterIP LAN3-2
(PR) #9855 StartFiltIP LAN3-3
(PR) #9856 EndFilterIP LAN3-3
(PR) #9857 StartFiltIP LAN3-4
(PR) #9858 EndFilterIP LAN3-4
(PR) #9859 StartFiltIP LAN3-5
(PR) #9860 EndFilterIP LAN3-5

This parameter specifies the IP address of the beginning of the 6th IP address range to be filtered on LAN3.

(Note) This parameter is enabled for M800VW/M80VW Series.
---Setting range---
0.0.0.0 to 255.255.255.255
This parameter specifies the IP address of the end of the 6th IP address range to be filtered on LAN3.
(Note) This parameter is enabled for M800VW/M80VW Series.
---Setting range---
0.0.0.0 to 255.255.255.255
This parameter specifies the IP address of the beginning of the 7th IP address range to be filtered on LAN3.
(Note) This parameter is enabled for M800VW/M80VW Series.
---Setting range---
0.0.0.0 to 255.255.255.255
This parameter specifies the IP address of the end of the 7th IP address range to be filtered on LAN3.
(Note) This parameter is enabled for M800VW/M80VW Series.
---Setting range---
0.0.0.0 to 255.255.255.255
This parameter specifies the IP address of the beginning of the 8th IP address range to be filtered on LAN3.
(Note) This parameter is enabled for M800VW/M80VW Series.
---Setting range---
0.0.0.0 to 255.255.255.255
This parameter specifies the IP address of the end of the 8th IP address range to be filtered on LAN3.
(Note) This parameter is enabled for M800VW/M80VW Series.
---Setting range---
0.0.0.0 to 255.255.255.255
Specify the offset from the Coordinated Universal Time (UTC).
When a leading minus sign (-) is added, the offset is negative.
When a leading plus sign (+) or no sign is added, the offset is positive.
Set the offset in "hh:mm" format.
---Setting range---
-11:00 to +14:00
Set the IP address of the primary DNS server.
---Setting range---
0.0.0.0 to 255.255.255.255
Set the IP address of the secondary DNS server.
---Setting range---
0.0.0.0 to 255.255.255.255
(PR) #9861 StartFiltIP LAN3-6
(PR) #9862 EndFilterIP LAN3-6
(PR) #9863 StartFiltIP LAN3-7
(PR) #9864 EndFilterIP LAN3-7
(PR) #9865 StartFiltIP LAN3-8
(PR) #9866 EndFilterIP LAN3-8
(PR) #9903 Time Diff(UTC)
(PR) #9904 Preferred DNS
(PR) #9905 Alternate DNS

Set the proxy server name or the IP address of the proxy server.
If the server name is longer than 63 characters, set the IP address.
---Setting range---
A string of up to 63 characters, which can contain letters, numbers and symbols
Specify the proxy server port number.
---Setting range---
0 to 65535
Set the IP address of the display unit or the PC in which machining programs are stored (or the IP address of the IPC for M80V).
Set the IP address of the display unit which is powered OFF with the Auto power OFF function.
When the 3D machine interference check function is enabled, set the IP address of the display unit to be used for the 3D machine interference check (for M800VW only).
(Note) When "0.0.0.0" is entered, "192.168.100.2" is automatically assigned.
PC Subnet
Set the subnet mask for the display unit or PC in which machining programs are stored.
PC Gateway
Set the gateway for the display unit or PC in which machining programs are stored.
---Setting range---
0.0.0.0 to 255.255.255.255
(PR) #9906 Proxy Address
(PR) #9907 Proxy Port
(PR) #11005 PC IP address IP address setting

Select the rate at which data is transferred.
0: 19200 (bps)
1: 9600
2: 4800
3: 2400
4: 1200
5: 600
6: 300
7: 110
8: 38400
Select the stop bit length used in the start-stop system.
Refer to "#9603 PARITY EFFECTIVE". At the output of data, the number of characters is always adjusted for the parity check.

1: 1 (bit)
2: 1.5
3: 2
Select whether to add the parity bit to the data.
The parameter is set when using a parity bit separately from the data bit.
Set this parameter in accordance with the I/O device specifications.
0: Not add a parity bit at the input/output
1: Add a parity bit at the input/output
Select odd or even when parity is added to the data. This parameter is ignored when no parity is added.
0: Odd parity
1: Even parity
Set the length of the data bit.
Refer to "#9603 PARITY EFFECTIVE".
0: 5 (bit)
1: 6
2: 7 (NC connection not supported)
3: 8
Select the transmission control method.
"3" (DC code method) should be set for computer link B.
0: No control
1: RTS/CTS method
2: No handshaking
3: DC code method
#9601 BAUD RATE
#9602 STOP BIT
#9603 PARITY EFFECTIVE
#9604 EVEN PARITY
#9605 CHR. LENGTH
#9606 HAND SHAKE
Start bit Data bit Parity bit Stop bit
1character ON
OFF b1 b2 b3 b4 b5 b6 bn

Set the time-out time at which an interruption of data transfer during data input/output should be detected.
"0" means infinite time-out.
---Setting range---
0 to 999 (1/10s)
Set the code to be used for the data description.
Refer to "#9603 PARITY EFFECTIVE".
0: ASCII code
1: ISO code
bit1: DC1 output after NAK or SYN
Select whether to output the DC1 code after the NAK or SYN code is output.
0: Not output the DC1 code.
1: Output the DC1 code.
bit7: Enable/disable resetting
Select whether to enable the resetting in the computer link.
0: Enable
1: Disable
bit2: Specify the control code parity (even parity for the control code).
Select whether to add an even parity to the control code, in accordance with the I/O device specifications.
0: Not add a parity bit to the control code
1: Add a parity bit to the control code
bit3: Parity V
Select whether to enable checking of parity V in one block at the input of the data.
0: Disable
1: Enable
Not used. Set to "0".
Not used. Set to "0".
Not used. Set to "0".
Select the code used to command the first transfer of file data.
This parameter is used for a specific user. Normally set "0".
0: DC1 (11H)
1: BEL (07H)
#9607 TIME-OUT SET
#9608 DATA CODE
#9609 LINK PARAM. 1
#9610 LINK PARAM. 2
#9611 Link PARAM. 3
#9612 Link PARAM. 4
#9613 Link PARAM. 5
#9614 START CODE

bit0: NAK output
Select whether to send the NAK code to the host if a communication error occurs in computer link B.
0: Not output the NAK code
1: Output the NAK code.
bit1: SYN output
Select whether to send the SYN code to the host if NC resetting or an emergency stop occurs in computer link B.
0: Not output the SYN code.
1: Output the SYN code.

bit3: DC3 output
Select whether to send the DC3 code to the host when the communication ends in computer link B.
0: Not output the DC3 code.
1: Output the DC3 code.
Not used. Set to "0".
Not used. Set to "0".
Not used. Set to "0".
Not used. Set to "0".
Not used. Set to "0".
Not used. Set to "0".
Not used. Set to "0".
Not used. Set to "0".
Not used. Set to "0".
#9615 CTRL. CODE OUT
#9616 CTRL. INTERVAL
#9617 WAIT TIME
#9618 PACKET LENGTH
#9619 BUFFER SIZE
#9620 START SIZE
#9621 DC1 OUT SIZE
#9622 POLLING TIMER
#9623 TRANS. WAIT TMR
#9624 RETRY COUNTER

14.9 Subprogram Storage Location Parameters
If ",D1" to ",D4" is designated in a subprogram call, the called program will be searched from the storage (de vice and directory) set by this parameter.
(Example) When "M98 P (program No.), D0" is commanded, the device and directory below will be searched.
[Device] "#8880 Subpro stor D0: dev"
[Directory] "#8881 Subpro stor D0: dir"
(Note 1) If the called subprogram is not found, a program error will occur.
(Note 2) If there is no designation of D0 to D4, search is done according to the settings #8890 to #8894.
(Note 3) The setting of G (HD) is available for M800VW/M80VW equipped with the Windows-based display
unit, or for M80V when a program stored in the IPC is run on the NC connected to the same network.
---Setting range---
M: Memory
E: Memory2
G: HD
R: Memory card
D: Data server
N: USB Memory
Select the storage destination (directory) for the subprogram.
When D0 is designated at a subprogram call, the subprogram to be called will be searched from the directory
selected with this parameter.
Refer to "#8880 Subpro stor D0: dev".
---Setting range---
Directory 48 characters
If ",D1" to ",D4" is designated in a subprogram call, the called program will be searched from the storage (de vice and directory) set by this parameter.
(Example) When "M98 P (program No.), D0" is commanded, the device and directory below will be searched.
[Device] "#8880 Subpro stor D0: dev"
[Directory] "#8881 Subpro stor D0: dir"
(Note 1) If the called subprogram is not found, a program error will occur.
(Note 2) If there is no designation of D0 to D4, search is done according to the settings #8890 to #8894.
(Note 3) The setting of G (HD) is available for M800VW/M80VW equipped with the Windows-based display
unit, or for M80V when a program stored in the IPC is run on the NC connected to the same network.
---Setting range---
M: Memory
E: Memory2
G: HD
R: Memory card
D: Data server
N: USB Memory
Select the storage destination (directory) for the subprogram.
When D1 is designated at a subprogram call, the subprogram to be called will be searched from the directory
selected with this parameter.
Refer to "#8882 Subpro stor D1: dev".
---Setting range---
Directory 48 characters
#8880 Subpro stor D0: dev
#8881 Subpro stor D0: dir
#8882 Subpro stor D1: dev
#8883 Subpro stor D1: dir

If ",D1" to ",D4" is designated in a subprogram call, the called program will be searched from the storage (de vice and directory) set by this parameter.
(Example) When "M98 P (program No.), D0" is commanded, the device and directory below will be searched.
[Device] "#8880 Subpro stor D0: dev"
[Directory] "#8881 Subpro stor D0: dir"
(Note 1) If the called subprogram is not found, a program error will occur.
(Note 2) If there is no designation of D0 to D4, search is done according to the settings #8890 to #8894.
(Note 3) The setting of G (HD) is available for M800VW/M80VW equipped with the Windows-based display
unit, or for M80V when a program stored in the IPC is run on the NC connected to the same network.
---Setting range---
M: Memory

E: Memory2
G: HD
R: Memory card
D: Data server
N: USB Memory
Select the storage destination (directory) for the subprogram.
When D2 is designated at a subprogram call, the subprogram to be called will be searched from the directory selected with this parameter.
Refer to "#8884 Subpro stor D2: dev".
---Setting range---
Directory 48 characters
If ",D1" to ",D4" is designated in a subprogram call, the called program will be searched from the storage (de vice and directory) set by this parameter.
(Example) When "M98 P (program No.), D0" is commanded, the device and directory below will be searched.
[Device] "#8880 Subpro stor D0: dev"
[Directory] "#8881 Subpro stor D0: dir"
(Note 1) If the called subprogram is not found, a program error will occur.
(Note 2) If there is no designation of D0 to D4, search is done according to the settings #8890 to #8894.
(Note 3) The setting of G (HD) is available for M800VW/M80VW equipped with the Windows-based display unit, or for M80V when a program stored in the IPC is run on the NC connected to the same network.
---Setting range---
M: Memory
E: Memory2
G: HD
R: Memory card
D: Data server
N: USB Memory
Select the storage destination (directory) for the subprogram.
When D3 is designated at a subprogram call, the subprogram to be called will be searched from the directory selected with this parameter.
Refer to "#8886 Subpro stor D3: dev".
---Setting range---
Directory 48 characters
#8884 Subpro stor D2: dev
#8885 Subpro stor D2: dir
#8886 Subpro stor D3: dev
#8887 Subpro stor D3: dir

If ",D1" to ",D4" is designated in a subprogram call, the called program will be searched from the storage (de vice and directory) set by this parameter.
(Example) When "M98 P (program No.), D0" is commanded, the device and directory below will be searched.
[Device] "#8880 Subpro stor D0: dev"
[Directory] "#8881 Subpro stor D0: dir"
(Note 1) If the called subprogram is not found, a program error will occur.
(Note 2) If there is no designation of D0 to D4, search is done according to the settings #8890 to #8894.
(Note 3) The setting of G (HD) is available for M800VW/M80VW equipped with the Windows-based display unit, or for M80V when a program stored in the IPC is run on the NC connected to the same network.
---Setting range---
M: Memory
E: Memory2
G: HD
R: Memory card
D: Data server
N: USB Memory
Select the storage destination (directory) for the subprogram.
When D4 is designated at a subprogram call, the subprogram to be called will be searched from the directory selected with this parameter.
Refer to "#8888 Subpro stor D4: dev".
---Setting range---
Directory 48 characters
Specify the search order of D0 to D4 (devices and directories storing subprograms) when ",D0" to ",D4" are omitted from subprogram call.
Search is performed in the order from 1 to 5. When "0" is set, the device is excluded from search.
If the same value is set for more than one device, search is carried out in the order from the one with a smaller parameter number.
If "0" is set for all the devices, the memory is searched.
---Setting range---
0 to 5
#8888 Subpro stor D4: dev
#8889 Subpro stor D4: dir
#8890-8894 Subpro srch odr D0 to D4

14.10 Barrier Data (for L system only)
Set the reference X-coordinates of the chuck and the tail stock barrier.
Set the center coordinate of workpiece by the basic machine coordinate system. (radius value)
---Setting range---
-99999.999 to 99999.999 (mm)
Set the area of the chuck and tail stock barrier.
X axis: Set the coordinate from the workpiece center (P0). (radius value)
Z axis: Set the coordinates in the basic machine coordinate system.
---Setting range---
-99999.999 to 99999.999 (mm)
Set the area of the chuck and tail stock barrier.
X axis: Set the coordinate from the workpiece center (P0). (radius value)

Z axis: Set the coordinates in the basic machine coordinate system.
---Setting range---
-99999.999 to 99999.999 (mm)
Set the area of the chuck and tail stock barrier.
X axis: Set the coordinate from the workpiece center (P0). (radius value)
Z axis: Set the coordinates in the basic machine coordinate system.
---Setting range---
-99999.999 to 99999.999 (mm)
Set the area of the chuck and tail stock barrier.
X axis: Set the coordinate from the workpiece center (P0). (radius value)
Z axis: Set the coordinates in the basic machine coordinate system.
---Setting range---
-99999.999 to 99999.999 (mm)
Set the area of the chuck and tail stock barrier.
X axis: Set the coordinate from the workpiece center (P0). (radius value)
Z axis: Set the coordinates in the basic machine coordinate system.
---Setting range---
-99999.999 to 99999.999 (mm)
Set the area of the chuck and tail stock barrier.
X axis: Set the coordinate from the workpiece center (P0). (radius value)
Z axis: Set the coordinates in the basic machine coordinate system.
---Setting range---
-99999.999 to 99999.999 (mm)
Select whether to enable the chuck and tailstock barrier.
0: Disable (Setting from special display unit will be enabled)
1: Enable
#8300 P0 (for L system only)
#8301 P1 (for L system only)
#8302 P2 (for L system only)
#8303 P3 (for L system only)
#8304 P4 (for L system only)
#8305 P5 (for L system only)
#8306 P6 (for L system only)
#8310 Barrier ON (for L system only)

Set the area of the left spindle section.
X axis: Set the coordinate from the workpiece center (P0). (radius value)
Z axis: Set the coordinates in the basic machine coordinate system.
---Setting range---
-99999.999 to 99999.999 (mm)
Set the area of the left spindle section.
X axis: Set the coordinate from the workpiece center (P0). (radius value)
Z axis: Set the coordinates in the basic machine coordinate system.
---Setting range---
-99999.999 to 99999.999 (mm)
Set the area of the right spindle section.
X axis: Set the coordinate from the workpiece center (P0). (radius value)
Z axis: Set the coordinates in the basic machine coordinate system.
---Setting range---
-99999.999 to 99999.999 (mm)
Set the area of the right spindle section.
X axis: Set the coordinate from the workpiece center (P0). (radius value)
Z axis: Set the coordinates in the basic machine coordinate system.
---Setting range---
-99999.999 to 99999.999 (mm)
Select the shape of the left chuck and tailstock barrier.
0: No area
1: Chuck
2: Tailstock
Select the shape of the right chuck and tailstock barrier.
0: No area
1: Chuck
2: Tailstock
Set the name of the delivery axis when the right chuck and tailstock barrier is movable.
When using the multi-part system method and the delivery axis is an axis in the other part system, designate the axis including the part system as 1A, 1B or 2A, 2B. If the part system is not designated as A and B, the set part system will be used.
---Setting range---
A/B/.. (axis name)
1A/1B/..
2A/2B/.. (with part system designated)
0: Cancel
#8311 P7 (for L system only)
#8312 P8 (for L system only)
#8313 P9 (for L system only)
#8314 P10 (for L system only)
#8315 Barrier Type (L) (for L system only)
#8316 Barrier Type (R) (for L system only)
#8317 ELIV. AX. Name (for L system only)

Set the angle for the left tailstock end section.
The angle will be interpreted as 90 if there is no setting (when "0" is set).

---Setting range---
0 to 180 ()
0: 90 (default)
Set the angle for the right tailstock end section.
The angle will be interpreted as 90 if there is no setting (when "0" is set).
---Setting range---
0 to 180 ()
0: 90 (default)
#8318 Stock Angle (L) (for L system only)
#8319 Stock Angle (R) (for L system only)

Select whether to decelerate at the arc entrance or exit.
0: Not decelerate
1: Decelerate
0: Post-interpolation acceleration/deceleration is applied to G00.
1: Pre-interpolation acceleration/deceleration is applied to G00 even in the high accuracy control mode.
2: Rapid traverse constant-gradient multi-step acceleration/deceleration is enabled.
When the multi-part system simultaneous high-accuracy control option is enabled, "1" can be set for the 2nd part system and the following.
Set a cutting feedrate when applying pre-interpolation acceleration/deceleration.
When high-accuracy control time constant expansion is valid, set the maximum of cutting feed clamp speed of each axis.
---Setting range---
1 to 999999 (mm/min)
Set a cutting feed time constant when applying pre-interpolation acceleration/deceleration.
When set to "0", the time constant will be clamped at 1ms.
---Setting range---
Without high-accuracy control time constant expansion: 1 to 5000 (ms)
With high-accuracy control time constant expansion: 1 to 30000 (ms)
Cutting feed Acc Cutting feed acceleration
Displays cutting feed acceleration.
Set the deceleration speed at the arc entrance or exit.
---Setting range---
1 to 999999 (mm/min)
Set the filter time constant for smoothly changing the acceleration rate for the cutting feed acceleration/de celeration in pre-interpolation acceleration/deceleration.
- Notch frequency Hz
Displays the notch frequency (Hz) for the S-pattern filter set in "#1568 SfiltG1" (G01 soft acceleration/decel eration filter).
---Setting range---
0 to 200 (ms)
#1149 cireft Arc deceleration speed change
#1205 G0bdcc Acceleration and deceleration before G0 interpolation
#1206 G1bF Maximum speed
#1207 G1btL Time constant
#1209 cirdcc Arc deceleration speed
#1568 SfiltG1 G01 soft acceleration/deceleration filter
G1btL
G1bF
Time
Speed

Set the filter time constant for smoothly changing the acceleration rate for the rapid traverse acceleration/ deceleration in pre-interpolation acceleration/deceleration.
---Setting range---
0 to 200 (ms)
Set the filter time constant for smoothly changing the acceleration rate in pre-interpolation acceleration/de celeration.
This will be disabled when "0" or "1" is set.
- Notch frequency Hz
Displays the notch frequency (Hz) for the S-shape filter set in "#1570 Sfilt2" (Soft acceleration/deceleration filter 2).
---Setting range---
0 to 200 (ms)
Fix the shape recognition range for SSS control.
---Setting range---
0/1
Set the time constant for rotary axis prefilter.
By setting this time constant, the orientation change of the tool (rotary axis motion) during tool center point control/tool cutting point control becomes smoother.
This parameter can also be set from [Setup] screen ([User] - [Hi-prec param]).
When "0" is specified, the rotary axis prefiltering function is disabled.
---Setting range---
0 to 200 (ms)
#1569 SfiltG0 G00 soft acceleration/deceleration filter
#1570 Sfilt2 Soft acceleration/deceleration filter 2
#1571 SSSdis SSS control adjustment coefficient fixed value selec tion
#7914 ROT_PREFILT Rotary axis prefilter time constant

Set a compensation coefficient for reducing a control error in the reduction of a corner roundness and arc radius.

The larger the set value is, the smaller the theoretical error will be. However, since the speed at the corner
goes down, the cycle time will be extended.
Coefficient = 100 - setting value
(Note) This function will be enabled when "#8021 COMP_CHANGE" is set to "0".
---Setting range---
0 to 99 (%)
Theoretical radius decrease error amount
Displays the theoretical radius decrease error amount, R(mm), from the automatic calculation by NC.
Theoretical radius decrease amount in arc
R5mm arc deceleration speed
Displays a deceleration speed (mm/min) along an arc of 5 (mm) radius.
R1mm arc deceleration speed
Displays a deceleration speed(mm/min) along an arc of 1 (mm) radius.
#8019 R COMP
+
R
F
Command path
Path after servo control

Set the minimum value of an angle (external angle) that should be assumed to be a corner.
When an inter-block angle (external angle) in high-accuracy mode is larger than the set value, it will be de termined as a corner and the speed will go down to sharpen the edge.
(Note) If "0" is set, it will be handled as "5" degrees.
---Setting range---
0 to 89 ()
0: 5 degree (Equals to setting "5")
Theoretical corner dull amount
Displays the corner dull amount c(mm) in respect to the corner's angle (external angle) ().
ca(mm): Error () caused by the soft acceleration/deceleration 2
cs(mm): Error () caused by the servo system
Corner deceleration speed
Display corner deceleration speed c (mm/min) for the corner of the angle (external angle) with ().
Theoretical dull amount at 90 degree
Display corner dull amount when the angle is 90 degree.
Corner deceleration speed at 90 degree
Display corner deceleration speed when the angle is 90 degree.
Select whether to share or separate the compensation coefficient at the corner/curve during the high-accu racy control mode.
0: Share ("#8019 R COMP" is applied.)
1: Separate
* Corner: #8022 CORNER COMP
* Curve: #8023 CURVE COMP
(Note) Set "1" when using SSS/EasySSS control.
#8020 DCC ANGLE
#8021 COMP_CHANGE
If the set value is smaller than , the speed goes down to optimize
the corner.
F
ca
cs
Path after servo control
Path after soft acceleration/ Command path
deceleration 2
Theoretical roundness amount at corner

Set the compensation coefficient to further reduce or increase the roundness at the corner during the high accuracy control mode.
Coefficient = 100 - setting value
(Note) This is valid when "#8021 COMP CHANGE" is set to "1".
Reference to "#8020 Corner decreasing speed "for theoretical corner roundness amount, corner decreasing
speed, theoretical 90 degree dull amount, 90 degree corner decreasing speed.
---Setting range---
-1000 to 99 (%)
Set the compensation coefficient to further reduce or increase the radius reduction amount at the curve (arc,
involute, spline) during the high-accuracy control mode.
Coefficient = 100 - setting value
(Note) This is valid when "#8021 COMP CHANGE" is set to "1".
For theoretical radius reduction error amount, R5mm arc deceleration speed and R1mm arc deceleration
speed, refer to "#8019 R COMP".
---Setting range---
-1000 to 99 (%)
For M system only.
Specify whether to enable the fine spline function.
0: Disable the fine spline function.
1: Enable the fine spline function.
Spline interpolation will be valid during G61.2 modal regardless of this setting.
Set the angle where the spline interpolation is temporarily canceled.
When the angle made by blocks exceeds this parameter setting value, spline interpolation will be canceled
temporarily. In consideration of the pick feed, set a value a little smaller than the pick feed angle.
---Setting range---
0 to 180 ()
0: 180 ()
Set the maximum chord error (tolerance) in a block that includes an inflection point. Set the tolerance appli cable when the applicable block is developed to fine segments by CAM. (normally about 10 m)
When "0.000" is set, the applicable block will be linear.

---Setting range---
0.000 to 100.000 (mm)
Set the maximum chord error (tolerance) in a block that includes no inflection point. Set the tolerance appli cable when the applicable block is developed to fine segments by CAM. (normally about 10 m)
When "0.000" is set, the applicable block will be linear.
---Setting range---
0.000 to 100.000 (mm)
Set the length of the block subject to fairing.
(Enabled when "#8033 Fairing ON" is set to "1".)
---Setting range---
0 to 100.000 (mm)
#8022 CORNER COMP
#8023 CURVE COMP
#8025 SPLINE ON
#8026 CANCEL ANG. (for M system only)
#8027 Toler-1 (for M system only)
#8028 Toler-2 (for M system only)
#8029 FairingL (for M system only)

Set the fine-segment length where the spline interpolation is temporarily canceled.
When the length of one block exceeds this parameter setting value, spline interpolation is canceled tempo rarily and linear interpolation is performed. Set a value a little smaller than one block length of the program.
If "-1" is set, spline interpolation will be performed regardless of block length.
---Setting range---
-1 to 127 (mm)
0: 1 (mm)
Select whether or not to use the fairing or smooth fairing function.
0: Use neither of them
1: Use the fairing function
2: Use the smooth fairing function
Select the method for clamping the cutting speed.
0: Clamp with parameter "#2002 clamp" or the corner deceleration function.
1: Clamp the cutting speed with acceleration judgment. (Enabled when "#8033 Fairing ON" is set to "1".)
Select the condition to decide a corner.
0: A corner is decided from the angle of the neighboring block.
1: A corner is decided from the angle of the neighboring block, excluding minute blocks.
(Enabled when "#8033 Fairing ON" is set to "1".)
Set the length of the block to be excluded when deciding a corner.
(Enabled when "#8036 CordecJudge" is set to "1".)
---Setting range---
0 to 99999.999 (mm)
Path recognition range
Specify the range to recognize the tool paths adjoining to the command position when the smooth fairing function is ON.
If "0" is set, the range will be 1.000 (mm).
---Setting range---
0 to 100.000 (mm)
Compensation distance tolerance
Specify the upper limit of the distance between the command position and compensation position when the smooth fairing function is ON.
If you specify a negative value, operation is conducted with no tolerance limit.
If "0" is set, the tolerance will be 0.005 (mm).
---Setting range---
-1.000 to 100.000 (mm)
High-speed high-accuracy control-enabled part system
Select whether to enable the simultaneous use of the high-accuracy control and high-speed machining mode (including the high-speed high-accuracy control I and II) for each part system.
0: Not enable
1: Enable
"1" can be set for up to two part systems. If you set "1" for three or more part systems, the alarm (Y51 0032) will result.
#8030 MINUTE LENGS (for M system only)
#8033 Fairing ON (for M system only)
#8034 AccClamp ON (for M system only)
#8036 CordecJudge (for M system only)
#8037 CorJudgeL (for M system only)
#8038 Path recog. range
#8039 Comp. range limit
(PR) #8040 High-SpeedAcc

Set whether to enable the SSS control with G05 P10000.
0: Disable
1: Enable
Set the maximum value of the range for recognizing the shape.
To eliminate the effect of steps or errors, etc., set a large value. To enable sufficient deceleration, set a small value.
If "0.000" is set, the standard value (1.000mm) will be applied.
---Setting range---
0 to 100.000 (mm)
Set the clamp speed at the curved section configured of fine segments.
Coefficient = setting value
---Setting range---
1 to 100
Set the width of the step at which the speed is not to be decelerated. (Approximately the same as the CAM

path difference [Tolerance].)
If "0" is set, the standard value (5m) will be applied.
If a minus value is set, the speed will decelerate at all minute steps.
---Setting range---
-1.000 to 0.100 (mm)
Set the time to wait for deceleration when the speed FB does not drop to the clamp speed.
---Setting range---
0 to 100 (ms)
Deceleration coefficient for SSS control ON
Select whether to enable the speed coefficients ("#8097 Corner deceleration coefficient for SSS control",
"#8098 Arc clamp speed coefficient for SSS control") that are used for compensating for a path error and
clamp speed under SSS control.
0: Disable
1: Enable
Corner deceleration coefficient for SSS control
Specify the compensation coefficient to be used for adjusting a path error and clamp speed at a corner under
SSS control. This parameter is enabled during SSS control. Thus set this parameter if you wish to use differ ent compensation coefficients according to ON/OFF of SSS control (If you wish to adjust a path error and clamp speed at a corner, use "#8022 CORNER COMP").
If the setting value is smaller, the theoretical path error will decrease, but the cycle time may be longer be cause the corner deceleration speed will slow down.
Note that this parameter is enabled when "#8096 Deceleration coefficient for SSS control ON" is "1".
When "0" is set in this parameter, the standard value (300%) is applied.
---Setting range---
0 to 2000 (%)
#8090 SSS ON (for M system only)
#8091 StdLength (for M system only)
#8092 ClampCoeff (for M system only)
#8093 StepLeng (for M system only)
#8094 DccWaitAdd (for M system only)
#8096 Deceler. coeff. ON
#8097 Corner decel coeff

Arc clamp speed coefficient for SSS control
Specify the compensation coefficient to be used for adjusting a path error and clamp speed on an arc under
SSS control. This parameter is enabled during SSS control. Thus set this parameter if you wish to use differ ent compensation coefficients according to ON/OFF of SSS control (If you wish to adjust a path error and clamp speed on an arc, use "#8023 CURVE COMP").
If the setting value is smaller, the theoretical path error will decrease, but the cycle time may be longer be cause the arc clamp speed will slow down.
Note that this parameter is enabled when "#8096 Deceleration coefficient for SSS control ON" is "1".
When "0" is set in this parameter, the standard value (100%) is applied.
---Setting range---
0 to 2000 (%)
Specify the time constant of filter that is used for smoothing the change of jerk when pre-interpolation accel eration/deceleration is performed in cutting feed.
This filter causes no path error, as the filter is applied to the resultant speed calculated before interpolation.
If you specify the jerk filter time constant, the time constants of each filter will be as follows:
- S-shape filter time constant
"#1568 SfiltG1" - "Jerk_filtG1"
- Jerk filter time constant
"Jerk_filtG1"
---Setting range---
0 to 50 (ms)
Specify the time constant of filter that is used for smoothing the change of jerk when pre-interpolation accel eration/deceleration is performed in cutting feed.
This filter causes no path error, as the filter is applied to the resultant speed calculated before interpolation.
If you specify the jerk filter time constant, the time constants of each filter will be as follows:
- S-shape filter time constant
"#1569 SfiltG0" - "Jerk_filtG0"
- Jerk filter time constant
"Jerk_filtG0"
---Setting range---
0 to 50 (ms)
Select how to calculate the deceleration speed for a corner between the blocks where the high-accuracy con trol is enabled.
0: Optimal corner deceleration
(calculate the deceleration speed using the acceleration tolerance common for all the axes determined by
G1bF and G1btL)
1: Axis-specific acceleration tolerance control
(calculate the deceleration speed using acceleration tolerances of each axis determined by G1bFx and
G1btLx)
Select whether to enable variable-acceleration pre-interpolation acceleration/deceleration control while high accuracy control is ON.
0: Pre-interpolation acceleration/deceleration
(Apply the acceleration rate that is determined by G1bF and G1btL and is common for all the axes)
1: Variable-acceleration pre-interpolation acceleration/deceleration
(Apply the acceleration rate that is determined by G1bFx and G1btLx for each axis)
(Note) Variable-acceleration pre-interpolation acceleration/deceleration is a function available under
SSS control. To enable this function, set "#8090 SSS ON" to "1".
#8098 Arc clamp spd coef
#12051 Jerk_filtG1 G01 jerk filter
#12052 Jerk_filtG0 G00 jerk filter
#12053 EachAxAccCntrl Enable axis-specific acceleration tolerance control
#12060 VblAccPreInt Variable-acceleration pre-interpolation acceleration/de celeration ON

Select whether to enable the tolerance control.
0: Disable
1: Enable
(Note) Tolerance control is available only under SSS control.

To enable this function, set "#8090 SSS ON" to "1".
Set the compensation coefficient to adjust a path error or clamp speed in the corner while tolerance control is ON.
This parameter is enabled during tolerance control. Thus set this parameter if you wish to use different clamp speed according to ON/OFF of tolerance control.
When "0" is set in this parameter, the standard value (100%) is applied.
---Setting range---
0 to 2000 (%)
Spline interpolation 2: Smoothing range
Normally set "0" in this parameter.
If you run a program with micro segments and its reciprocating paths are uneven, set the parameter to about 3 to 5 times the length of the programmed segments.
---Setting range---
0.000 to 10.000 (mm)
Tolerance control: Corner recognition angle
Specify the corner recognition angle. Normally set to "0".
---Setting range---
0.000 to 180.000 ()
Specify the time constant of the filter that smoothes out fluctuations in acceleration under the tolerance con trol.
Basically set to 0.
---Setting range---
0 to 200 (ms)
#12066 Tolerance ctrl ON
#12067 Tolerance spd coef
#12068 Smoothing range
#12069 Corner angle
#12070 Sfilt2_tol Tolerance control: Soft acceleration/deceleration filter

14.12 High-accuracy Control Axis Parameters
Set the rapid traverse feedrate for each axis.
(Note) The maximum value to be set depends on the machine specifications.
---Setting range---
1 to 1000000 (mm/min)
Set the maximum cutting feedrate for each axis.
Even if the feedrate in G01 exceeds this value, the clamp will be applied at this feedrate.
---Setting range---
1 to 1000000 (mm/min)
Set a feed forward gain for pre-interpolation acceleration/deceleration.
The larger the set value, the smaller the theoretical control error will be. However, if a machine vibration oc curs, set the smaller value.
---Setting range---
0 to 200 (%)
Set a feed forward gain for G00 pre-interpolation acceleration/deceleration.
The larger the setting value, the shorter the positioning time during in-position checking.
If a machine vibration occurs, set the smaller value.
---Setting range---
0 to 200 (%)
Set the minimum clamp speed for corner deceleration in the high-accuracy control mode. Normally set "0".
(Note) This parameter is invalid during SSS control.
---Setting range---
0 to 1000000 (mm/min)
Set the rapid traverse rate for each axis in the high-accuracy control mode. When 0 is set, "#2001 rapid" is used.
---Setting range---
0 to 1000000 (mm/min)
Set the cutting feed maximum speed for each axis in the high-accuracy control mode. When 0 is set, "#2002 clamp" is used.
---Setting range---
0 to 1000000 (mm/min)
#2001 rapid Rapid traverse rate
#2002 clamp Cutting feedrate for clamp function
#2010 fwd_g Feed forward gain
#2068 G0fwdg G00 feed forward gain
#2096 crncsp Minimum corner deceleration speed
#2109 Rapid (H-precision) Rapid traverse rate for high-accuracy control mode
#2110 Clamp (H-precision) Cutting feed clamp speed for high-accuracy control mode

When axis-specific acceleration tolerance control is ON:
Specify the maximum speed to be used for calculating each axis' acceleration tolerance. When "0" is set, "#2001 rapid" is used.
When variable-acceleration pre-interpolation acceleration/deceleration is ON:
Specify the maximum speed to be used for calculating each axis' acceleration. When "0" is set, "#1206 G1bF" is used.
When both axis-specific acceleration tolerance control and variable-acceleration pre-interpolation accelera tion/deceleration are ON:
Specify the maximum speed to be used for calculating each axis' acceleration. When "0" is set, "#1206 G1bF" is used.
When neither axis-specific acceleration tolerance control nor variable-acceleration pre-interpolation acceler ation/deceleration is ON:
This parameter is disabled.
---Setting range---
0 to 999999 (mm/min)
When axis-specific acceleration tolerance control is ON:

Specify the time constant (a time to be taken until reaching the maximum speed) to be used for calculating
each axis' acceleration tolerance. When "0" is set, "#2004 G0tL" is used.
When variable-acceleration pre-interpolation acceleration/deceleration is ON:
Specify the time constant (a time to be taken until reaching the maximum speed) to be used for calculating
each axis' acceleration. When "0" is set, "#1207 G1btL" is used.
When both axis-specific acceleration tolerance control and variable-acceleration pre-interpolation accelera tion/deceleration are ON:
Specify the time constant (a time to be taken until reaching the maximum speed) to be used for calculating
each axis' acceleration. When "0" is set, "#1207 G1btL" is used.
When neither axis-specific acceleration tolerance control nor variable-acceleration pre-interpolation acceler ation/deceleration is ON:
This parameter is disabled.
---Setting range---
0 to 5000 (ms)
Specify the compensation coefficient to be used for adjusting a path error and clamp speed at a corner for
each axis during the high-accuracy control mode. If the setting value is larger, the edge accuracy will im prove, but the cycle time may be longer because the corner speed will slow down.
This parameter is disabled when the axis-specific acceleration tolerance control is OFF.
---Setting range---
-1000 to 99 (%)
#2157 G1bFx Maximum axis-specific pre-interpolation cutting feed
rate
#2158 G1btLx Axis-specific pre-interpolation cutting feed time con stant
#2159 compx Accuracy coefficient for each axis
M800V/M80V Series Alarm/Parameter Manual
14 User Parameters
14.13 Operation Parameters
293 IB-1501623-F
14.13 Operation Parameters
Select the type of the following counters on the Monitor screen.
Normal display: Upper-left counter
2-, 3- or 4-part system simultaneous display (four counters): Upper-left counter
2-, 3- or 4-part system simultaneous display (two counters): Upper counter
2-, 3- or 4-part system simultaneous display (one counter): Counter
Either relative position or tip work position is displayed by default.
(Note 1) 3- or 4-part system simultaneous display is enabled for a 15- or 19-type display unit only.
(Note 2) Tip work position is displayed when 5-axis-related option is ON.
(Note 3) PLC axis position is displayed when "#11091 PLC counter valid" is "1".
1: Current position
2: Workpiece coordinate position
3: Machine position
4: Program position
8: Remain command
9: Manual interrupt amount
10: Next command
11: Restart position
12: Remain distance
16: Tip workpiece coordinate position
18: Tool axis movement
19: Tip machine position
20: Relative position
21: Table coordinate position
22: Workpiece installation position
23: Inclined surface coordinate position
27: PLC axis position
---Setting range---
1 to 27
#8901 Counter type 1
M800V/M80V Series Alarm/Parameter Manual
14 User Parameters
14.13 Operation Parameters
IB-1501623-F 294
Select the type of the following counters on the Monitor screen.
Normal display: Lower-left counter
2-, 3- or 4-part system simultaneous display (four counters): Lower-left counter
2-, 3- or 4-part system simultaneous display (two counters): Lower counter
Programmed position is displayed by default.
(Note 1) 3- or 4-part system simultaneous display is enabled for a 15- or 19-type display unit only.
(Note 2) PLC axis position is displayed when "#11091 PLC counter valid" is "1".
1: Current position
2: Workpiece coordinate position
3: Machine position
4: Program position
8: Remain command
9: Manual interrupt amount
10: Next command
11: Restart position
12: Remain distance
16: Tip workpiece coordinate position
18: Tool axis movement
19: Tip machine position
20: Relative position
21: Table coordinate position
22: Workpiece installation position
23: Inclined surface coordinate position
27: PLC axis position
---Setting range---
1 to 27
#8902 Counter type 2
M800V/M80V Series Alarm/Parameter Manual
14 User Parameters

Select the type of the following counters on the Monitor screen.
Normal display: Upper-right counter
2-, 3- or 4-part system simultaneous display (four counters): Upper-right counter
Remaining command is displayed by default.
(Note 1) 3- or 4-part system simultaneous display is enabled for a 15- or 19-type display unit only.
(Note 2) PLC axis position is displayed when "#11091 PLC counter valid" is "1".
1: Current position
2: Workpiece coordinate position
3: Machine position
4: Program position
8: Remain command
9: Manual interrupt amount
10: Next command
11: Restart position
12: Remain distance
16: Tip workpiece coordinate position
18: Tool axis movement
19: Tip machine position
20: Relative position
21: Table coordinate position
22: Workpiece installation position
23: Inclined surface coordinate position
27: PLC axis position
---Setting range---
1 to 27
Select the type of the following counters on the Monitor screen.
Normal display: Lower-right counter
2-, 3- or 4-part system simultaneous display (four counters): Lower-right counter
Next command is displayed by default.
(Note 1) 3- or 4-part system simultaneous display is enabled for a 15- or 19-type display unit only.
(Note 2) PLC axis position is displayed when "#11091 PLC counter valid" is "1".
1: Current position
2: Workpiece coordinate position
3: Machine position
4: Program position
8: Remain command
9: Manual interrupt amount
10: Next command
11: Restart position
12: Remain distance
16: Tip workpiece coordinate position
18: Tool axis movement
19: Tip machine position
20: Relative position
21: Table coordinate position
22: Workpiece installation position
23: Inclined surface coordinate position
27: PLC axis position
---Setting range---
1 to 27
#8903 Counter type 3
#8904 Counter type 4

Select the type of counter on the Monitor screen (Simple display).
Either relative position or tip work position is displayed by default.
(Note 1) Tip work position is displayed when 5-axis-related option or program format switch option is ON.
(Note 2) PLC axis position is displayed when "#11091 PLC counter valid" is "1".
1: Current position
2: Workpiece coordinate position
3: Machine position
4: Program position
8: Remain command
9: Manual interrupt amount
10: Next command
11: Restart position
12: Remain distance
16: Tip workpiece coordinate position
18: Tool axis movement
19: Tip machine position
20: Relative position
21: Table coordinate position
22: Workpiece installation position
23: Inclined surface coordinate position
27: PLC axis position
---Setting range---
1 to 27
Not used. Set to "0".
Set whether to enable the Undo function during program edit on the Monitor screen or Edit screen.
0: Disable
1: Enable
(Note) This parameter is enabled for M800VW/M800VS/M80VW Series.
Select whether or not to display a confirmation message upon rewrite of common variable in NAVI operation.
0: Not display a confirming message

1: Display a confirming message
Select the NAVI operation during automatic operation.
0: NAVI is unable to start during automatic operation.
1: NAVI is able to start during automatic operation. (An operation involving common variable rewrite is dis abled.)
Set the sensibility of the touch panel.
The smaller the setting value is, the more sensitive the panel will be. (1: sensitive, 4: insensitive)
When set to "0", the sensibility will be the same as when the standard setting of 2 is applied.
---Setting range---
0 to 4
Select the operation method for restart search type 2.
0: It is necessary to set the top search position arbitrarily.
1: The restart search is executed from O No. that is designated as head.
#8905 Counter type 5
#8906 Counter type 6
#8910 Edit undo
#8911 NAVI-Message ON
#8912 NAVI operate type
#8913 Touch panel sense
#8914 Auto Top search

The automatic backup is executed when the CNC power is turned ON for the first time after the designated date of the month.
When "-1" is set in this parameter, the automatic backup is executed every time the CNC power is turned ON (a maximum of once per day).
---Setting range---
-1: Everyday
0: Disabled
1 to 31: Designated date of a month
The automatic backup is executed when the CNC power is turned ON for the first time after the designated date of the month.
---Setting range---
0: Disabled
1 to 31: Designated date of a month
The automatic backup is executed when the CNC power is turned ON for the first time after the designated date of the month.
---Setting range---
0: Disabled
1 to 31: Designated date of a month
The automatic backup is executed when the CNC power is turned ON for the first time after the designated date of the month.
---Setting range---
0: Disabled
1 to 31: Designated date of a month
Select the automatic backup target device.
[M800VW/M80VW with Windows-based display]
0: DS
1: HD
2: Memory card
3: USB Memory
[M800VS/M80V Series]
0: DS
2: Memory card
3: USB Memory
(Note 1) The setting range differs according to the CNC model.
(Note 2) Any value outside the setting range is treated as "0".
Select the method to calculate the drawing position when drawing a solid.
With 3D drawing, the drawing position (tool tip position) is calculated with the method designated with this parameter, and the image is drawn.
0: For tool radius compensation, use the tool compensation amount set in tool compensation screen. For tool length, use the value in tool set window. (for tool length measurement type I)
1: Use the tool compensation amount set in tool compensation screen for both tool radius and tool length compensation. (for tool length measurement type II)
2: Use the value set in tool set window for both tool radius and tool length compensation. (for tool length measurement type I)
3: Use the value set in tool set window for both tool radius and tool length compensation. (for tool length measurement type II)
#8915 Auto backup day 1
#8916 Auto backup day 2
#8917 Auto backup day 3
#8918 Auto backup day 4
#8919 Auto backup device
#8920 3D tool ofs select

Select the editing mode for the machining programs saved in HD, memory card, DS or USB memory.
0: Regular editing mode
If the program size is 1.0 MB (When "#8910 Edit undo" is invalid, 2.0 MB) or more, mass-editing will be applied.
(For M80V Series, mass-editing is applied to 0.5 MB or greater capacity.)
1: Mass-editing mode
Set whether to enable the duplication check in registering tools to magazine pots, and in setting tool Nos. for spindle/standby.
0: Duplication check valid for all valid magazines

1: Duplication check invalid
2: Duplication check valid only for the selected magazine
Set whether to enable the edit-in/out menu.
When disabled, the edit-input/output menu won't appear.
However, the maintenance-in/out menu is always enabled regardless of this parameter setting.
0: Enable
1: Disable
Select whether to display a confirming message when attempting to write compensation data for tool mea surement, or coordinate system data for workpiece measurement.
However, the confirmation message will not appear in L system tool measurement simple mode "#8957 T
meas (L)-Simple".
0: Not display a confirming message
1: Display a confirming message
Select which spindle to display in the 1st part system window for the 2-, 3- or 4-part system simultaneous
display.
(Note 1) If you select "00" for the 2-, 3- or 4-part system simultaneous display, the default display is used (1st
spindle on the upper side and 2nd spindle on the lower side).
(Note 2) If you set the same number as, or a greater number than the setting of "#1039 spinno", or if the high or low-order setting is "0", the 1st spindle is displayed.
(Note 3) If you set the low-order to F, the screen shows the actual rotation speed, command speed and load
meter of the high-order spindle.
Note that for the 4-counter display in 4-part system simultaneous display, even if the low-order is not
F, the screen shows the actual rotation speed, command speed and load meter of the high-order and
low-order spindles.
(Note 4) 3- or 4-part system simultaneous display is enabled for a 15- or 19-type display unit only.
---Setting range---
High-order (Select an upper side spindle.) : 0 to 8
Low-order (Select a lower side spindle.) : 0 to 8, F
#8921 Mass Edit select
#8922 T-reg-dup check
(PR) #8923 Hide Edit-IO menu
#8924 Meas. confirm msg
#8925 SP on 1st part sys

Select which spindle to display in the 2nd part system window for the 2-, 3- or 4-part system simultaneous
display.
(Note 1) If you select "00" for the 2-, 3- or 4-part system simultaneous display, the default display is used (1st
spindle on the upper side and 2nd spindle on the lower side).
(Note 2) If you set the same number as, or a greater number than the setting of "#1039 spinno", or if the high or low-order setting is "0", the 1st spindle is displayed.
(Note 3) If you set the low-order to F, the screen shows the actual rotation speed, command speed and load
meter of the high-order spindle.
Note that for the 4-counter display in 4-part system simultaneous display, even if the low-order is not
F, the screen shows the actual rotation speed, command speed and load meter of the high-order and
low-order spindles.
(Note 4) 3- or 4-part system simultaneous display is enabled for a 15- or 19-type display unit only.
---Setting range---
High-order (Select an upper side spindle.) : 0 to 8
Low-order (Select a lower side spindle.) : 0 to 8, F
Select which spindle to display in the 3rd part system window for the 2-, 3- or 4-part system simultaneous
display.
(Note 1) If you select "00" for the 2-, 3- or 4-part system simultaneous display, the default display is used (1st
spindle on the upper side and 2nd spindle on the lower side).
(Note 2) If you set the same number as, or a greater number than the setting of "#1039 spinno", or if the high or low-order setting is "0", the 1st spindle is displayed.
(Note 3) If you set the low-order to F, the screen shows the actual rotation speed, command speed and load
meter of the high-order spindle.
Note that for the 4-counter display in 4-part system simultaneous display, even if the low-order is not
F, the screen shows the actual rotation speed, command speed and load meter of the high-order and
low-order spindles.
(Note 4) 3- or 4-part system simultaneous display is enabled for a 15- or 19-type display unit only.
---Setting range---
High-order (Select an upper side spindle.) : 0 to 8
Low-order (Select a lower side spindle.) : 0 to 8, F
Select which spindle to display in the 4th part system window for the 2-, 3- or 4-part system simultaneous
display.
(Note 1) If you select "00" for the 2-, 3- or 4-part system simultaneous display, the default display is used (1st
spindle on the upper side and 2nd spindle on the lower side).
(Note 2) If you set the same number as, or a greater number than the setting of "#1039 spinno", or if the high or low-order setting is "0", the 1st spindle is displayed.
(Note 3) If you set the low-order to F, the screen shows the actual rotation speed, command speed and load
meter of the high-order spindle.
Note that for the 4-counter display in 4-part system simultaneous display, even if the low-order is not
F, the screen shows the actual rotation speed, command speed and load meter of the high-order and
low-order spindles.
(Note 4) 3- or 4-part system simultaneous display is enabled for a 15- or 19-type display unit only.
---Setting range---
High-order (Select an upper side spindle.) : 0 to 8
Low-order (Select a lower side spindle.) : 0 to 8, F
Disable [=INPUT] menu for tool compensation and workpiece coordinate offset values. Fix the setting meth od to the incremental value input.
0: Enable
1: Disable
Disable [=INPUT] menu for common variables.
0: Enable
1: Disable
#8926 SP on 2nd part sys
#8927 SP on 3rd part sys
#8928 SP on 4th part sys
#8929 Disable=INPUT:comp
#8930 Disable=INPUT:var

Select the restriction of the connected NC's screen display/settings on/from the remote control tool (NC Mon itor2).
0: Permit the screen display/settings
1: Permit the screen display only
2: Restrict the connection
Select whether to display the tool measurement screen and workpiece measurement screen.
0: Display
1: Not display
(Note) If the "#11056 Workshift invalid" (Workpiece coordinate system shift OFF) is "0" for the L system, the screen is displayed as the workpiece coordinate system shift screen even when this parameter is set to "1".
Set whether to disable the setting of tool shape compensation amount.
0: Enable the setting
1: Disable the setting
The shape compensation amount covers the following data according to the tool compensation type.
Compensation type I ("1" in "#1037 cmdtyp(command type)")
... Compensation amount (the sum of shape compensation and wear compensation amount)
Compensation type II ("2" in "#1037 cmdtyp(command type)")
... Length dimension and radius dimension
Compensation type III ("3" in "#1037 cmdtyp(command type)")
... Tool length and tool nose R
Select whether to disable the setting of tool wear compensation amount.
0: Enable the setting
1: Disable the setting
The wear compensation amount covers the following data according to the tool compensation type.
Compensation type I ("1" in "#1037 cmdtyp(command type)")
... This parameter is disabled.
Compensation type II ("2" in "#1037 cmdtyp(command type)")
... Length wear and radius wear
Compensation type III ("3" in "#1037 cmdtyp(command type)")
... Tool wear and tool nose wear
Select whether to display confirmation message when setting workpiece coordinate system offset in [Easy setting] menu.
0: Not display
1: Display
In creating a file, or in transferring a file, if the file name of the new file, or the file name of the transfer desti nation consists only of numerical figures, 0 of the file name head will be deleted from the name.
0: Designated file name (0 remains in the file name)
1: 0 will be deleted from the file name
#8931 Display/Set limit
(PR) #8932 Hide measure scrn
#8933 Disable lngth comp
#8934 Disable wear comp
#8935 W COORD CONFIRM
#8936 Delete leading 0

Set the maximum number of files to sort in the memory card, USB memory and DS lists.
If the setting is large, update of the list may take longer.
---Setting range---
64 to 1000: (M800VW/M80VW with Windows-based display)
64 to 250: (M800VS)
64 to 128: (M80V)
Standard: 128
Select whether to enable the automatic display on the Edit screen, when selected, of the programs searched by operation/check search or the MDI programs in MDI mode.
0: Enable the automatic display
1: Disable the automatic display
Display a confirming message when operating the [Undo] menu.
0: Not display a confirming message
1: Display a confirming message
Select what to display in the selectable display area.
0: Common variable
1: Local variable
2: Workpiece coordinate system offset
3: All spindles' rotation speed
4: Expanded counters
5: Tool center coordinate display
6: Tool compensation amount
(Note1) Tool center coordinate display is available only when any of the 5-axis related options is enabled.
Enable switching the method to set tool compensation data (absolute/incremental value) with INPUT key.
0: Fix it to the absolute value input.
1: Enable to switch between absolute and incremental value input.
Set the color to be shown on the top-left of screen for the 1st part system. This enables you to change the color patterns for each part system.
When set to "0", the settings between #8943(#8962) and #8945(#8965) are disabled and the screen is shown by the default color pattern for all the part systems.
(Note) When set to "0" or "1", the color is determined by the setting of "#11060 Screen theme color".
0: Theme color (default)
1: Theme color
2: Pink
3: Light blue
4: Orange
5: Green

6: Fuchsia
7: YellowGreen
8: Brown
#8937 File sort volume
#8938 Edit-Not show Prg
#8939 Undo confirm msg
#8940 Set select display
(PR) #8941 ABS/INC for T-ofs
(PR) #8942 $1 color

Set the color to be shown on the top-left of screen for the 2nd part system. This enables you to change the color patterns for each part system.
(Note 1) This parameter is enabled when "#8942 $1 color" is set to the values "1" to "8".
(Note 2) When set to "1", the color is determined by the setting of "#11060 Screen theme color".
1: Theme color (default)
2: Pink
3: Light blue
4: Orange
5: Green
6: Fuchsia
7: YellowGreen
8: Brown
Set the color to be shown on the top-left of screen for the 3rd part system. This enables you to change the color patterns for each part system.
(Note 1) This parameter is enabled when "#8942 $1 color" is set to the values "1" to "8".
(Note 2) When set to "1", the color is determined by the setting of "#11060 Screen theme color".
1: Theme color (default)
2: Pink
3: Light blue
4: Orange
5: Green
6: Fuchsia
7: YellowGreen
8: Brown
Set the color to be shown on the top-left of screen for the 4th part system. This enables you to change the color patterns for each part system.
(Note 1) This parameter is enabled when "#8942 $1 color" is set to the values "1" to "8".
(Note 2) When set to "1", the color is determined by the setting of "#11060 Screen theme color".
1: Theme color (default)
2: Pink
3: Light blue
4: Orange
5: Green
6: Fuchsia
7: YellowGreen
8: Brown
Select whether to enable switching of program displayed in the edit window on Monitor screen according to the displayed part system when part system switch is performed.
0: Not switch
1: Switch
Select how to switch the part system to display when the 2-, 3- or 4-part system simultaneous display is en abled.
0, 1: The No. of part system to display is incremented by one. The operation target is switched when the part system displayed in the non-active area is selected.
2: The operation target on the left side is fixed to $1. When $1 is selected for the part system switch, the left side is the operation target. When $2 or after is selected, the displayed part system on the right side is incremented by one.
(Note) 3- or 4-part system simultaneous display is enabled for a 15- or 19-type display unit only.
(PR) #8943 $2 color
(PR) #8944 $3 color
(PR) #8945 $4 color
#8952 Edit-win $ switch
(PR) #8953 2$ disp switch typ

Select the default setting of the coordinate axis direction designation method to be displayed on the [Surface detail] screen of R-Navi.
0,1: Point (+) on the axis
2: Latitude/Longitude
3: Latitude/Projection angle
4: Start point/End point
5: Index angle
Select the default coordinate axis combination to be displayed on the [Surface detail] screen of R-Navi.
0,1: Z/X
2: Z/Y
3: X/Y
Select the definition type of the user-defined keys.
There are two user-defined keys.
Type 1:
It is the same as the conventional specification. A line feed between "[ ]" is not dealt as ";".
It is dealt as an upper case/lower case letter depending on the CapsLock status.
A symbolic character may be converted into a specific character.
Type 2:
A line break inside square brackets "[ ]" is dealt as ";".

Regardless of the CapsLock status, the defined character is input.
A symbolic character is also input as defined.
0: Type 1 (conventional specification)
1: Type 2
Select the operation mode of the manual tool length measurement 1 for L system.
0: Normal operation mode (Conventional specification)
Select an axis to measure using the cursor position.
1: Simple operation mode
Select an axis to measure using an axis address key or menu. More than one axis can be selected.
Select which spindle to display in the 5th part system window for the 2-, 3- or 4-part system simultaneous display.
(Note 1) If you select "00" for the 2-, 3- or 4-part system simultaneous display, the default display is used (1st spindle on the upper side and 2nd spindle on the lower side).
(Note 2) If you set the same number as, or a greater number than the setting of "#1039 spinno", or if the high or low-order setting is "0", the 1st spindle is displayed.
(Note 3) If you set the low-order to F, the screen shows the actual rotation speed, command speed and load meter of the high-order spindle.
Note that for the 4-counter display in 4-part system simultaneous display, even if the low-order is not F, the screen shows the actual rotation speed, command speed and load meter of the high-order and low-order spindles.
(Note 4) 3- or 4-part system simultaneous display is enabled for a 15- or 19-type display unit only.
---Setting range---
High-order (Select an upper side spindle.) : 0 to 8
Low-order (Select a lower side spindle.) : 0 to 8, F
#8954 Initial type
#8955 Init axis pair
(PR) #8956 User key type
(PR) #8957 T meas (L)-Simple
#8958 SP on 5th part sys

Select which spindle to display in the 6th part system window for the 2-, 3- or 4-part system simultaneous display.
(Note 1) If you select "00" for the 2-, 3- or 4-part system simultaneous display, the default display is used (1st spindle on the upper side and 2nd spindle on the lower side).
(Note 2) If you set the same number as, or a greater number than the setting of "#1039 spinno", or if the high or low-order setting is "0", the 1st spindle is displayed.
(Note 3) If you set the low-order to F, the screen shows the actual rotation speed, command speed and load meter of the high-order spindle.
Note that for the 4-counter display in 4-part system simultaneous display, even if the low-order is not F, the screen shows the actual rotation speed, command speed and load meter of the high-order and low-order spindles.
(Note 4) 3- or 4-part system simultaneous display is enabled for a 15- or 19-type display unit only.
---Setting range---
High-order (Select an upper side spindle.) : 0 to 8
Low-order (Select a lower side spindle.) : 0 to 8, F
Select which spindle to display in the 7th part system window for the 2-, 3- or 4-part system simultaneous display.
(Note 1) If you select "00" for the 2-, 3- or 4-part system simultaneous display, the default display is used (1st spindle on the upper side and 2nd spindle on the lower side).
(Note 2) If you set the same number as, or a greater number than the setting of "#1039 spinno", or if the high or low-order setting is "0", the 1st spindle is displayed.
(Note 3) If you set the low-order to F, the screen shows the actual rotation speed, command speed and load meter of the high-order spindle.
Note that for the 4-counter display in 4-part system simultaneous display, even if the low-order is not F, the screen shows the actual rotation speed, command speed and load meter of the high-order and low-order spindles.
(Note 4) 3- or 4-part system simultaneous display is enabled for a 15- or 19-type display unit only.
---Setting range---
High-order (Select an upper side spindle.) : 0 to 8
Low-order (Select a lower side spindle.) : 0 to 8, F
Select which spindle to display in the 8th part system window for the 2-, 3- or 4-part system simultaneous display.
(Note 1) If you select "00" for the 2-, 3- or 4-part system simultaneous display, the default display is used (1st spindle on the upper side and 2nd spindle on the lower side).
(Note 2) If you set the same number as, or a greater number than the setting of "#1039 spinno", or if the high or low-order setting is "0", the 1st spindle is displayed.
(Note 3) If you set the low-order to F, the screen shows the actual rotation speed, command speed and load meter of the high-order spindle.
Note that for the 4-counter display in 4-part system simultaneous display, even if the low-order is not F, the screen shows the actual rotation speed, command speed and load meter of the high-order and low-order spindles.
(Note 4) 3- or 4-part system simultaneous display is enabled for a 15- or 19-type display unit only.
---Setting range---
High-order (Select an upper side spindle.) : 0 to 8
Low-order (Select a lower side spindle.) : 0 to 8, F
#8959 SP on 6th part sys
#8960 SP on 7th part sys
#8961 SP on 8th part sys

Set the color to be shown on the top-left of screen for the 5th part system. This enables you to change the color patterns for each part system.
(Note 1) This parameter is enabled when "#8942 $1 color" is set to the values "1" to "8".
(Note 2) When set to "1", the color is determined by the setting of "#11060 Screen theme color".
---Setting range---
1: Theme color (default)
2: Pink

3: Light blue
4: Orange
5: Green
6: Fuchsia
7: YellowGreen
8: Brown
Set the color to be shown on the top-left of screen for the 6th part system. This enables you to change the color patterns for each part system.
(Note 1) This parameter is enabled when "#8942 $1 color" is set to the values "1" to "8".
(Note 2) When set to "1", the color is determined by the setting of "#11060 Screen theme color".
---Setting range---
1: Theme color (default)
2: Pink
3: Light blue
4: Orange
5: Green
6: Fuchsia
7: YellowGreen
8: Brown
Set the color to be shown on the top-left of screen for the 7th part system. This enables you to change the color patterns for each part system.
(Note 1) This parameter is enabled when "#8942 $1 color" is set to the values "1" to "8".
(Note 2) When set to "1", the color is determined by the setting of "#11060 Screen theme color".
---Setting range---
1: Theme color (default)
2: Pink
3: Light blue
4: Orange
5: Green
6: Fuchsia
7: YellowGreen
8: Brown
(PR) #8962 $5 color
(PR) #8963 $6 color
(PR) #8964 $7 color

Set the color to be shown on the top-left of screen for the 8th part system. This enables you to change the color patterns for each part system.
(Note 1) This parameter is enabled when "#8942 $1 color" is set to the values "1" to "8".
(Note 2) When set to "1", the color is determined by the setting of "#11060 Screen theme color".
---Setting range---
1: Theme color (default)
2: Pink
3: Light blue
4: Orange
5: Green
6: Fuchsia
7: YellowGreen
8: Brown
Select whether to insert or overwrite during edit. Insert or overwrite mode can also be changed temporarily using the INS key.
0: Overwrite mode
1: Insert mode
Select the [DELETE] key operation during edit.
0: The key serves as a Delete key. (erases the character after the cursor)
1: The key serves as a Back Space key. (erases the character before the cursor)
Tool shape radius designation
Select the tool shape designation method.
0: Diameter designation
1: Radius designation
(PR) #8965 $8 color
(PR) #8966 Edit: INS or OVR
(PR) #8967 Delete key action
#8968 Tool shape radius

Specify the display item for the 1st column (type) and 2nd column (compensation amount) on the right side of the tool management screen list display.
The setting value and display item are specified as follows.
(Setting value): (1st column) / (2nd column)
Tool compensation type I
0-11: H (Compensation No.) / Length compensation
Tool compensation type II
0, 5-11: H (Compensation No.) / Length compensation
1: H (Compensation No.) / Length compensation
2: D (Compensation No.) / Radius compensation
3: +H (Compensation No.) / Length wear
4: +D (Compensation No.) / Radius wear
Tool compensation type III
0: (Axis name (1st axis))(Compensation No.) / 1st axis tool length
1: (Axis name (1st axis))(Compensation No.) / 1st axis tool length
2: (Axis name (2nd axis))(Compensation No.) / 2nd axis tool length
3: (Axis name (Additional axis))(Compensation No.) / Additional axis tool length

4: +(Axis name (1st axis))(Compensation No.) / 1st axis wear
5: +(Axis name (2nd axis))(Compensation No.) / 2nd axis wear
6: +(Axis name (Additional axis))(Compensation No.) / Additional axis wear
7: R / Nose R
8: +R / R wear
9: P / Point
10: (Axis name (2nd additional axis))(Compensation No.) / 2nd additional axis tool length
11: +(Axis name (2nd additional axis))(Compensation No.) / 2nd additional axis wear
---Setting range---
0 to 11
#8969 Tool offset type 1

Specify the display item for the 3rd column (type) and 4th column (compensation amount) on the right side of the tool management screen list display.
The setting value and display item are specified as follows.
(Setting value): (3rd column) / (4th column)
Tool compensation type I
0-11: Set to blank / Set to blank
Tool compensation type II
0, 5-11: D (Compensation No.) / Radius compensation
1: H (Compensation No.) / Length compensation
2: D (Compensation No.) / Radius compensation
3: +H (Compensation No.) / Length wear
4: +D (Compensation No.) / Radius wear
Tool compensation type III
0: (Axis name (2nd axis))(Compensation No.) / 2nd axis tool length
1: (Axis name (1st axis))(Compensation No.) / 1st axis tool length
2: (Axis name (2nd axis))(Compensation No.) / 2nd axis tool length
3: (Axis name (Additional axis))(Compensation No.) / Additional axis tool length
4: +(Axis name (1st axis))(Compensation No.) / 1st axis wear
5: +(Axis name (2nd axis))(Compensation No.) / 2nd axis wear
6: +(Axis name (Additional axis))(Compensation No.) / Additional axis wear
7: R / Nose R
8: +R / R wear
9: P / Point
10: (Axis name (2nd additional axis))(Compensation No.) / 2nd additional axis tool length
11: +(Axis name (2nd additional axis))(Compensation No.) / 2nd additional axis wear
---Setting range---
0 to 11
Select whether to enable the alarm display window.
0: Disable the alarm display window
1: Enable the alarm display window
For L system only
Select whether to display tool offset data with the address T's offset No. at the head when the tool offset screen is opened after a manual value command.
<Monitor screen>
* Open the tool offset screen (window)
<Setup screen>
* Display the tool offset screen
(Note) The display is unchanged if you change a tool offset No. with the tool offset screen displayed.
0: Not display tool offset data with the address T's offset No. at the head
1: Display tool offset data with the address T's offset No. at the head
Select whether to enable selective display on an 8.4- or 10.4-type display terminal.
0: Disable selective display
1: Enable selective display. Select what to display using the parameter "#8940 Set select display".
#8970 Tool offset type 2
#8971 Alarm window ON
#8972 T code offset disp
(PR) #8973 Selective display

Select whether to enable ON/OFF of PLC switch without a press of the [Setting valid] menu.
0: Enable ON/OFF of PLC switch after a press of the [Setting valid] menu.
1: Enable ON/OFF of PLC switch without a press of the [Setting valid] menu.
Select how the [XXX No search] menu works on screens including the parameter and tool offset screens.
0: When you press [No search], enter the No. to display and then press [INPUT], the data on the display is ordered to start from the designated No.
1: When you enter the No. to display and then press [No. search], the data on the display is ordered to start from the designated No.
Select whether to disable animated graphics of the menus.
0: Enable the animation
1: Disable the animation
Select whether to open the same named programs of different part systems simultaneously for each editing area upon a press of Open on Edit screen while Multi-part system program management is enabled.
0: Disable (Not open the programs simultaneously for each editing area)
1: Enable (Open the programs simultaneously for each editing area)
Set the noise tolerance of touch operation.
The larger setting value gives the higher noise tolerance, but the operation response becomes dull.
0: Select this when the motions are normal at one and two points in the stable environment of the power supply.
1 to 4: If the touch detection position is unstable, increase the setting value according to the cursor blur level.
(Note) Do not execute touch operation for two seconds after changing this parameter.

Specify the coordinate system direction of the workpiece graphics (machining surface graphics) to be dis played on the R-Navi surface list screen or surface selection screen.
(Note) The angle (degrees) is a CCW rotation when viewed from the positive end of the height axis.
---Setting range---
0: XYZ 0
1: YZX 0
2: ZXY 0
3: XYZ 90
4: YZX 90
5: ZXY 90
6: XYZ 180
7: YZX 180
8: ZXY 180
9: XYZ 270
10: YZX 270
11: ZXY 270
Specify the display items when displaying the updated time and date of the file on the "Date / Comment" if
NC memory/NC memory2 is selected on the program list display.
0: Displays the program comment. (Conventional operation)
1: Displays the updated time and date.
(Note) When multi-part system program management is valid, program comment display is specified, regard less of this setting.
#8974 Simple PLC switch
#8975 No. search process
#8976 Menu animation OFF
#8977 Multi-$ simul edit
#8979 Touch op noise res
#8980 R-Navi graphic dir
#8981 NCmemory date disp

In the check method 2 of graphic check, checking for 1st part system is invalid.
0: Enable the check. (The part system is the check target)
1: Disable the check. (The part system is not the check target)
In the check method 2 of graphic check, checking for 2nd part system is invalid.
0: Enable the check. (The part system is the check target)
1: Disable the check. (The part system is not the check target)
In the check method 2 of graphic check, checking for 3rd part system is invalid.
0: Enable the check. (The part system is the check target)
1: Disable the check. (The part system is not the check target)
In the check method 2 of graphic check, checking for 4th part system is invalid.
0: Enable the check. (The part system is the check target)
1: Disable the check. (The part system is not the check target)
In the check method 2 of graphic check, checking for 5th part system is invalid.
0: Enable the check. (The part system is the check target)
1: Disable the check. (The part system is not the check target)
In the check method 2 of graphic check, checking for 6th part system is invalid.
0: Enable the check. (The part system is the check target)
1: Disable the check. (The part system is not the check target)
In the check method 2 of graphic check, checking for 7th part system is invalid.
0: Enable the check. (The part system is the check target)
1: Disable the check. (The part system is not the check target)
In the check method 2 of graphic check, checking for 8th part system is invalid.
0: Enable the check. (The part system is the check target)
1: Disable the check. (The part system is not the check target)
At the time of normal edit, specify the operation with up and down cursor keys in the block on the several
lines.
0: Moves by line number
1: Moves by line on display
(Note) For mass-editing, the operation is always as "1" setting.
Select whether to enable the interactive cycle insertion function.
0: Disable
1: Enable
Switch the selectable cycle type.
0: Standard/Extended cycle
1: Not used
2: Not used
#8982 CheckSmltns$1Invld
#8983 CheckSmltns$2Invld
#8984 CheckSmltns$3Invld
#8985 CheckSmltns$4Invld
#8986 CheckSmltns$5Invld
#8987 CheckSmltns$6Invld
#8988 CheckSmltns$7Invld
#8989 CheckSmltns$8Invld
(PR) #8990 Edit-up/down keys
#8991 Interactive cycle
(PR) #8992 Cycle switch

Select whether to highlight the program cycle (from the cycle header to the footer) inserted through the inter active cycle insertion.
0: Not highlight
1: Highlight
Select whether to disable the [=Input] menu for interactive cycle insertion.
Fix the setting method to the incremental value input.
0: Enable [=Input] menu

1: Disable [=Input] menu
Set the time until recognized as long press (long tap).
When releasing a finger within the set time, it is recognized as tap.
0: 800 (ms)
1: 1000
2: 1500
3: 2000
Select whether to enable the simple programming function.
0: Disable
1: Enable
Select whether to increase the graphic check speed.
When you select 1 to 3, graphic check becomes faster.
Note however that the workpiece shape is drawn more inward than the programmed path.
The greater the setting value, the faster the graphic check will be.
0: Disable
1: Level 1
2: Level 2
3: Level 3
High-speed graphic check is enabled for the check method 1 only.
Select whether to enable the finished shape display.
0: Disable
1: Enable
Select the display format for simultaneous program edit (3 or 4 Edit), which can be selected with the [Display setting] menu.
0: [2 Edit] and [3 Edit] are selectable.
1: [2 Edit] and [4 Edit] are selectable.
Select whether to restrain the VNC client from connecting to the NC, displaying the NC screen or performing setting to the NC.
Menu selection may be disabled depending on the set value.
0: Disable the VNC server function.
1: Enable the VNC server function, and allow the VNC client to display the NC screen and to perform set ting operation.
2: Enable the VNC server function, and allow the VNC client to display the NC screen, but the available setting operation is INPUT key only.
#8993 Cycle highlight
#8994 =InputOFF:Interact
#8995 Touchop longtaptim
(PR) #8996 Simple program ON
#8997 Hi-speed grph chck
#8998 Finish shape view
(PR) #8999 Simul edit - View
(PR) #19701 Restrain VNCserver

Specify the password for connecting to the VNC server.
The password is needed for VNC client of an external PC to connect to the server.
---Setting range---
Up to 8 characters including alphanumeric characters and '_' (underscore)
Specify the port number for connecting to the VNC server.
The recommended value is "5901".
(Note) If you use the remote desktop function, do not set "5900".
---Setting range---
0 to 65535
Specify the color depth of the screen displayed by the VNC client via VNC server connection.
0: 16-bit color depth
1: 8-bit color depth
Specify the transmission cycle for the VNC server to send screen data to the VNC client.
0: Standard transmission cycle
1: Increase the cycle two-fold.
2: Increase the cycle four-fold.
(Note) If you increase the transmission cycle, the NC screen refresh may be delayed.
Enable upward search for the text search function in the edit window and edit screen.
0: Search downward from the cursor position.
1: Enable upward and downward search from the cursor position.
Switch the unit of feedrate display for Feedrate per revolution.
0: Display the feedrate in mm/rev unit.
1: Display the feedrate in mm/min unit.
Switch the behavior of the system variables (position data) that cannot be read during travel.
0: Conventional operation
1: Program error that is generated because of read during travel is discarded and recalculation is per formed.
Select where to output a cycle created with the interactive cycle insertion.
0: Output to the main program
1: Output to a subprogram stored in NC memory
2: Output to a subprogram stored in the directory "#8880/8881 Subpro stor D0"
3: Output to a subprogram stored in the directory "#8882/8883 Subpro stor D1"
4: Output to a subprogram stored in the directory "#8884/8885 Subpro stor D2"
5: Output to a subprogram stored in the directory "#8886/8887 Subpro stor D3"
6: Output to a subprogram stored in the directory "#8888/8889 Subpro stor D4"
#19702 VNC password
(PR) #19703 VNC server port
#19704 VNC color depth
#19705 VNC transmit cycle
#19710 Edit-Upward search
#19711 Unit of feed disp
#19712 Sys var pre-read
#19715 Cycle output dest.

Select where the cursor is located after data entry on the workpiece coordinate system offset screen.
0: Cursor moves to the next line. If the original cursor position is in the last line, it moves to the top of the next data.
1: Cursor moves to the next line. If the original cursor position is in the last line, the position is unchanged.
2: Unchanged from the original position.
(Note) When base common parameter "#1759 cfgPR09/bit1" is set to "1", the cursor does not move regard less of this parameter setting.
Select whether to enable NC Monitor Mobile.
0: Disable NC Monitor Mobile.
1: Enable NC Monitor Mobile. NC screen display and setting operation are enabled with NC Monitor Mo bile.
2: Enable NC Monitor Mobile. NC screen display is enabled, but setting operation with the INPUT key is disabled.
Disable 3D machining simulation in Graphic check (3D).
0: Enable 3D machining simulation.
1: Disable 3D machining simulation.
(*) This parameter is for M800VW series only.
Select the method for calculating the shape of the tool model in the 3D machine interference check.
The method specified with this parameter is used to calculate and draw the shape of the tool model.
0: Use the tool data set in Tool management screen for both tool radius and tool length.
1: Use the tool compensation amount set in Tool compensation screen for both tool radius and tool length.
(Note) When Tool compensation type I is used, the tool data set in Tool management screen is used for tool radius regardless of the setting value of this parameter.
Switch the behavior of the repeat key (page switch key/cursor key).
0: Screen stop time depends on the length of time the button is pressed
1: The screen stops as soon as the button is released
(Note) This parameter is only valid for M800VS and M80V.
#19717 W coord: cursor
(PR) #19720 NC Monitor Mobile NC Monitor Mobile operation restriction
#19721 3Dmac.simu.inval
#19723 3D intrf tooltype
#19724 Repeat key switch

14.14 Machining Condition Selection Parameters
(Note) The machining condition parameter groups which can be set through the machining condition setting screen are stored according to the application. The guidance display and parameter input/output on the screen follow the ma chining condition parameter numbers in the following table. These parameters can only be set through the machin ing condition setting screen.
Set a cutting feedrate when applying pre-interpolation acceleration/deceleration.
When high-accuracy control time constant expansion is valid, set the maximum of cutting feed clamp speed of each axis.
---Setting range---
1 to 999999 (mm/min)

Nos. on the machining condition setting screen	Machining Condition Pa rameters (Application 1)	Machining Condition Pa rameters (Application 2)	Machining Condition Pa rameters (Application 3)
#1207	#42001	#42301	#42601
#1568	#42002	#42302	#42602
#1570	#42003	#42303	#42603
#2010	#42007	#42307	#42607
#8019	#42004	#42304	#42604
#8020	#42008	#42308	#42608
#8022	#42005	#42305	#42605
#8023	#42006	#42306	#42606
#8026	#42009	#42309	#42609
#8027	#42010	#42310	#42610
#8028	#42011	#42311	#42611
#8030	#42012	#42312	#42612
#8033	#42013	#42313	#42613
#8029	#42014	#42314	#42614
#8037	#42015	#42315	#42615
#8090	#42016	#42316	#42616
#8091	#42017	#42317	#42617
#8093	#42018	#42318	#42618
#2659	#42019	#42319	#42619
#1206	#42020	#42320	#42620
#12070	#42021	#42321	#42621

#1206 G1bF Maximum speed

Set a cutting feed time constant when applying pre-interpolation acceleration/deceleration.
When set to "0", the time constant will be clamped at 1ms.
---Setting range---
Without high-accuracy control time constant expansion: 1 to 5000 (ms)
With high-accuracy control time constant expansion: 1 to 30000 (ms)
Cutting feed Acc Cutting feed acceleration
Displays cutting feed acceleration.
Set the filter time constant for smoothly changing the acceleration rate for the cutting feed acceleration/de celeration in pre-interpolation acceleration/deceleration.
- Notch frequency Hz
Displays the notch frequency (Hz) for the S-pattern filter set in "#1568 SfiltG1" (G01 soft acceleration/decel eration filter).

---Setting range---
0 to 200 (ms)
Set the filter time constant for smoothly changing the acceleration rate in pre-interpolation acceleration/de celeration.
This will be disabled when "0" or "1" is set.
- Notch frequency Hz
Displays the notch frequency (Hz) for the S-shape filter set in "#1570 Sfilt2" (Soft acceleration/deceleration
filter 2).
---Setting range---
0 to 200 (ms)
Set a feed forward gain for pre-interpolation acceleration/deceleration.
The larger the set value, the smaller the theoretical control error will be. However, if a machine vibration oc curs, set the smaller value.
---Setting range---
0 to 200 (%)
Specify a tolerance (tolerable error) to be used under tolerance control.
Set a tolerable error for fine segment program created by CAM. (Usually around 0.01(mm))
If 0.000 is set, it is operated with the tolerance of 0.01(mm).
When designating the tolerance amount with the ", K address", this parameter is not used.
---Setting range---
0.000 to 100.000 (mm)
#1207 G1btL Time constant
#1568 SfiltG1 G01 soft acceleration/deceleration filter
#1570 Sfilt2 Soft acceleration/deceleration filter 2
#2010 fwd_g Feed forward gain
#2659 tolerance Tolerance
G1btL
G1bF
Time
Speed

Set a compensation coefficient for reducing a control error in the reduction of a corner roundness and arc
radius.
The larger the set value is, the smaller the theoretical error will be. However, since the speed at the corner
goes down, the cycle time will be extended.
Coefficient = 100 - setting value
(Note) This function will be enabled when "#8021 COMP_CHANGE" is set to "0".
---Setting range---
0 to 99 (%)
Theoretical radius decrease error amount
Displays the theoretical radius decrease error amount, R(mm), from the automatic calculation by NC.
Theoretical radius decrease amount in arc
R5mm arc deceleration speed
Displays a deceleration speed (mm/min) along an arc of 5 (mm) radius.
R1mm arc deceleration speed
Displays a deceleration speed(mm/min) along an arc of 1 (mm) radius.
#8019 R COMP
+
R
F
Command path
Path after servo control

Set the minimum value of an angle (external angle) that should be assumed to be a corner.
When an inter-block angle (external angle) in high-accuracy mode is larger than the set value, it will be de termined as a corner and the speed will go down to sharpen the edge.
(Note) If "0" is set, it will be handled as "5" degrees.
---Setting range---
0 to 89 ()
0: 5 degree (Equals to setting "5")
Theoretical corner dull amount
Displays the corner dull amount c(mm) in respect to the corner's angle (external angle) ().
ca(mm): Error () caused by the soft acceleration/deceleration 2
cs(mm): Error () caused by the servo system
Corner deceleration speed
Display corner deceleration speed c (mm/min) for the corner of the angle (external angle) with ().
Theoretical dull amount at 90 degree
Display corner dull amount when the angle is 90 degree.
Corner deceleration speed at 90 degree
Display corner deceleration speed when the angle is 90 degree.
Select whether to share or separate the compensation coefficient at the corner/curve during the high-accu racy control mode.
0: Share ("#8019 R COMP" is applied.)
1: Separate
* Corner: #8022 CORNER COMP
* Curve: #8023 CURVE COMP
(Note) Set "1" when using SSS/EasySSS control.
#8020 DCC ANGLE
#8021 COMP_CHANGE
If the set value is smaller than , the speed goes down to optimize
the corner.
F
ca
cs
Path after servo control
Path after soft acceleration/ Command path

deceleration 2
Theoretical roundness amount at corner

Set the compensation coefficient to further reduce or increase the roundness at the corner during the high accuracy control mode.
Coefficient = 100 - setting value
(Note) This is valid when "#8021 COMP CHANGE" is set to "1".
Reference to "#8020 Corner decreasing speed "for theoretical corner roundness amount, corner decreasing speed, theoretical 90 degree dull amount, 90 degree corner decreasing speed.
---Setting range---
-1000 to 99 (%)
Set the compensation coefficient to further reduce or increase the radius reduction amount at the curve (arc, involute, spline) during the high-accuracy control mode.
Coefficient = 100 - setting value
(Note) This is valid when "#8021 COMP CHANGE" is set to "1".
For theoretical radius reduction error amount, R5mm arc deceleration speed and R1mm arc deceleration speed, refer to "#8019 R COMP".
---Setting range---
-1000 to 99 (%)
For M system only.
Specify whether to enable the fine spline function.
0: Disable the fine spline function.
1: Enable the fine spline function.
Spline interpolation will be valid during G61.2 modal regardless of this setting.
Set the angle where the spline interpolation is temporarily canceled.
When the angle made by blocks exceeds this parameter setting value, spline interpolation will be canceled temporarily. In consideration of the pick feed, set a value a little smaller than the pick feed angle.
---Setting range---
0 to 180 ()
0: 180 ()
Set the maximum chord error (tolerance) in a block that includes an inflection point. Set the tolerance appli cable when the applicable block is developed to fine segments by CAM. (normally about 10 m)
When "0.000" is set, the applicable block will be linear.
---Setting range---
0.000 to 100.000 (mm)
Set the maximum chord error (tolerance) in a block that includes no inflection point. Set the tolerance appli cable when the applicable block is developed to fine segments by CAM. (normally about 10 m)
When "0.000" is set, the applicable block will be linear.
---Setting range---
0.000 to 100.000 (mm)
Set the length of the block subject to fairing.
(Enabled when "#8033 Fairing ON" is set to "1".)
---Setting range---
0 to 100.000 (mm)
#8022 CORNER COMP
#8023 CURVE COMP
#8025 SPLINE ON
#8026 CANCEL ANG. (for M system only)
#8027 Toler-1 (for M system only)
#8028 Toler-2 (for M system only)
#8029 FairingL (for M system only)

Set the fine-segment length where the spline interpolation is temporarily canceled.
When the length of one block exceeds this parameter setting value, spline interpolation is canceled tempo rarily and linear interpolation is performed. Set a value a little smaller than one block length of the program.
If "-1" is set, spline interpolation will be performed regardless of block length.
---Setting range---
-1 to 127 (mm)
0: 1 (mm)
Select whether or not to use the fairing or smooth fairing function.
0: Use neither of them
1: Use the fairing function
2: Use the smooth fairing function
Set the length of the block to be excluded when deciding a corner.
(Enabled when "#8036 CordecJudge" is set to "1".)
---Setting range---
0 to 99999.999 (mm)
Set whether to enable the SSS control with G05 P10000.
0: Disable
1: Enable
Set the maximum value of the range for recognizing the shape.
To eliminate the effect of steps or errors, etc., set a large value. To enable sufficient deceleration, set a small value.
If "0.000" is set, the standard value (1.000mm) will be applied.
---Setting range---
0 to 100.000 (mm)
Set the width of the step at which the speed is not to be decelerated. (Approximately the same as the CAM path difference [Tolerance].)
If "0" is set, the standard value (5m) will be applied.
If a minus value is set, the speed will decelerate at all minute steps.
---Setting range---
-1.000 to 0.100 (mm)
Specify the time constant of the filter that smoothes out fluctuations in acceleration under the tolerance con trol.
Basically set to 0.
---Setting range---
0 to 200 (ms)

Time constant for machining condition selection I
Set the time constant for the machining condition selection I function. This is equivalent to the parameter
"#1207 G1btL".
---Setting range---
Without high-accuracy control time constant expansion: 0 to 5000 (ms)
With high-accuracy control time constant expansion: 0 to 30000 (ms)
#8030 MINUTE LENGS (for M system only)
#8033 Fairing ON (for M system only)
#8037 CorJudgeL (for M system only)
#8090 SSS ON (for M system only)
#8091 StdLength (for M system only)
#8093 StepLeng (for M system only)
#12070 Sfilt2_tol Tolerance control: Soft acceleration/deceleration filter
2
#42001 P1-G1btL Time constant for machining condition selection I

G01soft acceleration/deceleration filter for machining condition selection I
Set the G01 soft acceleration/deceleration filter's time constant for the machining condition selection I func tion. This is equivalent to the parameter "#1568 SfiltG1".
---Setting range---
0 to 200 (ms)
Soft acceleration/deceleration filter 2 for machining condition selection I
Set the soft acceleration/deceleration filter 2's time constant for the machining condition selection I function.
This is equivalent to the parameter "#1570 Sfilt2".
---Setting range---
0 to 50 (ms)
Accuracy coefficient for machining condition selection I
Set the accuracy coefficient for the machining condition selection I function. This is equivalent to the param eter "#8019 R COMP".
* This setting is enabled when "#8021 COMP_CHANGE" is set to "0".
---Setting range---
0 to 99 (%)
Corner accuracy coefficient for machining condition selection I
Set the corner accuracy coefficient for the machining condition selection I function. This is equivalent to the
parameter "#8022 CORNER COMP".
* This setting is enabled when "#8021 COMP_CHANGE" is set to "1".
---Setting range---
-1000 to 99 (%)
Curve accuracy coefficient for machining condition selection I
Set the curve accuracy coefficient for the machining condition selection I function. This is equivalent to the
parameter "#8023 CURVE COMP".
* This setting is enabled when "#8021 COMP_CHANGE" is set to "1".
---Setting range---
-1000 to 99 (%)
Feed forward gain for machining condition selection I
Set the feed forward gain for the machining condition selection I function. This is equivalent to the parameter
"#2010 fwd_g".
---Setting range---
0 to 200 (%)
Corner deceleration angle for machining condition selection I
Set the corner deceleration angle for the machining condition selection I function. This is equivalent to the
parameter "#8020 DCC ANGLE".
---Setting range---
0 to 89 ()
#42002 P1-SfiltG1 G01soft acceleration/deceleration filter for machining
condition selection I
#42003 P1-Sfilt2 Soft acceleration/deceleration filter 2 for machining
condition selection I
#42004 P1-rcomp Accuracy coefficient for machining condition selection
I
#42005 P1-cor_comp Corner accuracy coefficient for machining condition se lection I
#42006 P1-cur_comp Curve accuracy coefficient for machining condition se lection I
#42007 P1-fwd_g Feed forward gain for machining condition selection I
#42008 P1-fcorn Corner deceleration angle for machining condition se lection I

Cancel angle for machining condition selection I
Set the cancel angle for the machining condition selection I function. This is equivalent to the parameter
"#8026 CANCEL ANG".
---Setting range---
0 to 180 ()
Chord error 1 for machining condition selection I
Set the chord error 1 for the machining condition selection I function. This is equivalent to the parameter
"#8027 Toler-1".
---Setting range---
0.000 to 100.000 (mm)
Chord error 2 for machining condition selection I
Set the chord error 2 for the machining condition selection I function. This is equivalent to the parameter
"#8028 Toler-2".
---Setting range---
0.000 to 100.000 (mm)
Fine segment length for machining condition selection I
Set the fine segment length for the machining condition selection I function. This is equivalent to the param eter "#8030 MINUTE LENGS".
---Setting range---
-1 to 127 (mm)

Fairing ON for machining condition selection I
Set whether to enable the fairing function for the machining condition selection I function. This is equivalent
to the parameter "#8033 Fairing ON".
---Setting range---
0/1
Fairing L for machining condition selection I
Set the fairing length for the machining condition selection I function. This is equivalent to the parameter
"#8029 FairingL".
---Setting range---
0 to 100.000 (mm)
Corner judgment length for machining condition selection I
Set the corner judgment length for the machining condition selection I function. This is equivalent to the pa rameter "#8037 CorJudgeL".
---Setting range---
0 to 99999.999 (mm)
SSS/EasySSS control ON for machining condition selection I
Set whether to enable the SSS/EasySSS control for the machining condition selection I function. This is
equivalent to the parameter "#8090 SSS ON".
---Setting range---
0/1
#42009 P1-spcanag Cancel angle for machining condition selection I
#42010 P1-distth1 Chord error 1 for machining condition selection I
#42011 P1-distth2 Chord error 2 for machining condition selection I
#42012 P1-minute Fine segment length for machining condition selection I
#42013 P1-fairing Fairing ON for machining condition selection I
#42014 P1-minleng Fairing L for machining condition selection I
#42015 P1-cordeclen Corner judgment length for machining condition selec tion I
#42016 P1-sss_prcm SSS/EasySSS control ON for machining condition se lection I

Standard length for machining condition selection I
Set the standard length for the machining condition selection I function. This is equivalent to the parameter
"#8091 StdLength".
---Setting range---
0 to 100.000 (mm)
Step width for machining condition selection I
Set the width of the step for the machining condition selection I function. This is equivalent to the parameter
"#8093 StepLeng".
---Setting range---
-1.000 to 0.100 (mm)
Set the tolerance for machining condition selection parameter group for machining condition selection I func tion. This is equivalent to the parameter "#2659 tolerance".
---Setting range---
0 to 100.000 (mm)
Specify the maximum speed for the machining condition parameters of the machining condition selection I
function (equivalent to "#1206 G1bF").
---Setting range---
1 to 1000000 (mm/min)
Specify the tolerance control soft acceleration/deceleration filter 2 for the machining condition parameters of
the machining condition selection I function (equivalent to "#12070 Sfilt2_tol").
---Setting range---
0 to 200 (ms)
Time constant for machining condition selection I
Set the time constant for the machining condition selection I function. This is equivalent to the parameter
"#1207 G1btL".
---Setting range---
Without high-accuracy control time constant expansion: 0 to 5000 (ms)
With high-accuracy control time constant expansion: 0 to 30000 (ms)
G01soft acceleration/deceleration filter for machining condition selection I
Set the G01 soft acceleration/deceleration filter's time constant for the machining condition selection I func tion. This is equivalent to the parameter "#1568 SfiltG1".
---Setting range---
0 to 200 (ms)
Soft acceleration/deceleration filter 2 for machining condition selection I
Set the soft acceleration/deceleration filter 2's time constant for the machining condition selection I function.
This is equivalent to the parameter "#1570 Sfilt2".
---Setting range---
0 to 50 (ms)
#42017 P1-std_length Standard length for machining condition selection I
#42018 P1-step_length Step width for machining condition selection I
#42019 P1-tolerance Tolerance for machining condition selection I
#42020 P1-G1bF Machining condition selection I: maximum speed
#42021 P1-Sfilt2_tol Machining condition selection I: tolerance control soft
accel/decel filter 2
#42301 P2-G1btL Time constant for machining condition selection I
#42302 P2-SfiltG1 G01soft acceleration/deceleration filter for machining
condition selection I
#42303 P2-Sfilt2 Soft acceleration/deceleration filter 2 for machining
condition selection I

Accuracy coefficient for machining condition selection I
Set the accuracy coefficient for the machining condition selection I function. This is equivalent to the param eter "#8019 R COMP".
* This setting is enabled when "#8021 COMP_CHANGE" is set to "0".
---Setting range---
0 to 99 (%)
Corner accuracy coefficient for machining condition selection I

Set the corner accuracy coefficient for the machining condition selection I function. This is equivalent to the parameter "#8022 CORNER COMP".
* This setting is enabled when "#8021 COMP_CHANGE" is set to "1".
---Setting range---
-1000 to 99 (%)
Curve accuracy coefficient for machining condition selection I
Set the curve accuracy coefficient for the machining condition selection I function. This is equivalent to the parameter "#8023 CURVE COMP".
* This setting is enabled when "#8021 COMP_CHANGE" is set to "1".
---Setting range---
-1000 to 99 (%)
Feed forward gain for machining condition selection I
Set the feed forward gain for the machining condition selection I function. This is equivalent to the parameter "#2010 fwd_g".
---Setting range---
0 to 200 (%)
Corner deceleration angle for machining condition selection I
Set the corner deceleration angle for the machining condition selection I function. This is equivalent to the parameter "#8020 DCC ANGLE".
---Setting range---
0 to 89 ()
Cancel angle for machining condition selection I
Set the cancel angle for the machining condition selection I function. This is equivalent to the parameter "#8026 CANCEL ANG".
---Setting range---
0 to 180 ()
Chord error 1 for machining condition selection I
Set the chord error 1 for the machining condition selection I function. This is equivalent to the parameter "#8027 Toler-1".
---Setting range---
0.000 to 100.000 (mm)
#42304 P2-rcomp Accuracy coefficient for machining condition selection
I
#42305 P2-cor_comp Corner accuracy coefficient for machining condition se lection I
#42306 P2-cur_comp Curve accuracy coefficient for machining condition se lection I
#42307 P2-fwd_g Feed forward gain for machining condition selection I
#42308 P2-fcorn Corner deceleration angle for machining condition se lection I
#42309 P2-spcanag Cancel angle for machining condition selection I
#42310 P2-distth1 Chord error 1 for machining condition selection I

Chord error 2 for machining condition selection I
Set the chord error 2 for the machining condition selection I function. This is equivalent to the parameter "#8028 Toler-2".
---Setting range---
0.000 to 100.000 (mm)
Fine segment length for machining condition selection I
Set the fine segment length for the machining condition selection I function. This is equivalent to the param eter "#8030 MINUTE LENGS".
---Setting range---
-1 to 127 (mm)
Fairing ON for machining condition selection I
Set whether to enable the fairing function for the machining condition selection I function. This is equivalent to the parameter "#8033 Fairing ON".
---Setting range---
0/1
Fairing L for machining condition selection I
Set the fairing length for the machining condition selection I function. This is equivalent to the parameter "#8029 FairingL".
---Setting range---
0 to 100.000 (mm)
Corner judgment length for machining condition selection I
Set the corner judgment length for the machining condition selection I function. This is equivalent to the pa rameter "#8037 CorJudgeL".
---Setting range---
0 to 99999.999 (mm)
SSS/EasySSS control ON for machining condition selection I
Set whether to enable the SSS/EasySSS control for the machining condition selection I function. This is equivalent to the parameter "#8090 SSS ON".
---Setting range---
0/1
Standard length for machining condition selection I
Set the standard length for the machining condition selection I function. This is equivalent to the parameter "#8091 StdLength".
---Setting range---
0 to 100.000 (mm)
Step width for machining condition selection I
Set the width of the step for the machining condition selection I function. This is equivalent to the parameter "#8093 StepLeng".
---Setting range---
-1.000 to 0.100 (mm)
#42311 P2-distth2 Chord error 2 for machining condition selection I
#42312 P2-minute Fine segment length for machining condition selection I
#42313 P2-fairing Fairing ON for machining condition selection I
#42314 P2-minleng Fairing L for machining condition selection I
#42315 P2-cordeclen Corner judgment length for machining condition selec tion I
#42316 P2-sss_prcm SSS/EasySSS control ON for machining condition se lection I
#42317 P2-std_length Standard length for machining condition selection I

#42318 P2-step_length Step width for machining condition selection I

Set the tolerance for machining condition selection parameter group for machining condition selection I func tion. This is equivalent to the parameter "#2659 tolerance".
---Setting range---
0 to 100.000 (mm)
Specify the maximum speed for the machining condition parameters of the machining condition selection I
function (equivalent to "#1206 G1bF").
---Setting range---
1 to 1000000 (mm/min)
Specify the tolerance control soft acceleration/deceleration filter 2 for the machining condition parameters of
the machining condition selection I function (equivalent to "#12070 Sfilt2_tol").
---Setting range---
0 to 200 (ms)
Time constant for machining condition selection I
Set the time constant for the machining condition selection I function. This is equivalent to the parameter
"#1207 G1btL".
---Setting range---
Without high-accuracy control time constant expansion: 0 to 5000 (ms)
With high-accuracy control time constant expansion: 0 to 30000 (ms)
G01soft acceleration/deceleration filter for machining condition selection I
Set the G01 soft acceleration/deceleration filter's time constant for the machining condition selection I func tion. This is equivalent to the parameter "#1568 SfiltG1".
---Setting range---
0 to 200 (ms)
Soft acceleration/deceleration filter 2 for machining condition selection I
Set the soft acceleration/deceleration filter 2s time constant for the machining condition selection I function.
This is equivalent to the parameter "#1570 Sfilt2".
---Setting range---
0 to 50 (ms)
Accuracy coefficient for machining condition selection I
Set the accuracy coefficient for the machining condition selection I function. This is equivalent to the param eter "#8019 R COMP".
* This setting is enabled when "#8021 COMP_CHANGE" is set to "0".
---Setting range---
0 to 99 (%)
#42319 P2-tolerance Tolerance for machining condition selection I
#42320 P2-G1bF Machining condition selection I: maximum speed
#42321 P2-Sfilt2_tol Machining condition selection I: tolerance control soft
accel/decel filter 2
#42601 P3-G1btL Time constant for machining condition selection I
#42602 P3-SfiltG1 G01soft acceleration/deceleration filter for machining
condition selection I
#42603 P3-Sfilt2 Soft acceleration/deceleration filter 2 for machining
condition selection I
#42604 P3-rcomp Accuracy coefficient for machining condition selection
I

Corner accuracy coefficient for machining condition selection I
Set the corner accuracy coefficient for the machining condition selection I function. This is equivalent to the
parameter "#8022 CORNER COMP".
* This setting is enabled when "#8021 COMP_CHANGE" is set to "1".
---Setting range---
-1000 to 99 (%)
Curve accuracy coefficient for machining condition selection I
Set the curve accuracy coefficient for the machining condition selection I function. This is equivalent to the
parameter "#8023 CURVE COMP".
* This setting is enabled when "#8021 COMP_CHANGE" is set to "1".
---Setting range---
-1000 to 99 (%)
Feed forward gain for machining condition selection I
Set the feed forward gain for the machining condition selection I function. This is equivalent to the parameter
"#2010 fwd_g".
---Setting range---
0 to 200 (%)
Corner deceleration angle for machining condition selection I
Set the corner deceleration angle for the machining condition selection I function. This is equivalent to the
parameter "#8020 DCC ANGLE".
---Setting range---
0 to 89 ()
Cancel angle for machining condition selection I
Set the cancel angle for the machining condition selection I function. This is equivalent to the parameter
"#8026 CANCEL ANG".
---Setting range---
0 to 180 ()
Chord error 1 for machining condition selection I
Set the chord error 1 for the machining condition selection I function. This is equivalent to the parameter
"#8027 Toler-1".
---Setting range---
0.000 to 100.000 (mm)
Chord error 2 for machining condition selection I
Set the chord error 2 for the machining condition selection I function. This is equivalent to the parameter
"#8028 Toler-2".
---Setting range---
0.000 to 100.000 (mm)

#42605 P3-cor_comp Corner accuracy coefficient for machining condition se lection I
#42606 P3-cur_comp Curve accuracy coefficient for machining condition se lection I
#42607 P3-fwd_g Feed forward gain for machining condition selection I
#42608 P3-fcorn Corner deceleration angle for machining condition se lection I
#42609 P3-spcanag Cancel angle for machining condition selection I
#42610 P3-distth1 Chord error 1 for machining condition selection I
#42611 P3-distth2 Chord error 2 for machining condition selection I

Fine segment length for machining condition selection I
Set the fine segment length for the machining condition selection I function. This is equivalent to the param eter "#8030 MINUTE LENGS".
---Setting range---
-1 to 127 (mm)
Fairing ON for machining condition selection I
Set whether to enable the fairing function for the machining condition selection I function. This is equivalent
to the parameter "#8033 Fairing ON".
---Setting range---
0/1
Fairing L for machining condition selection I
Set the fairing length for the machining condition selection I function. This is equivalent to the parameter
"#8029 FairingL".
---Setting range---
0 to 100.000 (mm)
Corner judgment length for machining condition selection I
Set the corner judgment length for the machining condition selection I function. This is equivalent to the pa rameter "#8037 CorJudgeL".
---Setting range---
0 to 99999.999 (mm)
SSS/EasySSS control ON for machining condition selection I
Set whether to enable the SSS/EasySSS control for the machining condition selection I function. This is
equivalent to the parameter "#8090 SSS ON".
---Setting range---
0/1
Standard length for machining condition selection I
Set the standard length for the machining condition selection I function. This is equivalent to the parameter
"#8091 StdLength".
---Setting range---
0 to 100.000 (mm)
Step width for machining condition selection I
Set the width of the step for the machining condition selection I function. This is equivalent to the parameter
"#8093 StepLeng".
---Setting range---
-1.000 to 0.100 (mm)
Set the tolerance for machining condition selection parameter group for machining condition selection I func tion. This is equivalent to the parameter "#2659 tolerance".
---Setting range---
0 to 100.000 (mm)
#42612 P3-minute Fine segment length for machining condition selection I
#42613 P3-fairing Fairing ON for machining condition selection I
#42614 P3-minleng Fairing L for machining condition selection I
#42615 P3-cordeclen Corner judgment length for machining condition selec tion I
#42616 P3-sss_prcm SSS/EasySSS control ON for machining condition se lection I
#42617 P3-std_length Standard length for machining condition selection I
#42618 P3-step_length Step width for machining condition selection I
#42619 P3-tolerance Tolerance for machining condition selection I

Specify the maximum speed for the machining condition parameters of the machining condition selection I
function (equivalent to "#1206 G1bF").
---Setting range---
1 to 1000000 (mm/min)
Specify the tolerance control soft acceleration/deceleration filter 2 for the machining condition parameters of
the machining condition selection I function (equivalent to "#12070 Sfilt2_tol").
---Setting range---
0 to 200 (ms)
#42620 P3-G1bF Machining condition selection I: maximum speed
#42621 P3-Sfilt2_tol Machining condition selection I: tolerance control soft
accel/decel filter 2

14.15 Menu Selection Parameters
Select the menu Nos. to be displayed on Monitor screen's main menus.
Set the menu No. (numbered in the initial order) which you wish to set first from the left of Monitor's main
menus in #10501, second in the next parameter and likewise afterwards.
(E.g.) When you set the parameter #10501 to 11, the menu initially displayed at the left end of Monitor main
menu's 2nd page is displayed at the left end of the 1st page.
(Note) If you set the No. of menu which is not displayed in the initial state (without setting the menu selection
parameters), the menu won't be displayed after this parameter setting.
-- Menu No. --
-1: Not display
0: Default
1: Search
2: Restart
3: Edit

4: Trace
5: Check
6: Offset
7: Coord
8: W-shift
10: Dsp.Chg
11: Modal
12: Tree
13: Time
14: Com var
15: Loc var
16: P corr
17: PLC SW
18: G92 set
19: Col stp
20: LdMeter
21: Sp-stby
22: TipDisp
23: All sp
26: S-sel
27: Next Ax
28: Cnt exp
29: Cnt set
30: MST
32: Laser
(PR) #10501-
10540
Monitr main menu 1 to 40

Select the menu Nos. to be displayed on Setup screen's main menus.
Set the menu No. (numbered in the initial order) which you wish to set first from the left of Setup's main menus in #10551, second in the next parameter and likewise afterwards.
(E.g.) When you set the parameter #10551 to 11, the menu initially displayed at the left end of Setup main menu's 2nd page is displayed at the left end of the 1st page.
(Note) If you set the No. of menu which is not displayed in the initial state (without setting the menu selection parameters), the menu won't be displayed after this parameter setting.
-- Menu No. --
-1: Not display
0: Default
1: T-ofs
2: T-meas
3: T-reg
4: T-life
5: Coord
6: W-meas
7: T-Mng.
8: MDI
9: Cnt set
10: MST
11: T-list
12: Pallet
13: User
15: Storage
16: Surf
17: MacCond
22: Barrier
23: WE mea.
26: E-mail
27: Range
28: History
29: LsrCond
Select the menu Nos. to be displayed on Edit screen's main menus.
Set the menu No. (numbered in the initial order) which you wish to set first from the left of Edit's main menus in #10601, second in the next parameter and likewise afterwards.
(E.g.) When you set the parameter #10601 to 11, the menu initially displayed at the left end of Edit main menu's 2nd page is displayed at the left end of the 1st page.
(Note) If you set the No. of menu which is not displayed in the initial state (without setting the menu selection parameters), the menu won't be displayed after this parameter setting.
-- Menu No. --
-1: Not display
0: Default
1: Edit
2: Check
3: NAVI (NAVI MILL)
4: NAVI (NAVI LATHE)
5: I/O
(PR) #10551-
10580
Setup main menu 1 to 30
(PR) #10601-
10630
Edit main menu 1 to 30

Specify a tolerance (tolerable error) to be used under tolerance control.
Set a tolerable error for fine segment program created by CAM. (Usually around 0.01(mm))
If 0.000 is set, it is operated with the tolerance of 0.01(mm).
When designating the tolerance amount with the ", K address", this parameter is not used.
---Setting range---
0.000 to 100.000 (mm)
Set a cutting feedrate when applying pre-interpolation acceleration/deceleration.
When high-accuracy control time constant expansion is valid, set the maximum of cutting feed clamp speed
of each axis.
---Setting range---
1 to 999999 (mm/min)
Set a cutting feed time constant when applying pre-interpolation acceleration/deceleration.
When set to "0", the time constant will be clamped at 1ms.
---Setting range---
Without high-accuracy control time constant expansion: 1 to 5000 (ms)
With high-accuracy control time constant expansion: 1 to 30000 (ms)
Cutting feed Acc Cutting feed acceleration
Displays cutting feed acceleration.
Set the filter time constant for smoothly changing the acceleration rate for the cutting feed acceleration/de celeration in pre-interpolation acceleration/deceleration.
- Notch frequency Hz
Displays the notch frequency (Hz) for the S-pattern filter set in "#1568 SfiltG1" (G01 soft acceleration/decel eration filter).
---Setting range---
0 to 200 (ms)
Specify the time constant of filter that is used for smoothing the change of jerk when pre-interpolation accel eration/deceleration is performed in cutting feed.
This filter causes no path error, as the filter is applied to the resultant speed calculated before interpolation.
If you specify the jerk filter time constant, the time constants of each filter will be as follows:
- S-shape filter time constant
"#1568 SfiltG1" - "Jerk_filtG1"
- Jerk filter time constant
"Jerk_filtG1"
---Setting range---
0 to 50 (ms)
#2659 tolerance Tolerance
#1206 G1bF Maximum speed
#1207 G1btL Time constant
#1568 SfiltG1 G01 soft acceleration/deceleration filter
#12051 Jerk_filtG1 G01 jerk filter
G1btL
G1bF
Time
Speed

Select whether to enable the tolerance control.
0: Disable
1: Enable
(Note) Tolerance control is available only under SSS control.
To enable this function, set "#8090 SSS ON" to "1".
Specify the time constant of the filter that smoothes out fluctuations in acceleration under the tolerance con trol.
Basically set to 0.
---Setting range---
0 to 200 (ms)
#12066 Tolerance ctrl ON
#12070 Sfilt2_tol Tolerance control: Soft acceleration/deceleration filter

Specify the operation mode of wireless LAN.
0: No mode (Wireless LAN function invalid)
1: Station (STA) mode
2: Access point (AP) mode
Set the IP address for the wireless LAN.
(Note) This parameter is ignored when "#75050 DHCP client" is enabled.
---Setting range---
0.0.0.0 to 255.255.255.255
Set the subnet mask for the wireless LAN.
(Note) In Station (STA) mode, this parameter is ignored when "#75050 DHCP client" is enabled.
---Setting range---
0.0.0.0 to 255.255.255.255
For Station (STA) mode
Specify the SSID of the access point to be connected.
(Note) Spaces cannot be set.
---Setting range---
Up to 32 characters in length, containing alphanumeric characters and symbols
For Station (STA) mode
Specify the BSSID of the access point to be connected.
When this parameter is not set, the access point that has the strongest radio wave intensity is connected.
---Setting range---
00:00:00:00:00:00 to FF:FF:FF:FF:FF:FF
0: No setting
For Access Point (AP) mode

Specify the SSID used when a station connects to the CNC.
(Note) Spaces cannot be set.
---Setting range---
Up to 32 characters in length, containing alphanumeric characters and symbols
For Access Point (AP) mode
Specify the data encryption and authentication method for the wireless communications.
0: WPA-PSK TKIP
1: WPA2-PSK AES
In Access point (AP) mode, specify the encryption key to be used when the station is connecting to CNC.
In Station (STA) mode, specify the encryption key of the access point to be connected.
---Setting range---
8 or more to 32 characters in alphanumeric characters or symbols
(PR) #75000 WLAN STA/AP mode
(PR) #75001 WLAN IP address
(PR) #75002 WLAN Subnet mask
(PR) #75003 connect SSID
(PR) #75004 connect BSSID
(PR) #75005 SSID
(PR) #75006 Encryption mode
(PR) #75007 Encryption key

For Access Point (AP) mode
Specify the channel (frequency band) to be used for the wireless communication.
0: Automatic
1 to 13: Channel for 2.4 GHz
36, 40, 44 and 48: Channel for 5 GHz (W52)
149, 153, 157, 161 and 165: Channel for 5 GHz (W58)
(Note) Only channels that correspond to the country code are enabled.
JP, CH, GB, IS, LI, NO, TR and EU countries:
1 to 13, 36, 40, 44 and 48
CN, KR and TH:
1 to 13, 36, 40, 44, 48, 149, 153, 157, 161 and 165
IN, TW and US:
1 to 11, 36, 40, 44, 48, 149, 153, 157, 161 and 165
---Setting range---
0,1 to 13, 36, 40, 44, 48, 149, 153, 157, 161, 165
For Access Point (AP) mode
Specify the operation frequency band for the wireless communication.
0: 2.4 (GHz)
1: 5 (GHz)
For Access Point (AP) mode
Specify whether to enable ESSID stealth.
0: Disable
1: Enable
For Access Point (AP) mode
Specify whether to disable AP isolation.
0: Enable
1: Disable
For Access Point (AP) mode
Specify whether to enable abg mode.
0: Disable
1: Enable (not communicate with IEEE802.11n)
(Note) Set this parameter if the station to be communicated malfunctions when communicating with IEEE802.11n.
Specify whether to enable DHCP client.
0: Disable
1: Enable
(Note) This parameter is enabled when station (STA) mode is valid.
Specify whether to enable DHCP server.
0: Disable
1: Enable
(Note) This parameter is enabled when access point (AP) mode is valid.
(PR) #75008 WLAN channel
(PR) #75009 Frequency band
(PR) #75010 ESSID stealth
(PR) #75011 AP isolation OFF
(PR) #75012 abg mode
(PR) #75050 DHCP client
(PR) #75051 DHCP server

Specify the beginning of the IP addresses to be allocated to devices in the LAN by DHCP.
(Note) If the IP addresses used by the CNC are included in the allocatable IP addresses, they are not allo cated.
---Setting range---
0.0.0.0 to 255.255.255.255
Specify the number of IP addresses to be allocated to devices in the LAN by DHCP.
When "0" is set, the IP num DHCPserver is "20".
(Note) If the IP addresses used by the CNC are included in the allocatable IP addresses, they are not allo cated.
---Setting range---
0 to 20
Select whether to allow or block access from IP addresses within the specified range for the wireless LAN network.
When not using IP address filtering, enter "0".

0: Disable the filtering function
1: Allow
2: Block
Specify the IP address of the beginning of the 1st IP address range to be filtered on the wireless LAN.
---Setting range---
0.0.0.0 to 255.255.255.255
Specify the IP address of the end of the 1st IP address range to be filtered on the wireless LAN.
---Setting range---
0.0.0.0 to 255.255.255.255
Specify the IP address of the beginning of the 2nd IP address range to be filtered on the wireless LAN.
---Setting range---
0.0.0.0 to 255.255.255.255
Specify the IP address of the end of the 2nd IP address range to be filtered on the wireless LAN.
---Setting range---
0.0.0.0 to 255.255.255.255
Specify the IP address of the beginning of the 3rd IP address range to be filtered on the wireless LAN.
---Setting range---
0.0.0.0 to 255.255.255.255
Specify the IP address of the end of the 3rd IP address range to be filtered on the wireless LAN.
---Setting range---
0.0.0.0 to 255.255.255.255
Specify the IP address of the beginning of the 4th IP address range to be filtered on the wireless LAN.
---Setting range---
0.0.0.0 to 255.255.255.255
(PR) #75052 StartIP DHCPserver
(PR) #75053 IP num DHCPserver
(PR) #75100 IP Filter for WLAN
(PR) #75101 StartFiltIP WLAN-1
(PR) #75102 EndFiltIP WLAN-1
(PR) #75103 StartFiltIP WLAN-2
(PR) #75104 EndFiltIP WLAN-2
(PR) #75105 StartFiltIP WLAN-3
(PR) #75106 EndFiltIP WLAN-3
(PR) #75107 StartFiltIP WLAN-4

Specify the IP address of the end of the 4th IP address range to be filtered on the wireless LAN.
---Setting range---
0.0.0.0 to 255.255.255.255
Specify the IP address of the beginning of the 5th IP address range to be filtered on the wireless LAN.
---Setting range---
0.0.0.0 to 255.255.255.255
Specify the IP address of the end of the 5th IP address range to be filtered on the wireless LAN.
---Setting range---
0.0.0.0 to 255.255.255.255
Specify the IP address of the beginning of the 6th IP address range to be filtered on the wireless LAN.
---Setting range---
0.0.0.0 to 255.255.255.255
Specify the IP address of the end of the 6th IP address range to be filtered on the wireless LAN.
---Setting range---
0.0.0.0 to 255.255.255.255
Specify the IP address of the beginning of the 7th IP address range to be filtered on the wireless LAN.
---Setting range---
0.0.0.0 to 255.255.255.255
Specify the IP address of the end of the 7th IP address range to be filtered on the wireless LAN.
---Setting range---
0.0.0.0 to 255.255.255.255
Specify the IP address of the beginning of the 8th IP address range to be filtered on the wireless LAN.
---Setting range---
0.0.0.0 to 255.255.255.255
Specify the IP address of the end of the 8th IP address range to be filtered on the wireless LAN.
---Setting range---
0.0.0.0 to 255.255.255.255
(PR) #75108 EndFiltIP WLAN-4
(PR) #75109 StartFiltIP WLAN-5
(PR) #75110 EndFiltIP WLAN-5
(PR) #75111 StartFiltIP WLAN-6
(PR) #75112 EndFiltIP WLAN-6
(PR) #75113 StartFiltIP WLAN-7
(PR) #75114 EndFiltIP WLAN-7
(PR) #75115 StartFiltIP WLAN-8
(PR) #75116 EndFiltIP WLAN-8
15

15Machine Parameters
The parameters with "(PR)" requires the CNC to be turned OFF after the settings. Turn the power OFF and ON to enable the parameter settings.
15.1 Base System Parameters
Select the existence of PLC axes and part systems.
0: Not exist
1: Exist

Set the number of control axes and PLC axes.
A total of 32 axes can be set.
Control axis: 0 to 16
PLC axis: 0 to 8
When set to "0", the number of control axes in the part system will be "0". Do not set the number of control axes of the first part system to "0".
(Note) The setting range differs according to the model.
Select the input setting value for each part system and the PLC axis.
Increments in parameters will follow this selection.
B: 1 m
C: 0.1 m
D: 0.01 m (10 nm)
E: 0.001 m (1 nm)
Set the unit for the NC internal position data, data communicated between the NC and drive unit, and the servo movement data.
Some parameter units, such as the pitch error and backlash, follow this specification.
The standard value is "E"; however, set the optimum value according to the machine model and specifica tions.
B: 1 m
C: 0.1 m
D: 0.01 m (10 nm)
E: 0.001 m (1 nm)
F: 0.0001 m (0.1 nm)
Select the PLC interface setting and display increment.
The PLC interface setting and display increment will follow this specification. Note that the PLC axis will follow "#1003 iunit".
B: 1 m
C: 0.1 m
D: 0.01 m (10 nm)
E: 0.001 m (1 nm)
F: 0.0001 m (0.1 nm)
(PR) #1001 SYS_ON System validation setup
(PR) #1002 axisno Number of axes
(PR) #1003 iunit Input setup unit
(PR) #1004 ctrl_unit Control unit
(PR) #1005 plcunit PLC unit

Select the machine error compensation setting and display increment.
The parameters related to machine error compensation (backlash, pitch error compensation, etc.) and PLC interface (external machine coordinate system compensation) will follow this selection.
B: 1 m
C: 0.1 m
D: 0.01 m (10 nm)
E: 0.001 m (1 nm)
F: 0.0001 m (0.1 nm)
Select the NC system type.
0: Machining center system (M system)
1: Lathe system (L system)
(Note 1) If the setting value is out of range, M system will be selected.
Select the plane to be selected when the power is turned ON or reset.
When 0 is specified, 1 is assumed (X-Y plane).e model and specifications.
1: X-Y plane (G17 command state)
2: Z-X plane (G18 command state)
3: Y-Z plane (G19 command state)
Set the names of the basic axes that compose the plane.
Set the axis name set in "#1013 axname".
If all three items ("base_I", "base_J" and "base_K") do not need to be set, such as for 2-axis specifications, input "0", and the parameter will be blank.
Normally, when X, Y and Z are specified respectively for base_I, _J, _K, the following relation will be estab lished:
G17: X-Y
G18: Z-X
G19: Y-Z
Or specify any other axis name desired.
---Setting range---
Axis names such as X, Y or Z
Set the names of the basic axes that compose the plane.
Set the axis name set in "#1013 axname".
If all three items ("base_I", "base_J" and "base_K") do not need to be set, such as for 2-axis specifications, input "0", and the parameter will be blank.
Normally, when X, Y and Z are specified respectively for base_I, _J, _K, the following relation will be estab lished:
G17: X-Y
G18: Z-X
G19: Y-Z
Or specify any other axis name desired.
---Setting range---
Axis names such as X, Y or Z
(PR) #1006 mcmpunit Machine error compensation unit
(PR) #1007 System type select System type select
#1025 I_plane Initial plane selection
#1026 base_I Base axis I
#1027 base_J Base axis J

Set the names of the basic axes that compose the plane.

Set the axis name set in "#1013 axname".
If all three items ("base_I", "base_J" and "base_K") do not need to be set, such as for 2-axis specifications,
input "0", and the parameter will be blank.
Normally, when X, Y and Z are specified respectively for base_I, _J, _K, the following relation will be estab lished:
G17: X-Y
G18: Z-X
G19: Y-Z
Or specify any other axis name desired.
---Setting range---
Axis names such as X, Y or Z
Set the axis name when there is an axis parallel to "#1026 base_I".
---Setting range---
Axis names such as X, Y or Z
Set the axis name when there is an axis parallel to "#1027 base_J".
---Setting range---
Axis names such as X, Y or Z
Set the axis name when there is an axis parallel to "#1028 base_K".
---Setting range---
Axis names such as X, Y or Z
Set the G code list and compensation type for programs.
1: List1 (for M) Type I (one compensation amount for one compensation No.)
2: List1 (for M) Type II (shape and wear compensation amounts for one comp. No.)
3: List2 (for L) Type III (shape and wear compensation amounts for one comp. No.)
4: List3 (for L) Ditto
5: List4 (for special L) Ditto
6: List5 (for special L) Ditto
7: List6 (for special L) Ditto
8: List7 (for special L) Ditto
9: List8 (for M) M2 form at type Type I
(one compensation amount for one compensation No.)
10: List8 (for M) M2 form at type Type II
(shape and wear compensation amounts for one compensation No.)
There are some items in the specifications that can be used or cannot be used according to the value set in
this parameter.
The file structure may also change depending on the compensation data type.
(Note) When this parameter is changed, the file system will be changed after the power is turned ON.
So always execute format.
The new format will be enabled after turning the power ON again.
Setting order
(1) cmdtyp changeover -> (2) Turn power ON again -> (3) Format -> (4) Turn power ON again
(Note) Compensation type III can be selected for M system by setting #1046.
#1028 base_K Base axis K
#1029 aux_I Flat axis I
#1030 aux_J Flat axis J
#1031 aux_K Flat axis K
(PR) #1037 cmdtyp Command type

Select the mode (absolute or incremental) at turning ON the power or reset.
0: Incremental setting
1: Absolute setting
Select the feedrate mode at turning ON the power or reset.
0: Asynchronous feed (feed per minute)
1: Synchronous feed (feed per revolution)
Select the linear command mode at turning ON the power or reset.
0: Linear interpolation (G01 command state)
1: Positioning (G00 command state)
Select the command method for the absolute and incremental commands.
The absolute command/incremental command can be issued by using the absolute command address and
incremental command address for the same axis.
0: Use G command for the absolute and incremental commands.
1: Use axis name for the absolute and incremental commands.
(The axis name in "#1013 axname" will be the absolute command, "#1014 incax" will be the incremental
command.)
Select whether to apply dry run (feed at manual setting speed instead of command feedrate) to the G00 com mand.
0: Not apply to G00. (move at rapid traverse rate)
1: Apply to G00. (move at manual setting speed)
Select the G00 travel path type.
0: Move linearly toward the end point. (interpolation type)
1: Move to the end point of each axis at the rapid traverse feedrate for each axis. (non-interpolation)
(Note) If this parameter is set to "1", neither of the following functions will be available: rapid traverse con stant-gradient acceleration/deceleration and rapid traverse constant-gradient multi-step acceleration/decel eration.
Select the user macro interrupt with the substitute M code.
0: Disable substitute M code
1: Enable substitute M code
Set an M code to replace M96 when "#1109 subs_M" is set to "1".
---Setting range---
3 to 97 (excluding 30)
Specify an M code to replace M97 when "#1109 subs_M" is set to "1".
---Setting range---
3 to 97 (excluding 30)
#1073 I_Absm Initial absolute setting
#1074 I_Sync Initial synchronous feed
#1075 I_G00 Initial G00
#1076 AbsInc ABS/INC address (for L system only)
#1085 G00Drn G00 dry run
#1086 G0Intp G00 non-interpolation

#1109 subs_M Validate substitute M code
#1110 M96_M M96 substitute M code
#1111 M97_M M97 substitute M code

Select the modal state at power ON from among the following: high-accuracy control mode, high-speed high accuracy control I mode, high-speed high-accuracy control II mode or high-speed high-accuracy control III mode.
0: G08P0/G64 (cutting) mode
1: G08P1/G61.1 (high-accuracy control) mode
2: G05.1Q1 (high-speed high-accuracy control I) mode
3: G05P10000 (high-speed high-accuracy control II) mode
4: G05P20000 (high-speed high-accuracy control III) mode
Select whether to initialize (power ON state) the modals by resetting.
0: Not initialize modal state
1: Initialize modal state
Set the name of each part system.
This setting is only relevant if the system has multiple part systems.
This name appears on the screen when the part systems need to be differentiated.
The name must be a combination of alphanumeric characters. It can be up to 4 characters long.
---Setting range---
4 or less characters consisting of both alphabets and numbers
Set this address code when using the 2nd miscellaneous command. Set an address with A, B or C that is not used for "#1013 axname" or "#1014 incax".
---Setting range---
A, B, C
Set the tap return override value for the synchronous tapping.
When "0" is set, it will be regarded as 100%.
---Setting range---
0 to 100 (%)
Set the override value applied during a retract operation in synchronous tapping.
When set to "0", 100% is applied.
---Setting range---
0 to 999 (%)
Set the skip signal for ending the G04 (dwell) command.
PLC interface input signal
Skip3 Skip2 Skip1
0: - - -
1: - - *
2: - * -
3: - * *
4: * - -
5: * - *
6: * * -
7: * * *
(*: Enable, -: Disable)
#1148 I_G611 Initial hi-precis
#1151 rstint Reset initial
#1169 system name Part system name
#1170 M2name Second miscellaneous code
#1171 taprov Tap return override
#1172 tapovr Tap return override
#1173 dwlskp G04 skip condition

Set the feedrate when there is no F command in the program at G31 (skip) command.
---Setting range---
1 to 999999 (mm/min)
Designate the skip signal in multi-step skip G31.1.
The setting method is same as "#1173 dwlskp".
Set the skip feedrate in multi-step skip G31.1.
---Setting range---
1 to 999999 (mm/min)
Set the skip signal in multi-step skip G31.2.
The setting method is same as "#1173 dwlskp".
Set the skip feedrate in multi-step skip G31.2.
---Setting range---
1 to 999999 (mm/min)
Set the skip signal in multi-step skip G31.3.
The setting method is same as "#1173 dwlskp".
Set the skip feedrate in multi-step skip G31.3.
---Setting range---
1 to 999999 (mm/min)
Select the axis to be targeted for constant surface speed control.
0: Program setting will be disabled, and the axis will always be fixed to the 1st axis
1: 1st axis
2: 2nd axis
3: 3rd axis
:
16: 16th axis
However, when set to other than "0", the priority will be on the program setting.
Set the retract speed when not using chamfering in the thread cutting cycle.
0: Cutting feed clamp feedrate
1 to 60000 mm/min: Setting feedrate
---Setting range---

0 to 60000 (mm/min)
Set the M code for C axis clamp in hole drilling cycle.
---Setting range---
0 to 99999999
#1174 skip_F G31 skip speed
#1175 skip1 G31.1 skip condition
#1176 skip1f G31.1 skip speed
#1177 skip2 G31.2 skip condition
#1178 skip2f G31.2 skip speed
#1179 skip3 G31.3 skip condition
#1180 skip3f G31.3 skip speed
#1181 G96_ax Constant surface speed axis
#1182 thr_F Thread cutting speed
#1183 clmp_M M code for clamp

Set the dwell time after outputting the M code for C axis unclamp in hole drilling cycle.
---Setting range---
0.000 to 99999.999 (s)
Set the feedrate for the F command in the F 1-digit command ("#1079 F1digit" is set to "1").
Feedrate when F1 is issued (mm/min).
When "#1246 set08/bit6" is set to "1" and F 1-digit feed is commanded, the feedrate can be increased/de creased by operating the manual handle.
---Setting range---
0 to 1000000 (mm/min)
Set the feedrate for the F command in the F 1-digit command ("#1079 F1digit" is set to "1").
Feedrate when F2 is issued (mm/min).
When "#1246 set08/bit6" is set to "1" and F 1-digit feed is commanded, the feedrate can be increased/de creased by operating the manual handle.
---Setting range---
0 to 1000000 (mm/min)
Set the feedrate for the F command in the F 1-digit command ("#1079 F1digit" is set to "1").
Feedrate when F3 is issued (mm/min).
When "#1246 set08/bit6" is set to "1" and F 1-digit feed is commanded, the feedrate can be increased/de creased by operating the manual handle.
---Setting range---
0 to 1000000 (mm/min)
Set the feedrate for the F command in the F 1-digit command ("#1079 F1digit" is set to "1").
Feedrate when F4 is issued (mm/min).
When "#1246 set08/bit6" is set to "1" and F 1-digit feed is commanded, the feedrate can be increased/de creased by operating the manual handle.
---Setting range---
0 to 1000000 (mm/min)
Set the feedrate for the F command in the F 1-digit command ("#1079 F1digit" is set to "1").
Feedrate when F5 is issued (mm/min).
When "#1246 set08/bit6" is set to "1" and F 1-digit feed is commanded, the feedrate can be increased/de creased by operating the manual handle.
---Setting range---
0 to 1000000 (mm/min)
Select whether to enable or disable inclined axis control.
0: Disable inclined axis control
1: Enable inclined axis control
Set the inclination angle ().
(Note) When set to "0", the angle determined by three-side setting will be applied.
---Setting range---
-80.000 to 80.000 ()
#1184 clmp_D Dwelling time after outputting M code for unclamp
#1185 spd_F1 F1 digit feedrate F1
#1186 spd_F2 F1 digit feedrate F2
#1187 spd_F3 F1 digit feedrate F3
#1188 spd_F4 F1 digit feedrate F4
#1189 spd_F5 F1 digit feedrate F5
(PR) #1190 s_xcnt Validate inclined axis control (for L system only)
(PR) #1191 s_angl Inclination angle (for L system only)

Select whether to perform compensation for the basic axis corresponding to the inclined axis at reference
position return.
0: Perform compensation
1: Not perform compensation
The setting is selected with the parameter "#1306 InpsTyp".
0: Deceleration check method 1
Select the deceleration check method for G0.
0: Command deceleration check
1: In-position check
2: Smoothing check
1: Validate in-position check
Specify the deceleration confirmation method for the positioning or cutting command.
0: G0, G1+G9 Command deceleration check
1: G0, G1+G9 In-position check
2: G0, G1+G9 Smoothing check
Select the time constant for manual handle feed.
0: Use time constant for G01
1: Time constant 0 (step)
Select whether to enable or disable M command macro call of user macro.
0: Disable
1: Enable
Select whether to enable or disable S command macro call of user macro.
0: Disable

1: Enable
Select whether to enable a call of user macro using command T.
0: Disable macro call
1: Enable macro call, irrespective of the number of command T digits
2: Enable macro call when a tool No. (excluding 0) is given to the upper digit of command T
3: Enable macro call when a tool No. (including 0) is given to the upper digit of command T.
Select whether to enable or disable 2nd miscellaneous command macro call of user macro.
0: Disable
1: Enable
Select the initial condition of spindle control after power is turned ON.
0: 1st spindle control mode (G43.1)
1: 2nd spindle control mode (G44.1)
2: All spindle simultaneously control mode (G47.1)
(Note) While G43.1 or G44.1 command is given, the spindle No. is selected with "#12090 SnG43.1" or "#1534 SnG44.1".
(PR) #1192 s_zrmv Compensation at reference position return (for L sys tem only)
#1193 inpos Deceleration check method 1
#1194 H_acdc Time constant 0 for handle feed
#1195 Mmac Macro call for M command
#1196 Smac Macro call for S command
#1197 Tmac Macro call by command T
#1198 M2mac Macro call with 2nd miscellaneous code
#1199 Sselect Select initial spindle control

Select the acceleration and deceleration type when a rapid traverse command is issued.
0: Acceleration and deceleration with constant time (conventional type)
1: Acceleration and deceleration with a constant angle of inclination
(Note) When rapid traverse constant-gradient multi-step acceleration/deceleration is valid, this parameter will be invalid.
Select the acceleration and deceleration type when a linear interpolation command is issued.
0: Acceleration and deceleration with constant time (conventional type)
1: Acceleration and deceleration with a constant angle of inclination
Set the distance between tools (edges) (between facing turrets).
---Setting range---
0 to 99999.999 (mm)
Select the turrets, which correspond to the tool Nos. 1 to 32, as facing turrets for T code mirror image.
---Setting range---
0 to FFFFFFFF
Select the turrets, which correspond to the tool Nos. 33 to 64, as facing turrets for T code mirror image.
---Setting range---
0 to FFFFFFFF
0: Post-interpolation acceleration/deceleration is applied to G00.
1: Pre-interpolation acceleration/deceleration is applied to G00 even in the high accuracy control mode.
2: Rapid traverse constant-gradient multi-step acceleration/deceleration is enabled.
When the multi-part system simultaneous high-accuracy control option is enabled, "1" can be set for the 2nd part system and the following.
Set a cutting feedrate when applying pre-interpolation acceleration/deceleration.
When high-accuracy control time constant expansion is valid, set the maximum of cutting feed clamp speed of each axis.
---Setting range---
1 to 999999 (mm/min)
(PR) #1200 G0_acc Validate acceleration and deceleration with inclination constant G0
(PR) #1201 G1_acc Validate acceleration and deceleration with inclination constant G1
#1202 mirofs Distance between facing turrets (for L system only)
#1203 TmirS1 Select turrets as facing turrets with T command (for L system only)
#1204 TmirS2 Select turrets as facing turrets with T command (for L system only)
#1205 G0bdcc Acceleration and deceleration before G0 interpolation
#1206 G1bF Maximum speed

Set a cutting feed time constant when applying pre-interpolation acceleration/deceleration.
When set to "0", the time constant will be clamped at 1ms.
---Setting range---
Without high-accuracy control time constant expansion: 1 to 5000 (ms)
With high-accuracy control time constant expansion: 1 to 30000 (ms)
Cutting feed Acc Cutting feed acceleration
Displays cutting feed acceleration.
Set a coefficient for arc radius error compensation.
An arc radius error compensation amount can be increased or decreased between -60.0 and +20.0%.
---Setting range---
-60.0 to +20.0 (%)
Set the deceleration speed at the arc entrance or exit.
---Setting range---
1 to 999999 (mm/min)
#1207 G1btL Time constant
#1208 RCK Arc radius error compensation factor
#1209 cirdcc Arc deceleration speed
G1btL
G1bF

Time
Speed

Select whether to initialize G code group modals and H and D codes, which corresponds to bits as follows, when the system is reset.
0: Initialize.
1: Not initialize.
<Description of bits for M system>
bit 1F: (Not used)
bit 1E: (Not used)
bit 1D: (Not used)
bit 1C: (Not used)
bit 1B: (Not used)
bit 1A: (Not used)
bit 19: Spindle clamp rotation speed initialization
bit 18: H, D codes initialization
bit 17: (Not used)
bit 16: Group23
bit 15: (Not used)
bit 14: (Not used)
bit 13: Group 20 2nd spindle control modal initialization
bit 12: Group 19 G command mirror modal initialization
bit 11: Group 18 Polar coordinate command modal initialization
bit 10: Group 17 Constant surface speed control command modal initialization
bit F: Group 16 Retains inclined surface machining modal
bit E: Group 15 Normal line control modal initialization
bit D: (Not used)
bit C: Group 13 Cutting modal initialization
bit B: Group 12 Workpiece coordinate system modal initialization
bit A: (Not used)
bit 9: Group 10 Fixed cycle return command modal initialization
bit 8: (Not used)
bit 7: Group 8 Length compensation modal initialization
bit 6: Group 7 Radius compensation modal initialization
bit 5: Group 6 Inch/metric modal initialization
bit 4: Group 5 Feed G modal initialization
bit 3: (Not used)
bit 2: Group 3 Absolute/incremental command modal initialization
bit 1: Group 2 Plane selection modal initialization
bit 0: Group 1 Move G modal initialization
#1210 RstGmd Modal G code reset
1F 1E 1D 1C 1B 1A 19 18 17 16 15 14 13 12 11 10
0000 00 * * 0 * 0 0 ****
FEDC BA9 8 7 6 5 4 3 2 1 0
* * 0 * * 0 * 0 **** 0 ***

The H code indicates the tool length offset number, and the D code indicates the tool radius compensation number.
When bit 18 is set to ON, the H and D codes and group 8 G modal are retained.
When bit 7 is set to ON, the H code and group 8 G modal are retained.
<Description of bits for L system>
bit 1F: (Not used)
bit 1E: (Not used)
bit 1D: (Not used)
bit 1C: (Not used)
bit 1B: (Not used)
bit 1A: (Not used)
bit 19: Spindle clamp rotation speed initialization
bit 18: (Not used)
bit 17: (Not used)
bit 16: (Not used)
bit 15: (Not used)
bit 14: (Not used)
bit 13: Group 20 2nd spindle control modal initialization
bit 12: (Not used)
bit 11: Group 18 Balance cut initialization
bit 10: Group 17 Constant surface speed control command modal initialization
bit F: Group 16 Retains inclined surface machining modal
bit E: Group 15 Facing turret mirror image initialization
bit D: (Not used)
bit C: Group 13 Cutting modal initialization
bit B: Group 12 Workpiece coordinate system modal initialization
bit A: (Not used)
bit 9: Group 10 Fixed cycle return command modal initialization
bit 8: (Not used)
bit 7: (Not used)
bit 6: Group 7 Nose R compensation modal initialization
bit 5: Group 6 Inch/metric modal initialization
bit 4: Group 5 Feed G modal initialization
bit 3: Group 4 Barrier check modal initialization
bit 2: Group 3 Absolute/incremental command modal initialization
bit 1: Group 2 Plane selection modal initialization

bit 0: Group 1 Move G modal initialization
1F 1E 1D 1C 1B 1A 19 18 17 16 15 14 13 12 11 10
0000 00 * 0 000
*
* 0 * *
FEDC BA9 8 7 6 5 4 3 2 1 0
*
0
0 * * 0 * 0 0 *** ****

Specify the length of the side of the triangle formed by the tilt angle in line with the rectangular coordinate system of the inclined axis.
---Setting range---
-9999.999 to 9999.999
Specify the length of the side of the triangle formed by the tilt angle in line with the actual axis of the inclined axis.
---Setting range---
-9999.999 to 9999.999
Specify the length of the side of the triangle formed by the tilt angle in line with the actual axis of the base axis corresponding to the inclined axis.
---Setting range---
-9999.999 to 9999.999
Set the upper limit value of the feedrate when the external deceleration signals are enabled.
---Setting range---
1 to 999999 (mm/min)
Specify the number of the rotational tool axis (servo axis) used for polygon machining (G51.2).
Set "0" when not using polygon machining (spindle-servo axis), or when using spindle-spindle polygon ma chining.
A value exceeding the base specification parameter "#1002 axisno" cannot be specified.
This parameter is valid when the G code system is 1, 6 or 7 ("1", "2", "7" or "8" is set in the parameter "#1037 cmdtyp").
---Setting range---
0 to controlled axis number
Select whether to perform a deceleration check when the travel direction is changed from G1 to G0.
0: Not perform
1: Perform
Select whether to perform a deceleration check when the travel direction is changed from G1 to G1.
0: Not perform
1: Perform
Select whether the check is carried out at the specified position in manual second reference position return mode upon completion of spindle orientation or at second reference position return interlock signal.
0: Upon completion of spindle orientation
1: At second reference position return interlock signal
Set the maximum value up to which the F 1-digit feedrate can be changed.
---Setting range---
0 to 1000000 (mm/min)
Set the constant that determines the speed change rate per manual handle graduation in F 1-digit feedrate change mode.
---Setting range---
0 to 32767
(PR) #1213 proaxy Side 1 of inclination angle (for L system only)
(PR) #1214 macaxy Side 2 of inclination angle (for L system only)
(PR) #1215 macaxx Side 3 of inclination angle (for L system only)
#1216 extdcc External deceleration speed
#1501 polyax Rotational tool axis number
#1502 G0lpfg G1 -> G0 deceleration check
#1503 G1lpfg G1 -> G1 deceleration check
#1505 ckref2 Second reference position return check
#1506 F1_FM Upper limit of F 1-digit feedrate
#1507 F1_K F 1-digit feedrate change constant

Select whether to shorten the time during which the axis is stopped when the door is opened.
0: Use the conventional axis stop time.
1: Shorten the axis stop time.
(Note) When the door interlock II signal is input via a ladder, the conventional axis stop time will be used.
Set the fixed device number for door interlock II signal input for each part system.
A device number from X001 to X3FF can be specified. (Except X100.)
Device number "000" is invalid.
Set device number "100" when using no fixed device number for door interlock II signal input.
Related parameter: "#1154 pdoor" (Door interlock II for each part system)
---Setting range---
000 to 3FF (hexadecimal)
Set the fixed device number for door interlock II signal input for each part system.
(Set the same value as that of "#1155 DOOR_m".)
Related parameter: "#1154 pdoor" (Door interlock II for each part system)
---Setting range---
000 to 3FF (hexadecimal)
Set the M code for the synchronous tapping selection.
Select the synchronous tapping mode using the miscellaneous function code of the value set in this param eter. The M function command can be issued immediately before the tap command or in the same block.
This function is valid only when "1" is set in "#1272 ext08/bit1" (M-function synchronous tap cycle).
(Note) Do not use M00, 01 02, 30, 98, and 99.
---Setting range---
0 to 99999999

Set the axis name for the linear axis used in exponential function interpolation.
---Setting range---
A to Z
Set the axis name for the rotary axis used in exponential function interpolation.
---Setting range---
A to Z
Set the name of the rotary axis used in milling interpolation. Only one rotary axis can be set.
When there is no E command in issuing the G12.1 command, this parameter will be followed.
---Setting range---
A to Z
Select the hypothetical axis command name for milling interpolation.
When there is no D command in issuing the milling interpolation command, this parameter will be followed.
(Note) The setting value "2" cannot be used for Milling interpolation.
0: Y axis command (Fixed)
1: Command rotary axis name
2: Base axis corresponding to hypothetical axis
#1510 DOOR_H Shorten door interlock II axis stop time
#1511 DOORPm Signal input device 1 for door interlock II: for each part
system
#1512 DOORPs Signal input device 2 for door interlock II: for each part
system
#1513 stapM M code for synchronous tap selection
#1514 expLinax Exponential function interpolation linear axis
#1515 expRotax Exponential function interpolation rotary axis
#1516 mill_ax Milling axis name
#1517 mill_C Milling interpolation hypothetical axis name

Set the name or No. of the spindle which controls the workpiece used in spindle-spindle polygon machining.
(Note 1) The 1st spindle will be selected when "0" is set.
(Note 2) There are 2 spindle designation methods: spindle No. method and spindle name method. When names (any of 1 to 9) are set by the parameter "#3077 Sname" (Spindle command name) for all spindles, spindle name method is applied. Otherwise, spindle No. method is applied.
---Setting range---
0 to 9
Set the name or No. of the spindle which controls the rotary tool used in spindle-spindle polygon machining.
(Note 1) The 2nd spindle will be selected when "0" is set.
(Note 2) There are 2 spindle designation methods: spindle No. method and spindle name method. When names (any of 1 to 9) are set by the parameter "#3077 Sname" (Spindle command name) for all spindles, spindle name method is applied. Otherwise, spindle No. method is applied.
---Setting range---
0 to 9
Select axis to carry out the additional axis' tool compensation function.
0: 3rd axis.
1: 4th axis.
Set the minimum turning angle of the normal line control axis at the block joint during normal line control.
---Setting range---
0.000 to 360.000 () (Input setting increment applies)
Set the number of the axis for normal line control.
Set a rotary axis No.
0: Normal line control disabled
1 to 16: Axis No. (number of control axes)
Set the turning speed of the normal line control axis at the block joint during normal line control.
Set a value that does not exceed the normal line control axis' clamp speed ("#2002 clamp").
This is enabled during the normal line control type I.
---Setting range---
0 to 100000 (/min)
Select the normal line control type.
0: Normal line control type I
1: Normal line control type II
Set the linear axis name used for pole coordinate interpolation.
---Setting range---
Axis names such as X, Y or Z
#1518 polm Spindle-spindle polygon Workpiece spindle No.
#1519 pols Spindle-spindle polygon Tool spindle No.
(PR) #1520 Tchg34 Additional axis tool compensation operation (for L sys tem only)
#1521 C_min Minimum turning angle
(PR) #1522 C_axis Normal line control axis
#1523 C_feed Normal line control axis turning speed
#1524 C_type Normal line control type
#1533 millPax Pole coordinate linear axis name

Specify which spindle to be selected when G44.1 is commanded.
<Spindle No. type>
Specify by the spindle No. 1 to 8.
The 2nd spindle is selected if you specify a nonexistent spindle No.
<Spindle name type>
Specify by the spindle name 1 to 9.
The 2nd spindle is selected if you specify a nonexistent spindle name.
(Note) When names (any of 1 to 9) are for all spindles by the parameter "#3077 Sname" (Spindle command name), "Spindle name type" is applied.
---Setting range---
0 to 9

Set the minimum turning movement amount of the normal line control axis at the block joint during normal line control.
---Setting range---
0.000 to 99999.999 (mm) (Input setting increment applies)
Set the axis to be interchanged during the mixed control (cross axis control).
Using two digits, set the name of the axis to be interchanged with the axis in the part system where the mixed control (cross axis control) request signal is input, or the name of the axis to be shifted to that part system.
---Setting range---
Two digits between A to Z and 1 to 9
(Setting is cleared when "0" is set)
Set the axis to be interchanged during the mixed control (cross axis control).
Using two digits, set the name of the axis to be interchanged with the axis in the part system where the mixed control (cross axis control) request signal is input, or the name of the axis to be shifted to that part system.
---Setting range---
Two digits between A to Z and 1 to 9
(Setting is cleared when "0" is set)
Set the axis to be interchanged during the mixed control (cross axis control).
Using two digits, set the name of the axis to be interchanged with the axis in the part system where the mixed control (cross axis control) request signal is input, or the name of the axis to be shifted to that part system.
---Setting range---
Two digits between A to Z and 1 to 9
(Setting is cleared when "0" is set)
Set the axis to be interchanged during the mixed control (cross axis control).
Using two digits, set the name of the axis to be interchanged with the axis in the part system where the mixed control (cross axis control) request signal is input, or the name of the axis to be shifted to that part system.
---Setting range---
Two digits between A to Z and 1 to 9
(Setting is cleared when "0" is set)
(PR) #1534 SnG44.1 Spindle No. for G44.1 command
#1535 C_leng Minimum turning movement amount
#1537 crsax[1] Mixed control (cross axis control) axis
#1538 crsax[2] Mixed control (cross axis control) axis
#1539 crsax[3] Mixed control (cross axis control) axis
#1540 crsax[4] Mixed control (cross axis control) axis

Set the axis to be interchanged during the mixed control (cross axis control).
Using two digits, set the name of the axis to be interchanged with the axis in the part system where the mixed control (cross axis control) request signal is input, or the name of the axis to be shifted to that part system.
---Setting range---
Two digits between A to Z and 1 to 9
(Setting is cleared when "0" is set)
Set the axis to be interchanged during the mixed control (cross axis control).
Using two digits, set the name of the axis to be interchanged with the axis in the part system where the mixed control (cross axis control) request signal is input, or the name of the axis to be shifted to that part system.
---Setting range---
Two digits between A to Z and 1 to 9
(Setting is cleared when "0" is set)
Set the axis to be interchanged during the mixed control (cross axis control).
Using two digits, set the name of the axis to be interchanged with the axis in the part system where the mixed control (cross axis control) request signal is input, or the name of the axis to be shifted to that part system.
---Setting range---
Two digits between A to Z and 1 to 9
(Setting is cleared when "0" is set)
Set the axis to be interchanged during the mixed control (cross axis control).
Using two digits, set the name of the axis to be interchanged with the axis in the part system where the mixed control (cross axis control) request signal is input, or the name of the axis to be shifted to that part system.
---Setting range---
Two digits between A to Z and 1 to 9
(Setting is cleared when "0" is set)
Set the lower limit of the override for involute interpolation override.
---Setting range---
0 to 100 (%)
Set the maximum acceleration (time constant) for the acceleration clamping during involute interpolation.
---Setting range---
0 to 32767 (ms)
Set the minimum feedrate for the acceleration clamping during involute interpolation.
---Setting range---
0 to 999999 (mm/min)
The workpiece coordinate display during 3D coordinate conversion is switched to the workpiece coordinate system or G68 program coordinate system.
0: Workpiece coordinate system
1: G68 program coordinate system
(Note) The special display unit's absolute coordinates also follow this parameter setting.
#1541 crsax[5] Mixed control (cross axis control) axis
#1542 crsax[6] Mixed control (cross axis control) axis
#1543 crsax[7] Mixed control (cross axis control) axis
#1544 crsax[8] Mixed control (cross axis control) axis
#1558 IvOMin Involute interpolation override lower limit value
#1559 IvAMax Involute interpolation allowable acceleration speed
#1560 IvFMin Involute interpolation minimum feedrate
#1561 3Dcdc Switch workpiece coordinate display during 3D coordi nate conversion

The remaining command display during 3D coordinate conversion is switched to the workpiece coordinate
system or G68 program coordinate system.
0: Workpiece coordinate system
1: G68 program coordinate system
The coordinate system of the workpiece/skip coordinate read value in the 3D coordinate conversion modal
is switched.
0: G68 program coordinate system
1: Workpiece (local) coordinate system
Set the rapid traverse rate for the hole drilling cycle during 3D coordinate conversion.
0: The cutting feed clamp speed is used.
Other than 0: The set speed is used.
Note that if the rapid traverse rate is exceeded, the speed will be clamped at the rapid traverse rate.
---Setting range---
0 to 1000000mm/min
Set the base axis for helix angle calculation in helical machining. If no setting, Z axis will be used.
---Setting range---
Axis address such as X, Y, Z, U, V, W, A, B, C or H
Switch the rapid traverse mode in non-drilling blocks among a drilling cycle to the cutting feed mode during
3-dimensional coordinate conversion.
0: Rapid traverse mode. The speed follows the setting of "#2001 rapid".
1: Cutting feed mode. The speed follows the setting of "#1564 3Dspd".
Set the filter time constant for smoothly changing the acceleration rate for the cutting feed acceleration/de celeration in pre-interpolation acceleration/deceleration.
- Notch frequency Hz
Displays the notch frequency (Hz) for the S-pattern filter set in "#1568 SfiltG1" (G01 soft acceleration/decel eration filter).
---Setting range---
0 to 200 (ms)
Set the filter time constant for smoothly changing the acceleration rate for the rapid traverse acceleration/
deceleration in pre-interpolation acceleration/deceleration.
---Setting range---
0 to 200 (ms)
Set the filter time constant for smoothly changing the acceleration rate in pre-interpolation acceleration/de celeration.
This will be disabled when "0" or "1" is set.
- Notch frequency Hz
Displays the notch frequency (Hz) for the S-shape filter set in "#1570 Sfilt2" (Soft acceleration/deceleration
filter 2).
---Setting range---
0 to 200 (ms)
#1562 3Dremc Switch remaining command display during 3D coordi nate conversion
#1563 3Dcdrc Switch coordinate reading during 3D coordinate con version
#1564 3Dspd Hole drilling speed during 3D coordinate conversion
#1565 helgear Helical machining base axis
#1566 3DSelctDrillaxMode Switch drill axis's mode from rapid traverse during 3D
coordinate conversion
#1568 SfiltG1 G01 soft acceleration/deceleration filter
#1569 SfiltG0 G00 soft acceleration/deceleration filter
#1570 Sfilt2 Soft acceleration/deceleration filter 2

Fix the shape recognition range for SSS control.
---Setting range---
0/1
This eliminates speed fluctuations at the joint of the arc and straight line and arc and arc.
Set as a bit unit.
0: Do not overlap the arc command blocks
1: Overlap the arc command blocks
bit0: Arc command during high-speed high-accuracy control II
bit1: Arc command during high-speed machining mode II
bit2: Arc command during high-accuracy control (G61.1)
bit3: Arc command during cutting mode (G64)
The line command block and arc command block won't be overlapped during G61.2 modal regardless of this
setting.
(Note) This parameter is invalid during SSS control.
---Setting range---
0 to F (HEX)
Select the axis to be moved later after tool return.
This is referred to with the movement path (transit point #1 -> interrupt point).
Up to eight axes can be specified by expressing one axis with one bit.
bit0: Transit point #1 1st axis
bit1: Transit point #1 2nd axis
bit2: Transit point #1 3rd axis
bit3: Transit point #1 4th axis
bit4: Transit point #1 5th axis
bit5: Transit point #1 6th axis
bit6: Transit point #1 7th axis
bit7: Transit point #1 8th axis
---Setting range---
00000000 to 11111111 (Binary)
Select the axis to be moved later after tool return.
This is referred to with the movement path (return start point -> transit point #2).
Up to eight axes can be specified by expressing one axis with one bit.
bit0: Transit point #2 1st axis
bit1: Transit point #2 2nd axis
bit2: Transit point #2 3rd axis
bit3: Transit point #2 4th axis
bit4: Transit point #2 5th axis
bit5: Transit point #2 6th axis

bit6: Transit point #2 7th axis
bit7: Transit point #2 8th axis
---Setting range---
00000000 to 11111111 (Binary)
#1571 SSSdis SSS control adjustment coefficient fixed value selec tion
#1572 Cirorp Arc command overlap
#1573 Ret1 Return type 1
#1574 Ret2 Return type 2

Specify the spindle No. or spindle name of rotary tool in "MITSUBISHI CNC Special Format (G81.4)" of hob bing command.
(Note) There are 2 spindle designation methods: spindle No. method and spindle name method. When
names (any of 1 to 9) are set by the parameter "#3077 Sname" (Spindle command name) for all spindles,
spindle name method is applied. Otherwise, spindle No. method is applied.
---Setting range---
0 to 9
Specify the NC axis No. of workpiece axis (in a part system) in "MITSUBISHI CNC Special Format (G81.4)"
of hobbing command.
This parameter is valid when "#1292 ext28/bit4 (Hobbing workpiece axis selection switch) is "0".
---Setting range---
1 to the number of NC axes (in a part system)
Set wether to enable the axis travel for the compensation change when the compensation amount of rotary
axis workpiece position is changed.
0: Enable
1: Disable
* Regardless of the parameter setting, the axis travel is not enabled at reset.
Specify the tolerable range for an error of the end point of travel command which is deviated from the tool
path direction during the G68.1 ,E1 command.
---Setting range---
0.000 to 100.000 (mm)
Set the part system axis name ("#1013 axname") for the two axes that intersect with the rotary axis direction.
When one of the two axes is blank, a constant speed will be applied without using constant surface speed
control.
---Setting range---
Axis addresses such as X, Y, Z, U, V, W, A, B, and C
Set the part system axis name ("#1013 axname") for the two axes that intersect with the rotary axis direction.
When one of the two axes is blank, a constant speed will be applied without using constant surface speed
control.
---Setting range---
Axis addresses such as X, Y, Z, U, V, W, A, B, and C
Set the machine coordinate position (horizontal axis) at the center of the rotary axis.
---Setting range---
-99999.999 to 99999.999 (mm)
Set the machine coordinate position (vertical axis) at the center of the rotary axis.
---Setting range---
-99999.999 to 99999.999 (mm)
#1595 hobm Hobbing rotary tool axis No.
#1596 hobs Hobbing workpiece axis No.
#1597 rpcNoMove No axis travel with compensation amount change for
rotary axis workpiece position
#1599 3DEndPointErr End point error in 3D coordinate conversion
#12001 ManualB RectanA xH Manual feed rate B constant surface control intersect ing part system axis name (horizontal)
#12002 ManualB RectanA xV Manual feed rate B constant surface control intersect ing part system axis name (vertical)
#12003 ManualB RotCent erH Manual feed rate B constant surface control rotation
center machine position (horizontal)
#12004 ManualB RotCent erV Manual feed rate B constant surface control rotation
center machine position (vertical)

Set the number of M codes that can be specified within the same block.
---Setting range---
1 to 4
Data type 0: BCD
Data type 1: Unsigned binary
Data type -1: Singed binary
<For unsigned binary>
The absolute value "1" is output for "-1".
<For singed binary>
"-1" is output as "0xFFFFFFFF".
---Setting range---
Data type
(-1,0,1)
Set the number of spindles.
(Note 1) The setting range differs according to the model.
(Note 2) "Sfig" is set in the range of 1 to 8. However, the number of outputs by "Sfig" cannot be controlled.
Thus, only one S command is output regardless of the Sfig setting value.
---Setting range---
1 to 8
Data type 0: BCD
Data type 1: Unsigned binary
Data type -1: Singed binary
<For unsigned binary>
The absolute value "1" is output for "-1".
<For singed binary>

"-1" is output as "0xFFFFFFFF".
(Note 1) Sbin can be set with "-1", "0" and "1", but the S command cannot be BCD output.
If BCD (0) is selected for Sbin, it will be handled as a singed binary (-1).
---Setting range---
Data type
(-1,0,1)
Set the number of T codes that can be specified within the same block.
---Setting range---
1 to 4
(PR) #12005 Mfig Number of M
(PR) #12006 Mbin M binary
(PR) #12007 Sfig Number of S
(PR) #12008 Sbin S binary
(PR) #12009 Tfig Number of T

Data type 0: BCD
Data type 1: Unsigned binary
Data type -1: Singed binary
<For unsigned binary>
The absolute value "1" is output for "-1".
<For singed binary>
"-1" is output as "0xFFFFFFFF".
---Setting range---
Data type
(-1,0,1)
Set the number of B codes that can be specified within the same block.
---Setting range---
1 to 4
Data type 0: BCD
Data type 1: Unsigned binary
Data type -1: Singed binary
<For unsigned binary>
The absolute value "1" is output for "-1".
<For singed binary>
"-1" is output as "0xFFFFFFFF".
---Setting range---
Data type
(-1,0,1)
Select the axis to use as C axis with its axis name.
---Setting range---
A to Z
Not used.
bit0: Skip speed spec: Cutting feed override ON
Select whether to enable cutting feed override for a skip command.
0: Disable cutting feed override
1: Enable cutting feed override
bit1: Skip speed spec: Dry run ON
Select whether to enable dry run for a skip command.
0: Disable dry run
1: Enable dry run
bit2: Skip speed spec: Feed rate selection
Select the feed rate for a skip command.
0: A feed rate given to address F of the G31 block. If the G31 block has no address F, the value specified by "#1174 skip_F" is applied. In either case the F modal status is unchanged.
1: A feed rate programmed as an F modal value. F modal status is updated by the address F given to the G31 block.
(PR) #12010 Tbin T binary
(PR) #12011 Bfig Number of B
(PR) #12012 Bbin B binary
#12013 G33.n rot G33.n rotary axis name
#12014 G33.n ovr G33.n override
#12022 skipF_spec

Set M codes to which pre-read will not be applied.
---Setting range---
0 to 99999999
Set M codes to which pre-read will not be applied.
---Setting range---
0 to 99999999
Set M codes to which pre-read will not be applied.
---Setting range---
0 to 99999999
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0 to 99999999
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---Setting range---
0 to 99999999
Set M codes to which pre-read will not be applied.
---Setting range---
0 to 99999999
Set M codes to which pre-read will not be applied.
---Setting range---
0 to 99999999
Set the minimum value of the M code to which pre-read will not be applied.
---Setting range---
0 to 99999999
(PR) #12023 Mblkstp1 Pre-read prohibited M code 1
(PR) #12024 Mblkstp2 Pre-read prohibited M code 2
(PR) #12025 Mblkstp3 Pre-read prohibited M code 3
(PR) #12026 Mblkstp4 Pre-read prohibited M code 4
(PR) #12027 Mblkstp5 Pre-read prohibited M code 5
(PR) #12028 Mblkstp6 Pre-read prohibited M code 6
(PR) #12029 Mblkstp7 Pre-read prohibited M code 7
(PR) #12030 Mblkstp8 Pre-read prohibited M code 8
(PR) #12031 Mblkstp9 Pre-read prohibited M code 9
(PR) #12032 Mblkstp10 Pre-read prohibited M code 10
(PR) #12033 MblkstpMin1 Minimum value of the pre-read prohibited M code range
setting 1

Set the maximum value of the M code to which pre-read will not be applied.
---Setting range---
0 to 99999999
Set the minimum value of the M code to which pre-read will not be applied.
---Setting range---
0 to 99999999
Set the maximum value of the M code to which pre-read will not be applied.
---Setting range---
0 to 99999999
Set the minimum value of the M code to which pre-read will not be applied.
---Setting range---
0 to 99999999
Set the maximum value of the M code to which pre-read will not be applied.
---Setting range---
0 to 99999999
Set the minimum value of the M code to which pre-read will not be applied.
---Setting range---
0 to 99999999
Set the maximum value of the M code to which pre-read will not be applied.
---Setting range---
0 to 99999999
Set the minimum value of the M code to which pre-read will not be applied.
---Setting range---
0 to 99999999
Set the maximum value of the M code to which pre-read will not be applied.
---Setting range---
0 to 99999999
Set the minimum value of the M code to which pre-read will not be applied.
---Setting range---
0 to 99999999
(PR) #12034 MblkstpMax1 Maximum value of the pre-read prohibited M code range
setting 1
(PR) #12035 MblkstpMin2 Minimum value of the pre-read prohibited M code range
setting 2
(PR) #12036 MblkstpMax2 Maximum value of the pre-read prohibited M code range
setting 2
(PR) #12037 MblkstpMin3 Minimum value of the pre-read prohibited M code range
setting 3
(PR) #12038 MblkstpMax3 Maximum value of the pre-read prohibited M code range
setting 3
(PR) #12039 MblkstpMin4 Minimum value of the pre-read prohibited M code range
setting 4
(PR) #12040 MblkstpMax4 Maximum value of the pre-read prohibited M code range
setting 4
(PR) #12041 MblkstpMin5 Minimum value of the pre-read prohibited M code range
setting 5
(PR) #12042 MblkstpMax5 Maximum value of the pre-read prohibited M code range
setting 5
(PR) #12043 MblkstpMin6 Minimum value of the pre-read prohibited M code range
setting 6

Set the maximum value of the M code to which pre-read will not be applied.
---Setting range---
0 to 99999999
Specify the ID number (address B value) to be used when activating this part system as a sub part system

during G122 command. Set to "0" when this part system is not used as a sub part system.
---Setting range---
0 to 7
Specify the No. of program to be called when activating this part system as a sub part system during G122
command. This parameter setting is used when a program designation (address A value/<file name>) is omit ted.
---Setting range---
0 to 99999999
Specify the time constant of filter that is used for smoothing the change of jerk when pre-interpolation accel eration/deceleration is performed in cutting feed.
This filter causes no path error, as the filter is applied to the resultant speed calculated before interpolation.
If you specify the jerk filter time constant, the time constants of each filter will be as follows:
- S-shape filter time constant
"#1568 SfiltG1" - "Jerk_filtG1"
- Jerk filter time constant
"Jerk_filtG1"
---Setting range---
0 to 50 (ms)
Specify the time constant of filter that is used for smoothing the change of jerk when pre-interpolation accel eration/deceleration is performed in cutting feed.
This filter causes no path error, as the filter is applied to the resultant speed calculated before interpolation.
If you specify the jerk filter time constant, the time constants of each filter will be as follows:
- S-shape filter time constant
"#1569 SfiltG0" - "Jerk_filtG0"
- Jerk filter time constant
"Jerk_filtG0"
---Setting range---
0 to 50 (ms)
Select how to calculate the deceleration speed for a corner between the blocks where the high-accuracy con trol is enabled.
0: Optimal corner deceleration
(calculate the deceleration speed using the acceleration tolerance common for all the axes determined by
G1bF and G1btL)
1: Axis-specific acceleration tolerance control
(calculate the deceleration speed using acceleration tolerances of each axis determined by G1bFx and
G1btLx)
Specify the number of offset sets to be allocated when the arbitrary allocation method is selected for offset
sets.
---Setting range---
0 to 999
(PR) #12044 MblkstpMax6 Maximum value of the pre-read prohibited M code range
setting 6
#12049 SBS_no Sub part system I identification No.
#12050 SBS_pro Sub part system I standard program No.
#12051 Jerk_filtG1 G01 jerk filter
#12052 Jerk_filtG0 G00 jerk filter
#12053 EachAxAccCntrl Enable axis-specific acceleration tolerance control
(PR) #12054 Tol-Ofsnum Number of tool offset sets for allocation
M800V/M80V Series Alarm/Parameter Manual
15 Machine Parameters
15.1 Base System Parameters
363 IB-1501623-F
Specify the number of life management tools to be allocated when the arbitrary allocation method is selected
for life management tools.
---Setting range---
0 to 1000
Select whether to enable the rapid traverse block overlap function at power ON or at reset.
0: Disabled
1: Enabled
Select the entry inhibition area for stroke check before travel.
0: Perform stroke check before travel for the area specified by G22.
1: Perform stroke check before travel for the area set by the stored stroke limit function, with or without
G22.
Select whether to enable or disable the stroke check before travel for skip (G31 or G31.n) and automatic tool
length measurement (G37).
0: Disable
1: Enable
(Note) This parameter is enabled when #12057=1 and the option "Stroke check before travel" is ON.
Specify each sub part system name.
This name is displayed when the part system acts as a sub part system.
---Setting range---
4 or less characters consisting of both alphabets and numbers
Select whether to enable variable-acceleration pre-interpolation acceleration/deceleration control while high accuracy control is ON.
0: Pre-interpolation acceleration/deceleration
(Apply the acceleration rate that is determined by G1bF and G1btL and is common for all the axes)
1: Variable-acceleration pre-interpolation acceleration/deceleration
(Apply the acceleration rate that is determined by G1bFx and G1btLx for each axis)
(Note) Variable-acceleration pre-interpolation acceleration/deceleration is a function available under
SSS control. To enable this function, set "#8090 SSS ON" to "1".
Specify the time constant of the filter that smoothes out fluctuations in acceleration under the tolerance con trol.
Basically set to 0.
---Setting range---
0 to 200 (ms)
(PR) #12055 Tol-lifenum Number of life management tools for allocation
#12056 I_G0ol Initial rapid traverse block overlap for G00
#12057 OT_prechkON Enabling stroke check before travel for stored stroke
limit
#12058 OT_prechkTYPE Stroke check before travel for skip and automatic tool
length measurement
#12059 SBS_name Sub part system name
#12060 VblAccPreInt Variable-acceleration pre-interpolation acceleration/de celeration ON
#12070 Sfilt2_tol Tolerance control: Soft acceleration/deceleration filter

Specify the axis address to be given in an arbitrary axis exchange command for the part system.
(Note 1) This parameter is disabled when the arbitrary axis exchange function is unused.
(Note 2) Do not give an identical name to two or more of the parameters adr_abs[1] to adr_abs[8].
(Note 3) Do not leave any unspecified parameter in the middle between adr_abs[1] and [8].
(Note 4) Set the addresses of adr_abs[ ] in the same order as of the axis names (#1013 axname). Note that you can set a nonexistent axis name in the middle.
(Note 5) If there are 9 or more control axes per part system, specify the axis address that is programmed based on the basic axis configuration.
---Setting range---
Axis address such as X, Y, Z, U, V, W, A, B, C or H
Specify the incremental command address for each of the axes to be used in an arbitrary axis exchange com mand.
(Note 1) This parameter is disabled when the arbitrary axis exchange function is unused.
(Note 2) There is no need to set this parameter when command type (absolute or incremental) is not distin guished by the axis address (when "#1076 AbsInc" = "0").
(Note 3) Do not give an identical name to two or more of the parameters adr_inc[1] to adr_inc[8]. If there is any overlap, priority is given in the ascending order (adr_inc[1] to adr_inc[8]).
---Setting range---
Axis address such as X, Y, Z, U, V, W, A, B, C or H
Specify a dry run speed for each part system.
When "0" is set, the manual feed rate selected by Manual feedrate method selection (JVS) signal is applied.
---Setting range---
0 to 1000000 (mm/min)
Select the address type of the 2nd miscellaneous function.
0: One-letter command for the 2nd miscellaneous function
1: Two-letter command for the 2nd miscellaneous function
Specify which spindle to be selected when G43.1 is commanded.
<Spindle No. type>
Specify by the spindle No. 1 to 8.
The 1st spindle is selected if you specify a nonexistent spindle No.
<Spindle name type>
Specify by the spindle name 1 to 9.
The 1st spindle is selected if you specify a nonexistent spindle name.
(Note) When names (any of 1 to 9) are for all spindles by the parameter "#3077 Sname" (Spindle command name), "Spindle name type" is applied.
---Setting range---
0 to 9
Select whether to enable tool offset on the 2nd additional axis.
0: Disable
1: Enable
(PR) #12071-12078 adr_abs[1]-[8] Command address for arbitrary axis exchange
(PR) #12079-12086 adr_inc[1]-[8] Incremental command address for arbitrary axis ex change
#12088 Drn_F Dry run speed
#12089 M2adr 2nd miscellaneous function address type
(PR) #12090 SnG43.1 Spindle designation for G43.1
(PR) #12103 2nd add T-ofs ON 2nd additional axis tool offset ON (for L system only)

Select on which axis to perform the 2nd additional axis tool offset.
Specify the axis address set in "#1013 axname".
---Setting range---
A to Z
Specify the operation when the turning angle is set the minimum turning angle (#1521 C_min) or less and the turning operation is not inserted, in the seams of the arc blocks during normal line control.
0: Interpolate before reaching arc end point.
1: Do not interpolate.
Specify the axis to be moved later after tool return.
This is referred to with the movement path (transit point #2 to transit point #1).
One bit represents one axis. Up to eight axes can be specified.
---Setting range---
00000000 to 11111111 (Binary)
Specify the head of the common variables which are protected from setting operation.
(Note 1) If #12111 or #12112 is 0 or is greater than the bottom No. (#12112), this setting is disabled.
(Note 2) For the common variables shared by part systems, the protection takes effect in a part system set by this parameter.
(Note 3) It is possible to set an unspecified variable, but the protection covers the specified variables only.
---Setting range---
0: Disabled
100 to 199, 400 to 999
Specify the end of the common variables which are protected from setting operation.
(Note 1) If #12111 or #12112 is 0 or is smaller than the top No. (#12111), this setting is disabled.
(Note 2) For the common variables shared by part systems, the protection takes effect in a part system set by this parameter.
(Note 3) It is possible to set an unspecified variable, but the protection covers the specified variables only.
---Setting range---
0: Disabled
100 to 199, 400 to 999
Specify the head of the common variables which are protected from setting operation.
(Note 1) If #12113 or #12114 is 0 or is greater than the bottom No. (#12114), this setting is disabled.
(Note 2) For the common variables shared by part systems, the protection takes effect in a part system set by this parameter.
(Note 3) It is possible to set an unspecified variable, but the protection covers the specified variables only.
---Setting range---

0: Disabled
100 to 199, 400 to 999
(PR) #12104 2nd add T-ofs set 2nd additional axis tool offset setting (for L system on ly)
#12105 C_minTyp Operation selection of minimum turning angle or less
#12110 Ret3 Return type
#12111 Var protect Top1 Common variable setting protection - Top variable No.
(1st group)
#12112 Var protect Btm1 Common variable setting protection - Bottom variable
No. (1st group)
#12113 Var protect Top2 Common variable setting protection - Top variable No.
(2nd group)

Specify the end of the common variables which are protected from setting operation.
(Note 1) If #12113 or #12114 is 0 or is smaller than the top No. (#12113), this setting is disabled.
(Note 2) For the common variables shared by part systems, the protection takes effect in a part system set
by this parameter.
(Note 3) It is possible to set an unspecified variable, but the protection covers the specified variables only.
---Setting range---
0: Disabled
100 to 199, 400 to 999
Select whether to stop rapid traverse when the cutting feedrate override is 0% during rapid traverse.
0: Stop rapid traverse
1: Not stop rapid traverse
(Note) This parameter is invalid when the code method for rapid traverse override is selected.
Specify whether to show or hide the tool compensation data for each axis.
0: Show
1: Hide
Specify the setting individually for each axis assigned to the hexadecimal bits.
bit0: axis in the 1st column
bit1: axis in the 2nd column
bit2: axis in the 3rd column
bit3: axis in the 4th column
(Note 1) The setting of bit3 is enabled for L system when "#12103 2nd add T-ofs ON" is "1".
(Note 2) This parameter is invalid for the tool compensation type I or II.
---Setting range---
0 to F (hexadecimal)
Specify the name of macro program for the rotation center error measurement.
The macro program name is input at initialization of rotation center error measurement macro.
If 0 is set, the macro program for the measurement is not input to the part system.
The macro program is used for execution of the measurement.
---Setting range---
0, 9000 to 9099, 9300 to 9999,
100010000 to 100018999,
100030000 to 199999998
Rotation direction of primary axis for rotation center error measurement.
Select the direction, allowing for the rotary axis stroke limit, etc.
0: Positive direction
1: Negative direction
This parameter specifies the upper limit of the frequency.
If this parameter is set to "0", the upper limit will be 40 (Hz).
---Setting range---
0, or from 30 to 300 (Hz)
#12114 Var protect Btm2 Common variable setting protection - Bottom variable
No. (2nd group)
#12116 CutOvrZeroMovRap Rapid traverse operation when cutting feedrate over ride is 0%
(PR) #12117 T-ofs hide axis Hiding tool compensation data of specific axis
#12121 REM Mcr No Macro No. for rotation center error measurement
#12122 REM PrimAx Rot Dir Primary axis rotation direction for rotation center error
measurement
#12131 FrqClmpSys_VCC Upper limit of frequency (per part system)

This setting value is used as a reference value to determine the adjustment range of "#1207 G1btL" in the
High-accuracy parameter adjustment screen.
Enter the value of "#1207 G1btL" for servo adjustment.
When "0" is set, the parameter adjustment mode cannot be selected from the High-accuracy parameter ad justment screen.
---Setting range---
Without extension of high-accuracy control time constant: 1 to 5000 (ms)
With extension of high-accuracy control time constant: 1 to 30000 (ms)
This setting value is used as a reference value to determine the adjustment range of "#1568 SfiltG1" and
"#12070 Sfilt2_tol" in the High-accuracy parameter adjustment screen.
Specify the filter time constant according to the machine vibration frequency.
When "0" is set, the parameter adjustment mode cannot be selected from the High-accuracy parameter ad justment screen.
---Setting range---
1 to 200 (ms)
Set the name of each part system.
This setting is only relevant if the system has multiple part systems.
This name appears on the screen when the part systems need to be differentiated.
The name must be a combination of alphanumeric characters. It can be up to 6 characters long.
(*) This name is displayed with priority over the name that is set in #1169 system name.
(*) Even if this parameter is set, the name that is set in #1169 system name is displayed in some cases.
---Setting range---
A combination of alphanumeric characters up to 6 characters in length

Set the name of each sub part system.
This name appears when it serves as a sub part system.
(*) This name is displayed with priority over the name that is set in "#12059 SBS_name".
(*) Even if this parameter is set, the name that is set in "#12059 SBS_name" is displayed in some cases.
---Setting range---
A combination of alphanumeric characters up to 6 characters in length
Select whether to enable the motion control release (coordinate transformation function).
0: Disable
1: Enable
Specify the offset amount from the machine coordinate zero point to the base workpiece zero point X.
---Setting range---
-99999.999 to 99999.999 (mm)
#12139 SrvAdjst_Tconst Time constant for servo adjustment
#12140 MacVib_Tconst Machine vibration filter time constant
#12144 system name2 part system name 2
#12145 SBS_name2 Sub part system name 2
(PR) #12150 MCR Coord Tr Motion control release (coordinate transformation func tion) valid
(PR) #12391 ref_wk0pt_x Base workpiece zero point X

Specify the unit for data communicated with the servo drive unit.
The data communicated between the NC and servo drive unit, and the servo movement data unit follow this specification.
The standard value is "E"; however, set the optimum value according to the machine model and specifica tions.
B: 1 m
C: 0.1 m
D: 0.01 m (10 nm)
E: 0.001 m (1 nm)
F: 0.0001 m (0.1 nm)
Set each axis' name with an alphabetic character.
Use the characters X, Y, Z, U, V, W, A, B or C.
(Note 1) Do not set the same name twice in one part system.
The same name which is used in another part system can be set.
(Note 2) The PLC name does not need to be set. (Numbers 1 to 8 are shown as the axis names.)
(Note 3) "H" can be specified only with L system.
---Setting range---
X, Y, Z, U, V, W, A, B, C or H
Set the axis name when commanding an incremental value for the axis travel amount.
(Note 1) Set an alphabet that is different from that of "#1013 axname".
(Note 2) Setting is not required if absolute/incremental specification with axis names is not performed ("#1076 AbsInc" = "0").
---Setting range---
X, Y, Z, U, V, W, A, B, C or H
Set the minimum increment of program travel command.
<Travel amount for travel command 1>
0: Follow "#1003 iunit"
1: 0.0001 mm (0.1 m)
10: 0.001 mm (1 m)
100: 0.01 mm (10 m)
1000: 0.1 mm (100 m)
10000: 1.0 mm
If there is a decimal point in travel command, the decimal point position will be handled as 1 (mm) regardless of this setting.
Select whether the axis is a rotary axis or linear axis.
When rotary axis is set, the axis will be controlled with the rotary axis's coordinate system. Set the rotary axis type with "#8213 Rotation axis type".
0: Linear axis
1: Rotary axis
Select the direction of the motor rotation to the command direction.
0: Clockwise (looking from motor shaft) with the forward rotation command
1: Counterclockwise (looking from motor shaft) with the forward rotation command
(PR) #1010 srvunit Output unit (servo)
(PR) #1013 axname Axis name
(PR) #1014 incax Incremental command axis name
(PR) #1015 cunit Program command unit
(PR) #1017 rot Rotational axis
(PR) #1018 ccw Motor CCW

Select the command method of program travel amount.
When the travel amount is commanded with the diameter dimensions, the travel distance will be 5mm when the command is 10mm of travel distance.
The travel amount per pulse will also be halved during manual pulse feed.
If diameter is selected, tool length, the wear compensation amount, and the workpiece coordinate offset will be displayed in diameter value. Other parameters concerning length will always be displayed in radius value.
0: Command with travel amount
1: Command with diameter dimension
Select "1" when using the spindle for contour control of NC axis (C-axis).
Select "2" to implement the spindle-mode rotary axis control.
0: Servo axis is used for contour control.
1: Spindle is used for contour control.
2: Spindle-mode rotary axis control.
Using a 4-digit number, set the drive unit interface channel No. and which axis in that channel is to be used

when connecting a servo drive unit.
Set the name of the axis displayed on the screen with two characters. (X1, Z2, etc.)
Always use an alphabetic character (A to Z) for the first character.
---Setting range---
A to Z and 1 to 9 (Two digits)
(Setting is cleared when "0" is set)
Set the axis name for issuing a command to this axis during mixed control (cross axis control).
---Setting range---
A to Z
(Setting is cleared when "0" is set)
Set the axis name for issuing an incremental command to this axis during mixed control (cross axis control).
---Setting range---
A to Z
(Setting is cleared when "0" is set)
Select whether to update the absolute position data during automatic handle interrupt.
This parameter is enabled only when "#1145 I_abs" is set to "1".
0: Do not update (coordinate system shifted the amount of the interruption)
1: Update (same coordinates as when interrupt did not occur will be applied)
(PR) #1019 dia Diameter specification axis
(PR) #1020 sp_ax Spindle interpolation
(PR) #1021 mcp_no Drive unit I/F channel No. (servo)
(PR) #1022 axname2 2nd axis name
(PR) #1023 crsadr Command address during mixed control (cross axis
control)
(PR) #1024 crsinc Incremental command address during mixed control
(cross axis control)
(PR) #1061 intabs Manual ABS updating
Axis No.
Not used (Set to "0")
Drive unit interface channel No.

Select whether the tool length compensation and wear compensation are enabled during T command exe cution.
0: Tool length compensation enable Wear compensation enable
1: Tool length compensation enable Wear compensation disable
2: Tool length compensation disable Wear compensation enable
3: Tool length compensation disable Wear compensation disable
Select the manual reference position return method for the second return (after the coordinate system is es tablished) and later.
The initial reference position return after the power ON is performed with dog-type return, and the coordinate
system will be established.
(This setting is not required when the absolute position detection is used.)
0: High speed return
1: Dog-type
Select whether to correct the error when the servo is OFF.
0: Not correct the error
The command value will not change during servo OFF, and the movement amount during servo OFF will
be handled as droop. When the servo is turned ON the next time, the axis will move to the command
position where it used to be when the servo was turned OFF.
1: Correct the error
The command value and the current position will follow the feedback position. When the servo is turned
ON the next time, the axis will not move.
During servo READY OFF, the operation will be always the same as of "Correct the error". (The current po sition will follow the position of the axis.)
Set the axis number of the slave axis in synchronous control.
The axis number is an NC number excluding the spindle and PLC axis.
Two or more slave axis cannot be set for one master axis.
This parameter cannot be set for a slave axis.
When using the multi-part system, the relation of the master axis and slave axis cannot extend over part sys tems.
You cannot set the No. of the axis targeted for the multiple axis synchronization control.
You cannot set this parameter for the axis targeted for the multiple axis synchronization control.
0: No slave axis
1 to 32: 1st to 32nd axis
Select whether to display the axis counter or not.
This setting is enabled on the counter display screen (relative position counter, etc.).
0: Display
1: Not display
Select whether to enable or disable axis removal control.
0: Disable
1: Enable
Select the chopping axis.
0: Non-chopping axis
1: Chopping axis
#1062 T_cmp Tool compensation function
#1063 mandog Manual dog-type
(PR) #1064 svof Error correction
(PR) #1068 slavno Slave axis number
#1069 no_dsp Axis with no counter display
#1070 axoff Axis removal
#1072 chop_ax Chopping axis

0: Master axis and slave axis determine their zero points individually.
1: The zero points of both master and slave axes are determined by initializing the master axis' zero point.
The slave axis moves in perfect synchronization with the master axis.
Set this to "1" for speed/current command synchronization control.

Set this in order to change the axis order of counter display.
If this is set, the axes will be displayed in ascending order.
However, axis whose setting is "0" will be displayed after axes whose settings are between "1" and "16" are displayed.
(Note 1) When the same value is set for more than one axis, axis that is displayed on the left side on the parameter screen will be first displayed.
(Note 2) When both of the mixed control (cross axis control) and interchange coordinate position display ("1280 ext16/bit2" OFF) are valid, and when there are two or more valid part systems, this parameter will be ignored.
(Note 3) When the arbitrary axis exchange control (option) is ON, and when there are two or more valid part systems, this parameter will be ignored.
---Setting range---
0: The axis is displayed after the axes whose settings are between "1" and "16" are displayed.
1 to 16: Axes are displayed in ascending order.
If the number other than "1" to "16" is set, it is dealt as "0" setting.
Select the axis travel direction in the 2D graphic drawing (trace, check).
If set to 1, the positive/negative directions are reversed.
---Setting range---
0/1
Specify the sub axis for the simple synchronous control using its NC axis number.
This parameter can be set for the master axis and the slave axis of the synchronous control, because the axes act as main axis of the simple synchronous control.
Before setting this parameter, set the synchronous control parameter (#1068 slavno) first, and then turn OFF and ON the power.
The sub axis number must be greater than that of the main axis of the same part system.
Neither a spindle C-axis nor a PLC indexing axis can be designated as main or sub axis.
---Setting range---
0: No sub axis
1 to 32: 1st axis to 32nd axis
Specify the second letter of command axis name when the axis name extension parameter is valid (#1266 ext02/bit0 = 1).
The command axis name is not extended if this parameter is unspecified, and the only one letter set in "#1013 axname" or "#1014 incax" respectively is the absolute command axis name or incremental command axis name.
Axis configuration should not be as the non-name extension axis (1-letter axis) after the name extension axis (2-letter axis) in the part system.
(Configure the 2-letter axis after the 1-letter axis)
---Setting range---
A to Z (Setting is cleared when "0" is set)
Specify the PLC I/F device assignment No. for the axis.
---Setting range---
0: No designation for assignment
1 to 32: Axis device assignment No.
(PR) #1493 ref_syn Synchronization at zero point initialization
(PR) #1494 dsp_ax_change Axis order of counter display
(PR) #1495 grf_ax_direction Axis travel direction in 2D graphic
(PR) #1497 sync_sub Sub axis number
(PR) #1601 axnameEx Axis name extension letter
(PR) #1603 PLCdev_no Axis device assignment No.

Specify the machine group No. to which each axis belongs.
---Setting range---
0 to 32
(PR) #1605 mgrnum Machine group No.

Not used. Set to "0".
Select the number of spindles.
0: No spindle
1 to 8: One to eight spindles
(Note) The setting range differs according to the model.
Select the unit system for setting and display regarding machine parameter and PLC interface's position, length and speed.
0: Metric system
1: Inch system
Select the unit system for the program travel amount when the power is turned ON or reset and for position display.
0: Metric system
1: Inch system
(Note) The units of the following data are converted by "#1041 I_inch".
- Command unit at power ON and reset (Inch/metric command mode)
But under the following conditions, the unit will follow G20/G21 command modal even at reset.
When reset modal is retained ("#1151 rstint"="0")
When G code group 06 reset modal is retained ("#1210 RstGmd/bit5" ON)
- Unit system for position display (counter, user parameter, tool, work offset)
- User parameter I/O unit
- Parameter unit of user parameters concerning length and speed
- Arc error parameter (#1084 RadErr)
Select the unit system for the commands to the PLC axis.
0: Metric system
1: Inch system
#1038 plcsel Ladder selection

(PR) #1039 spinno Number of spindles
(PR) #1040 M_inch Constant input (inch)
(PR) #1041 I_inch Initial state (inch)
(PR) #1042 pcinch PLC axis command (inch)

Select the display language.
0: English
1: Japanese
11: German
12: French
13: Italian
14: Spanish
15: Traditional Chinese
16: Korean
17: Portuguese
18: Dutch
19: Swedish
20: Hungarian
21: Polish
22: Simplified Chinese
23: Russian
24: Turkish
25: Czech
31: Indonesian
32: Vietnamese
(Note) NC displays in English, when it doesn't equip language option.
Set the number of MR-J2-CTs connected.
(Note) The number of MR-J2-CTs possible to connect and setting range are different according to the model.
Check the specifications of each series.
Specify the number of NSK megatorque motors connected. When a value other than 0 is specified, 2nd mis cellaneous function data is output as signed binary data.
---Setting range---
0 to 16
Set this parameter to 1 when you use the L system's tool compensation type (e.g. when using a turning tool)
in the M system.
0: Use the compensation type specified by "#1037 cmdtyp"
1: Use the tool compensation type III, irrespective of "#1037 cmdtyp"
(Note that the type is not switched to III on the tool measurement screen.)
Select the part system for which you enable the program format switch.
0: Part system 1 (default)
1: Part system 1
2: Part system 2
If G188 is given to any other part system, a program error (P29) occurs. If PFCHR is turned ON in any other
part system, it is ignored.
0: Tool compensation memory separate for part systems
1: Tool compensation memory common for part systems
#1043 lang Select language displayed
(PR) #1044 auxno MR-J2-CT Connections
(PR) #1045 nskno Megatorgue motor connections
(PR) #1046 T-ofs disp type Tool compensation display type switch (for M system
only)
(PR) #1047 G_Chg_En_Sno Select program format switch-enabled part system
(PR) #1051 MemTol Tool compensation memory common for part systems

0: Common variables common for part systems (number fixed)
#100 -: Per part system
#500 -: Common for part systems
1: Common variables common for part systems (number designation)
#100 -: Designate with V1comN
#500 -: Designate with V0comN
(Note 1) When this parameter is changed, the file system will be changed after the power is turned ON.
So always execute format.
The new format will be enabled after turning the power ON again.
Setting order
(1) MemVal changeover -> (2) Turn power ON again -> (3) Format -> (4) Turn power ON again
(Note 2) When this parameter is set to "1", #900000 to #907399 are not available even if the number of com mon variables is 8000.
Select which screen should be displayed while the image input expansion card is connected.
When no image expansion card is connected, the Mitsubishi Electric standard screen will be displayed re gardless of the setting of this parameter.
0: Always displays the Mitsubishi Electric standard screen
1: Always displays the screen sent from IPC
2: Screen can be switched with a PLC signal (displays the Mitsubishi Electric standard screen at power up)
3: Screen can be switched with a PLC signal (displays the screen sent from IPC at power up)
4: Screen can be switched with a PLC signal (partial display of either the screen sent from IPC or the video
from the camera at power up)
Select whether the incremental command of the diameter specification axis ("#1019 dia" is set to "1") uses
the diameter value or radius value.
0: Diameter value
1: Radius value
Select the increment of position commands that do not have a decimal point.
0: Minimum input command unit (follows "#1015 cunit")
1: 1mm (or 1inch) unit (For the dwell time, 1s unit is used.)
Select the F command method.
0: Direct numerical command (command feedrate during feed per minute or rotation)

1: 1-digit code command (feedrate set with "#1185 spd_F1" to "#1189 spd_F5")
Select a fixed cycle hole drilling axis.
0: Use an axis vertical to the selected plane as hole drilling axis.
1: Use the Z axis as the hole drilling axis regardless of the selected plane.
Select the G code priority relationship during the macro call with G command.
0: Priority is on G code used in the system
1: Priority is on registered G code for call
(PR) #1052 MemVal No. of common variables shared in part system desig nation
(PR) #1057 disp_input Selection of screen for Image input I/F
#1077 radius Incremental command for diameter specification axis
#1078 Decpt2 Decimal point type 2
#1079 F1digt Validate F1 digit
#1080 Dril_Z Drilling Z fixed
#1081 Gmac_P Give priority to G code parameter

Select the type of geometric to use.
0: Not use
1: Use only geometric I
2: Use geometric I and IB
With geometric, specific address codes are used for exclusive meanings. Thus, if A or C is used for the axis name or 2nd miscellaneous command code, the A used for the axis name may function as the geometric's angle designation. Pay special attention to axis names, etc., when using this function.
Set the tolerable error range when the end point deviates from the center coordinate in the circular command.
---Setting range---
0 to 1.000 (mm)
Select how to handle the surface speed for the G00 command when using the constant surface speed control function.
0: Calculate the surface speed constantly even during G00 movement
1: Calculate the surface speed at the block end point in the G00 command
Select how to handle the soft limit during G30 (2nd reference position return).
0: Enable
1: Disable
Select how to handle the middle point during G28 and G30 reference position return.
0: Pass the middle point designated in the program and move to the reference position.
1: Ignore the middle point designated in the program and move straight to the reference position.
Select the movement of the additional axis at the tool change position return command.
0: The additional axis will not move
1: After the standard axis returns, the additional axis will also return to the tool change position
Select the timing of synchronization between part systems when using the multi-part system.
When the travel command is found in the synchronization command (!, M) block:
0: Synchronize before executing travel command
1: Synchronize after executing travel command
Select whether to count the data units to be used for single block operation when using the tool life manage ment II function (L system).
0: Not count
1: Count
Select how to handle TF for T00 command.
0: TF will be output
1: TF wont be output
#1082 Geomet Geometric
#1084 RadErr Arc error
#1087 G96_G0 Constant surface speed control by rapid traverse feed command
#1088 G30SL Disable G30 soft limit
#1091 Mpoint Ignore middle point
#1092 Tchg _A Replace tools for additional axis
#1093 Wmvfin Synchronization between part systems method
#1094 Tl_SBK Select life count for single block (for L system only)
#1095 T0tfof TF output (for L system only)

Select the tool life management type.
1: Life management I
The cutting hours or number of cuttings of the tool that is commanded in the program is accumulated to monitor the usage state.
2: Life management II
The same as tool life management I, but with the spare tool selection function.
A spare tool is selected from a group of tool commands commanded in the program.
Tool compensations (tool length and radius compensations) are carried out for the selected tool.
3: Life management III (for M system only)
The cutting hours or number of cuttings of the tool that is commanded in the program is accumulated to monitor the usage state.
The group No. is not used to manage the tool life.
(Note) When "3" is set for the L system, the tool life management I is selected.
Select the number of digits for an offset No. in command T.
0: Lower two digits of command T serve as an offset No.; the remaining upper digits as a tool No.
1: Lower one digit of command T serves as an offset No.; the remaining upper digits as a tool No.
2: Lower two digits of command T serve as an offset No., the remaining upper digits as a tool No.
3: Lower three digits of command T serve as an offset No.; the remaining upper digits as a tool No.
Select the number of digits of the tool length compensation No. in the T command.
0: Lower 3 digits in T code serve as a tool length and wear offset Nos.; the remaining upper digits as a tool No.
1: Lower 3 digits in T code serve as a tool wear offset No.; the remaining upper digits as a tool No. and tool length offset No.

Select how to handle the tool compensation vector when resetting the system.
0: Clear the tool length and wear compensation vectors when resetting
1: Hold the tool length and wear compensation vectors when resetting
When the values are cleared, the compensation will not be applied. So the axis will be shifted by the com pensation amount in the next compensation operation.
When the values are kept, the compensation will be applied, so the axis will shift the differential amount of
the compensation amount in the next compensation operation.
Select when to perform tool length compensation and wear compensation.
0: Compensate when T command is executed.
1: Superimpose and compensate with the travel command in the block where the T command is located.
If there is no travel command in the same block, compensation will be executed after the travel command
is superimposed in the next travel command block.
2: Compensate the wear amount when the T command is executed. Superimpose and compensate the
tool length compensation amount with the travel command in the same block. If there is no travel com mand in the same block, compensation will be executed after the travel command is superimposed in
the next travel command block.
Select the type of travel command when "#1100 Tmove" is set to "1" or "2".
0: Compensate regardless of the travel command type (absolute or incremental)
1: Compensate only at the travel command in the absolute command
Select whether to use the tool life management.
0: Not use tool life management.
1: Use tool life management.
(PR) #1096 T_Ltyp Tool life management type
#1097 Tldigt Tool offset No. digits selection
#1098 Tlno. Tool length offset number
#1099 Treset Cancel tool compensation amount
#1100 Tmove Tool compensation
#1101 Tabsmv Tool compensation method
#1103 T_Life Validate life management

Select how to handle the tool command in the program when "#1103 T_Life" is set to "1".
0: Handle the command as group No.
1: Handle the command as tool No.
(Note) In the case of the tool life management III, the program tool command will be handled as the tool No.
regardless of the setting.
Select the tool selection method when "#1103 T_Life" is set to "1".
0: Select in order of registered No. from the tools used in the same group.
1: Select the tool with the longest remaining life from the tools used or unused in the same group.
Select the input method when address N is omitted in inputting the data (G10 L3 command) for tool life man agement function II.
0: Time specified input
1: Number of times specified input
Set the number of groups to be displayed on the tool life management II (L system) screen.
0: Displayed group count 1, maximum number of registered tools: 16
1: Displayed group count 2, maximum number of registered tools: 8
2: Displayed group count 4, maximum number of registered tools: 4
Set the M code for tool life management II (L system) re-count.
---Setting range---
0 to 99
Select the enable conditions for the user macro interrupt signal (UIT).
0: Enable when interrupt signal (UIT) turns ON
1: Enable when interrupt signal (UIT) is ON
Select the performance after user macro interrupt signal (UIT) input.
0: Execute interrupt program without waiting for block being executed to end
1: Execute interrupt program after completing block being executed
Select whether to clear statements other than specified arguments by macro call.
Also select whether to clear local variables by power-ON and resetting.
0: Clear the non-specified arguments by macro call.
1: Hold non-specified arguments by macro call
2: Hold non-specified arguments by macro call, and clear local variables by power-ON and resetting
Set the number of waits for retract when chamfering is OFF in thread cutting.
---Setting range---
0 to 99 (Approx. 4 ms)
Standard setting value: 4
Enable this function when disabling the soft limit check function at the second to fourth reference position
return.
0: Enable soft limit function
1: Disable soft limit function
#1104 T_Com2 Tool command method 2
#1105 T_sel2 Tool selection method 2
#1106 Tcount Life management (for L system only)
#1107 Tllfsc Split life management display screen (for L system on ly)
#1108 TlrectM Life management re-count M code (for L system only)
(PR) #1112 S_TRG Validate status trigger method
(PR) #1113 INT_2 Validate interrupt method type 2
#1114 mcrint Macro argument initialization
#1115 thwait Waiting for retract
#1116 G30SLM Invalidate soft limit (manual operation)

Not used.
Select one of the following two methods:
- Set the current length of tools on each facing turret.
- Set a value, assuming that the tools on each facing turret are in the same direction as that of those on the
base turret.
0: Current length of the tools on each facing turret

1: Value, assuming that the tools on each facing turret are in the same direction as that of those on the
base turret
Select whether to enable the mirror image of each facing turret with the T command.
0: Disable
1: Enable
Select whether to change the macro variable (tool offset) numbers for shape compensation and wear com pensation.
0: Not change (Conventional specification)
1: Change the shape and wear compensation variable numbers each for X, Z, and R
Specify whether to prohibit editing of program Nos. 9000 to 9999.
0: Editing possible
1: Editing prohibited
(Note) If "#1122 pglk_c" is set to "1" or "2", "1" will be set in "#1121 edlk_c" when the power is turned ON.
The display and search of program Nos. 9000 to 9999 can be prohibited.
Specify whether to prohibit display and search.
0: Display and search is possible.
1: Program details are not displayed.
2: Program details are not displayed, and operation/restart search is prohibited.
The program details will not be displayed, but the program No. and sequence No. will display in the prohibited
state.
(Note) If "#1122 pglk_c" is set to "1" or "2", "1" will be set in "#1121 edlk_c" when the power is turned ON.
Select whether to use the origin set function.
0: Use
1: Not use
Select how to handle the compensation No. when the input key is pressed on the tool compensation screen.
0: Increment the compensation No. by 1 (Same as general parameters)
1: # compensation No. does not change
When setting in sequence, "0" is handier.
When changing and setting repeatedly while adjusting one compensation value, "1" is handier.
(Note) When base common parameter "#1759 cfgPR09/bit1" is set to "1", the cursor does not move regard less of this parameter setting.
Select the feedrate display on the monitor screen.
0: Command speed
1: Actual travel feedrate
(PR) #1117 H_sens
#1118 mirr_A Select how to set up the length of tools on cutter tables
(opposed tables) (for L system only)
#1119 Tmiron Select the mirror image of each facing turret with T com mand (for L system only)
(PR) #1120 TofVal Change macro variable
#1121 edlk_c Edit lock C
(PR) #1122 pglk_c Program display lock C
#1123 origin Origin set prohibit
#1124 ofsfix Fix tool compensation No.
#1125 real_f Actual feedrate display

Select the method to command the playback travel amount in the playback editing.
0: Incremental value
1: Absolute value
Select the alignment for printing out with the DPRINT function.
0: No alignment, output s printed with left justification
1: Align the minimum digit and output
Select how to handle the common variables when resetting.
0: Common variables won't change after resetting.
1: Common variables will be cleared #100 to #199 by resetting.
Select how to handle the common variables when the power is turned ON.
0: The common variables are in the same state as before turning the power OFF.
1: Common variables will be cleared #100 to #199 when the power is turned ON.
Select the tool command value display on the monitor screen.
0: Display T-modal value of program command
1: Display Tool No. sent from PLC
Select the brightness of display unit.
1: High brightness (in bright state)
0: Medium brightness
-1: Low brightness (in dim state)
(*) This parameter is enabled for M800VW/M80VW/M800VS/M80V Series.
Not used. Set to "0".
Not used. Set to "0".
Set the unit name.
Use 4 or less characters consisting of both alphabets and numbers.
If "0" is set, the unit name won't be displayed.
---Setting range---
4 or less characters consisting of both alphabets and numbers
Not used. Set to "0".
Not used. Set to "0".
Not used. Set to "0".
Not used. Set to "0".
Set the first number of M code that corresponds to the setup Nos. from 100 to 199.
---Setting range---
0 to 99999999
#1126 PB_G90 Playback G90
#1127 DPRINT DPRINT alignment
#1128 RstVCl Clear variables by resetting
#1129 PwrVCl Clear variables by power-ON
#1130 set_t Display selected tool number
#1132 brightness Brightness control
#1133 ofsmem
#1134 LCDneg

#1135 unt_nm Unit name
#1136 optype
#1137 Cntsel
#1138 Pnosel
#1139 edtype
#1140 Mn100 M code number

Set the first number of M code that corresponds to the setup Nos. from 200 to 299.
---Setting range---
0 to 99999999
Set the first number of M code that corresponds to the setup Nos. from 300 to 399.
---Setting range---
0 to 99999999
Set the first number of M code that corresponds to the setup Nos. from 400 to 499.
---Setting range---
0 to 99999999
Select whether to enable MDI setting in non-MDI mode.
0: Disable MDI setting
1: Enable MDI setting
Select how to handle the absolute position data during automatic handle interrupt.
0: Absolute position data will be renewed if manual ABS switch is ON. If it is OFF, data won't be renewed.
1: Follow the "intabs" state when "#1061 intabs" is enabled
Select how to handle the spindle rotation speed clamp function with the G92/G50S command.
0: G92/G50S command is handled as a clamp command only in the G96 state (during constant surface speed control).
G92S will be handled as normal S command in G97 state (constant surface speed OFF).
1: The S command in the same block as G92/G50 is constantly handled as a clamp command
Specify the type of spindle min. rotation speed clamp value.
0: Rotation speed setting
1: Output voltage coefficient setting
Set "#3023 smini" according to this type setting.
Select whether to decelerate at the arc entrance or exit.
0: Not decelerate
1: Decelerate
Select whether to perform a deceleration check or in-position check at the hole bottom in a hole drilling cycle.
This parameter is enabled only for a hole drilling cycle in which no dwell command can be issued at the hole bottom.
0: Perform no deceleration check and in-position check
1: Perform deceleration check
2: Perform in-position check
Not used. Set to "0".
Not used. Set to "100".
Not used. Set to "100".
#1141 Mn200 M code number
#1142 Mn300 M code number
#1143 Mn400 M code number
#1144 mdlkof MDI setup lock
#1145 I_abs Manual ABS parameter
#1146 Sclamp Spindle rotation speed clamp function
#1147 smin_V Minimum spindle rotation speed clamp type
#1149 cireft Arc deceleration speed change
#1153 FixbDc Hole bottom deceleration check
(PR) #1154 pdoor
#1155 DOOR_m
#1156 DOOR_s

Not used. Set to "0".
Not used. Set to "0".
Select whether to enable or disable RIO connection detection.
0: Enable
1: Disable
If your I/O consists of only cards such as CC-LINK, setting this parameter to "1" will avoid the RIO commu nication cutoff alarm.
Select whether to enable or disable the automatic tuning function.
0: Disable
1: Enable
(Note 1) Enable this parameter when using MS Configurator.
(Note 2) Disable this parameter during normal operation.
(Note 3) Search & start function is disabled for safety when this parameter is set to "1".
Select the type of programs handled on the Edit/Program list/Data in/out screen from the following: general programs, fixed cycles, or machine tool builder macro programs.
When Machine tool builder macro password management method type 1 is selected ("#1761 cfgPR11/bit6" = 0)
0: General programs can be edited, etc.
1: Fixed cycles can be edited, etc.
Password No.: The machine tool builder macro programs can be edited, etc.
When Machine tool builder macro password management method type 2 is selected ("#1761 cfgPR11/bit6" = 1)
0: General programs can be edited, etc.
1: Fixed cycles can be edited, etc.
2: Machine tool builder macro programs can be edited, etc.
(*) "2" can be set only when a password is authenticated in "#11796 mmacpro".
---Setting range---

0 to 99999999
Not used. Set to "0".
Select the test mode for the control unit.
In the test mode, test is performed with a hypothetical reference position return complete even though the real reference position return hasn't been completed. This is limited to test operation of the control unit itself, and must not be used when the machine is connected.
0: Normal operation mode
1: Test mode
Not used. Set to "0".
#1157 F0atrn
#1158 F0atno
(PR) #1163 No rio RIO connection detection invalid
(PR) #1164 ATS Automatic tuning function
#1166 fixpro Fixed cycle editing
#1167 e2rom
#1168 test Simulation test
#1217 aux01

bit3: Parameter input/output format
Select the parameter input/output format.
0: Type I
Displayed on one line per parameter.
(Example)
N1001T1P1
N1001T2P1
N1001T3P0
1: Type II
Data with the same parameter number is displayed on the same line.
(Example)
N1001 T1 P1 T2 P1 T3 P0
bit4: External workpiece coordinate offset tool number selection
Select the R register that contains the tool number used for automatic calculation when measuring the coor dinate offset of an external workpiece.
0: Follow the setting of "#1130 set_t".
1: Use the tool number indicated by user PLC.
bit5: Parameter I/O II spindle specification address
Select the spindle specification address of parameter I/O type II.
0: C
1: T
This parameter is also applied to the spindle specification address for input and verification.
(Note) This parameter is valid only for parameter I/O type II (when "#1218 aux02/bit3" is set to "1").
#1218 aux02

bit1: Stop high-speed PC monitoring function
Set "1" to disable the function that triggers the emergency stop when the PC high-speed processing time is extended.
Disable the monitoring function only as a temporary measure.
bit5: Dog-type intermediate point
Select whether to move to the intermediate point during automatic dog-type reference position return.
0: Not move.
1: Move.
bit7: Time constant setting changeover for soft acceleration/deceleration
0: Accelerating time is G0tL(G1tL).
When the G00 pre-interpolation acceleration/deceleration and the soft acceleration/deceleration are used together, the inclination of soft acceleration/deceleration will be steeper by setting a time to the soft acceleration/deceleration 2nd step time constant (#2005 G0t1). Consequently, the acceleration for G28/G30 will be larger than that for G00.
(1) Total accelerating time is "G0tL".
(2) The time for curve part is "G0t1".
(3) The time for linear part is obtained by "G0tL-(2 x G0t1)".
1: Accelerating time is obtained by G0tL+G0t1 (G1tL+G1t1).
When the G00 pre-interpolation acceleration/deceleration and the soft acceleration/deceleration are used together, you can attain the G28/G30 acceleration that is equal to G00, by setting the same value to G00 soft acceleration/deceleration filter (#1569 SfiltG0) as well as to the soft acceleration/deceleration 2nd step time constant (#2005 G0t1).
(1) Total accelerating time is obtained by "G0tL+G0t1".
(2) The time for curve part is "G0t1".
(3) The time for linear part is obtained by "G0tL-G0t1".
#1219 aux03
t
t
G0tL - G0t1
G0tL
G0t1 G0t1
Speed
Acceleration
G0tL
G0tL + G0t1
G0t1 G0t1
t
t
Acceleration
Speed

bit0: Tool life check timing selection
Select the criterion to judge the end of tool life when the cumulative number of cuttings is incremented in tool
life management II.
0: Determine the tool life end when the incremented cumulative number of cuttings has exceeded the esti mated number of cuttings. (Default)
(cumulative number of cuttings > estimated number of cuttings)
1: Determine the tool life end when the incremented cumulative number of cuttings has reached the esti mated number of cuttings.
(cumulative number of cuttings >= estimated number of cuttings)
bit0: Workpiece coordinate/ Absolute coordinate display switching (for L system only)
Select the coordinate to display when workpiece coordinate position counter is selected for the Monitor
screen counter display.
0: Workpiece coordinate
1: Absolute coordinate
bit3: Enable setup parameter lock
Select whether to enable the setup parameter lock.
0: Disable
1: Enable
bit4: Minimum cut-in amount selection
Select the minimum cut-in amount command value for the compound thread cutting cycle (G76 command).
0: The minimum cut-in amount (Q) will be "0".
1: The minimum cut-in amount (Q) will be set in the last command value (it is retained even after the NC
power has been turned off).
bit5: Fixed cycle for compound lathe command format check selection
Select the operation when the 1st block of the fixed cycle for compound lathe is omitted while the conven tional format is selected ("#1265 ext01/bit0" is set to "0").
0: Program error (P33) will occur.
1: Parameter setting value will be used.
bit7: Reference position return deceleration check method
Select the deceleration check method to be used during automatic reference position return.
0: In-position check
1: Commanded deceleration check
#1220 aux04 (for L system only)
#1221 aux05
#1222 aux06

bit1: Deceleration check method 2
Select the deceleration check method in G1+G9.
0: Command deceleration check in G1+G9
1: In-position check in G1+G9
The deceleration check is not performed for the commands except G1+G9.
When "#1306 InpsTyp deceleration check specification type" is set to "1" (Deceleration check specification
type 2), this parameter will be invalid.
bit2: Synchronous tap R-point in-position check
Select whether to enable the synchronous tap I-point -> R-point in-position check.
0: Disable
1: Enable
(Note) This parameter is valid only when "1" (Enable in-position check) is set for "#1223 aux07/bit3 Synchro nous tap in-position check improvement".
bit3: Synchronous tap in-position check improvement
Select whether to enable the synchronous tap in-position check improvement.
0: Disable
1: Enable
Related parameters:
#1223/bit2 Synchronous tap R-point in-position check
#1223/bit4 Synchronous tap hole bottom in-position check
#1223/bit5 Synchronous tap R-point in-position check 2
bit4: Synchronous tap hole bottom in-position check
Select whether to enable the synchronous tap hole bottom in-position check.
0: Disable
1: Enable
(Note) This parameter is valid only when "1" (Enable in-position check) is set for "#1223 aux07/bit3 Synchro nous tap in-position check improvement".
bit5: Synchronous tap R-point in-position check 2
Select whether to enable the synchronous tap R-point in-position check.
0: Disable
1: Enable
(Note) This parameter is valid only when "1" (Enable in-position check) is set for "#1223 aux07/bit3 Synchro nous tap in-position check improvement".
bit6: Cancel synchronous tap (, S) return
0: Retain the spindle speed (,S) in synchronous tap return
1: Cancel the spindle speed (,S) in synchronous tap return with G80
bit7: Synchronous tap method
Specify a synchronous tap method.
0: Synchronous tap with multi-step acceleration deceleration
1: Conventional type synchronous tap
bit0: Sampling data output
Select whether to enable the sampling data output.
0: Disable
1: Enable
#1223 aux07
#1224 aux08

bit7: Enable/disable spindle rotation speed clamp

Select whether to enable the spindle rotation speed clamp by the G92 S or Q command for the spindle com mand rotation speed (R7000) set with the user ladder.
0: Enable
1: Disable
bit0: Tool compensation data for external workpiece coordinate offset measurement
Select the tool compensation data to be used for external workpiece coordinate offset measurement.
0: Tool length data and tool nose wear data
1: Tool length data
bit1: Optional block skip type
Select whether to enable the optional block skip in the middle of a block.
0: Enable only at the beginning of a block.
1: Enable in the middle of a block, as well as at the beginning of the block.
Note that a slash "/" in an equation between [ ] is handled as division operator.
(Note) This parameter is enabled when "#1274 ext10/bit4" is "0".
bit2: Single block stop timing
Select the timing at which the "Single block" signal is activated.
0: When the signal goes ON while automatic operation is starting, the block will stop after finished.
1: When the signal is ON at the end of the block, the block will stop.
bit3: C-axis reference position return type
Select the C-axis reference position return type.
0: Basic position return is performed by the G28 reference position return command or by activating the
manual reference position return. The basic point dog is used.
1: When the first C-axis command is issued after the C-axis mode is entered in automatic mode, reference
position return is performed before the execution of the block. The reference position return is also per formed by the G28 reference position return command or by activating the manual reference position
return. The Z phase of the encoder is used.
bit4: S command during constant surface speed
Select whether to output a strobe signal when the S command is issued in constant surface speed mode.
0: Not output any strobe signal in constant surface speed mode.
1: Output strobe signals in constant surface speed mode.
bit5: Arbitrary allocation of dog signal
Select whether to enable the arbitrary allocation parameter for "Reference position return near-point detec tion" signal and "Stroke end" signal.
0: Disable (Fixed device is used.)
1: Enable (Device is specified by the parameter.)
bit7: Shorten JOG stop time
Specify whether to shorten the JOG stop time.
0: Do not shorten the JOG stop time. (Same as before)
1: Shorten the JOG stop time.
#1225 aux09
#1226 aux10

bit0: Select PLC signal or spindle feedrate attained
Set up this option when disabling the cutting start interlock by spindle feedrate attained.
0: Cutting start interlock by PLC signal
1: Cutting start interlock by spindle feedrate attained
bit1: Select H or D code
Set up this option to validate the data that is set up on the tool life management screen when issuing the H99
or D99 command.
0: The H and D codes validate the data that is set up on the management setup screen.
1: Validates the data that is set up on the management setup screen when issuing the H99 or D99 com mand.
bit2: Measures against tool setter chattering
Select a condition where a relieving operation completes after measurement with tools.
0: Sensor signals have stopped for 500 (ms) or longer.
1: 100 (m) or longer has passed after sensor signals stopped.
bit4: Word command check
Select whether to output an error when no numeric value follows a program address during execution of a
machining program.
0: Not check
1: Check
bit5: Spindle rotation speed clamp
Specify whether to clamp the rotation speed in constant surface speed mode when the spindle rotation clamp
command is issued.
0: Clamps the rotation regardless of the constant surface speed mode.
1: Clamps the rotation only in constant surface speed mode.
bit7: Switch the range of tool life data to be input
Set up the range of tool life data to be input or compared.
0: Inputs or compares all of the data output.
1: Inputs or compares part of the data output
(1) Tool life management I data to be input or compared
Tool number (D), lifetime (E), life count (F), and auxiliary data (B).
(2) Tool life management II data to be input or compared
Group number (G), method (M), life (E/F), tool number (D), and compensation number (H)
#1227 aux11

bit0:
When not using, set to "0".
bit1: Switch "offset and parameter" screen
Select to switch the "offset and parameter" screen to the parameter screen.
0: Display the "offset and parameter" screen.
1: Display the "parameter" screen.
bit2: Switch data protection in data transmission mode
Select the range of data protection in data transmission mode.
0: Enable the protection for both send and receive data.
1: Enable the protection for receive data only.

bit3: Nose R specification
Select whether to specify the nose R compensation by shape or wear number.
0: Specifies the nose R compensation by shape number.
1: Specifies the nose R compensation by wear number.
bit4: Select operation error or stop code
Select operation error or stop code to provide for both block start and cutting start interlocks.
0: Operation error
1: Stop code
bit5: Select constant surface speed coordinates (for L system only)
Select the constant surface speed coordinate.
0: Workpiece coordinate
1: Absolute value coordinate
bit6: Switch relative values displayed
Select whether to preset the relative coordinates with workpiece coordinate preset (G92.1) or counter preset
(G92).
0: Preset the relative coordinates.
1: Not preset the relative coordinates.
bit7: Protection with manual value command
Select whether to protect a manual value command.
0: Not protect. (Conventional specification)
1: Protect.
#1228 aux12

bit0: Subprogram interrupt
Select the type of the user macro interrupt.
0: Macro type user macro interrupt
1: Sub-program type user macro interrupt
bit1: Accurate thread cutting E
Select what the address E specifies in inch screw cutting.
0: Number of threads per inch
1: Precision lead
bit2: Radius compensation type B (for M system only)
Select the method of the arithmetic processing for the intersection point when the start-up or cancel com mand is operated during radius compensation.
0: The processing does not handle the start-up or cancel command block: handle the offset vector in the
direction vertical to that of the command instead.
1: The processing is executed for the intersection point between the command block and the next block.
bit2: Nose R compensation type B (for L system only)
Select the method of the arithmetic processing for the intersection point when the start-up or cancel com mands are operated during nose R or radius compensation.
0: The processing does not handle the start-up or cancel command block: handle the offset vector in the
direction vertical to that of the command instead.
1: The processing is executed for the intersection point between the command block and the next block.
bit3: Initial constant surface speed
Select the initial state after the power-ON.
0: Constant surface speed control cancel mode
1: Constant surface speed control mode
bit4: Synchronous tap
Select the operation when ",R" is omitted in G74/G84 tapping cycle.
0: Asynchronous tap
1: Synchronous tap
bit5: Start point alarm
Select the operation when the operation start point cannot be found while executing the next block of G115,
G116 or G117.
0: (G115/G116)Starts after the block has been moved.
(G117)Enables an auxiliary function after the block has been moved.
1: (G115)Waits until reaching start point at the movement after next block when the operation start point is
not found.
(G116/G117)Outputs an program error (P33) when the operation start point is not found.
bit6: Grid display selection
Select the grid display type on the servo monitor screen during the dog type reference position return.
0: Distance between dog OFF and basic point (including a grid mask amount)
1: A value given by reducing a grid mask amount from the distance between dog OFF and basic point
bit7: Command switch during fixed cycle with label O
Select the condition to handle the address E or P given during fixed cycle mode as a command of fixed cycle.
0: When a G-code from group 0, 1, 4, 8 or 11 is not given
1: When a G-code from group 0, 1, 4, 8, 11 or 12 is not given
* This parameter is enabled when "#11009 M2 label O" (Program number label for M2-format) is "1" (Label
O).
#1229 set01

bit2: Proximity switch spindle orientation: Z phase re-detection request type
Select when to request Z phase re-detection for proximity switch type spindle orientation.
0: After confirming the spindle has reached the Z phase detection speed.
1: Right after Servo ON of the spindle.
bit4: Tolerance control mode selection
Select the tolerance control mode. When you give higher priority to the tolerable acceleration rate in the
speed control, set "0". When giving priority to the tolerance, set "1".
0: Give priority to the speed for the tolerable acceleration rate
1: Give priority to the speed for the tolerance
bit7: Macro interface input/output for each part system
Select the specification of the macro interface input/output.
0: Shared by all part systems.
1: Used independently by the part systems.

#1230 set02

bit0: Graphic check compatibility parameter
Select whether to return the data to the pre-starting data after having checked a machining program that re writes the common variables, workpiece offsets and tool offsets.
0: Return the data.
1: Not return the data.
bit1: Switch graphic coordinates
Select whether to use machine coordinate value or tool position coordinate value (position being machined, obtained by subtracting the tool compensation amount from machine coordinate values) for drawing with trace display.
0: Machine coordinates zero point (same as conventional method)
1: Tool position coordinate value
bit2: Switch graphic check trace
Select the coordinates to draw at program check: both machine coordinate value (tool center path) and tool position coordinate value (program path) simultaneously, or only the coordinates selected with "#1231 set03/bit1" (Switch graphic trace coordinates).
0: Both machine coordinates and tool position coordinates (conventional method)
1: Only coordinates designated with switch graphic coordinates
bit4: Switch zero point mark display position
Select the position for displaying the zero point mark in the graphic display.
0: Machine coordinates zero point (same as conventional method)
1: Workpiece coordinate zero point
bit5: Switch graphic check counter display
Select the type of counter displayed on the Graphic Check screen with the combination of "#1231 set03/bit1".
If the drawing coordinate system is other than "all workpiece coordinates", the counter displayed is workpiece coordinate position counter or tool position (workpiece coordinate) regardless of this setting.
0: (When "#1231 set03/bit1" is set to "0") Machine position counter
(When "#1231 set03/bit1" is set to "1") Tool position (machine coordinate) counter
1: (When "#1231 set03/bit1" is set to "0") Workpiece coordinate counter
(When "#1231 set03/bit1" is set to "1") Tool position (workpiece coordinate) counter
bit6: Initialization of drawing in graphic check
Select whether to initialize the workpiece drawing automatically when you change any data in the 3D check workpiece setup screen.
0: Initialize the workpiece drawing (conventional specifications)
1: Not initialize the workpiece drawing
Note that if you change the workpiece shape or dimensions, the workpiece drawing is automatically reset, irrespective of this parameter.
bit7: Disable switching of graphic check method
Select whether to enable or disable switching of the 3D check method.
0: Enable
1: Disable
If you choose Disable, the last selected check method remains selected.
#1231 set03

bit0: Exclude acceleration/deceleration in load monitor
Select whether or not to exclude acceleration/deceleration when detecting the load in load monitoring.
0: Acceleration/Deceleration is included
1: Acceleration/Deceleration is excluded
(Note) When "Exclude acceleration/deceleration in load monitor" ("#1232 set04/bit0") is enabled, "Spindle function 8" ("#13228 SP228/bit2") needs to be set to "1" (load display, high-cycle motor output effective val ue).
bit5: Actual load selection
Load fluctuation due to speed change is excluded from the actual load.
0: Disable
1: Enable
(Note) When "Actual load selection" ("#1232 set04/bit5") is enabled, "Spindle function 8" ("#13228 SP228/bit2") needs to be set to "1" (load display, high-cycle motor output effective value).
bit7: Spindle unit disturbance torque display selection
Select display contents on "estimated disturbance torque" and "MAX disturbance torque" of the drive unit (spindle unit).
0: Estimated disturbance torque
1: Cutting torque
When not using, set to "0".
bit3: Interlock when tap retract enabled
Select whether to enable automatic/manual interlock for the part system with "Tap retract enable" signal ON.
0: Interlock all the axes
1: Disable the interlock
bit4: Tap retract possible state cancel signal operation selection
Specify the behavior after "Tap retract possible" signal (TRVE) is turned OFF with "Tap retract possible state cancel" signal (TRVEC).
0: After reset, "Tap retract possible" signal (TRVE) is turned ON.
1: "Tap retract possible" signal (TRVE) remains OFF state after reset.
#1232 set04
#1233 set05
#1234 set06

bit0: Helical interpolation/Helical involute interpolation speed 2
0: Designated with the resultant velocity of all programmed axes
1: Designated with the velocity component in the plane of the circle/involute
bit2: Fixed type chopping compensation valid only at start

When the fixed type compensation value is selected, the method can be changed to the compensation value
sequential update type after the first four cycles.
0: Disable the method changeover
1: Enable the method changeover
bit4: Condition to select multi-step acceleration/deceleration synch tap gear step
Select the parameters that determine the gear step for multi-step acceleration/deceleration synchronous tap ping ("#1223 aux07/bit7" = 0).
0: #3005 to #3008 (smax1 to 4) when "#1245 set17/bit2" = 0
#43046 to #43049 (smax_tap1 to 4) when "#1245 set17/bit2" = 1
1: #3013 to #3016 (stap1 to 4), #3037 to #3040 (taps21 to 24) and #43046 to #43049 (smax_tap1 to 4)
bit5: Tool wear data clear on tool length measurement (For L system only)
Select whether to clear tool wear data to zero when the tool length is set using [Measure] menu on the [T ofs] screen.
0: Not clear tool wear data to zero
1: Clear tool wear data to zero
(Note) This parameter is invalid for the tool compensation type I or II.
bit0: Manual rotary axis feedrate unit
Select the unit of manual rotary axis feedrate.
0: Fixed to [/min]
1: Same speed as before (When inch command, the speed is the command speed divided by 25.4.)
bit1: Spindle speed detection
Select the pulse input source of actual spindle rotation speed (R6506/R6507) when the spindle encoder se rial connection is selected ("#3025 enc-on" is set to "2").
0: Serial input
1: Encoder input connector
bit2: Current limit droop cancel invalid
Select whether to cancel the position droop when the current limit changeover signal is canceled.
0: Cancel the droop.
1: Not cancel the droop.
bit3: Rotary axis command speed scale
Select to multiply the rotary axis command speed by 10 times.
0: Invalid
1: During initial inching, the rotary axis command speed is multiplied by 10.
In other words, if "F100" is commanded, the speed will be the same as when 1000/min is commanded.
The rotary axis speed display unit will be 10/min.
Not used. Set to "0".
#1235 set07
#1236 set08
(PR) #1237 set09
M800V/M80V Series Alarm/Parameter Manual
15 Machine Parameters
15.3 Base Common Parameters
395 IB-1501623-F
bit0: Switch G36 function
Select the function, the automatic tool length measurement or arc thread cutting (CCW), to be applied to G36
when the G code system 6 or 7 is selected.
0: Automatic tool length measurement
1: Arc thread cutting (CCW)
bit3: Ignoring input from RIO
Select whether to ignore the input from RIO.
0: Output the input from RIO to X or ZR device.
1: Ignore the input from RIO, and not output it to X or ZR device.
(*) Normally set this parameter to "0".
(*) The devices corresponding to the system-occupied stations of RIO3 or operation panel connection chan nel are used exclusively by the NC system. These devices are excluded from the target.
bit6: Switch absolute position detection alarm
Select the output destination of the absolute position detection alarm.
0: NC alarm 4 (AL4)
1: NC alarm 5 (AL5)
(Note) The absolute position detection alarm is listed in the alarm history regardless of this parameter setting.
bit7: Switch operation alarm
Select whether to enable the NC alarm 5 (AL5) signal output.
0: Disable NC alarm 5 (AL5)
All operation alarms will be output to NC alarm 4 (AL4).
1: Enable NC alarm 5 (AL5)
The following operation alarms will be output to NC alarm 5 (AL5), not to NC alarm 4 (AL4).
External interlock axis exists (M01 0004)
Cutting override zero (M01 0102)
External feedrate zero (M01 0103)
Block start interlock (M01 0109)
Cutting block start interlock (M01 0110)
Interference check disabled (M01 0200)
Cutting interlock for spindle-spindle polygon (G51.2) (M01 1033)
The above alarms are not recorded in the alarm history regardless of the setting value of this parameter.
(PR) #1238 set10
M800V/M80V Series Alarm/Parameter Manual
15 Machine Parameters
15.3 Base Common Parameters
IB-1501623-F 396
bit0: Coil switching method
Select the coil switching method.
0: Via PLC. (Y189F)
1: NC internal processing. (Y189F is invalid.)
bit1: Handle I/F selection
Select the handle connection destination.
0: Use the handle connected to the encoder communication connector.
1: Use the remote I/O unit as a priority.
(Note) When the operation panel I/O unit is mounted, the handle connected to the unit will be used regardless
of this parameter setting.
bit3: Polygon machining mode at reset
Select whether to cancel the polygon machining mode when reset is applied.
0: Not cancel.

1: Cancel.
bit4: Invalidate G51.1 phase command
Select whether to enable the phase control with the spindle-spindle polygon function.
0: Always enable. (When R is not commanded, it will be handled as R0.)
1: Enable only at the R command.
bit5: Door interlock spindle speed clamp valid
Select whether to enable the spindle clamp speed changeover by the PLC signal.
0: Disabled
1: Enabled
bit6: External deceleration axis compliance valid
Designate the method for setting the external deceleration speed.
0: Set speed common for all axes ("#1216 extdcc" (external deceleration speed))
1: Set speed for each axis ("#2086 exdcax" (external deceleration speed))
bit0: Handle input pulse
Select the handle input pulse.
0: MITSUBISHI CNC standard handle pulse (25 pulse/rev)
1: Handle 400 pulse (100 pulse/rev)
bit2:Zero point shift amount magnification
If "1" is set, the following magnification will be applied on the #2027 G28sft reference point shift amount,
#2057 zero point proximity + and #2058 zero point proximity - settings.
For 0.1m: 10-fold
For 0.01m: 100-fold
bit4: Optical communication automatic channel detection invalid
Select whether to enable the optical communication automatic channel detection.
0: Enable
1: Disable
(PR) #1239 set11
(PR) #1240 set12

bit0: Prevention of program error due to incorrect G code combination
When a G code from some modal groups is commanded in the same block as an unmodal G code, a program
error due to incorrect G code combination occurs. This parameter is used to avoid this program error.
0: The program error (P45) will occur.
1: The program error is avoided, however, a G code from an uncombinable modal group is ignored.
bit1: Interference check at starting up radius compensation (for M system only)
Interference check at starting up nose R compensation (for L system only)
0: In a start-up block, an interference check is not carried out.
1: An error occurs even at a start-up block if an interference occurs.
The error occurs even when the interference avoidance is set to ON (#8102="1"). However, an interfer ence check is not carried out when it is set to OFF (#8103="1").
bit4: Plane axis check invalid in fixed cycle for turning machining
Select whether to raise a program error when a fixed cycle for turning machining is commanded in either of
the following conditions:
* The commanded axis does not coincide with the selected plane
* One or both of the selected plane axes have no movement
0: Raise a program error
1: Not raise a program error
bit5: Macro argument L/P valid
Select whether to enable L and P to be used as argument of G(MSTB) macro command or ASCII code macro
command.
0: L and P commands cannot be used.
1: L and P commands can be used as argument.
bit7: Spindle rotation speed during synchronous tap return
Specify how to operate in a sync tap command block if the tap return spindle rotation speed (,S) is lower than
the tap spindle rotation speed (S).
0: Operate at the tap return spindle rotation speed (,S)
1: Operate at the tap spindle rotation speed (S)
bit0: Ignoring timing sync in multi-system simultaneous thread cut cycle I (G76.1)
Select whether to execute timing synchronization during multi-part system simultaneous thread cut cycle I
(G76.1).
0: Execute timing synchronization at the start and end of thread cutting.
1: Ignore the timing synchronization given during the cycle.
bit1: G92.1 single command error check ON
Select whether to enable the error check when G92.1 (G50.3) is given alone in a block.
0: Disable the error check
1: Enable the error check
bit2: Spindle rotation speed fluctuation alarm selection
Select whether to output an operation error upon detection of spindle speed fluctuation (G162).
0: Output an operation error
1: Not output an operation error
bit6: G113 command type when multiple spindle synchronization set valid
Specify the G113 command type of when multiple spindle synchronization set is valid.
0: Cancels all the spindle synchronization by issuing G113H0 or G113D0.
1: Cancels all the spindle synchronization by issuing G113.
Not used. Set to "0".
#1241 set13
#1242 set14
#1243 set15

bit0: No superimposition of timing synchronization block onto subsequent block
0: Superimpose a block, where timing synchronization command is given as a single command, onto the
subsequent block, and treat the blocks as one block
1: Treat a block, where timing synchronization command is given as a single command, as one block.

bit1: Enable automatic re-calculation after timing synchronization
0: Look-ahead a block next to the timing synchronization command block
1: Automatically re-calculate a block next to the timing synchronization command block after the synchro nization has been completed.
bit2: Balance cut in all the blocks
Select in which block(s) to execute synchronization between part systems when a balance cut command is given.
0: Execute synchronization in cutting feed command block(s)
1: Execute synchronization in all the blocks
bit3: Enable tool offset at start/stop of arbitrary axis superimposition
Select whether or not to apply tool offset to a travel at workpiece coordinate system switch or a travel toward the superimposition start/end position when the arbitrary axis superimposition control start/stop command is issued.
0: Not apply
1: Apply
bit4: Speed clamp method under superimposition control
0: Apply a fixed superimposition clamp speed to the superimposition-related axes. This clamp speed takes effect irrespective of the feed status (feed direction and mode) of the superimposition-related axes.
When this method is chosen, the clamp speed is unchanged during block execution.
1: Apply the optimal clamp speed according to the real-time monitored feed status of the superimposition related axes (feed direction and mode). When this method is chosen, the clamp speed is changed even during block execution. This method helps reduce the cycle time.
bit5: Read of position info with superimposing travel distance taken into account
Select whether to take into account the superimposing travel distance (travel distance of the reference axis) when reading position info (machine coordinates/skip coordinates) using a variable under control axis super imposition or arbitrary axis superimposition control.
0: Not take the distance into account
1: Take the distance into account
bit6: Axis address check ON
Select whether to output a program error (P32) when any address other than those specified by "#1013 ax name" and "#1014 incax" is given as an axis address.
If the arbitrary axis exchange function is ON, select whether to output a program error (P32) when any ad dress other than those specified by "#12071-12078 adr_abs[1]-[8]" and "#12079-12086 adr_inc[1]-[8]" is giv en as an axis address.
0: Not output a program error (P32). (Ignore the axis address.)
1: Output a program error (P32)
#1244 set16

bit2: Speed to select multi-step acceleration/deceleration synch tap gear step
Specify the rotation speeds that determine the gear step for multi-step acceleration/deceleration synchro nous tapping ("#1223 aux07/bit7" = 0).
0: #3005 to #3008 (smax1 to 4)
1: #43046 to #43049 (smax_tap1 to 4)
(Note) This parameter is enabled when "#1235 set07/bit4" = 0.
bit7: Synchronous tap spindle rotation direction type
Select whether the spindle's rotation direction is determined by the synchronous tapping axis' travel direction.
0: The spindle's rotation direction is determined by the synchronous tapping axis' travel direction.
When the travel direction is negative, the spindle rotates forward.
When the travel direction is positive, the spindle rotates in reverse.
1: The spindle always rotates forward regardless of the synchronous tapping axis' travel direction.
(Note) When a reverse tap is commanded, the spindle rotates in an opposite direction to that mentioned above.
#1245 set17

bit0: Thread cut override ON
Select whether to enable spindle override during thread cutting.
0: Disabled
1: Enabled
bit1: Thread cut override feed hold
Select whether to perform feed hold when spindle override is changed during thread cutting.
0: Not perform feed hold
1: Perform feed hold
bit2: Switch coordinate systems for radius compensation
Select the coordinate system for radius compensation.
0: Type 1 (conventional specification)
Perform radius compensation with reference to a position on the workpiece coordinate system.
1: Type 2
Perform radius compensation with reference to a position on the program coordinate system.
bit3: Change repetition final return position at M2L
Select the final return position after repetition, when in G99 modal and in M2 format with the label L.
0: Initial point
1: R point
bit4: T-lifeover signal output
Select the timing at which the "Tool life over" signal is output when using the M system tool life management I/III.
0: Turn the signal ON when a selected tool has reached the lifetime.
1: Turn the signal ON when any of tools (in the case of the tool life management III, all the registered tools) in a selected group has reached the lifetime.
bit5: Tool status update type
Select whether to update tool status automatically when estimated tool life data/cumulative usage data is changed on the screen in the M system tool life management I/II/III.
0: Do not update
1: Update.
(Note) When "1" is selected, tool status will be updated as follows.
When usage data is "0", tool status will be "0".
When usage data is smaller than lifetime data, tool status will be "1".
When usage data is the same as or larger than lifetime data, tool status will be "2".
bit6: Switch F 1-digit feedrate change method
Set whether to enable feedrate change with handle until power OFF, or change the parameters #1185 to

#1189 with change of speed.
0: Enabled until power OFF
1: Change "#1185 spd_F1" to "#1189 spd_F5"
bit7: PLC axis random device assignment
Select whether to enable PLC axis random device assignment for "Reference position return near-point de tection" signal and "Stroke end" signal.
0: Disable (Fixed device is used.)
1: Enable (Device is specified by the parameter.)
#1246 set18

bit0: Movement by tool length compensation command (for M system only)
Select whether or not to move the axis by the compensation amount when tool length compensation/cancel
is independently commanded.
0: Move
1: Not move
bit1: Thread cutting operation when manual speed command enabled
Select the thread cutting operation in manual speed command.
0: The axis travels at the handle feed rate, jog feed rate, or manual rapid traverse rate
1: The axis travels following the program command
bit2: Inclined surface machining mode hold
Select whether to hold or cancel the inclined surface machining mode at an emergency stop or power OFF.
0: Cancel the inclined surface machining mode.
1: Hold the inclined surface machining mode.
Not used. Set to "0".
bit2: Encryption key setting
Select whether to enable the encryption key for System lock to be entered.
0: Disable the encryption key entry
1: Enable the encryption key entry
bit5: Warning on 24Hr continuous ON display
Select whether to show or hide the alarm (V53 0001).
0: Not display
1: Display
bit0: Enable cycle operation after turning OFF manual arbitrary reverse run mode
Select whether to enable automatic cycle operation after turning OFF the manual arbitrary reverse run mode.
0: Disable
1: Enable
bit3: Switch acceleration rate for rapid traverse
Select how to determine the acceleration rate for rapid traverse (G0) in high-accuracy control.
This parameter is enabled during tool center point control, tool cutting point control, workpiece installation
error compensation or inclined surface machining command.
0: The acceleration/deceleration determined by "#1206 G1bF Maximum speed" and "#1207 G1btL Time
constant" is applied. The acceleration/deceleration is common to all axes.
1: The acceleration/deceleration determined by "#2001 Rapid traverse rate" and "#2004 G0tL G0 time con stant (linear)" is applied. The acceleration/deceleration is specific to each axis.
bit7: Movement at command of workpiece position offset for rotary axis
Select whether to move the machine by the workpiece position offset when the workpiece position offset for
rotary axis is started or cancelled.
0: Move
1: Not move
#1247 set19
#1248 set20
#1249 set21
#1250 set22

bit0: Load inertia ratio display
Select whether to show the load inertia ratio of servo and spindle units on the drive monitor screen.
0: Display
1: Not display (Show zero)
bit1: Spindle temperature display
Select whether or not to display the spindle unit temperature on the drive monitor screen.
0: Display according to "#13225 SP225/bit2"
1: Not display (Show zero)
(Note) Regardless of the setting of this parameter, the temperature of the spindle for which "1" is set in
"#43105 sp_temp_hide" is hidden (blank).
bit2: Warning of "WCS offset not reflected"
This parameter specifies whether to enable the warning that informs that any of the following items being
selected has not been reflected in the workpiece position counter or in the program position counter:
Workpiece coordinate system offset
Extended workpiece coordinate system offset
External workpiece coordinate system offset
Workpiece coordinate system shift
Workpiece base point offset
0: Disable
1: Enable
bit4: Speed indication when selection of axis for feedrate command is valid
Select which speed is to be displayed on the screen when the axis (axes) for feedrate command is (are) being
selected with G130.
0: Display the resultant speed of the axis (axes) designated with G130
1: Display the resultant speed of all the axes
bit5: Warning "Continuous write of parameter" invalid
Select whether to indicate the warning when write of parameter is being continuously executed through a
"write window" of the PLC window function.
0: Indicate the warning
1: Not indicate the warning

bit6: Retention of directory path invalid
Select whether to enable/disable the function of retaining the previous directory path.
0: Enable
1: Disable
(Note) The function supports the following screens: Operation search, Collation and stop, T-list search and Check search.
bit7: 3D machine interference check: pinch gesture
Switch the pinch-to-zoom gesture on the model for 3D machine interference check.
0: Pinch in to zoom in on the model, and pinch out to zoom out on the model.
1: Pinch in to zoom out on the model, and pinch out to zoom in on the model.
bit3: Number of file input/output points for PLC constant (extension)
Specify the number of file I/O points for the PLC constant (extension) at the time of parameter input/output (ALL.PRM).
0: All the points of file input/output (ALL.PRM) for the PLC constant (extension)
1: The number of points specified by #1326 (PLC Const Ext. Num) for the PLC constant (extension)
#1251 set23
#1252 set24

bit0: Number of machine tool builder macro definition files
Select the number of definition files for machine tool builder macro.
0: One (O199999999)
1: Ten (O199999990 to O199999999)
bit2: Acceleration/Deceleration mode change in hole drilling cycle
Change the acceleration/deceleration mode of hole drilling cycle.
0: The operation follows the parameter setting.
The setting of #1153 is enabled.
1: A constant inclination acceleration/deceleration and an acceleration/deceleration after interpolation are applied to the hole drilling cycle.
The setting of #19417 is enabled.
bit4: Clearing data at fixed cycle mode switch
Select whether to zero clear the argument data at the time of fixed cycle mode switch.
0: Do not zero clear the argument data
1: Zero clear the argument data
bit5: G53 motion type
Change the motion type for G53 command.
0: Cutting feed or rapid traverse is determined by the active modal status.
1: Fixed to rapid traverse.
bit6: Switch G68/G69 function
Select whether to use G68/G69 as tool post mirror image function or balance cut function when the selected G code system is 6 or 7.
0: Facing turret mirror image
1: Balance cut
bit0: Reducing processing time of zero-travel-distance block (for L system only)
Select whether to reduce the processing time of a zero-travel-distance block.
0: Disable the reduction of non-travel block processing time.
1: Enable the reduction of non-travel block processing time.
bit1: Program format switch
Enable the program format switch function.
0: Disable the function
1: Enable the function
bit3: Select timing for updating axis parameter
Select the timing for when to update axis parameter.
0: Update after All axes smoothing zero turns ON for all the part systems.
1: Update after All axes smoothing zero turns ON for each part system.
bit4: Reference of zero point shift distance for spindle C axis
Select the reference method for zero point shift distance when C axis returns to zero under spindle C axis control.
0: Use "#2027 G28sft" as the zero point shift distance.
1: Use "#3113 cax_sft" as the zero point shift distance.
(PR) #1253 set25
(PR) #1254 set26

bit0: High-accuracy calculation during constant surface speed control
Enable the high-accuracy spindle speed calculation under constant surface speed control.
0: Calculate the speed with the tolerance of plus or minus 10r/min (same as conventional specifications).
1: Calculate the speed with the tolerance of plus or minus 1r/min.
bit1: MTB macro M99 command single block stop
For M99 command during MTB macro, select whether to execute single block stop or not.
0: Not execute single block stop in the M99 command
1: Execute single block stop in M99 command
(Note 1) During Suppression of single block stop (#3003/bit0 = 1) of system variable, single block stop is not applied in the M99 command even if this parameter is valid.
(Note 2) While single block is suppressed by the A1 command of macro definition program (O199999999), single block stop is applied if this parameter is valid.
bit3: Holding diameter/radius designation after NC reset
Select whether to hold the diameter/radius designation of each axis selected in G10.9 after NC reset.
0: Diameter/radius designation is initialized by NC reset.
1: Diameter/radius designation is held after NC reset.
bit4:Tool retraction from hole bottom in boring cycle
0: Move at the rapid traverse rate (G0 interpolation feed).
1: Move with linear interpolation (at the feedrate commanded with F).
bit5: Tool length offset for multiple axis synchronization control

Select whether to enable the tool length offset dedicated to the multiple axis synchronization control.
0: Disable
1: Enable
bit6: Acc/Dec pattern applied until rotation sync when sync SP start signal is OFF
Select the acceleration/deceleration pattern to be applied until the synchronized spindle attains rotation syn chronization, when spindle synchronization command is given with the spindle start signal of the synchro nized spindle OFF (servo OFF).
0: Linear acceleration/deceleration
1: Spindle synchronization multi-step acceleration/deceleration
(PR) #1255 set27

bit0: Switch to C axis mode at cancel of EMG stop/door open under spindle C axis
Select whether to switch the control to C axis mode when you execute and cancel emergency stop, or turn ON and OFF the door open signal under spindle C axis control mode.
(This takes effect when spindle/C axis switch method is PLC signal type.)
0: Not switch to C axis mode.
Control is switched to C axis mode when C axis' Servo OFF signal is turned OFF and ON after cancel of emergency stop or door open.
1: Switch to C axis mode when emergency stop or door open is cancelled.
bit1: Position loop gain in C axis zero return/orientation/synch tap zero return
Select the position loop gain to be applied when the interpolation mode is selected for the spindle C axis, spindle orientation or synchronous tap zero return that is executed when the spindle stops (when "#3106 zrn_typ/bitE"="0").
0: SP003 PGS
1: SP002 PGN
bit2: Change current FB (load) output unit
Select the units in which the current FB (load) is output to a register.
When output in units of 0.01%, the output range is from 0 to 327.67%.
0: Default (Output in units of 1%).
1: Output in units of 0.01%.
bit3: Tool shape compensation in 3D coordinate conversion mode (For L system only)
Select whether to apply tool shape compensation before or after executing 3D coordinate conversion.
0: Apply tool shape compensation before 3D coordinate conversion
1: Apply tool shape compensation after 3D coordinate conversion
Not used. Set to "0".
bit0: Skip I/F switch
Select A or B contact for the skip interface.
0: A contact (Skip operation starts at rising edge of a signal)
1: B contact (Skip operation starts at falling edge of a signal)
(Note) This parameter is not applied to PLC skip.
bit3: System lock warning selection
Set this parameter to "1" if you choose to have the system alarm message (Z64) cleared by NC reset.
0: Not clear the message by NC reset
1: Clear the message by NC reset
bit4: Thread recut command
Specify through which interface to give a thread recut command.
0: Through HMI screen
1: Through PLC I/F
bit5: Addition of command Q to thread recut
Select whether to add the command Q's data to the spindle angle to be compensated during thread recut of a stored thread section.
0: Not add the command Q's data
1: Add the command Q's data
bit6: Spindle compensation angle in thread recut mode
Select whether to calculate the spindle compensation angle when a thread cut command is given during the thread recut mode.
0: Calculate the angle for the initial thread cut command in automatic operation. (The initially calculated an gle is used for the 2nd and subsequent thread cut commands.)
1: Calculate the angle every time a thread cut command is given.
(PR) #1256 set28
#1257 set29
(PR) #1258 set30

bit0: Enable normal life tool's data count (for M system only)
Select whether to enable or disable too use data counting when the tool status is 2 (normal life tool).
0: Not count the use data of normal life tool.
1: Count the use data of normal life tool.
bit2: Disabling decimal point for PLC window
Select the input/output specifications of fraction data for PLC window.
0: Enable decimal point
Fraction data is output as the fixed fraction information.
(The numbers of digits in the integer and fraction parts are the same as of the on-screen specifications.)
1: Disable decimal point (cut off all digits after decimal point)
Only the integer part is input/output.
bit7: Macro processing method
Select the macro processing method.
0: High speed
1: Compatible with conventional models
(*) Remarks
Select whether to refresh the display data at regular intervals of a certain number of macro blocks when processing successive macro blocks.
Selecting "0" enables high-speed macro processing, because it creates no data for refreshing display.
Selecting "1" enables most of the blocks under processing to be viewed, because it creates display re fresh data at regular intervals even for successive macro blocks.
When "1" is selected, the operation is the same as of M700 Series control.

(PR) #1259 set31

bit0: Switching to actual cutting mode during automatic operation
0: Unable to switch to actual cutting mode or no-load operation mode during automatic operation.
Block stop is executed before a speed change-disabled command (thread cut or tap).
1: Able to switch to actual cutting mode or no-load operation mode during automatic operation.
Block stop is not executed before a speed change-disabled command (thread cut or tap).
bit1: Speed selection for other part systems during actual cutting mode
0: Other part systems operate at the programmed speed in the same manner as the part system where a
speed change-disabled command (thread cut or tap) is given.
1: Other part systems operate at the program check speed.
bit2: Prohibit reverse run of fixed cycle
Select whether to prohibit reverse run of a fixed cycle during manual arbitrary reverse run.
0: Permit reverse run
1: Prohibit reverse run
(Note) Even when the parameter is "1", reverse run is enabled during fixed cycle operation.
bit3: Prohibit MSTB reverse run
Select whether to prohibit reverse run of MSTB during the manual arbitrary reverse run.
0: Enable MSTB reverse run
1: Disable MSTB reverse run
(Note) Even when the parameter is "0", MSTB reverse run is disabled while the MSTB reverse run prohibit
signal (MRPSG) is ON.
bit4:Thread cut start shift angle operation
Select the operation to be performed at the start of thread cutting when a thread cut start shift angle com mand is issued.
0: Start thread cut from the thread cut start shift angle after phase Z has been detected once.
1: Start thread cut from the thread cut start shift angle, independently of phase Z detection.
bit7: Storage of spindle C axis coordinate system
Select whether to automatically insert zero return to spindle/C axis control at the initial servo ON or at every
servo ON.
This parameter is enabled when spindle/C axis deceleration stop type (#3106 zrn_typ/bit8=1) and zero point
return automatic insertion (#1226 aux10/bit3=1) are selected.
0: Execute automatic zero return before C axis rotation for the first C axis command given after every servo
ON.
1: Execute automatic zero return before C axis rotation for the first C axis command given after the initial
servo ON.
For the 2nd and subsequent servo ON, the coordinate system is retained after servo OFF, and zero re turn is not automatically inserted.
(PR) #1260 set32

bit1: Operation panel I/O emergency stop function OFF
Select whether to disable the emergency stop function when an operation panel I/O unit is disconnected.
(This setting is enabled for separated-type NC only)
0: Enable the emergency stop function
1: Disable the emergency stop function
(*) While the operation panel I/O unit is connected to the NC unit, the emergency stop function is enabled
irrespective of this parameter.
bit2: Synchronized turning ON/OFF of NC and display
Select whether to synchronize the turning ON/OFF of the M800VW/M80VW Series NC controller and display.
0: NC and display turn ON/OFF independently.
1: NC and display turn ON/OFF in synchronization with each other.
(*) If no operation panel I/O unit is connected, the NC and display turn ON/OFF independently, irrespective
of this parameter.
bit3: PLC high-speed process start timing selection
Select the type of PLC high-speed process start timing.
0: Type 1 (default)
1: Type 2
bit4: High-speed ladder execution cycle
Specify the high-speed ladder execution cycle. (Standard value: 0)
0: Default (equivalent to Mitsubishi Electric M700V Series)
1: Twice the default
(Note) When the parameter "#1261 set33/bit4" is set to its default value, the high-speed ladder execution
cycle differs according to the model and the number of part systems.
bit5: Operation switch at OT and soft limit in synchronous operation method
This parameter switches the axis operation at stoke end and soft limit for slave axis in the synchronous op eration method.
When independent operation method or correction mode is set, the operation will be the same as #1261=0
(disable).
0: When "Stroke end" signal is turned ON for only slave axis by stroke end or soft limit, the slave axis stops
but master axis does not stop.
1: When one of master axis or slave axis is in the stroke end or soft limit, both master and slave axes stop.
bit2: Disable warning for coordinate system selection without 3D manual feed spec.
Select whether to display a warning when hypothetical coordinate system has been selected although 3D
manual feed is not included in the specifications.
0: Display
1: Not display
bit3: Condition of turning OFF Tool life end signal (for L system only)
Select when to turn OFF the tool life end signal in the tool life management 1 for L system.
0: When M function finish signal (FIN) is turned ON
1: When a tool that has not reached the end of life is selected
(PR) #1261 set33
(PR) #1262 set34

bit1: Show/Hide history clear menus
Show/Hide operation menus for data clear of collection setting screen, history clear of alarm history screen, history start, and history stop.
0: Show history clearing operation menus
1: Hide history clearing operation menus
bit2: Hide the alarm category of PLC message
Select whether to hide the alarm category of PLC message (alarm or operator message).
0: Display the alarm category
1: Hide the alarm category
bit3: Overvoltage alarm switch
Select the alarm for overvoltage.
0: Display the warning upon occurrence of overvoltage alarm.
1: Execute emergency stop upon occurrence of overvoltage alarm.
bit2: Disabling manual numerical value command during automatic operation
Specify whether manual numerical commands should be disabled during automatic operation.
0: Enable manual numerical command during automatic operation
1: Disable manual numerical command during automatic operation
bit0: Command format 1
Select the command format for the fixed cycle for compound lathe.
0: Conventional format
1: MITSUBISHI CNC special format
(1 block command method)
bit1: Command format 2
Select the command format for the lathe fixed cycle.
0: Conventional format
1: MITSUBISHI CNC special format
bit2: Command format 3
Select the command format for the fixed cycle for drilling.
0: Conventional format
1: MITSUBISHI CNC special format
bit3: F-command unit 2 (for L system only)
Specify the unit to be used if a synchronous feed or thread cutting lead command contains no decimal point.
0: Type 1 (conventional specifications) or Type 2
Type 1 or Type 2 is selected by the parameter "#1271 ext07/bit2".
1: Type 3
F command 0.01 mm/rev, 0.0001 inch/rev
E command
Sync feed (corner chamfer/corner R feedrate) 0.01 mm/rev, 0.0001 inch/rev
Thread cut (fine thread cut lead) 0.0001 mm/rev, 0.000001 inch/rev
(Note) Type 3 is independent of the input unit.
bit0: Axis name extension valid
0: "Axis name extension" invalid
1: "Axis name extension" valid
bit0:
Not used.
(PR) #1263 set35
#1264 set36
(PR) #1265 ext01
(PR) #1266 ext02
(PR) #1267 ext03

bit2: Enable synchronous tapping per minute
Select whether to enable feed per minute with the F command of synchronous tapping cycle.
0: Disable (Command in pitch regardless of "G group 5" modal)
1: Enable (Follow "G group 5" modal)
bit4: Enable address K to specify the repetition count in G76/G87
Select whether to enable address K to be used for specifying the repetition count in G76/G87 command.
0: Disable
1: Enable
When "1" is set in this parameter with "#1271 ext07/bit1" (Specifying repetition count with address K) set to "1", the address K given to G76/G87 is treated as the number of repetitions.
bit0: Inverse tangent (ATAN) command format
Select the command format of ATAN operation.
0: Format 1
Either the ratio of two sides or the whole expression is enclosed in square brackets "[ ]".
ATAN[#k] or ATAN[#j/#k]
1: Format 2
Two sides are enclosed in "[ ]" respectively and also divided by a slash "/".
ATAN[#j]/[#k]
bit1: Range of inverse tangent (ATAN) calculation result
Select the range of calculation result for inverse tangent (ATAN) to be applied when Format 2 is selected for inverse tangent (ATAN) command (when #1269/bit0 = 1).
0: -180 to 180
1: 0 to 360
(PR) #1268 ext04
(PR) #1269 ext05

bit2: Select finished shape program search method
Select how to search a finished shape program to be called by G70, G71, G72 or G73 command.
0: Search from the top of the currently executed program or from the top of the program specified with the address A.

1: <G71, G72, G73>
Search from a block following G71, G72 or G73.
<G70>
Search from the same start sequence No., if it exists, as that of the finished shape program where G71, G72 or G73 has been executed.
In the other cases, search from the top of the currently executed program or from the top of the program specified with the address A.
bit4: Switch chamfering operation
Select the operation to be performed when the cycle start point is exceeded as a result of chamfering in a thread cutting cycle.
0: Output a program error (P192).
1: Stop chamfering upon arrival at the cycle start point, and then move to the end point of the thread cutting block at a rapid traverse rate.
bit5: Coordinate rotation angle without command (for L system only)
Select the operation when there is no rotation angle command R for the coordinate rotation.
0: Use the previously commanded value (modal value). If the command is the first issued command, the rotation angle will be 0.
1: Use the set value in "#8081 Gcode Rotat".
bit6: Switch continuous thread cutting Z phase wait operation
Select when to start the 2nd block thread cutting when there is a command with no movement (MST com mand, etc.) between the thread cutting blocks.
0: Wait for the spindle's single rotation synchronization signal before starting the movement.
1: Start movement without waiting for the spindle's single rotation synchronization signal.
bit7: Handle C axis coordinate during cylindrical interpolation
Specify whether to keep the rotary axis coordinate as before the cylindrical interpolation start command is issued during the cylindrical interpolation.
0: Not keep
1: Keep
(PR) #1270 ext06

bit0: Mirror image operation
Select the type of mirror image operation.
0: Type 1
The program mirror image, external mirror image, and parameter mirror image are exclusive to each oth er.
An incremental command moves the image to the position indicated by the travel amount with the sign inverted.
1: Type 2
Mirror image operation is enabled when the program mirror image (G51.1) command is issued or when the external signal or parameter is ON.
An incremental command moves the image to the position determined by applying the mirror image to the absolute program coordinates.
bit1: Address specifying fixed cycle repetition count (for M system only)
Select the address that specifies the fixed cycle repetition count.
0: Address L only (Default)
1: Addresses K and L
If addresses K and L are specified simultaneously, the data at address K will be used for operation.
bit2: F-command unit
(M system)
Specify the unit to be used if a thread cutting lead command contains no decimal point.
* This setting is independent of the input unit.
0: Type 1 (conventional specifications)
F1: 1 mm/rev, 1 inch/rev
1: Type 2
F1: 0.01 mm/rev, 0.0001 inch/rev
(L system)
Specify the unit to be used if a synchronous feed or thread cutting lead command contains no decimal point.
0: Type 1 (conventional specifications)
[Input unit B] F1: 0.0001 mm/rev, 0.000001 inch/rev
[Input unit C] F1: 0.00001 mm/rev, 0.0000001 inch/rev
1: Type 2
F1: 0.0001 mm/rev, 0.000001 inch/rev
* Type 2 is independent of the input unit.
bit3: G-code group for unidirectional positioning (for M system only)
Select the G-code group for unidirectional positioning.
0: Unmodal G code (group 00)
1: Modal G code (group 01)
Related parameter: "#8209 G60 Shift" (Set the last positioning direction and distance for each axis ap plicable when the unidirectional positioning command is issued.)
bit4: Operation by independent G40 command
Select whether the radius compensation vector is canceled by the independent G40 command.
0: Type 1 (conventional specification) (Default)
The radius compensation vector will be canceled by the independent G40 command.
1: Type 2
The radius compensation vector won't be canceled by the independent G40 command: it will be can celed by the next travel command for the radius compensation plane.
bit5: Cut start position (for L system only)
Select the position from where cutting begins in a fixed cycle for compound lathe.
0: Conventional specification (Default)
The cut start position will be determined by the final shaping program.
1: Extended specifications
Determined from the cycle start point.
(PR) #1271 ext07

bit6: Nose R compensation (for L system only)

Select whether to apply nose R compensation for shapes in a rough cutting cycle.
0: Conventional specification (Default)
The shape after nose R compensation in the final shaping program will be used as rough cutting shape.
(when the nose R compensation for the final shaping program).
1: Extended specifications
The shape without nose R compensation in the final shaping program will be used as rough cutting
shape.
bit7: Cut amount (for L system only)
Select the operation to be performed when the program-specified cut amount exceeds the cut amount of the
final shaping program.
0: Conventional specification (Default)
A program error will occur when the program-specified cut amount exceeds the cut amount of the final
shaping program.
1: Extended specifications
Rough cutting will be performed by one cut when the program-specified cut amount exceeds the cut
amount of the final shaping program.

bit0: Switch pocket machining operation
Select the pocket machining specification.
0: Conventional specification
Pocket machining will be selected with the H designation.
The pull direction when pocket machining is ON will be the Z direction.
1: Extended specifications
Pocket machining will start only when both X and Z axes are specified in the first travel block after the
finished shape start block.
The pull direction when pocket machining is ON will be the X direction.
bit1: M function synchronous tap cycle
Specify whether to enable the M function synchronous tapping cycle.
0: Disable
1: Enable
bit2: Spiral/conical interpolation command format 2
Select the command format for spiral and conical interpolation.
0: Type 1 (conventional specification)
1: Type 2 (with the number of spiral rotation L designation and the increment designation)
bit3: Switch macro call function
Select whether to shift the argument to the subprogram if nests are overlapped when per block call (G66.1)
is commanded.
0: Shift
1: Not shift (Conventional specification)
bit4: Tap cycle selection
Select the tapping cycle.
0: Pecking tapping cycle
1: Deep hole tapping cycle
bit5: Deep hole tap cycle override selection
Select whether to enable override on the pulling operation during synchronized tapping with the deep hole
tapping cycle.
0: Disable
1: Enable
bit6: Switch corner chamfering/ corner R command format
Select the command format of the corner chamfering/corner R.
0: Command format I (conventional format)
Issue a command with comma (,C and ,R).
1: Command format II
In addition to command format I, addresses without comma can be used to command. I/K or C can be
used for corner chamfering, while R can be used for corner R.
bit7: Return position after macro interrupt in fixed cycle selection
Select the destination to return to after a macro interrupt in the fixed cycle.
0: Return to the block in the fixed cycle.
1: Return to the block next to the fixed cycle.
(PR) #1272 ext08

bit0: Switch ASIN calculation results range
Select the notation system for operation result of ASIN.
0: Do not switch minus figures to positive figures. (-90 to 90)
1: Switch minus figures to positive figures. (270 to 90)
bit1: Switch system variable unit
Select the unit for the system variable #3002 (cycle start operation time).
0: 1 ms unit
1: 1 hour unit
bit2: Switch G71, G72, G73 cutting direction judgment
Select the cutting direction when the longitudinal rough cutting cycle (G71), face rough cutting cycle (G72)
or closed loop cutting cycle (G73) is commanded.
0: Conventional specification
Determined according to the finished shape program.
1: Extended specifications
Determined according to the finishing allowance and cutting allowance commanded in the program.
bit3: Facing turret mirror image coordinate value type
Select how to show the workpiece coordinate values of the axis for which the facing turret mirror image is
valid.
0: Movements in the workpiece coordinate system are in the same direction as those in the workpiece ma chine coordinate system.
1: Movements in the workpiece coordinate system are in the opposite direction to those in the workpiece
machine coordinate system.

bit4: Facing turret mirror image valid axis selection
Select the axis for which the facing turret mirror image is valid.
0: Fixed to 1st axis.
1: Determined according to the plane selected when the facing turret mirror image is commanded.
bit2: M98 sequence No. address selection
Select which address to use for calling a sequence No. in a sub program under sub program control (M98/
M198).
0: Address H is used for specifying the sequence No.
1: Address Q is used for specifying the sequence No.
bit4: Optional block skip operation changeover
Select the optional block skip operation.
0: Enable or disable optional block skipping in the middle of a block according to the setting of "#1226
aux10/bit1".
1: Enable optional block skipping at the top and in the middle of a block.
Note that a slash "/" on the right-hand side of equation or that in an equation between [ ] is handled as
division operator.
bit5: Use of G54Pn for selecting extended workpiece coordinate system
Select whether to use G54Pn as a command for selecting an extended workpiece coordinate system.
0: Not use G54Pn as a command for selecting an extended workpiece coordinate system
1: Use G54Pn as a command for selecting an extended workpiece coordinate system
When 1 is set in this parameter, G54Pn is treated in the same manner as G54.1Pn.
bit7: Word range check
Select whether to check that the operation expression of the word data in the program is enclosed in brackets
[ ] when the machine program is executed.
This check is also applied to the 08000 to 09999 and the machine tool builder macro program.
0: Not check
1: Check
(PR) #1273 ext09
(PR) #1274 ext10

Not used. Set to "0".
Not used. Set to "0".
bit0: Tool life management II count type 2 (default: 0)
Select how and when cumulative number of mountings or cuttings will be incremented in tool life manage ment II. The condition to output "tool group life over (TGLO)" signal will be changed accordingly.
0: Type 1 (default)
Counts up when the spindle tool is used for cutting. TGLO signal will be output when the last tool in se lected group is judged as expired.
1: Type 2
Counts up by one for a tool used or mounted in a program at the time of resetting. TGLO signal will be
output when any of tool groups has reached its lifetime limit.
bit1: Tool life management II life prediction
Select whether to enable tool life prediction function in tool life management II.
0: Disabled
1: Enabled
bit2: Tool life management II life end signal timing
Select the timing in which tool life prediction signal is output in tool life management II.
0: Output only when the ["tool life data" - "tool usage data"] matches the remaining tool life prediction setting.
1: Output when the ["tool life data" - "tool usage data"] is less than the remaining tool life prediction setting.
bit3: Tool life management II life end signal tool
Select the tool for which the tool life prediction signal is output in tool life management II.
0: Output the signal tool by tool.
1: Output the signal at the last tool in the group.
bit4: Tool life management II count changeover (For M system only)
Select the tool life count method and its timing.
0: Conforms to "#1227 ext13/bit0" setting.
1: When "#1227 ext13/bit0" is set to "0":
Counts up by one for a tool used or mounted in a program at the time of resetting.
When "#1227 ext13/bit0" is set to "1":
Follow the setting of "Method (Mthd)" on Tool life screen.
The output condition of "tool group life over" signal conforms to "#1227 ext13/bit0".
(PR) #1275 ext11
(PR) #1276 ext12
(PR) #1277 ext13

bit0: Program restart method selection
Select the program restart type.
0: Restart type A
1: Restart type B
bit1: Change miscellaneous command completion method
Select the complete signal and completion condition.
0: Normal method
Complete at the falling edge of M function finish 1 signal (FIN1) or rising edge of M function finish 2
(FIN2).
1: High-speed method
Complete when High-speed M finish signal (MFIN1 to 4, SFIN1 to 6, TFIN1 to 4 or BFIN1 to 4) reaches
the same logical level as the strobe signal.
bit2: Change areas for stored stroke limit I
Enable/Disable change of the areas for stored stroke limit I.
0: Disable
1: Enable
bit3: Select M30 rewinding operation
Select the operation when the miscellaneous function completed signal (FIN) is returned to M30.
0: Not carry out automatic rewinding

1: Carry out automatic rewinding
bit4: Select M02 rewinding operation
Select the operation when the miscellaneous function completed signal (FIN) is returned to M02.
0: Not carry out automatic rewinding
1: Carry out automatic rewinding
bit5: M code output during high-speed simple program check
Select whether to enable M code output during high-speed simple program check.
The M codes to be output are those specified by "#1451 M[M031-000](SMLK)" to "#1466 M[M511-480](SM LK)".
0: Disable
1: Enable
bit7: Operation for circular radius error at perfect circle command
Select the operation to be performed when a perfect circle command is given and there is a difference be tween the start point and end point radii, but no difference between the start point and end point angles.
0: Linear interpolation from the start to the end point
1: Spiral interpolation from the start to the end point
(PR) #1278 ext14

bit0: Part system synchronization method
Select the part system synchronization method.
0: If one part system is not in the automatic operation, the synchronization command will be ignored and
the next block will be executed.
1: Operate according to the "waiting ignore" signal.
If the "waiting ignore" signal is set to "1", the synchronization command will be ignored. When set to "0",
synchronization will be applied.
bit1: Interrupt amount during machine lock
Select when to cancel the interruption amount during machine lock.
0: Canceled when resetting
1: Canceled during manual reference position return (not when resetting)
bit2: Selection of cutting start interlock target block
Select whether to enable the cutting start interlock for successive cutting blocks.
0: Enable
1: Disable
bit4: Dry run OFF during thread cutting
Select whether to enable or disable dry run during thread cutting.
0: Enable dry run
1: Disable dry run
bit5: Cancel G92 shift distance
Select whether to clear the G92 (coordinate system setting) shift distance when the manual reference posi tion is reached.
0: Not clear
1: Clear
bit6: Enable single block stop at middle point
Set whether to enable/disable single block stop at the middle point of G28/G29/G30.
0: Disable single block stop
1: Enable single block stop
bit7: Retain G52 at manual reference position return
Select whether to retain the local coordinate system setting (G52) at the time of manual reference position
arrival. This parameter is enabled when #1279 ext15/bit5 is 1.
0: Not retain (Cancel)
1: Retain
(PR) #1279 ext15

bit0: I/F per axis during mixed control (cross axis control)
Select how to handle the following PLC interface for axes interchanged with the mixed control (cross axis
control).
- Mirror image
- Manual/automatic interlock
- Manual/automatic machine lock
0: Follows axis configuration before the mixed control (cross axis control).
1: Follows axis configuration after the mixed control (cross axis control).
(Example)
The device No. of automatic interlock (+) for X1 will be as follows when the mixed control (cross axis control)
is executed with the 1st axis (X1) in the 1st part system and 1st axis (X2) in the 2nd part system.
When "0" is set: YA60 (interface for 1st axis in 1st part system)
When "1" is set: YA68 (interface for 1st axis in 2nd part system)
(Note) If the number of axes in the part system changes with the mixed control (cross axis control), the inter face of the target axis may change when this parameter is set to "1".
bit1: Mixed control (cross axis control) cancel with reset
Select whether to cancel the mixed control (cross axis control) when reset is applied.
0: Cancel.
1: Not cancel.
bit2: Interchange coordinate position display
Select whether to display interchanged (or moved) coordinate positions in the mixed control (cross axis con trol).
This setting will be followed not only when the axes are interchanged but also when the axes are moved.
0: Display interchanged (or moved) coordinate positions.
1: Display coordinate positions without being interchanged (nor moved).
(Example)
When 1st part system's C axis is moved to 2nd part system with a 1st part system (X, Z, C, Y) and 2nd part
system (X, Z) configuration:
1st part system: X, Z and Y coordinate positions are displayed.
2nd part system: X, Z and C coordinate positions are displayed.
bit3: Reset operation for synchronization/superimposition control
Select whether to cancel synchronization/superimposition control when reset is applied.
0: Cancel.
1: Not cancel.

bit4: Mixed control (cross axis control) command method
Select how to command mixed control (cross axis control).
0: Use PLC interface signal for mixed control
1: Use G command for mixed control
bit5: Command method of control axis synchronization between part systems
Select how to command the control axis synchronization between part systems.
0: Use PLC I/F.
1: Use G command.
bit6: Interchange machine position display
Select whether to display interchanged (or moved) machine positions in the mixed control (cross axis con trol).
This setting will be followed not only when the axes are interchanged but also when the axes are moved.
(Note 1) This parameter is enabled when "#1280 ext16/bit2 (Interchange coordinate position display)" is "0".
0: Display interchanged (or moved) machine positions.
1: Display machine positions without being interchanged (nor moved).
(PR) #1280 ext16

bit7: Control axis superimposition command method
Select how to command control axis superimposition.
0: Use PLC interface signal for control axis superimposition
1: Use G command for control axis superimposition
bit0: Switch manual high-speed reference position return in synchronous control
Select the movement of synchronized axes in manual high-speed reference position return.
0: Master and slave axes start the return synchronizing. Even when one axis stops at its reference position,
the other axis continues moving until it reaches its reference position.
1: Master and slave axes start the return synchronizing, and when the master axis stops at the reference
position, the slave axis also stops. Thus, the relative position of the master and slave is kept.
bit1: Selection of additional tool offset axis (for L system only)
Select axis to carry out the additional axis' tool compensation function.
0: Follow the setting of "#1520 Tchg34".
1: The axis specified by "#1027 base_J" is used as the 3rd compensation axis.
bit3: Synchronous control operation setting
Select whether or not the positioning of slave axis automatically aligns with that of master axis when the axis
subject to synchronous control is changed from servo OFF to servo ON.
0: The positioning does not automatically align.
1: The positioning automatically aligns.
bit5: High-speed synchronous tapping valid
Select whether to enable the high-speed synchronous tapping.
0: Disable
1: Enable
bit6: Compensation method for external machine coordinate system/ball screw thermal expansion
during synchronization
Select the method of how to compensate the slave axis when compensating external machine coordinate
system or ball screw thermal expansion during synchronization control. The setting of this parameter will be
validated when you select synchronous operation method by the synchronization control operation method
signal.
0: Master axis and slave axis are independently compensated.
1: Master axis' compensation amount is applied to slave axis.
bit7: Switch automatic high-speed reference position return in synchronous control
Select the movement of synchronized axes in automatic high-speed reference position return.
0: Master and slave axes start the return synchronizing, and when the master axis stops at the reference
position, the slave also stops. Thus, the relative position of the master and slave is kept.
1: Master and slave axes start the return synchronizing. Even when one axis stops at its reference position,
the other axis continues moving until it reaches its reference position.
(PR) #1281 ext17

bit1: Condition of the reference position reached signal in synchronous control
This parameter switches only conditions of a master axis's reference position return reached signal in syn chronous operation. A slave axis's signal is output when the slave axis reaches the reference position coor dinate.
0: A master axis's reference position reached signal is output only when both of the master and slave axes
reach the reference position coordinate by a reference position return.
1: A master axis's reference position reached signal is output when the master axis reaches the reference
position coordinate.
bit3: Index table clamp type
Set the clamp type of the index table.
0: Type A
Clamped when an unclamp command turns OFF.
1: Type B
Clamped when a clamp command turns ON.
bit5: Automatic correction of synchronization offset at power ON
The slave axis position is automatically corrected so that the synchronization offset before having turned the
power OFF the last time can be restored at power ON.
(Note) This parameter is enabled when the parameter "#1281 ext17/bit3" (Synchronous control operation
setting) is set to "1".
0: Disable
1: Enable
bit6: Reset type at emergency stop cancel
Select the type of reset to be applied when emergency stop is cancelled.
0: Reset 1
1: Reset 2
bit7: Functional operation inhibition during write of servo parameters
Select whether to inhibit functional operation during write of servo parameters.
0: Inhibit functional operation with an alarm displayed
1: Give priority to functional operation with write of servo parameters suspended

(Note) This parameter can inhibit a start of the following four functions.
Spindle/C axis changeover
Speed observation mode signal ON
High-speed synchronous tapping
Start of PLC indexing axis
Not used. Set to "0".
(PR) #1282 ext18
(PR) #1283 ext19

bit0: Spindle speed clamp check
Select whether to check the spindle speed clamp under the constant surface speed control.
0: Check the spindle speed clamp.
1: Not check the spindle speed clamp.
(Note) This parameter is enabled when the parameter "#1146 Sclamp" is set to "1".
bit1: Spindle control selected in response to Z83 (NC started during SP rotation)
Select whether to force-stop the spindle when the alarm (Z83 0001) occurs.
0: Not force-stop the spindle
1: Force-stop the spindle
bit2: Manual tool length measure 1: work coordinate system offset (for L sys only)
Select the operation to be performed in manual tool length measurement 1 (for L system) when the workpiece coordinate system offset is used for the measurement reference point.
0: Workpiece coordinate system offset in measurement is used for the measurement reference point.
If measurement is carried out during automatic cycle operation, the external workpiece coordinate offset, G92 offset, local coordinate offset, workpiece coordinate system shift and workpiece base point offset are all included in the workpiece coordinate system offset.
1: Setting values of workpiece coordinate system offset, external workpiece coordinate system offset, work piece coordinate shift and workpiece base point offset are used for the measurement reference point.
G92 offset and local coordinate offset are excluded.
bit3: M code output during multi-system simultaneous simulation (Check type II)
Select whether to enable a miscellaneous function code output during execution of multi-part system simul taneous simulation (Check type II).
0: Not output a miscellaneous function
1: Output a miscellaneous function
(Note) When the output is enabled, the miscellaneous codes specified in "#1406 S_mode(SMLK)", "#1407 T_mode(SMLK)", "#1408 M2_mode(SMLK)" and "#1451 M[M031-000](SMLK)" to "#1466 M[M511-480](SMLK)" can be output.
M code output specification is determined by "#1405 M_mode(SMLK)".
bit4: Maximum life time/life count for tool life management I (for L system only)
Select the maximum life time and life count for tool life management I of L system.
0: Life time 0 to 99:59 (h:min)
Life count 0 to 65000 (times)
1: Life time 0 to 5000:00 (h:min)
Life count 0 to 99999999 (times)
bit6: Automatic operation handle interruption during inclined surface machining
Select whether to enable the automatic operation handle interruption function during inclined surface machin ing.
0: Disable
1: Enable
(PR) #1284 ext20

bit0: Multi-part system program management
Select whether to use multi-part system program management.
0: Not use
1: Use
(Note) When this parameter's value is changed, the power must be turned OFF and ON, and the system for matted. Two or more part systems from [1] to [4] need to be set to "1" in "#1001 SYS_ON". Otherwise this parameter will be disabled even though set to "1".
bit1: Switching of program search type
Select the type of search to be performed when Operation search, Check search or Restart search is exe cuted in the NC memory/NC memory2 while the multi-part system program management is active.
0: Search through a program individually for each part system
1: Search through a program for all part systems at once
(Program number will be common to all part systems.)
bit2: Multi-part system program generation and operation
Select whether to perform the following processes for all the part systems or for each part system separately in multi-part system program management: newly create, delete or rename the machining programs in NC memory/NC memory2 or transfer, compare, merge the programs between NC memory/NC memory2 and other device.
0: Perform these processes for the programs in all the part systems.
If no subprogram contents are found by the subprogram call during automatic operation, the program will be searched for and executed from $1.
1: Perform these processes for the programs in the selected part system.
bit5: Selection of multi-part system program input/output method
Select whether to perform the transfer from NC memory/NC memory2 to other device for all the part systems or for each part system separately in multi-part system program management.
0: Output the designated programs for all the part systems.
(The programs output from NC memory/NC memory2 contain the system delimiter $ marks.)
1: Output the programs of only the selected part system.
(PR) #1285 ext21
(PR) #1286 ext22

bit1: Inclined surface coordinate display
0: Display the position which includes tool length offset.
1: Display the position on the program which excludes tool length offset.

bit2: Inclined surface coordinate display (for M system only)
0: Display the position which includes tool radius compensation.
1: Display the position on the program which excludes tool radius compensation.
bit4: Relative coordinate display
(M system)
0: Display the position which includes tool length offset.
1: Display the position on the program which excludes tool length offset.
(L system)
0: Display the position which includes tool shape compensation.
1: Display the position on the program which excludes tool shape compensation.
bit5: Relative coordinate display
(M system)
0: Display the position which includes tool radius compensation.
1: Display the position on the program which excludes tool radius compensation.
(L system)
0: Display the position which includes nose R compensation.
1: Display the position on the program which excludes nose R compensation.
bit6: Absolute coordinate display (for L system only)
Select how coordinate values are displayed when absolute coordinate display is selected ("#1221 aux05/
bit0"="1").
0: Display the position which includes tool shape compensation.
1: Display the position on the program which excludes tool shape compensation.
bit7: Absolute coordinate display (for L system only)
Select how coordinate values are displayed when absolute coordinate display is selected ("#1221 aux05/
bit0"="1").
0: Display the position which includes nose R compensation.
1: Display the position on the program which excludes nose R compensation.
(PR) #1287 ext23

bit0: MDI program clear
Select whether to clear the MDI programs when MDI operation ends, the power is turned ON again, reset is
input, or emergency stop is canceled.
0: Not clear
1: Clear (save only % programs).
bit2: Restore previous program before external search by NC reset
Select whether to restore the previous program before external search when operation is finished, power is
turned OFF and ON, NC reset is input or Emergency stop is cancelled.
0: Not restore the previous program before external search
1: Restore the previous program before external search
bit3: Restore previous program before external search by Program restore signal
Select whether to restore the previous program before external search when Program restore signal is input.
0: Not restore the previous program before external search
1: Restore the previous program before external search
bit7: Behavior of position counter at change in workpiece coordinate system offset
When a change is made to the workpiece coordinate system offset, extended workpiece coordinate system
offset, external workpiece coordinate system offset, workpiece coordinate system shift or workpiece base
point offset being selected, the position counter will be updated in accordance with the setting of this param eter.
The specified behavior applies to the following counters:
Workpiece coordinate position
Program position
Tip workpiece position (*1)
Table coordinate position (*1)
Workpiece set position (*1)
Inclined surface coordinate position (*1)
(*1) These counters are displayed when an optional function associated with 5-axis control is active.
0: The counter is updated when any of the following actions takes place after the change.
Cycle start
Reset
Emergency stop
1: The counter is updated immediately upon the change.
bit0: Tool radius compensation switch corner judgment method (nose R compen.)
Select the criterion to execute the outer rounding at the small corner in tool radius compensation.
(L system)
0: The corner angle is 0; linear-linear; G02-G03/G03-G02; the radius is the same. (Conventional method)
1: The corner angle is 1 or smaller; linear-linear; G02-G03/G03-G02; the radius is almost the same. (Meth od for rounding minute corner angle)
(M system)
0: The corner angle is 1 or smaller; linear-linear; G02-G03/G03-G02. (Conventional method)
1: The corner angle is 1 or smaller; linear-linear; G02-G03/G03-G02; the radius is almost the same. (Meth od for rounding minute corner angle)
Not used. Set to "0".
bit2: Variable command: Reset operation for tool function T code (#4120/#4320)
Select how reset operation affects the address T's modal information (#4120/#4320).
0: Clear the information
1: Retain the information
(PR) #1288 ext24
(PR) #1289 ext25
(PR) #1290 ext26
(PR) #1291 ext27

bit1: Address F given in sync tap cycle
Select the specification of address F given in synchronous tapping cycle.
0: The value given to address F in synchronous tapping cycle is treated as the feed rate. Feed command
follows the setting of "#1268 ext04/bit2 Enable synchronous tapping per minute". F modal status is un changed.

1: Follow the G code group 5 modal status, irrespective of the setting of "#1268 ext04/bit2 Enable synchro nous tapping per minute". The F modal value given in the program is treated as the feed rate.
bit5: Selection of sub program call operation in fixed cycle mode
Select the operation to be carried out when sub program call (M98/M198) and either an axis address or ad
dress R (for hole drilling cycle) are given in one block during fixed cycle for drilling or turning machining.
0: Not execute fixed cycle operation in the sub program call block.
Sub program call is executed after travelling to the position specified by the axis address in modal status
of G code group 01. Neither the axis address nor address R affects the subsequent fixed cycle operation.
1: Execute fixed cycle operation in the sub program call block before executing the sub program call. The
axis address or address R is treated as the fixed cycle argument.
bit0: Synchronous feed in milling
Select whether to enable synchronous feed in milling interpolation, cylindrical interpolation or polar coordi nate interpolation mode.
0: Disable
1: Enable
bit1: Enabling N0 command
Select how to handle a command of sequence number zero (N0).
0: N0 causes an error.
1: N0 is ignored (causes no error).
Not used. Set to "0".
bit5: Timing of tool offset amount change (For L system only)
This parameter is only valid if "#1100 Tmove" = 1.
This parameter switches the timing of the change in the tool length offset amount or the wear offset amount
when the currently selected amount is modified.
0: The new offset amount is applied when the T command is executed.
1: The new offset amount is applied when the movement command is read to the pre-read buffer.
bit6: Analog spindle synchronous tapping ON
Select whether to enable analog spindle synchronous tapping.
0: Disable
1: Enable
bit7: Synchronous tapping with analog I/F spindle: control switching method
This parameter specifies the control method for the synchronous tapping with analog I/F spindle function.
0: Not use the feedback from the encoder
1: The rotation speed command is compensated in accordance with the difference between the command
position and the actual position of the analog I/F spindle.
(PR) #1292 ext28
(PR) #1293 ext29
(PR) #1294 ext30
(PR) #1295 ext31

bit4: Behavior at the start of tool compensation (for L system only)
Select the behavior to be executed at the start of tool compensation.
The parameter is enabled when "#1100 Tmove" is "0".
0: Move the axis by the offset amount
1: Reflect the offset in the programmed position without axis travel
bit5: Subprogram calling/return block operation switching
Select whether the subprogram call block is interpreted as an executable statement or as a macro statement.
When macro statement is selected, the block is batch processed with the adjacent macro statements.
This parameter changes the behavior at M98, M198, M99, G65 or G66.1 command.
0: Executable statement
1: Macro statement
Not used. Set to "0".
Not used. Set to "0".
Not used. Set to "0".
bit0: Multiple spindle control II
Select multiple spindle control I or II.
0: Multiple spindle control I (L system only)
1: Multiple spindle control II (select from ladder)
bit1: Spindle control for each part system
Select whether to set spindle control command (S code/G96/G92) to be common in the part systems or to
be separated by each part system when multiple spindle control II is enabled (#1300 ext36/bit0 = 1).
0: Common in the part systems
1: Separated by each part system
bit2: Part system-based spindle clamp speed management
Select how to manage the spindle clamp speed data.
0: Manage the data of all part systems collectively
1: Manage the data of each part system individually
bit3: Spindle command rotation speed input timing selection
When multiple-spindle control II is enabled (#1300 ext36/bit0 = 1), switch the timing to update the spindle
command rotation speed input when performing the spindle selection(SWS) or spindle command selec tion(SLSP) with M command given in the same block as S command.
0: S command updates the spindle command rotation speed input for the spindle which is before the selec tion by the spindle selection(SWS) or spindle command selection(SLSP).
1: S command updates the spindle command rotation speed input for the spindle which is after the selection
by the spindle selection(SWS) or spindle command selection(SLSP).
bit7: Spindle synchronization command method
Select the spindle synchronization command method.
0: Spindle synchronization with PLC I/F
1: Spindle synchronization with machining program
Select the high-speed check method of the origin neighboring signal.
0: Do not check positions near the origin at high speeds. (Conventional specifications)
1: Check positions near the origin at high speeds using command machine positions.
2: Check positions near the origin at high speeds using encoder feedback positions.
(PR) #1296 ext32
(PR) #1297 ext33
(PR) #1298 ext34
(PR) #1299 ext35
(PR) #1300 ext36
#1301 nrfchk Near reference position check method

Select the method to move to the restart position when restarting the program.
0: Move the system to the restart position manually.
1: For program restarting, the first activation automatically moves the system to the restart position.
Set the number of common variables, common for part systems, starting from address #100.
This is valid only when "#1052 MemVal" is set to "1".
---Setting range---
0 to 100
Set the number of common variables, common for part systems, starting from address #500.
This is valid only when "#1052 MemVal" is set to "1".
---Setting range---
0 to 500
Select the parameter specification type for the G0 or G1 deceleration check.
0: Deceleration check specification type 1
G0 is specified with "#1193 inpos", and G1+G9 with "#1223 aux07/bit1".
1: Deceleration check specification type 2
G0 or G1+G9 is specified with "#1193 inpos".
Set a type of acceleration/deceleration for the rapid traverse command.
0: Constant-time acceleration/deceleration (conventional method)
1: Constant-gradient acceleration/deceleration
Select the type of acceleration/deceleration for a cutting feed command.
0: Constant-time acceleration/deceleration (conventional method)
1: Constant-gradient acceleration/deceleration
Select which is used to command the reverse tap.
0: G84.1/G88.1
1: D command with the value changed to negative
Set the minimum value for the M code. When "0" is set, the synchronization M code will be invalid.
---Setting range---
0, 100 to 99999999
Set the maximum value for the M code. When "0" is set, the synchronization M code will be invalid.
---Setting range---
0, 100 to 99999999
#1302 AutoRP Automatic return by program restart
(PR) #1303 V1comN No. of #100 address part system common variables
(PR) #1304 V0comN No. of #500 address part system common variables
#1306 InpsTyp Deceleration check specification type
(PR) #1307 G0acc_plc PLC axis G00 constant-gradient acceleration/decelera tion valid
(PR) #1308 G1acc_plc PLC axis G01 constant-gradient acceleration/decelera tion valid
(PR) #1309 GType Switch command format
#1310 WtMmin Minimum value for synchronization M code
#1311 WtMmax Maximum value for synchronization M code

Set the standard No. for the tool life management.
When the value specified by the T code command exceeds the set value in this parameter, the set value will be subtracted from the command value, which will be used as tool group No. for tool life management.
When the value specified by the T code command is equal to or less than the set value, the T code will be handled as a normal T code and not subjected to tool life management.
When "0" is set in this parameter, the T code command will always specify a group No. (Valid for M-system tool life management II.)
---Setting range---
0 to 9999
Set the hole bottom wait time for synchronous tapping.
When P address is specified, the greater value will be used as the hole bottom wait time. When an in-position check is performed at the hole bottom, the wait time will be provided after the completion of the in-position check.
(Note) This parameter is valid only when "1" is set in "#1223 aux07/bit3" (synchronous tap in-position check improvement) and "#1223 aux07/bit4" (synchronous tap hole bottom in-position check).
---Setting range---
0 to 999 (ms)
Set the hole bottom in-position check width for synchronous tapping.
(Note) This parameter is valid only when "1" is set in "#1223 aux07/bit3" (synchronous tap in-position check improvement) and "#1223 aux07/bit4" (synchronous tap hole bottom in-position check).
---Setting range---
0.000 to 99.999
Specify the maximum number of pre-read blocks for Tool radius compensation.
(Note) When "0" or a value out of the setting range is set, the maximum number of pre-read blocks is "4".
---Setting range---
0, 2 to 4
Select whether to use the common variables from #100100 to #800199.
0: Not use
1: Use
This parameter is valid only when the number of variable sets is set to 600 or more.
When this parameter is set to "1", variables from #100100 to #100110 will not be available as the system variables for PLC data read function, and the setting of "#1052 MemVal" will be invalid.
In a multi-part system configuration, select whether to use the machine tool builder macro variables (#450 to #499, #80000 to #80049 and #80500 to #80649) in common to all part systems or individually for each part system.
0: #450 to #499, #80000 to #80049 and #80500 to #80649 are used in common.
1: #450 to #499 are used in common to part systems. #80000 to #80049 and #80500 to #80649 are indi vidual for each part system.
2: #450 to #499 are individual for each part system. #80000 to #80049 and #80500 to #80649 are common to part systems.
3: #450 to #499, #80000 to #80049 and #80500 to #80649 are used individually for each part system.

#1312 T_base Tool life management standard number
#1313 TapDw1 Synchronous tap hole bottom wait time
#1314 TapInp Synchronous tap in-position check width (tap axis)
#1315 RcmpBlk Maximum number of pre-read blocks for Tool radius
compensation
(PR) #1316 CrossCom Reference of common variables common for part sys tems
(PR) #1318 MacVcom Machine tool builder macro variables for each part sys tem

Select whether or not to retain the G group 24 modal state (G188/G189) after modal retention reset.
0: Not initialize the G group 24 modal state even when you turn OFF the program format change request
signal (PFCHR) and press Cycle Start.
1: Determine the G group 24 modal state according to the program format change request signal (PFCHR)
when Cycle Start is pressed.
Set the head No. of the R register used as the compensation amount save area during fixed compensation
amount method.
When the first number is an odd number, the operation message "Setting error" appears.
When the value overlaps with the chopping control data area, the operation message "Setting error" appears.
---Setting range---
8300 to 9782
(Only the even number)
(Within backup area)
Set the number of PLC constant extension points.
---Setting range---
0 to 750
Select the tool change method for determining the tool to draw solids.
With 3D drawing, the tool will be changed by the method designated with this parameter, and then the image
will be drawn.
0: With one standby tool
1: With two standby tools
2: With no standby tool
Select the reference position for tool measurement.
0: The machine position at the time when TLM is turned ON
1: The machine zero point
Set the time taken for the drive section's main power to be shut-off when the confirmation of all the axes' stop
failed after the emergency stop state.
The contactor shut-off signal is output as soon as all the axes are confirmed stopped if the confirmation is
done prior to the set time.
When there is no safety observation option or "0" is set, the shut-off time will be 30 (s).
---Setting range---
0 to 60 (s)
When safety observation is executed, set the remote I/O device to input the contactor's auxiliary b contact
signal used for the contactor weld detection.
If "0" is set, weld detection will not be executed.
Thus, "X0" cannot be used as contactor weld detection device.
---Setting range---
0000 to 03FF (hexadecimal)
When safety observation is executed, set the remote I/O device to input the contactor's auxiliary b contact
signal used for the contactor weld detection.
If "0" is set, weld detection will not be executed.
Thus, "X0" cannot be used as contactor weld detection device.
---Setting range---
0000 to 03FF (hexadecimal)
#1319 Grp24_mdrst_off G group 24 modal retention reset OFF
(PR) #1324 chop_R Chopping compensation value fixing method
(PR) #1326 PLC Const Ext. Num PLC constant extension number
#1327 3D ATC type Tool change method specification
#1328 TLM type Reference position for tool measurement
#1329 Emgcnt Emergency stop contactor shut-off time
(PR) #1330 MC_dp1 Contactor weld detection device 1
(PR) #1331 MC_dp2 Contactor weld detection device 2

Specify a period of time during which the control does not detect a Fieldbus communication error of the Field bus expansion card mounted in the slot EXT3 (or EXT1 for M80V/M800VS), after startup of the NC is com pleted.
Set this in 0.1-second increments.
(Note) PROFIBUS-DP communication expansion card refers to this parameter, whichever slot (EXT3 or
EXT4 (or EXT1 or EXT2 for M80V/M800VS)) the card is mounted in. It does not refer to the parameter
#1490.
---Setting range---
0 to 60000 (0.1s)
Select whether to restrain the lost motion compensation in handle mode.
0: Not restrain
1: Restrain
Select the start cycle of PLC main processing program.
When wait time until the next start cycle from 1 scan end is long, the wait time can be shortened by adjusting
the start cycle.
-1: Low-speed mode (2 fold)
0: Standard mode
1: High-speed mode 1 (1/2 fold)
2: High-speed mode 2 (1/4 fold)
(Note 1) The refresh cycle of M80V(typeB) is fixed regardless of the setting value of this parameter.
(Note 2) When the high-speed mode is selected, the fine segment processing performance may degrade due
to the increased processing load of the system.
(Note 3) When the high-speed mode 2 is selected, the scan time should be 1/4 or less of the base interruption

cycle as a standard. If the standard is exceeded, the update of all the DI/DOs in refresh cycle may not be able to be performed.
(Note 4) If the number of RIO stations connected is large, the update of all the RIO in refresh cycle may not be able to be performed. Make the setting according to the number of stations per RIO channel.
Select the acceleration/deceleration mode in jog feed, incremental feed and manual reference position return (when rapid traverse signal OFF).
0: Acceleration/Deceleration for rapid traverse
1: Acceleration/Deceleration for cutting feed
Select whether the #400-level variables are used as machine tool builder macro variables or as common vari ables.
0: #400 to #449 are not available;
#450 to #499 are used as machine tool builder macro variables.
1: #400 to #499 are used as common variables
(Note) 700 sets or more of common variables are required for using #400 to #499 as common variables.
If this parameter is set to "1" while the number of common variables is set to less than 700, this parameter setting will be regarded as "0".
Select the condition to start/stop saving reverse run data.
0: Starts when the reverse run control mode signal is turned ON, and stops when turned OFF.
1: Start when the reverse run control mode signal is ON and macro interrupt is valid (M96/ION). Stop when the reverse run control mode signal is OFF or macro interruption is finished (M97/IOF). (compatible with M500M)
(PR) #1332 F-bus init delay Fieldbus communication error invalid time
#1333 LMC restrain Lost motion compensation restraint in handle mode
(PR) #1334 DI/DO refresh cycl DI/DO refresh cycle
#1335 man_smg Manual feed acceleration/deceleration selection
(PR) #1336 #400_Valtype #400 address variable type
(PR) #1338 rev data save trg Trigger switching to save arbitrary reverse run data

When safety observation is executed, set the remote I/O device to input the contactor's auxiliary b contact signal used for the contactor weld detection.
If "0" is set, weld detection will not be executed.
Thus, "X0" cannot be used as contactor weld detection device.
---Setting range---
0000 to 03FF (hexadecimal)
When safety observation is executed, set the remote I/O device to input the contactor's auxiliary b contact signal used for the contactor weld detection.
If "0" is set, weld detection will not be executed.
Thus, "X0" cannot be used as contactor weld detection device.
---Setting range---
0000 to 03FF (hexadecimal)
Set a period of time by which alarm display is delayed.
Set a time between when an operation alarm occurs and when the alarm display and signal turn ON.
When set to "0", the alarm display and signal will turn ON immediately after the alarm occurrence.
When set to "-1", the alarm display and signal will not turn ON after the alarm occurrence.
Target alarms:
M01 External interlock axis exists 0004
M01 Internal interlock axis exists 0005
M01 Sensor signal illegal ON 0019
M01 No operation mode 0101
This parameter is disabled if "#1343 DlyReg" is set.
---Setting range---
-1 to 30000 (ms)
Set the head No. of the R register to be used for delayed display of an operation alarm.
If any R register outside the user area is specified, delayed alarm display is disabled.
If this parameter is set, the setting of #1342 AlmDly is disabled.
When not using, set to "0".
---Setting range---
0 to 29899
Set a remote I/O device to input the door sensor signal to detect Door 1's status in safety observation.
When "0" is set, the door is always detected to be open.
Thus, "X0" cannot be used as Door 1 switch input device.
---Setting range---
0000 to 03FF (hexadecimal)
Set a remote I/O device to input the door sensor signal to detect Door 2's status in safety observation.
When "0" is set, the door is always detected to be open.
Thus, "X0" cannot be used as Door 2 switch input device.
---Setting range---
0000 to 03FF (hexadecimal)
Set a device of an output remote I/O device to control contactor in safety observation.
When set to "0", contactor shutoff output is disabled.
Thus, "Y0" cannot be used as contactor shutoff output device.
---Setting range---
0000 to 03FF (hexadecimal)
(PR) #1339 MC_dp3 Contactor weld detection device 3
(PR) #1340 MC_dp4 Contactor weld detection device 4
#1342 AlmDly Alarm display delay time
(PR) #1343 DlyReg R register for delayed alarm display setting
(PR) #1349 DOOR_1 Door 1 switch input device
(PR) #1350 DOOR_2 Door 2 switch input device
(PR) #1353 MC_ct1 Contactor shutoff output 1 device

Set a period of time until emergency stop is issued when a contactor does not operate even though contactor shutoff output 1 is output.

If the vertical axis drop prevention function is used, set a value bigger than the vertical axis drop prevention time (SV048 EMGrt).
When "0" is set, the contactor operation check will be disabled.
---Setting range---
0 to 30000 (ms)
Select the acceleration/deceleration type of auxiliary axis in PLC axis indexing.
0: Acceleration/deceleration with constant time
1: Acceleration/deceleration with a constant angle of inclination
Select the manual speed command type.
0: Manual speed command
The axis travels at the handle/jog feed rate.
Reverse run is performed for each part system independently of the other ones.
1: Manual speed command 2
In a multi-part system configuration, the axis travels at the handle/jog feed rate multiplied by the ratio of each part system's program command speeds.
When the block start point is reached in reverse run in any of the part systems, the axes in the other part systems stop simultaneously.
Select the operation when G31 is commanded in more than one part system.
(Note) When set to "1", the skip coordinate position will always be "0" whether G31 is commanded in a single part system or in one part system of a multi-part system.
Set to "0" when using G31 command for measurement etc.
0: Carry out G31 command in one part system, while the G31 is kept in an interlocked state in the other systems.
1: Carry out G31 command simultaneously in more than one part system.
Note that the skip coordinate is not read and so the skip coordinate value will be 0.
Set the maximum override value to be applied to the cutting feed that is in constant inclination acceleration/deceleration.
When the setting of this parameter is between 0 and 99, the override value is handled as 100% even though the specified cutting feed override is over 100%.
---Setting range---
0 to 300 (%)
Set the remote I/O device to input the observation speed change signal 1 during executing the safety obser vation function.
When set to "0", there is no observation speed change signal input.
Therefore "X0" cannot be used as safety observation signal device.
---Setting range---
0000 to 03FF (hexadecimal)
Set the remote I/O device to input the observation speed change signal 2 during executing the safety obser vation function.
When set to "0", there is no observation speed change signal input.
Therefore "X0" cannot be used as safety observation signal device.
---Setting range---
0000 to 03FF (hexadecimal)
(PR) #1357 mchkt1 Contactor operation check allowed time 1
(PR) #1361 aux_acc Auxiliary axis acceleration/deceleration type
#1365 manualFtype Manual speed command type
#1366 skipExTyp Multi-system simultaneous skip command
#1367 G1AccOVRMax Max. override value for cutting feed constant inclination acc./dec.
(PR) #1369 S_Sig1 Safety observation signal device 1
(PR) #1370 S_Sig2 Safety observation signal device 2

Specify the intervals of accumulating power consumption to create the history.
The accumulated power consumption history can be obtained according to this parameter along with "#1392 StartTimeIPC" (Power consumption accumulation start time).
When 0 is set, power consumption is not accumulated.
---Setting range---
0 to 999 (hr)
Specify the fixed power consumption of the drive system.
This value is used for calculating the power consumption.
---Setting range---
0 to 99999999 (W)
Enable the multi-step speed monitor.
0: Disable the multi-step speed monitor
1: Enable the multi-step speed monitor
* When enabling the multi-step speed monitor, setting values for SV238, SV239, SP238 and SP239 will be ignored.
Set the remote I/O device to input the observation speed change signal 3 during executing the safety obser vation function.
When set to "0", there is no observation speed change signal input.
Therefore "X0" cannot be used as safety observation signal device.
---Setting range---
0000 to 03FF (hexadecimal)
Not used. Set to "0".
Select whether to apply smoothing check method to a cutting block for deceleration check, when deceleration check method is selected individually for G0 and G1 (when "#1306 InpsTyp" = 0).
0: Follow the setting of "#1223 aux07/bit1"
1: Apply smoothing check method
Specify the number of the display's rear USB ports occupied by a machine tool builder. Using this setting the control determines the drive to be used for the front SD and USB memory.
(Note) This parameter is enabled for a Windows-based display of M800VW/M80VW.
---Setting range---
0 to 6
Enable the function of Data protection by user's level.
0: Use a machine user password to switch the protection of each operation (same as the conventional models)
1: Switch the protection according to the protective levels (0 to 7) specified for each operation through the protection setting screen

(Note) You are authorized to change this parameter from 1 to 0 only if your operation level is the same or higher than that of "Available level" on the protection setting screen.
Specify when to start accumulating power consumption to create the history.
The accumulated power consumption history can be obtained according to this parameter along with "#1371 PwrIntegIntvl" (Power consumption accumulation interval).
---Setting range---
0 to 23 (o'clock)
(PR) #1371 PwrIntegIntvl Power consumption accumulation interval
#1372 DrvBasePwr Fixed drive system power consumption
(PR) #1373 mstpssc Multi-step speed monitor enabled
(PR) #1379 S_Sig3 Safety observation signal device 3
(PR) #1380 TolOfsVal_M Tool compensation variable change
#1389 G1SmthChk Smoothing check method in cutting block
(PR) #1390 BackUSBUseNum Number of backside USB ports occupied
(PR) #1391 User level protect Enable Data protection by user's level
(PR) #1392 StartTimeIPC Power consumption accumulation start time

Specify the efficiency for calculating power consumption.
This value is used for calculating the drive system power consumption.
When 0 is set, the efficiency is treated as 70 (%).
If the drive system power consumption computed by the NC is different from that measured by a measuring device, this parameter is used to adjust the drive system power consumption of the NC.
---Setting range---
0 to 100 (%)
Specify the connection destination of the 1st handle.
bit0 to bit3: Handle connection channel 1 to 4 ("3" is only valid for operation panel)
bit4 to bit7: Handle connection destination
0: CNC unit
1 to 4: Remote I/O unit
5: Expansion unit
D to F: Operation panel I/O unit
bit8 to bitF: Remote I/O unit station 1 to 40 (hexadecimal)
(Example)
0001: Handle 1 connected to the CNC unit
2421: Handle 1 of 36th station for remote I/O unit connected to RIO2
00D3: Handle 3 of operation panel I/O unit connected to RIO1
(Note 1) When the specified destination is not implemented, handle movement is not performed.
(Note 2) When all the "H1_pno" to "H3_pno"are set to "0000", handles are automatically allocated.
Other than above, "0000" setting is the same connection as "0001" setting.
---Setting range---
0000 to FFFF (hexadecimal)
Specify the connection destination of the 2nd handle.
Refer to "#1395 H1_pno" (1st handle selection) for further details.
Specify the connection destination of the 3rd handle.
Refer to "#1395 H1_pno" (1st handle selection) for further details.
Specify the average filter scale factor for the spindle's actual rotation speed data.
If the scale factor increases, fluctuations in speed display are mitigated.
0: Standard setting
1: 0.5-fold
2: 1-fold
3: 2-fold
4: 4-fold
5: 8-fold
Select the M command operation.
(Note) Register M codes in the special operation registration M codes (#1411 to #1426).
0: Not wait for the completion of registered M codes,
but wait for the completion of the other M codes
1: Wait for the completion of registered M codes,
but not wait for the completion of the other M code
Select the S command completion method.
0: Wait for the complete signal from PLC
1: Not wait for the complete signal from PLC
#1393 Efficiency (PwrCal) Efficiency for power consumption computation
(PR) #1395 H1_pno 1st handle selection
(PR) #1396 H2_pno 2nd handle selection
(PR) #1397 H3_pno 3rd handle selection
#1399 sp_filt Spindle's actual rotation speed filter
#1401 M_mode M command operation selection
#1402 S_mode S command completion method selection

Select the T command completion method.
0: Wait for the complete signal from PLC
1: Not wait for the complete signal from PLC
Select the 2nd miscellaneous command completion method.
0: Wait for the complete signal from PLC
1: Not wait for the complete signal from PLC
M code output (during high-speed simple program check)
Select the M code output method to be applied during high-speed simple program check.
0: Output the M codes registered in #1449 to #1464 M[M511-000](SMLK), but not output unregistered M codes.
M512 or subsequent M codes are not output.
1: Output the M codes unregistered in #1449 to #1464 M[M511-000](SMLK), but not output those regis tered.

M512 and subsequent M codes are all output.
S code output (during high-speed simple program check)
Select the S code output method to be applied during high-speed simple program check.
0: Not output S code
1: Output S code
T code output (during high-speed simple program check)
Select the T code output method to be applied during high-speed simple program check.
0: Not output T code
1: Output T code
2nd miscellaneous code output (during high-speed simple program check)
Select the 2nd M code output method to be applied during high-speed simple program check.
0: Not output 2nd M code
1: Output 2nd M code
Register an M code that needs special operation.
Each bit of the set value corresponds to the M code number.
(Example) To register M05, set 00000020 in #1411.
(Note) Note that the registered M code operation varies according to M_mode (#1401).
---Setting range---
0 to FFFFFFFF
Set this in hexadecimal format.
#1403 T_mode T command completion method selection
#1404 M2_mode 2nd miscellaneous command completion method se lection
#1405 M_mode(SMLK) M code output (during high-speed simple program
check)
#1406 S_mode(SMLK) S code output (during high-speed simple program
check)
#1407 T_mode(SMLK) T code output (during high-speed simple program
check)
#1408 M2_mode(SMLK) 2nd miscellaneous code output (during high-speed
simple program check)
#1411 M_wait[M031-000] Special operation registration M code

Register an M code (32 to 63) that needs special operation.
Each bit of the set value corresponds to the M code number.
(Example) To register M05, set 00000020 in #1411.
(Note) Note that the registered M code operation varies according to M_mode (#1401).
---Setting range---
0 to FFFFFFFF
Set this in hexadecimal format.
Register an M code (64 to 95) that needs special operation.
Each bit of the set value corresponds to the M code number.
(Example) To register M05, set 00000020 in #1411.
(Note) Note that the registered M code operation varies according to M_mode (#1401).
---Setting range---
0 to FFFFFFFF
Set this in hexadecimal format.
Register an M code (96 to 127) that needs special operation.
Each bit of the set value corresponds to the M code number.
(Example) To register M05, set 00000020 in #1411.
(Note) Note that the registered M code operation varies according to M_mode (#1401).
---Setting range---
0 to FFFFFFFF
Set this in hexadecimal format.
Register an M code (128 to 159) that needs special operation.
Each bit of the set value corresponds to the M code number.
(Example) To register M05, set 00000020 in #1411.
(Note) Note that the registered M code operation varies according to M_mode (#1401).
---Setting range---
0 to FFFFFFFF
Set this in hexadecimal format.
Register an M code (160 to 191) that needs special operation.
Each bit of the set value corresponds to the M code number.
(Example) To register M05, set 00000020 in #1411.
(Note) Note that the registered M code operation varies according to M_mode (#1401).
---Setting range---
0 to FFFFFFFF
Set this in hexadecimal format.
Register an M code (192 to 223) that needs special operation.
Each bit of the set value corresponds to the M code number.
(Example) To register M05, set 00000020 in #1411.
(Note) Note that the registered M code operation varies according to M_mode (#1401).
---Setting range---
0 to FFFFFFFF
Set this in hexadecimal format.
#1412 M_wait[M063-032] Special operation registration M code
#1413 M_wait[M095-064] Special operation registration M code
#1414 M_wait[M127-096] Special operation registration M code
#1415 M_wait[M159-128] Special operation registration M code
#1416 M_wait[M191-160] Special operation registration M code
#1417 M_wait[M223-192] Special operation registration M code

Register an M code (224 to 255) that needs special operation.

Each bit of the set value corresponds to the M code number.
(Example) To register M05, set 00000020 in #1411.
(Note) Note that the registered M code operation varies according to M_mode (#1401).
---Setting range---
0 to FFFFFFFF
Set this in hexadecimal format.
Not used.
Not used.
Not used.
Not used.
Not used.
Not used.
Not used.
Not used.
Select whether to enable switching of acceleration/deceleration time constant after G1 interpolation.
0: Disable switching of acceleration/deceleration time constant after G1 interpolation.
1: Enable switching of acceleration/deceleration time constant after G1 interpolation.
Select whether to change acceleration/deceleration time constant back to parameter value when NC is reset.
0: Disable changing acceleration/deceleration time constant back when NC is reset.
1: Enable changing acceleration/deceleration time constant back when NC is reset.
Choose which of the following controls to enable; Mixed control (Cross axis control) I, II or arbitrary axis ex change control.
Set this parameter to "1" to enable the arbitrary axis exchange control function with M80VtypeA (M system)
and M80VW (M system).
0: Mixed control (Cross axis control) I or II
1: Arbitrary axis exchange control
#1418 M_wait[M255-224] Special operation registration M code
#1419 M_wait[M287-256] Special operation registration M code
#1420 M_wait[M319-288] Special operation registration M code
#1421 M_wait[M351-320] Special operation registration M code
#1422 M_wait[M383-352] Special operation registration M code
#1423 M_wait[M415-384] Special operation registration M code
#1424 M_wait[M447-416] Special operation registration M code
#1425 M_wait[M479-448] Special operation registration M code
#1426 M_wait[M511-480] Special operation registration M code
(PR) #1427 RT2AftG1 RT2: Enable switching of acce/dece time constant after
G1 interpolation
(PR) #1428 RT2rst RT2: Enable changing acce/dece time constant back
when NC is reset
(PR) #1431 Ax_Chg Selection of mixed control (cross axis control) or arbi trary axis exchange control

bit0: Selection of alarm when axis exchange is disabled
Select whether to issue an alarm or wait until the axis becomes exchangeable when axis exchange is dis abled.
0: Wait until the axis becomes exchangeable when the axis declared in an axis exchange command is in capable of being exchanged.
* The parameter #1433 (G140TimeOut) determines the operation to be carried out during the waiting
time.
1: Output the alarm (M01 1101) when the axis declared in an axis exchange command is incapable of be ing exchanged.
bit1: Compensation cancel after arbitrary axis exchange
Select whether to enable canceling of compensation after an arbitrary axis exchange.
0: Not cancel compensation after arbitrary axis exchange
1: Cancel compensation after arbitrary axis exchange
Specify a period of time to wait before outputting the alarm (M01 1101) when an axis declared in the axis
exchange command is unexchangeable.
If the specified time elapses with the axis remaining unexchangeable, the alarm (M01 1101) is output. How ever this alarm is cancelled and axis exchange is carried out once the axis becomes capable of being ex changed.
0 to 254: Period of time to wait before timeout (sec)
255: Wait until the axis becomes exchangeable without executing timeout check
(Note) This parameter is enabled when the alarm is not caused by an axis' unexchangeable state (when
#1432 Ax_Chg_Spec(bit0) = 0).
---Setting range---
0 to 254 (s)
255: No timeout
Select which axis address(es) can be commanded under G140 (Arbitrary axis exchange) control.
0: The axis (or axes) specified in the G140 block can be commanded.
1: Not only the axis (or axes) specified in the G140 block but those unspecified in the block can also be
commanded.
Select whether to enable manual interruption for an axis being under cross machining control.
0: Disable
1: Enable
Select whether to enable override for the dwell time and miscellaneous function time.
0: Disable (Override takes no effect.)
1: Enable (Override takes effect.)
bit0: Selection of alarm when sub part system II start is disabled
Select the type of operation to be carried out when the sub part system specified by G144 is incapable of
being activated.
0: Wait until the system becomes capable of being activated
1: Output an alarm
bit1: Sub part system control II: Reset type selection
Select how to reset the sub part system control II.
0: Reset sub part system at the same time as main part system reset.
1: Not reset sub part system at the time of main part system reset.
#1432 Ax_Chg_Spec
#1433 G140TimeOut G140 timeout period
#1434 G140Type2 G140 command type 2
#1435 crsman Manual interruption during cross machining
#1436 mstsyn Enable override for dwell and miscellaneous function
time

#1437 SBS2_Spec Selection of alarm when sub part system II start is dis abled

Select the allocation method of tool offset sets.
0: Automatic equal allocation
1: Arbitrary allocation
The setting of "1" is enabled for a system configured with two or more part systems.
When "1" is selected for a system configured with a single part system, all the offset sets of the system are allocated to the 1st part system.
Select the allocation method of the life management tools.
0: Automatic equal allocation
1: Arbitrary allocation
The setting of "1" is enabled for a system configured with two or more part systems.
When "1" is selected for a system configured with a single part system, all the life management tools of the system are allocated to the 1st part system.
Select whether to enable multiple spindle synchronization.
0: Disable multiple spindle synchronization.
1: Enable multiple spindle synchronization.
Select the tool command method.
0: Tool life management II format
1: Tool function
Select whether to enable the G00 rapid traverse block overlap function.
0: Disable
1: Enable
Select whether to enable the G28 rapid traverse block overlap function.
0: Disable
1: Enable
Select whether to stop all the part systems or only the part system where H/W stroke end, soft limit or inter ference check alarm has occurred.
(Note) If H/W stroke end, soft limit or interference check alarm has occurred on an axis related to superim position, synchronization, arbitrary axis superimposition, or synchronization during axis traveling, the part system to which the superimposition (synchronous) and reference axes belong is treated as the one where the alarm has occurred.
0: Stop each part system
1: Stop all the part systems
Select whether to display or hide additional information on the tool management screen.
0: Display
1: Not display
Select the operation to be performed when command T has no tool length offset No.
0: Tool length offset No. is deemed as 0.
1: Last commanded tool length offset No.is applied.
(Tool length offset No. is unchanged.)
0: Disable a spindle rotation command given in another part system
1: Enable a spindle rotation command given in another part system
(PR) #1438 Ofs-SysAssign Enable part system allocation of tool offset sets
(PR) #1439 Tlife-SysAssign Part system allocation of life management tools
(PR) #1440 multi_sp_syn Multiple spindle synchronization valid
(PR) #1441 Tcode_Method_Chg T command method selection
#1442 G0ol Enable G00 rapid traverse block overlap
#1443 G28ol Enable G28 rapid traverse block overlap
#1444 otsys Stop all part systems at OT
(PR) #1445 Tol-Custom-nondisp Non-display of additional info on tool management screen
#1446 Tlno.hold Tool length offset No. retention
#1447 G96_tmp_cancel Temporary cancel of constant surface speed control

0: Disable cancel of the error
1: Enable cancel of the error
0: Rapid traverse rate (#2001 rapid) serves as the maximum speed in jog, handle, incremental or manual reference position return (high-speed) mode. However you can use a PLC device to switch the maxi mum speed to the manual feed clamp speed (#2614 m_clamp).
1: Manual feed clamp speed (#2614 m_clamp) serves as the maximum speed in jog, handle, incremental, or manual reference position return (high-speed) mode.
bit0: Axis name setting method of rotary axis configuration parameter
Select the axis name setting method for rotary axis configuration parameter (#7900, #7901, #7902, #7922, #7932, #7942, #7952).
0: Set by axis name
1: Set by 2nd axis name
bit1: Using G174 tool axis rotation angle as compensation amount
0: Specify the compensation amount using the address R and R register.
1: Use the tool axis rotation angle of G174 as the compensation amount.
bit2: Application of rotary axis configuration parameters
Select the method of applying the rotary axis configuration parameters.
0: Automatic selection method
1: PLC signal method
(Note) This parameter is enabled when "#1450 5axis_Spec/bit0 (Axis name setting method of rotary axis configuration parameter)" is "1".
bit3: Select specifications of rotation direction parameter
Select the specifications of rotation direction parameter (#7923, #7933, #7943, #7953).
0: The parameter specifications vary for each function.
1: The parameter specifications are common to the functions.
"#7923 DIR_T1", "#7933 DIR_T2", "#7943 DIR_W1", "#7953 DIR_W2"
0: When the tool motion viewed from the workpiece is in right-hand screw direction, it is taken as the positive direction.
1: When the tool motion viewed from the workpiece is in left-hand screw direction, it is taken as the positive direction.

bit5: Rotation center error compensation: restraint of machine movement
Select whether to enable restraint of machine movement when the rotation center error compensation is used in combination with any of the following multi-part system functions:
Arbitrary axis exchange control
Mixed control I or II
Control axis synchronization between part systems I or II
Control axis superimposition
Arbitrary axis superimposition
0: Enable restraint of machine movement
Retain the multi-part system function at reset or emergency stop
Perform error check when multi-part system function is commanded
1: Disable restraint of machine movement
Not retain the multi-part system function at reset or emergency stop
Not perform error check when multi-part system function is commanded
(Note) This parameter is enabled when "#1450 5axis_Spec/bit0" (Axis name setting method of rotary axis configuration parameter) is "1".
#1448 Sclamp_err_cancel Cancel of the error for absence of spindle speed clamp
#1449 m_clamp_on Manual feed rate clamp ON
(PR) #1450 5axis_Spec

Register an M code to be output during high-speed simple program check.
Each bit of the set value corresponds to the M code number.
(Example) To register M05, set 00000020 in #1451.
Note that operation of the registered M code varies according to #1405 M_mode(SMLK).
---Setting range---
0 to FFFFFFFF
Set this in hexadecimal format.
Register an M code to be output during high-speed simple program check.
Each bit of the set value corresponds to the M code number.
(Example) To register M05, set 00000020 in #1451.
Note that operation of the registered M code varies according to #1405 M_mode(SMLK).
---Setting range---
0 to FFFFFFFF
Set this in hexadecimal format.
Register an M code to be output during high-speed simple program check.
Each bit of the set value corresponds to the M code number.
(Example) To register M05, set 00000020 in #1451.
Note that operation of the registered M code varies according to #1405 M_mode(SMLK).
---Setting range---
0 to FFFFFFFF
Set this in hexadecimal format.
Register an M code to be output during high-speed simple program check.
Each bit of the set value corresponds to the M code number.
(Example) To register M05, set 00000020 in #1451.
Note that operation of the registered M code varies according to #1405 M_mode(SMLK).
---Setting range---
0 to FFFFFFFF
Set this in hexadecimal format.
Register an M code to be output during high-speed simple program check.
Each bit of the set value corresponds to the M code number.
(Example) To register M05, set 00000020 in #1451.
Note that operation of the registered M code varies according to #1405 M_mode(SMLK).
---Setting range---
0 to FFFFFFFF
Set this in hexadecimal format.
#1451 M[M031-000](SMLK) Special operation registration M code (High-speed sim ple program check)
#1452 M[M063-032](SMLK) Special operation registration M code (High-speed sim ple program check)
#1453 M[M095-064](SMLK) Special operation registration M code (High-speed sim ple program check)
#1454 M[M127-096](SMLK) Special operation registration M code (High-speed sim ple program check)
#1455 M[M159-128](SMLK) Special operation registration M code (High-speed sim ple program check)

Register an M code to be output during high-speed simple program check.
Each bit of the set value corresponds to the M code number.
(Example) To register M05, set 00000020 in #1451.
Note that operation of the registered M code varies according to #1405 M_mode(SMLK).
---Setting range---
0 to FFFFFFFF
Set this in hexadecimal format.
Register an M code to be output during high-speed simple program check.
Each bit of the set value corresponds to the M code number.
(Example) To register M05, set 00000020 in #1451.
Note that operation of the registered M code varies according to #1405 M_mode(SMLK).
---Setting range---
0 to FFFFFFFF
Set this in hexadecimal format.
Register an M code to be output during high-speed simple program check.
Each bit of the set value corresponds to the M code number.
(Example) To register M05, set 00000020 in #1451.
Note that operation of the registered M code varies according to #1405 M_mode(SMLK).
---Setting range---
0 to FFFFFFFF
Set this in hexadecimal format.

Register an M code to be output during high-speed simple program check.
Each bit of the set value corresponds to the M code number.
(Example) To register M05, set 00000020 in #1451.
Note that operation of the registered M code varies according to #1405 M_mode(SMLK).
---Setting range---
0 to FFFFFFFF
Set this in hexadecimal format.
Register an M code to be output during high-speed simple program check.
Each bit of the set value corresponds to the M code number.
(Example) To register M05, set 00000020 in #1451.
Note that operation of the registered M code varies according to #1405 M_mode(SMLK).
---Setting range---
0 to FFFFFFFF
Set this in hexadecimal format.
#1456 M[M191-160](SMLK) Special operation registration M code (High-speed sim ple program check)
#1457 M[M223-192](SMLK) Special operation registration M code (High-speed sim ple program check)
#1458 M[M255-224](SMLK) Special operation registration M code (High-speed sim ple program check)
#1459 M[M287-256](SMLK) Special operation registration M code (High-speed sim ple program check)
#1460 M[M319-288](SMLK) Special operation registration M code (High-speed sim ple program check)

Register an M code to be output during high-speed simple program check.
Each bit of the set value corresponds to the M code number.
(Example) To register M05, set 00000020 in #1451.
Note that operation of the registered M code varies according to #1405 M_mode(SMLK).
---Setting range---
0 to FFFFFFFF
Set this in hexadecimal format.
Register an M code to be output during high-speed simple program check.
Each bit of the set value corresponds to the M code number.
(Example) To register M05, set 00000020 in #1451.
Note that operation of the registered M code varies according to #1405 M_mode(SMLK).
---Setting range---
0 to FFFFFFFF
Set this in hexadecimal format.
Register an M code to be output during high-speed simple program check.
Each bit of the set value corresponds to the M code number.
(Example) To register M05, set 00000020 in #1451.
Note that operation of the registered M code varies according to #1405 M_mode(SMLK).
---Setting range---
0 to FFFFFFFF
Set this in hexadecimal format.
Register an M code to be output during high-speed simple program check.
Each bit of the set value corresponds to the M code number.
(Example) To register M05, set 00000020 in #1451.
Note that operation of the registered M code varies according to #1405 M_mode(SMLK).
---Setting range---
0 to FFFFFFFF
Set this in hexadecimal format.
#1461 M[M351-320](SMLK) Special operation registration M code (High-speed sim ple program check)
#1462 M[M383-352](SMLK) Special operation registration M code (High-speed sim ple program check)
#1463 M[M415-384](SMLK) Special operation registration M code (High-speed sim ple program check)
#1464 M[M447-416](SMLK) Special operation registration M code (High-speed sim ple program check)
#1465 M[M479-448](SMLK) Special operation registration M code (High-speed sim ple program check)

Register an M code to be output during high-speed simple program check.
Each bit of the set value corresponds to the M code number.
(Example) To register M05, set 00000020 in #1451.
Note that operation of the registered M code varies according to #1405 M_mode(SMLK).
---Setting range---
0 to FFFFFFFF
Set this in hexadecimal format.
Select whether to enable a miscellaneous command macro call through the manual numerical value com mand.
0: Disable
1: Enable
When Disable is selected, the commanded MSTB code and strobe are output.
Set the standard value "0".
Select how to allocate the PLC devices that are used for PROFIBUS-DP(DPV0): fixed allocation (512 points)
or arbitrary allocation (8192 points).
0: Fixed
1: Arbitrary
Select whether to enable the machine groupwise alarm stop function.
0: Disable
1: Enable
Select whether to allow automatic operation to be activated after machine groupwise alarm stop.
0: Not allow automatic operation to start after machine groupwise alarm stop

1: Allow automatic operation to start after machine groupwise alarm stop
When any alarm causes an axis that is in the midst of program execution to stop, this parameter allows you to select the behavior of axes that belong to machine groups other than that of the said axis.
0: Feed hold
1: The operation is allowed to continue.
Specify the number of sub part systems to use in sub part system control II.
The specified number of part systems counted from the end of the system's effective part systems are treated as sub part systems.
---Setting range---
0 to 7
Set whether to enable the MES interface function.
0: Disable
1: Enable
#1466 M[M511-480](SMLK) Special operation registration M code (High-speed sim ple program check)
#1467 Manual MSTB macro MSTB macro call via manual numerical value command
#1468 ctrl period Control period
(PR) #1469 P-BUS dev assign PROFIBUS device allocation method
(PR) #1471 mgralmstp Enable machine groupwise alarm stop
(PR) #1472 mgralmrestart Allowing automatic operation to start after machine groupwise alarm stop
(PR) #1473 mgralmcont Allowing operation to continue after machine group wise alarm stop
(PR) #1474 SBS2_sys num Number of sub systems to use in sub part system con trol II
(PR) #1475 MES-IF_on MES-IF ON

Specify a period of time by which to delay the error display and the storage to the alarm history, when the communication error (Y02 System error 0051) occurs.
Set this time when the communication error is stored in the history at the power OFF.
If it does not occur (if unused), set to "0".
---Setting range---
0 to 5000 (ms)
Specify a period of time by which to delay the alarm display and the storage to the alarm history, when a servo/spindle alarm occurs.
Set this time when a servo/spindle alarm is stored in the history at the power OFF.
If it does not occur (if unused), set to "0".
---Setting range---
0 to 5000 (ms)
Select whether to enable or disable the Fieldbus communication expansion card mounted in the slot EXT3 (or EXT1 for M80V/M800VS).
0: Enable (default)
1: Disable
(Note) This parameter is enabled for all the communication expansion cards, except CC-Link expansion card.
Select whether to enable or disable the Fieldbus communication expansion card mounted in the slot EXT4 (or EXT2 for M80V/M800VS).
0: Enable (default)
1: Disable
(Note) This parameter is enabled for all the communication expansion cards, except CC-Link expansion card.
Select whether to disable input via touch panel.
0: Enable touch panel operation
1: Disable touch panel operation
Select whether to enable smart safety observation.
0: Disable
1: Enable
Specify the number of sub part systems to be used for Sub part system control I in M80V or M80VW. The specified number of part systems counted from the end of the system's effective part systems are treated as sub part systems.
(Note) For M800V, this setting is ignored. (All the effective part systems can be used as main or sub part system.)
---Setting range---
0 to 7
bit0: Speed clamp specifications at entering the interference warning area
In interference check III, select whether to perform speed clamp and torque limit in only the part systems re lating to the interference warning or in all the part systems at entering the interference warning area.
0: Perform in only the part systems relating to the interference warning
1: Perform in all the part systems and axes
#1476 ComErrDly Delayed display and storage of communication error
#1477 SrvAlmDly Delayed display and storage of servo/spindle alarm
(PR) #1478 F-bus Card 1 OFF Fieldbus communication extension card 1 OFF
(PR) #1479 F-bus Card 2 OFF Fieldbus communication extension card 2 OFF
#1480 tp_invalid Disable touch panel operation
(PR) #1481 Enable S-Safety Enable smart safety observation
(PR) #1483 SBS1_sys num Number of sub systems to use in sub part system con trol I
#1487 ITF3_Spec Interference check III specification

Interference check III is validated.
When interference check III is invalid, interference check between part systems is valid.
0: Interference check III invalid
1: Interference check III valid
Select whether to enable or disable the SLMP server function.
0: Disable
1: Enable
Specify a period of time during which the control does not detect a Fieldbus communication error of the Field bus expansion card mounted in the slot EXT4 (or EXT2 for M80V/M800VS), after startup of the NC is com pleted.

Set this in 0.1-second increments.
(Note 1) This parameter is enabled for all the communication expansion cards except PROFIBUS-DP com munication expansion card.
(Note 2) PROFIBUS-DP communication expansion card does not refer to this parameter, whichever slot
(EXT3 or EXT4 (or EXT1 or EXT2 for M80V/M800VS)) the card is mounted in. It refers to the param eter #1332.
---Setting range---
0 to 60000 (0.1s)
Select whether to perform the in-position check for each block of the Punch Tap cycle.
bit0-5:
0: Not perform in-position check
1: Perform in-position check
bit1: Disabling movement in prohibited area of stored stroke limit IB/IIB
Specify whether axis movement is disabled or not when the tool is in the prohibited area of stored stroke limit
IB/IIB.
0: Not disable movement.
1: Disable movement, except for movements towards the nearest permitted area.
bit2: Mode of rapid traverse block overlap for G00/G28
Select the mode of rapid traverse block overlap for G00 and G28.
When pre-interpolation acceleration/deceleration is used, Mode 2 is recommended.
This parameter is valid when rapid traverse block overlap for G00 is enabled ("#1442 G0ol" = 1) or rapid tra verse block overlap for G28 is enabled ("#1443 G28ol" = 1).
0: Mode 1 (compatible with post-interpolation acceleration/deceleration)
1: Mode 2 (optimized for post-/pre-interpolation acceleration/deceleration)
bit3: Spindle position control: Program command method Zero point return spec
Specify the zero point return type of the program command method in Spindle position control.
0: Zero point return type
1: Follow the parameter setting in "#3106 zrn_typ/bit8" (Spindle/C axis zero point return)
bit4: Behavior of Optional block skip in high-speed mode
Select how the program blocks skipped with Optional block skip are handled while any of the following modes
is enabled: High-speed machining mode II, High-speed high-accuracy control II or High-speed high-accuracy
control III.
0: The blocks are handled as those with no motion.
1: The blocks are skipped.
(PR) #1488 ITF3 valid Interference check III valid
(PR) #1489 SLMP_on SLMP_on
(PR) #1490 F-bus init delay 2 Field bus communication error invalid time 2
#1702 cfg02 In-position check for Punch Tap
#1711 cfg11
M800V/M80V Series Alarm/Parameter Manual
15 Machine Parameters
15.3 Base Common Parameters
IB-1501623-F 448
bit0: Rapid traverse rate: PR display
Specify whether to display PR when Command speed monitoring function is enabled and Rapid traverse rate
is changed.
0: Not display
1: Display
bit1: Load monitoring I: torque output switch
Specify how torque is output in Load monitoring I
0: Only during automatic operation (the estimated disturbance torque of the servo axis is always output)
1: Always output
bit0: Confirmation about formatting at edit of SRAM open parameter
Select whether to display a confirmation message at the setting of SRAM open parameter data, notifying that
the NC memory needs to be formatted.
0: Not display the confirmation message
1: Display the confirmation message
bit1: Displaying of FIN in status field
Specify whether to display FIN that indicates Waiting for miscellaneous function.
0: Disable FIN display
1: Enable FIN display
bit1: Selection of coordinate system for shift amount of G76/G87
Select in which coordinate system the tool-tip shift amount is interpreted for G76 fine boring cycle or G87
back boring cycle. The shift amount is specified with address Q or I/J/K.
(Note) When "Machine coordinate system" is selected, do not perform figure rotation.
0: Currently active coordinate system
1: Machine coordinate system
bit4: Behavior for G92 (G50) and G53 in the same block
Select the behavior for G92 (G50) and G53 commands in the same block specifying an axis address other
than "0".
0: Output a program error (P35)
1: Process the commands by treating the axis address as "0"
#1712 cfg12
#1725 cfg25
(PR) #1751 cfgPR01
M800V/M80V Series Alarm/Parameter Manual
15 Machine Parameters
15.3 Base Common Parameters
449 IB-1501623-F
bit0: PLC window diameter specification valid
Enable input/output in diameter value for the data of "Diameter specification axis" ("#1019 dia" is set to "1")
in PLC window.
0: Input/output is executed in radius value.
1: Input/output is executed in diameter value.
bit2: Constant-gradient acc/dec behavior switch when G0 non-interpolation is enabled
Switch how acceleration/deceleration works while the following modes are active when "#1086 G0Intp" = 1
(G0 non-interpolation) and "#1200 G0_acc" = 1 (G0 constant-gradient acceleration/deceleration).
Inclined surface machining
Tool center point control
Simple inclined surface machining
Simple tool center point control

Workpiece installation error compensation
Tool cutting point control
L system and coordinate rotation by program
0: Constant-time acceleration/deceleration
1: Constant-gradient acceleration/deceleration
bit4: Prioritization of G0 constant-gradient acc/dec time constant
When "#1200 G0_acc" = 1 (G0 constant-gradient acceleration/deceleration), even if the time constant for G0
constant-gradient acceleration/deceleration is greater than the G0 time constant (axis specification parame ter "#2004 G0tL"), acceleration/deceleration is performed based on the time constant for G0 constant-gradi ent acceleration/deceleration.
When this setting is used, the G0 time constant is limited to 2000 ms.
This setting is applied to the following parameters.
#2004 G0tL
#2005 G0t1
#2092 plG0tL
#2093 plG0t1
#2598 G0tL_2
#2599 G0t1_2
#2622 pl3G0tL
#2623 pl3G0t1
(Note) When "#1752 cfgPR02/bit4" = 1, even if "#1200 G0_acc" = 0 (G0 constant-gradient acceleration/de celeration invalid), the setting of these parameters is limited.
0: Perform acceleration/deceleration based on the shorter of the G0 constant-gradient acceleration/decel eration time constant and the G0 time constant
1: Perform acceleration/deceleration based on the G0 constant-gradient acceleration/deceleration time
constant
bit5: System variable (feedrate F) value to be read
Select the value to be read from the system variables #4109 and #4309 (Feedrate F).
0: The programmed feed-per-minute F value is read, regardless of the feed mode.
1: Depending on the feed mode, either the programmed feed-per-minute or feed-per-revolution F value is
read.
bit0: The enhanced surface quality mode for OMR-CC
Select whether to enable the enhanced surface quality mode for OMR-CC.
0: Disable
1: Enable
bit2: Disable extension of encoder input frequency
Specify whether to disable the extension of encoder input frequency range.
0: Enable
1: Disable
(PR) #1752 cfgPR02
(PR) #1753 cfgPR03

bit1: Improvement of Compound type fixed cycle for turning machining I
0: Disable
1: Enable
bit0: Disable screen list display
Turn off the screen list display via multi-touch gesture (grab operation with four or more points).
0: Screen list display ON
1: Screen list display OFF
bit1: Fixed cursor position
Select where the cursor is located after data entry.
0: Cursor moves to the next data entry position.
1: Unchanged from the original position.
bit0: Machining condition selection screen - Disable setting of condition names
Select whether to allow setting of names for the machining conditions.
0: Enable the setting
1: Disable the setting
bit2: Enable HD mode on IPC
This parameter specifies whether the NC can run a program stored in the IPC which is connected to the same
network.
0: A program stored in the IPC cannot be run.
1: A program stored in the IPC can be run.
(Note 1) This parameter is valid for M80V.
(Note 2) The parameter "#11005 PC IP address" needs to be set to enable program operations.
bit4: Hide motor temperature
Select whether to show/hide the item of the servo unit "Motor temp. (degC)" on the drive monitor screen.
0: Show
1: Hide
bit5: Whether to count a comment block in searching
Select whether to count a comment block as one block when searching is performed within a program, in cluding Operation search and Cursor position search.
0: Count a comment block as one block
1: Not count a comment block
bit6: Wear compensation amount edit in Data protection ON
Specify whether to enable or disable editing of Wear compensation amount.
0: When the data protection key 1 (KEY1) is turned OFF (0), editing is disabled.
1: Editing is enabled regardless of whether the data protection key 1 (KEY1) is turned ON or OFF.
bit7: Interactive cycle insertion feedrate command selection
Specify the command method for the item "Feedrate" of Turning hole cycle and Turning cycle in Interactive
cycle insertion.
0: Feed per revolution (mm/rev)
1: Feed per minute (mm/min)
(PR) #1756 cfgPR06
(PR) #1759 cfgPR09
(PR) #1760 cfgPR10

bit0: Plane selection method for Polar coordinate interpolation
Specify the selection method of Polar coordinate interpolation plane (G17 - G19).
0: The plane whose 1st plane axis is equal to the parameter "#1533 millPax" is specified as a command plane for Polar coordinate interpolation.
When the X axis is set, G17 (XY plane) is specified as the Polar coordinate interpolation plane.
1: The plane whose 2nd plane axis is equal to the parameter "#1533 millPax" is specified as a command plane for Polar coordinate interpolation.
When the Y axis is set, G17 (XY plane) is specified as the Polar coordinate interpolation plane.
bit1: Cogging torque compensation ON
Select whether to enable cogging torque compensation.
0: Disable
1: Enable
bit6: Machine tool builder macro password management method
0: MTB macro password management method type 1
Password authentication is set with "#1166 fixpro".
1: MTB macro password management method type 2
Password authentication is set with "#11796 mmacpro".
bit0: NC-HPU optical communication: communication function valid
Specify whether to disable/enable communication function in the NC-HPU optical communication.
0: Disable (not communicate)
1: Enable (communicate)
bit1: NC-HPU optical communication: error type
Specify the error type of NC-HPU optical communication.
0: Z107 0001 "NC-HPU optical communication warning"
1: Z107 0002 "NC-HPU optical communication alarm"
bit2: NC-HPU optical communication: received data initialization at error
Specify whether to initialize the received data or not at the NC-HPU optical communication error.
0: Not initialize
1: Initialize
bit4-3: NC-HPU optical communication: send/receive data size selection
Specify the send/receive data size in the NC-HPU optical communication.
00: 512 Bytes
01: 1024 Bytes
10: 2048 Bytes
11: 512 Bytes
bit5: BiSS encoder I/F valid
Specify whether to enable/disable BiSS encoder I/F.
0: Disable
1: Enable
(Note) When "1" is set, external encoder I/F and external encoder position output I/F are invalid.
bit6: Z phase detection speed limit
Specify whether to limit the Z phase detection speed with S command speed in Spindle/C axis control for Z phase detection.
0: Z phase detection speed is not limited with S command speed (conventional operation).
1: Z phase detection speed is limited with S command speed.
(*) This setting is valid when "1" is set to the parameter "#3106 zrn_typ/bit3" (Z phase detection operation ON).
(PR) #1761 cfgPR11
(PR) #1762 cfgPR12

bit0: HPU custom module: notification data invalid
Select whether to reflect the data notified from HPU custom module in NC.
When Disable is selected, all the data notified from HPU custom module will be invalid, and will not be re flected in NC.
0: Enable (default)
1: Disable
bit2: Suppression of recalculation after FH cancellation
Recalculation after feed-hold cancellation is suppressed during SSS control to improve response speed.
0: Do not suppress
1: Suppress
Start or stop the Ethernet communication function.
0: Stop
1: Start
Set the main CPU's IP address.
Set the NC IP address seen from an external source.
---Setting range---
Set these parameters in accordance with the network rules in the connection environment.
Set the subnet mask for the IP address.
---Setting range---
Set these parameters in accordance with the network rules in the connection environment.
Set the IP address for the gateway.
---Setting range---
Set these parameters in accordance with the network rules in the connection environment.
Not used. Set to "0".
Not used. Set to "0".
Set the host's port No.
---Setting range---
1 to 9999
Set the HMI side CPU's IP address.
(Note) This parameter is dedicated to M800VW/M80VW with Windows-based display.
---Setting range---
Set these parameters in accordance with the network rules in the connection environment.
Set the HMI side CPU's subnet mask.
(Note) This parameter is dedicated to M800VW/M80VW with Windows-based display.
---Setting range---
Set these parameters in accordance with the network rules in the connection environment.

(PR) #1766 cfgPR16
#1925 EtherNet Start of service
(PR) #1926 Global IP address IP address
(PR) #1927 Global Subnet mask Subnet mask
(PR) #1928 Global Gateway Gateway
#1929
#1930
(PR) #1931 Host number Host No.
(PR) #1934 Local IP address
(PR) #1935 Local Subnet mask

Specify the IP address on the non-Windows-based display unit (LAN1) side.
---Setting range---
Set these parameters in accordance with the network rules in the connection environment.
Specify the IP address of subnet mask on the non-Windows-based display unit (LAN1) side.
---Setting range---
Set these parameters in accordance with the network rules in the connection environment.
Specify the gateway IP address on the non-Windows-based display unit (LAN1) side.
---Setting range---
Set these parameters in accordance with the network rules in the connection environment.
Specify the IP address of the field network communication expansion unit installed in the slot EXT3 (or EXT1 for M80V/M800VS).
---Setting range---
0.0.0.0 to 255.255.255.255
Specify the subnet mask of the field network communication expansion unit installed in the slot EXT3 (or EXT1 for M80V/M800VS).
---Setting range---
0.0.0.0 to 255.255.255.255
Specify the gateway of the field network communication expansion unit installed in the slot EXT3 (or EXT1 for M80V/M800VS).
---Setting range---
0.0.0.0 to 255.255.255.255
Specify the IP address of the field network communication expansion unit installed in the slot EXT4 (or EXT2 for M80V/M800VS).
---Setting range---
0.0.0.0 to 255.255.255.255
Specify the subnet mask of the field network communication expansion unit installed in the slot EXT4 (or EXT2 for M80V/M800VS).
---Setting range---
0.0.0.0 to 255.255.255.255
Specify the gateway of the field network communication expansion unit installed in the slot EXT4 (or EXT2 for M80V/M800VS).
---Setting range---
0.0.0.0 to 255.255.255.255
(PR) #1953 Intra IP address IP address on non-Windows-based display unit (LAN1) side
(PR) #1954 Intra Subnet mask Subnet mask on non-Windows-based display unit (LAN1) side
(PR) #1955 Intra Gateway Gateway on non-Windows-based display unit (LAN1) side
(PR) #1958 Ext Unit1 IP Addr Field network communication expansion unit: IP ad dress 1
(PR) #1959 Ext Unit1 Sub mask Field network communication expansion unit: subnet mask 1
(PR) #1960 Ext Unit1 Gateway Field network communication expansion unit: gateway 1
(PR) #1961 Ext Unit2 IP Addr Field network communication expansion unit: IP ad dress 2
(PR) #1962 Ext Unit2 Sub mask Field network communication expansion unit: subnet mask 2
(PR) #1963 Ext Unit2 Gateway Field network communication expansion unit: gateway 2

Set the type of screen displayed with the pallet program registration screen.
0: Standard pallet registration screen
1: Pallet 4-page registration screen
Set the number of pallets validated on the pallet program registration screen.
---Setting range---
2 to 12 (Interpreted as 2 when 0 is set.)
Temporarily disable APLC.
Normally set "1".
0: Disable
1: Enable
Select starting condition of the built-in PLC.
0: Start PLC after NC screen startup
1: Start PLC at NC startup
(Note) When standard NC screen is not used, set "1".
Set the IP address of the display unit or the PC in which machining programs are stored (or the IP address of the IPC for M80V).
Set the IP address of the display unit which is powered OFF with the Auto power OFF function.
When the 3D machine interference check function is enabled, set the IP address of the display unit to be used for the 3D machine interference check (for M800VW only).
(Note) When "0.0.0.0" is entered, "192.168.100.2" is automatically assigned.
PC Subnet

Set the subnet mask for the display unit or PC in which machining programs are stored.
PC Gateway
Set the gateway for the display unit or PC in which machining programs are stored.
---Setting range---
0.0.0.0 to 255.255.255.255
Set the port No. for the display unit or PC in which machining programs are stored.
(Note 1) When "0" is input, "55555" is automatically set.
(Note 2) When changing the parameter, set the same value in "PD_Control_Port" in the PC side environment setting file.
---Setting range---
0 to 65535
Set the NC side communication timeout time.
Set the timeout time for the display unit to be shut down upon automatic power OFF request.
(Note 1) When "0" is input, "120" is automatically set.
(Note 2) When the value greater than "300" is set, a setting error occurs.
(Note 3) When changing the parameter, set the same value in "PD_Time_out" in the PC side environment setting file.
---Setting range---
0 to 300 (s)
(PR) #11001 APC type APC screen display type selection
(PR) #11002 Valid pallet num Number of pallets setting
(PR) #11003 APLC valid APLC valid
(PR) #11004 PLCauto-run enable PLC automatic startup valid
(PR) #11005 PC IP address IP address setting
#11006 PC Port number Port No. setting
(PR) #11007 PC Timeout Communication timeout time setting

Select the program number label when using the M2 format.
0: Label L
1: Label O
Select whether or not to use a software keyboard on a touchscreen.
0: Not use (Note 1)
1: Use (no automatic display)
2: Use (The keyboard appears automatically on a specific screen or upon Y/N confirmation)
3: Use (The keyboard appears automatically upon Y/N confirmation)
(Note 1) If no NC keyboard is connected, the screen shows the software keyboard button.
Set the password used for the handy terminal customized downloading.
Blank (when "0" is set) and "0000" are regarded as no password.
Not the password of a new customizing file but the password of the customizing file downloaded to the last handy terminal is set.
Set blank or "0000" when initially downloading.
---Setting range---
0000 to 9999
Select the maximum number of axes (sum of the NC axis, spindle, and PLC axis) connected to the drive unit interface (channel 1).
0: Up to 8 axes can be connected to channel 1.
1: Up to 16 axes can be connected to channel 1. This parameter is disabled when the extension unit is connected. It is possible to connect only up to eight axes or less per channel.
Select whether to enable the 3D machine interference check function.
0: Enable
1: Disable
Set the 1st-step check distance when in 3D machine interference check mode.
The standard value is "30.000".
---Setting range---
0.000 to 99999.999 (mm)
Set the 2nd-step check distance when in 3D machine interference check mode.
The standard setting value is "5.000".
---Setting range---
0.000 to 99999.999 (mm)
Set the model shape expansion rate to be used for 3D machine interference check. This parameter is used for expanding a model shape to be used for 3D machine interference check. The interference check is per formed using a shape expanded by the amount of [Check length (mm) x Shape expansion rate (%)].
---Setting range---
0 to 300 (%)
Select whether to enable the tool compensation amount setting and life value setting during automatic oper ation and operation pause.
0: Disable
1: Enable
(PR) #11009 M2 label O M2 label O
(PR) #11010 Software keyboard Software keyboard
#11011 Handy TERM. PW. Handy terminal password
(PR) #11012 16 axes for 1ch Connecting 16 axes for 1ch
#11013 3D_MChk Invalidate 3D machine interference check
#11014 Chk_len1 1st-step interference check distance
#11015 Chk_len2 2nd-step interference check distance
#11016 Expand_Rate Shape expansion rate
#11017 T-ofs set at run Tool compensation amount setting during automatic operation enabled

When set to "1", the "Machine user" (operation level 6) password will be held even if the NC is restarted.
0: Do not hold
1: Machine user password is held
Select whether to enable simultaneous display of multiple part systems on the monitor screen.
0: Display one part system on the monitor screen.

1, 2: Display two part systems simultaneously on the monitor screen.
3: Display three part systems simultaneously on the monitor screen. Note that this is enabled for a 15- or 19-type display unit only.
4: Display four part systems simultaneously on the monitor screen. Note that this is enabled for a 15- or 19-type display unit only.
(Note 1) If the number of part systems to display is smaller than that of the simultaneous display, a single part system display is selected.
(Note 2) If you select "3" or "4" for any display unit other than 15- or 19-type, a single part system display is selected.
Select the format of PLC alarms and operator messages to be displayed on the bottom right of the screen.
0: Display up to the first 40 characters.
1: If text is longer than 40 characters, divide it into two and display separately. (Supplementary information is displayed together)
Not used. Set to "0".
Not used. Set to "0".
Not used. Set to "0".
Set the tolerable correction value for the calculated coordinate value error of R-specified circular center.
When a difference between "a line between the start and end points" and "commanded radius x 2" is the tol erance or smaller, the error is corrected so that the middle of a line between the start and end points will be the arc center.
When [Setting value < 0]: 0 (Not correct arc center error)
When [Setting value = 0]: 0.002 mm
When [Setting value > 0]: Setting value
---Setting range---
<Metric system> -1 to 0.100 (mm)
<Inch system> -0.0393 to 0.0039 (inch)
When arc center or radius designation is omitted from arc command, change the arc command into linear without causing program error.
0: Program error
1: Change into linear command
Select whether handle feed of the tapping axis in manual synchronous tappingsynchronizes with the spindle or not.
0: Synchronize with the spindle
1: Not synchronize with the spindle
#11018 M password hold Machine user password is held
(PR) #11019 2-system display 2-part system simultaneous display
#11021 PLC mesg disp type Format of PLC alarm and operator message
#11022 SRAM Output Type
#11023 G33.n Drn
#11024 G33.n fhd
#11028 Tolerance Arc Cent Tolerable correction value of arc center error
#11029 Arc to G1 no Cent Change command from arc to linear when no arc center designation
#11030 Man tap sync cancl Synchronization cancel in manual synchronous tap ping

Select the cursor position searching method.
0: Disable
1: Pressing the INPUT key in [Monitr] - [Edit] menu starts the operation search for the block with the cursor.
2: Turning ON/OFF the "Edit/Search" signal in [Monitr] - [Edit] menu starts the operation search for the block with the cursor.
3: Turning ON/OFF the "Edit/Search" signal in [Monitr] - [Edit] menu starts the operation search for the block with the cursor.
Pressing the reset key shows the top of the program on the [Edit/Search] window.
Enable the setting of the menu selection parameters, with which the order of main menus on Monitor, Setup and Edit screens can be rearranged. And also select who is allowed to do this setting.
0: Disable
1: Enable (machine tool builder password is required)
2: Enable (users are allowed to set)
Select the contact of the sensor which you wish to set as unconnected, when the skip signal is set to contact B.
Set "1" for the contact to be unconnected.
bit0: Skip input 1
bit1: Skip input 2
bit2: Skip input 3
bit3: Skip input 4
bit4: Skip input 5
bit5: Skip input 6
bit6: Skip input 7
bit7: Skip input 8
(Note 1) This parameter is enabled when "#1258 set30/bit0" is set to "1".
(Note 2) This parameter is independent of PLC skip.
---Setting range---
00000000 to 11111111 (Binary)
Select the type of command address to check in circular cutting.
0: Regard command addresses other than D, F, I as illegal.
1: Regard the command address H as illegal.
And commands other than D,F,I and M,S,T,B are disabled.
This restricts switching the part systems displayed on screen.
0: Not restrict
1: Disable the part system switching by pressing [$<->$] key on touch panel.
2: Disable the part system switching by display switch signals(Y730 to Y733).
Set the non-sensitive band to be used for judging the manual measurement direction.
If the feedback position fluctuates widely at the axis stop, set the fluctuation width or larger value in this set the parameter.
When set to "0", the band will be 1 (m).
---Setting range---

0 to 1000 (m)
0: 1 (m)
(PR) #11031 Cursor pos search Cursor position search
(PR) #11032 Menu sel para lkof Validate menu selection parameter setting
(PR) #11033 skipB_no_sens Unconnected sensor selection when skip is set to con tact B
#11034 G12AddrCheckType Command address type to check in circular cutting
#11035 Sys. change limit Part system switching restriction
#11036 meas dir judge Non-sensitive band for manual measurement direction
judgment (for M system only)

Select the machining surface indexing type in the R-Navi function.
0: Indexing type 1 (Only rotary axes move to perform indexing)
1: Indexing type 2 (Indexing is performed with the tool center point fixed to the position seen from the work piece)
Select the T display (tool command value) type on the monitor screen between displaying tool No. only or
displaying tool No. and compensation No. (L system only)
0: Display tool No. only
1: Display the tool command value (the combined value consisting of the tool No. and compensation No.)
last commanded by the program. Even in a manual value command, the program's tool command value
is displayed.
Set the availability of the cursor position search during single block stop when "#11031 Cursor pos search"
is any of "1" to "3".
0: Disable cursor position search during single block stop.
1: Enable cursor position search during single block stop.
Sub-program is displayed when selecting menus [Monitr]-[Edit] while single block stop is carried out
during sub-program with this parameter set to 1.
Select ON/OFF of the Direct Socket communication I/F.
0: OFF (Default)
1: ON
(Note) When the Direct Socket communication I/F is ON, applications that uses "#1926 Global IP address"
such as MS Configurator and GX Developer cannot be used.
Select in which order to sort the operation log files (all logs) to be output.
0: Sort the data in chronologically ascending order separately for each log type.
1: Sort the data in chronologically ascending order for all the log types.
If the times and dates logged are identical, the log files are output in the order of key, touchscreen, alarm,
PLC signal, tool offset change, workpiece offset change and AC power.
Specify which magazine to display when Sp-stby is selected on the Spindle standby or Tool registration
screen.
0: Fixed to the magazine #1
1: The magazine selected by the menu (Magazine 1 to Magazine 5).
Specify how many part systems to display on a screen.
0: The same number as that of the enabled part systems
1 or greater: The number specified by this parameter serves as that of the part systems to display.
(Note) The setting range differs according to the NC model. For the number of part systems displaying in the
operating state, follow this parameter setting.
---Setting range---
0 to 8
Set this parameter to 1 if you wish to disable the workpiece coordinate system shift function.
0: Enable the workpiece coordinate shift function
1: Disable the workpiece coordinate shift function
#11037 R-Navi Index Type R-Navi machining surface indexing type
#11038 T disp typ T display (tool command value) type (For L system only)
#11039 Cusr pos srch type Cursor position search type
#11051 Direct Socket ON Direct Socket communication I/F ON
#11052 LOG Sort Order Log data sorting order
#11054 Sp-stby disp type Spindle-standby display type
#11055 Disp. sysno Number of part systems to display
(PR) #11056 Workshift invalid Workpiece coordinate system shift OFF (For L system
only)

Set the No. of F device to specify the displayed operator message.
Device specified with this parameter is treated as No.1, and displays up to 4 operator messages correspond ing to F device that is ON.
This parameter is valid when #6455/bit3 is 0.
(Note 1) Use from F1024 when "0" is set.
(Note 2) Set the device No. to be a multiple of 32. When other value is input, a setting error occurs.
---Setting range---
0 to 2016
Select whether to enable the remote communication.
0: Disabled
1: Enabled
Select the screen theme colors.
This selection affects the colors of the entire screen.
0: Standard colors (gray tone)
1: Blue tone
Specify how many EcoMonitorLight units (an energy meter made by Mitsubishi Electric for measuring the
consumption and regeneration) are connected to the CNC.
---Setting range---
0: None
1 to 16: Number of connected modules
Default 0
Specify the PLC input signal (X) that is excluded from the PLC signal log.
Efficiency of the history analysis is improved by excluding the machine contact input/output signals or other
frequently switched signals from the signal log.

When "0" is set, the history exclusion PLC input signal is disabled.
Thus X0 cannot be excluded from the signal log.
---Setting range---
0000 to 1FFF (hexadecimal)
Specify the PLC input signal (X) that is excluded from the PLC signal log.
Efficiency of the history analysis is improved by excluding the machine contact input/output signals or other frequently switched signals from the signal log.
When "0" is set, the history exclusion PLC input signal is disabled.
Thus X0 cannot be excluded from the signal log.
---Setting range---
0000 to 1FFF (hexadecimal)
Specify the PLC input signal (X) that is excluded from the PLC signal log.
Efficiency of the history analysis is improved by excluding the machine contact input/output signals or other frequently switched signals from the signal log.
When "0" is set, the history exclusion PLC input signal is disabled.
Thus X0 cannot be excluded from the signal log.
---Setting range---
0000 to 1FFF (hexadecimal)
(PR) #11058 plc_opemsg0 Operator messages display device
(PR) #11059 Remote comm enable Remote connect enabled
(PR) #11060 Screen theme color Select screen theme colors
(PR) #11061 Num of EcoMonitors The Number of EcoMonitorLight connected to CNC
(PR) #11062 NoHistDevIn.1 History exclusion PLC input signal 1
(PR) #11063 NoHistDevIn.2 History exclusion PLC input signal 2
(PR) #11064 NoHistDevIn.3 History exclusion PLC input signal 3

Specify the PLC input signal (X) that is excluded from the PLC signal log.
Efficiency of the history analysis is improved by excluding the machine contact input/output signals or other frequently switched signals from the signal log.
When "0" is set, the history exclusion PLC input signal is disabled.
Thus X0 cannot be excluded from the signal log.
---Setting range---
0000 to 1FFF (hexadecimal)
Specify the PLC input signal (X) that is excluded from the PLC signal log.
Efficiency of the history analysis is improved by excluding the machine contact input/output signals or other frequently switched signals from the signal log.
When "0" is set, the history exclusion PLC input signal is disabled.
Thus X0 cannot be excluded from the signal log.
---Setting range---
0000 to 1FFF (hexadecimal)
Specify the PLC output signal (Y) that is excluded from the PLC signal log.
Efficiency of the history analysis is improved by excluding the machine contact input/output signals or other frequently switched signals from the signal log.
When "0" is set, the history exclusion PLC output signal is disabled.
Thus Y0 cannot be excluded from the signal log.
---Setting range---
0000 to 1FFF (hexadecimal)
Specify the PLC output signal (Y) that is excluded from the PLC signal log.
Efficiency of the history analysis is improved by excluding the machine contact input/output signals or other frequently switched signals from the signal log.
When "0" is set, the history exclusion PLC output signal is disabled.
Thus Y0 cannot be excluded from the signal log.
---Setting range---
0000 to 1FFF (hexadecimal)
Specify the PLC output signal (Y) that is excluded from the PLC signal log.
Efficiency of the history analysis is improved by excluding the machine contact input/output signals or other frequently switched signals from the signal log.
When "0" is set, the history exclusion PLC output signal is disabled.
Thus Y0 cannot be excluded from the signal log.
---Setting range---
0000 to 1FFF (hexadecimal)
(PR) #11065 NoHistDevIn.4 History exclusion PLC input signal 4
(PR) #11066 NoHistDevIn.5 History exclusion PLC input signal 5
(PR) #11067 NoHistDevOut.1 History exclusion PLC output signal 1
(PR) #11068 NoHistDevOut.2 History exclusion PLC output signal 2
(PR) #11069 NoHistDevOut.3 History exclusion PLC output signal 3
(PR) #11070 NoHistDevOut.4 History exclusion PLC output signal 4

Specify the PLC output signal (Y) that is excluded from the PLC signal log.
Efficiency of the history analysis is improved by excluding the machine contact input/output signals or other frequently switched signals from the signal log.
When "0" is set, the history exclusion PLC output signal is disabled.
Thus Y0 cannot be excluded from the signal log.
---Setting range---
0000 to 1FFF (hexadecimal)

Select whether to display the home screen.
0: Not display
1: Display (display at power ON)
2: Display (not display at power ON)
When switching the program format from M system to L system with program format switch command (G188) or when switching G code guidance from M system to L system by the menu [Edit]-[Guide M/L], the G code systems after switching follow the setting of this parameter.
0: L system G code system 2
1: L system G code system 3
2: L system G code system 4
3: L system G code system 5
4: L system G code system 6
5: L system G code system 7
Select the type of counter display (workpiece coordinate position, relative position and absolute position) while #8116 is 0 (coordinate rotation by parameter is enabled).
0: Display the position relative to the orthogonal coordinate system.
1: Display the position relative to the coordinate system rotated through the coordinate rotation by param eter. (with EXT [external workpiece coordinate offset] added during automatic operation)
2: Display the position relative to the coordinate system rotated through the coordinate rotation by param eter. (with EXT [external workpiece coordinate offset] constantly added)
Select how to specify the measurement reference point coordinates for manual tool length measurement I (L system).
0: Use the machine zero point as the reference point
1: Use the coordinates of "#2015 tlml-" as the reference point (the same operation as when #1282 bit2 = 0 for M7)
2: Use the workpiece coordinate system offset (modal) as the reference point (the same operation as when #1282 bit2 = 1 for M7)
Select whether to have the monitor screen show a PLC axis position counter.
0: Monitor screen does not show a PLC axis position counter.
1: Depending on the selected counter type, monitor screen is able to show.
Select whether to block the connection from GX Developer/GX Works2.
0: Allow the connection
1: Block the connection
(PR) #11071 NoHistDevOut.5 History exclusion PLC output signal 5
(PR) #11080 HomeScreen display HomeScreen display
(PR) #11082 Lsys_change_Gtype L system G code system after program format switch (for M system only)
#11086 rot_angle_dsp Counter display during coordinate rotation
(PR) #11087 Meas basic point Tool length measurement I reference point (for L sys tem only)
#11091 PLC counter valid Enable PLC axis counter
(PR) #11094 GX Restriction Inhibiting GX Developer/GX Works2 connection

Select whether the 3D machine interference check outputs an alarm or not when the tool is not mounted.
0: Not output an alarm when the tool check is disabled or the tool is not mounted.
1: Output an alarm when the tool check is disabled or the tool is not mounted.
Designate the destination menu Nos. to move monitor screen's main menus.
-1: Menu not displayed
0: No change
1 to 40: Destination menu No.
Designate the destination menu Nos. to move setup screen's main menus.
-1: Menu not displayed
0: No change
1 to 30: Destination menu No.
Designate the destination menu Nos. to move edit screen's main menus.
-1: Menu not displayed
0: No change
1 to 30: Destination menu No.
Designate the destination menu Nos. to move diagn screen's main menus.
-1 : Not display the menu
0: No change
1 to 30: Destination menu No.
Designate the destination menu Nos. to move mainte screen's main menus.
-1 : Not display the menu
0: No change
1 to 30: Destination menu No.
Select the type of data to be input to the multi-analog input unit.
0: Analog voltage
1: Analog current
2: Temperature (resistance thermometer bulb, normal, Pt100, 3-wire)
3: Temperature (resistance thermometer bulb, normal, Pt100, 4-wire)
4: Temperature (resistance thermometer bulb, normal, Pt1000, 3-wire)
5: Temperature (resistance thermometer bulb, normal, Pt1000, 4-wire)
6: Temperature (resistance thermometer bulb, high-accuracy, Pt100, 3-wire)
7: Temperature (resistance thermometer bulb, high-accuracy, Pt100, 4-wire)
8: Temperature (resistance thermometer bulb, high-accuracy, Pt1000, 3-wire)
9: Temperature (resistance thermometer bulb, high-accuracy, Pt1000, 4-wire)
10: Temperature (thermocouple (K))
11: Temperature (thermocouple (J))
#11100 3D_MChk_ToolAlm Alarm when tool interference check is disabled
(PR) #11101-
11140
Monitr menu(MTB)1-40 Monitor main menu (MTB) 1 to 40
(PR) #11151-
11180
Setup menu (MTB) 1-30 Setup main menu (MTB) 1 to 30

(PR) #11201-
11230
Edit menu(MTB) 1-30 Edit main menu (MTB) 1 to 30
(PR) #11251-
11280
Diagn menu(MTB)1-30 Diagn main menu (MTB) 1 to 30
(PR) #11301-
11330
Mainte menu(MTB)1-30 Mainte main menu (MTB) 1 to 30
(PR) #11351-
11366
manasel_00-manasel_15 Multi-analog input data type ch0 to ch15

Set the speed of communication with BiSS encoder.
0: 5MHz
1: 3.33MHz
2: 2.5MHz
3: 2MHz
4: 1.67MHz
5: 1.43MHz
6: 1.25MHz
7: 1.11MHz
8: 1MHz
9: 0.91MHz
10: 0.83MHz
11: 0.77MHz
12: 0.71MHz
13: 667kHz
14: 625kHz
Set the data length (number of bits) for BiSS encoder.
(Note) When "0" is set, the data length defaults to 1 bit.
---Setting range---
0 to 64
Select the CRC generating polynomial used for communication with BiSS encoder.
0: CRC generating polynomial = 0x43
1: CRC invalid
2: CRC generating polynomial = 0xB
3: CRC generating polynomial = 0x13
4: CRC generating polynomial = 0x25
5: CRC generating polynomial = 0x89
6: CRC generating polynomial = 0x12F
7: CRC generating polynomial = 0x190D9
8: Custom
(Note) When "8" is set, enter a CRC generating polynomial into parameter "#11379 BiSS_enc1_CRC_cstm".
Set a CRC generating polynomial in this parameter when parameter "#11378 BiSS_enc1_CRC_slct" is set
to "8: Custom".
(Note) When "0" is set, the CRC generating polynomial defaults to "1".
---Setting range---
0 to FF (HEX)
Set the default value of CRC used in communication with BiSS encoder.
---Setting range---
0 to FFFF (HEX)
Specify the period of time that the NC operates after the brake wear diagnosis is completed before the brake
wear diagnostics incomplete signal (BWDNFm) is next turned on.
If set to "0", the interval is 8 hours.
---Setting range---
0 to 255 hours
(PR) #11376 BiSS_enc_rate BiSS encoder communication speed
(PR) #11377 BiSS_enc1_dat_leng BiSS encoder 1 data length
(PR) #11378 BiSS_enc1_CRC_slct BiSS encoder 1 CRC selection
(PR) #11379 BiSS_enc1_CRC_cstm BiSS encoder 1 CRC (custom)
(PR) #11380 BiSS_enc1_CRC_init BiSS encoder 1 CRC default value
(PR) #11386 BWD_INT Brake wear diagnostics interval

Select whether to activate the brake wear diagnostics incomplete state at power-on.
0: Activate the brake wear diagnostics incomplete state.
1: Not activate the brake wear diagnostics incomplete state.
Select whether to enable motion control release.
0: Disable
1: Enable
Specify the behavior when the system variable #3006 (message display and stop) is commanded during
Suppression of single block stop (#3003/bit0 = 1) of system variable.
0: Block stop is not executed with #3006 command.
1: Block stop is executed with #3006 command.
Specify whether to enable the specification of each function.
bit0: 3D machine interference check specification enabled
0: Disable
1: Enable
(Note) This parameter is valid for M80VW.
---Setting range---
0x00 to 0xFF (hexadecimal)
Adjust the axis travel detection cycle for displaying actual feedrate (F) during emergency stop.

Increasing the magnification leads to smaller fluctuations in the actual feedrate readout (F).
0: Standard setting (1-fold)
1: 0.25-fold
2: 0.5-fold
3: 1-fold
4: 2-fold
5: 4-fold
6: 8-fold
(Note) This parameter is enabled when "#1125 real_f (Actual feedrate display)" is "1" .
This parameter specifies the ratio of vibration amplitude to feed per spindle revolution.
(Vibration cutting control is conducted with the amplitude of feed per spindle revolution multiplied by the am plitude-feed ratio.)
If this parameter is set to "0", the ratio will be 2.00.
---Setting range---
0 to 9.99
This parameter specifies the maximum value of the vibration amplitude-to-feed ratio.
If this parameter is set to "0", the maximum value will be 9.99.
---Setting range---
0 to 9.99
This parameter specifies the type of the vibration waveform.
0: Triangular wave
1: Sine wave
2: Rectangular wave
(PR) #11387 BWD_INIT_NF Brake wear diagnostics incomplete state at power-on
(PR) #11481 MCR valid Motion control release valid
#11482 ValBlkStopSelect System variable #3006 block stop switch
(PR) #11484 Spec_valid Specification valid
#11669 EMG F_disp Filt Actual feedrate detection cycle for displaying F during
emergency stop
#11670 AmpFeedRate_VCC Vibration amplitude-to-feed ratio
#11671 AmpFeedRateMax_VCC Maximum value of amplitude-to-feed ratio
#11673 VibType_VCC Vibration waveform type

This parameter specifies the maximum number of vibrations per spindle revolution.
If this parameter is set to "0", the maximum number will be 31.50.
The frequency range selected for the VCC mode is switched as follows according to this parameter:
When in the range of 0.10 to 6.50: 5.63 to 281.25 (Hz)
When "0" or in the range of 6.51 to 31.50: 28.13 to 281.25 (Hz)
---Setting range---
0, 0.10 to 31.50 (oscillations)
Specify the starting number of common variables that store the measurement result.
Eight common variables starting from the specified number are used.
Specify the No. of common variable that is common to part systems.
* Select the number so that eight common variables beginning with the selected number are all common to
part systems.
---Setting range---
0, 100 to 142, 400 to 992, 100100 to 800192, 900000 to 907392
Specify the name of macro program for the workpiece installation error measurement.
The macro program name is output at initialization of workpiece installation error measurement macro.
The macro program is used for execution of the measurement.
---Setting range---
0, 9000 to 9099, 9300 to 9999, 100010000 to 100018999, 100030000 to 199999998
Specify the diameter of reference sphere that is used for rotation center error measurement.
If the set value is significantly different from the actual diameter, the sensor may be damaged.
---Setting range---
0.000, 1.000 to 100.000 (mm)
Select whether to activate emergency stop or display a warning if an error occurs on the Fieldbus expansion
card mounted in the slot EXT3 (or EXT1 for M80V/M800VS).
(Note) The parameter does not apply to a CC-Link expansion card.
0: Emergency stop
1: Warning display
Select whether to activate emergency stop or display a warning if an error occurs on the Fieldbus expansion
card mounted in the slot EXT4 (or EXT2 for M80V/M800VS).
(Note) The parameter does not apply to a CC-Link expansion card.
0: Emergency stop
1: Warning display
Select the method of specifying the cutting-edge angle that is used for turning-tool shape compensation in
Compound type fixed cycle for turning machining I.
0: Tool shape method
1: Tool compensation method
Select the part system to which the analog spindle synchronous tapping cycle is applied.
When 0 is set, the part system 1 is considered to be selected.
---Setting range---
0 to 8
#11678 VibPerRevMax_VCC Maximum number of vibrations per spindle revolution
#11700 EM Cmn No Starting common variable No. for storage of error mea surement result
#11701 WEM Mcr No Macro No. for workpiece installation error measurement
#11702 Ref Sphere Dia Reference sphere diameter
(PR) #11708 F-bus 1 Err Switch Fieldbus communication error switch 1
(PR) #11709 F-bus 2 Err Switch Fieldbus communication error switch 2
#11716 CutEdgeAngleType Turning tool shape compensation: setting method of
cutting-edge angle
(PR) #11717 astap_sysno Analog spindle synch tap: Part system selection

This parameter enables you to adjust the motion start timing of the tap axis and the spindle in analog spindle synchronous tapping.
(1) When the setting = 0
Not adjust the timing.
(2) When the setting > 0
Delay the start of tap axis command by the specified length of time.
This is effective when the analog spindle lags behind the tap axis.
(3) When the setting < 0
Delay the start of analog spindle command by the specified length of time.
This is effective when the analog spindle runs ahead of the tap axis.
---Setting range---
-50 to 50 (ms)
When the synchronous tapping with analog I/F spindle is active, the compensation amount for the spindle rotation speed is calculated using the feedback. The compensation amount can be adjusted by the factor specified in this parameter.
---Setting range---
0 to 300 (%)
When the synchronous tapping with analog I/F spindle is active, the first-order lag filter is applied to compen sate the spindle rotation speed. The time constant of the filter is specified by this parameter.
---Setting range---
0 to 500 (ms)
When the synchronous tapping with analog I/F spindle function is active, there may be a time lag between the command issued to the spindle and the feedback sent from the encoder. The time lag can be corrected by entering the length of time in this parameter.
---Setting range---
0 to 50 (ms)
Select the type of the enhanced PLC security mode.
0: No mode (invalid)
1: Write-protection mode
2: Read/Write-protection mode
Select the number of the project which can be used as "E/U project" by end users.
When "0" is set, the end-user mode is disabled.
When any number from 1 to 6 is selected, the end-user mode is enabled.
While the parameter "#11761 PLC Security Mode" is "0", the end-user mode is invalid irrespective of this pa rameter.
---Setting range---
1 to 6
0: No setting (End-user mode is invalid)
Specify the initial number of the Y devices that are free to use for end users.
The sum of this setting and "#11764 E/U Y Dev Size" cannot exceed 0600 (HEX).
---Setting range---
0000 to 05FF (HEX)
#11718 astap_timeadj Analog spindle synch tap: Timing adjustment
#11719 astap_Fbadj Synchronous tapping with analog I/F spindle: compen sation factor
#11720 astap_filt Synchronous tapping with analog I/F spindle: filter time
constant
#11721 astap_Fbtime Synchronous tapping with analog I/F spindle: feedback
time lag
(PR) #11761 PLC Security Mode Enhanced PLC security mode
(PR) #11762 E/U Project No. End-user project number
(PR) #11763 E/U Y Dev No. Initial number of Y device for end user

Specify the quantity of the Y devices that are free to use for end users.
The sum of this setting and "#11763 E/U Y Dev No." cannot exceed 0600 (HEX).
---Setting range---
0000 to 0600 (HEX)
Specify the initial number of the M devices that are common to projects, and are free to use for end users.
The sum of this setting and "#11766 E/U M Dev Size" cannot exceed 61440.
---Setting range---
0 to 61439
Specify the quantity of the M devices that are common to projects, and are free to use for end users.
The sum of this setting and "#11765 E/U M Dev No." cannot exceed 61440.
---Setting range---
0 to 61440
Specify the initial number of the D devices that are common to projects, and are free to use for end users.
The sum of this setting and "#11768 E/U D Dev Size" cannot exceed 8192.
---Setting range---
0 to 8191
Specify the quantity of the D devices that are common to projects, and are free to use for end users.
The sum of this setting and "#11767 E/U D Dev No." cannot exceed 8192.
---Setting range---
0 to 8192
Select whether to clear the values of RIO output devices at PLC STOP.
0: Retain the outputs of RIO
1: Clear the outputs of RIO
Specify the in-position range to be applied to the in-position check at the bottom of Punch Tap hole.
---Setting range---
0.000 to 99.999 (mm)
Specify the end point of the deburring process for the pattern PT1.5 or PT2.0, using the distance from the bottom of the hole.
---Setting range---
0.000 to 32.767 (mm)
Specify the angle of the rotation of the Punch Tap tool to be applied in tapping.
An angle of 180 degrees is used commonly for a double-helix Punch Tap tool.
When "0" is set, the angle will be interpreted as 180 degrees.
---Setting range---

0 to 360 (deg)
(PR) #11764 E/U Y Dev Size Quantity of Y devices for end user
(PR) #11765 E/U M Dev No. Initial number of M device for end user
(PR) #11766 E/U M Dev Size Quantity of M devices for end user
(PR) #11767 E/U D Dev No. Initial number of D device for end user
(PR) #11768 E/U D Dev Size Quantity of D devices for end user
(PR) #11769 Remote I/O Clear Initialization of remote I/O
#11771 PTapInp In-position range for Punch Tap (tap axis)
#11772 ptapd End point of deburring
#11773 ptapag Rotation angle of Punch Tap

Set this parameter when the workpiece has scratches during the machining that is switched from linear to
circular when Variable torsion compensation function is used.
If the machined workpiece has scratches, set the larger value in the parameter setting.
When "0" is set, it is operated as "1".
---Setting range---
1 to 255
This parameter determines the upper limit of output adjustment in synchronous tapping with analog I/F spin dle.
Specify a limit on the adjustment of output rotation speed in terms of the percentage of commanded spindle
speed.
If a value between 0 and 99 is specified, the system behaves as if "120" was specified.
---Setting range---
0 to 300 (%)
Specify the part system to display on the [Monitr] screen after power on.
This parameter is valid only when "#11019 2-system display" is enabled (other than "0").
(*) When "0" is specified, the unassigned part system with the smallest part system number is set.
---Setting range---
0 to 8
Specify the part system to display on the [Monitr] screen after power on.
This parameter is valid only when "#11019 2-system display" is enabled (other than "0").
(*) When "0" is specified, the unassigned part system with the smallest part system number is set.
---Setting range---
0 to 8
Specify the part system to display on the [Monitr] screen after power on.
This parameter is valid only when "#11019 2-system display" is enabled (other than "0").
(*) When "0" is specified, the unassigned part system with the smallest part system number is set.
---Setting range---
0 to 8
Specify how to scale images when an image input expansion card is connected and the resolution of input
from an IPC or a camera is different from that of the display.
0: Maintain aspect ratio
1: Not maintain aspect ratio
(PR) #11776 VDC_cntmax Acceleration rate retaining time
#11790 astap_cmpmax Factor for max speed after adjustment in sync tap w/ an alog I/F spindle
(PR) #11791 Disp area1 sysno Monitr-Area1 part system to display
(PR) #11792 Disp area2 sysno Monitr-Area2 part system to display
(PR) #11793 Disp area3 sysno Monitr-Area3 part system to display
(PR) #11794 Disp area4 sysno Monitr-Area4 part system to display
(PR) #11795 aspect ratio Image input I/F: Aspect ratio

Register and authenticate a password to enable editing etc. of machine tool builder macro programs.
If a password is unregistered, (blank display), a password consisting of one to eight alphanumeric charac ters can be set. (lower case letters and a password only consisting of one zero (0) cannot be set.)
If a password has been registered (displays ****), when the registered password is entered, "---OK---" will
be displayed and the protection will be canceled.
If a wrong password is entered, "setting error" will occur.
(Note) This parameter can be set only when Machine tool builder macro password management method type
2 is selected. (#1761 cfgPR11/bit6=1)
---Setting range---
One to eight alphanumeric characters (except for lower case letters and a password consisting of only one
zero (0))
Specify the part system number for which laser processing control is enabled.
If "0" or a nonexistent part system is set, laser processing control is disabled for all part systems.
---Setting range---
0 to 8
Specify whether to enable or disable SPRINT.
0: Disable
1: Enable
When SPRINT is enabled
M codes for SPRINT control are executable.
SKIP8 is assigned to the SPRINT connector of the expansion unit FCU8-EX543.
Specify the first M code for SPRINT control.
0: default setting
600: Start signal ON
601: Start signal OFF
602: Enable signal ON
603: Enable signal OFF
604: Select signal ON

605: Select signal OFF
Other than 0: the six consecutive M codes starting from the set value are assigned as the M codes for
SPRINT control.
Set value + 0: Start signal ON
Set value + 1: Start signal OFF
Set value + 2: Enable signal ON
Set value + 3: Enable signal OFF
Set value + 4: Select signal ON
Set value + 5: Select signal OFF
---Setting range---
0, 200 to 99999999
Specify whether to remove the machine error compensation amount from the feedback position retrieved
from the drive unit.
0: Not remove (when a machine end encoder is used)
1: Remove (when a motor end encoder is used)
#11796 mmacpro Machine tool builder macro password
(PR) #11799 lsr_sys Laser processing control-enabled part system (For M
system only)
#11801 SPRINT ON SPRINT ON
#11802 SPRINT_Mcode M codes for SPRINT control
#11803 SPRINT_mcmp Removal of machine error compensation in SPRINT

Specify the time delay after which the machine error compensation amount is removed from the feedback
position data when the parameter for removal of machine error compensation in SPRINT is set to "1" (Re move).
---Setting range---
0 to 500 (ms)
Select the machine model to be used in the 3D machining simulation.
0: Machine configuration file is not used, only execute work simulation.
1: Use the machine configuration file specified in the configuration file.
If the selected machine configuration file is not existed, the machine configuration file in the designated
location will be used.
2 to 20: Use the machine configuration file specified in the configuration file.
(Note 1) 3D machining simulation is required (optional).
(Note 2) The setting range differs depending on machine tool builders.
(*) This parameter is for M800VW series only.
---Setting range---
0 to 20
Specify the machining condition to be protected from parameter settings when the machine tool builder pass word is not entered in the High-accuracy parameter adjustment screen.
---Setting range---
0, 11 to 13, 21 to 23, 31 to 33
0: Not specified
11: Condition 1-1, 12: Condition 1-2, 13: Condition 1-3
21: Condition 2-1, 22: Condition 2-2, 23: Condition 2-3
31: Condition 3-1, 32: Condition 3-2, 33: Condition 3-3
Specify the machining condition to be protected from parameter settings when the machine tool builder pass word is not entered in the High-accuracy parameter adjustment screen.
---Setting range---
0, 11 to 13, 21 to 23, 31 to 33
0: Not specified
11: Condition 1-1, 12: Condition 1-2, 13: Condition 1-3
21: Condition 2-1, 22: Condition 2-2, 23: Condition 2-3
31: Condition 3-1, 32: Condition 3-2, 33: Condition 3-3
Specify the machining condition to be protected from parameter settings when the machine tool builder pass word is not entered in the High-accuracy parameter adjustment screen.
---Setting range---
0, 11 to 13, 21 to 23, 31 to 33
0: Not specified
11: Condition 1-1, 12: Condition 1-2, 13: Condition 1-3
21: Condition 2-1, 22: Condition 2-2, 23: Condition 2-3
31: Condition 3-1, 32: Condition 3-2, 33: Condition 3-3
Select the part system to be assigned for loader operation.
1 to 8: $1 to $8
When not using this parameter, set "0".
---Setting range---
0 to 8
#11804 SPRINT_mcmpDly Timing adjustment for removal of machine error com pensation in SPRINT
(PR) #11805 Machine Simu Model
#11808 proc cnd protect 1 Machining condition protection 1
#11809 proc cnd protect 2 Machining condition protection 2
#11810 proc cnd protect 3 Machining condition protection 3
(PR) #11811 LDR Dedicated Sys Loader-dedicated part system (For M system only)

Specify the number of real number data (8 bytes) for Extended common variable I.
---Setting range---
0 to 10000
Specify the number of integer data (2 bytes) for Extended common variable I.
---Setting range---
0 to 40000
Specify the SRAM open parameter No. to be used for real number data of Extended common variable II.
---Setting range---
0, 41001 to 41100
Specify the number of real number data (8 bytes) for Extended common variable II.
---Setting range---
0 to 80000

Specify the number of real number data (8 bytes) for Extended common variable III.
---Setting range---
0 to 2000
Specify the number of integer data (2 bytes) for Extended common variable III.
---Setting range---
0 to 8000
Specify the number of data files for Extended common variable III.
---Setting range---
0 to 1000
Not used.
---Setting range---
0
(PR) #11823 exComVar1DecN Extended common variable I: number of real number
data
(PR) #11824 exComVar1IntN Extended common variable I: number of integer data
(PR) #11825 exComVar2SramOpen Extended common variable II: SRAM open parameter
No.
(PR) #11826 exComVar2DecN Extended common variable II: number of real number
data
(PR) #11827 exComVar3DecN Extended common variable III: number of real number
data
(PR) #11828 exComVar3IntN Extended common variable III: number of integer data
(PR) #11829 exComVar3FileN Extended common variable III: number of data files
#11895 LC_KEY

15.4 Axis Specifications Parameters
Set the rapid traverse feedrate for each axis.
(Note) The maximum value to be set depends on the machine specifications.
---Setting range---
1 to 1000000 (mm/min)
Set the maximum cutting feedrate for each axis.
Even if the feedrate in G01 exceeds this value, the clamp will be applied at this feedrate.
---Setting range---
1 to 1000000 (mm/min)
#2001 rapid Rapid traverse rate
#2002 clamp Cutting feedrate for clamp function

Set acceleration and deceleration control modes.
Set value is in hexadecimal.
HEX-1 Rapid traverse acceleration/deceleration type
0(bit3,2,1,0 = 0000): Step
1(bit3,2,1,0 = 0001): Linear acceleration/deceleration
2(bit3,2,1,0 = 0010): Primary delay
8(bit3,2,1,0 = 1000): Exponential acceleration and linear deceleration
F(bit3,2,1,0 = 1111): Soft acceleration/deceleration
(Note) Primary delay is applied because R1 setting has priority over R3 setting when R1 and R3 are both set
to "1".
HEX-2 Cutting feed acceleration/deceleration type
0 (bit7,6,5,4 = 0000): Step
1 (bit7,6,5,4 = 0001): Linear acceleration/deceleration
2 (bit7,6,5,4 = 0010): Primary delay
8 (bit7,6,5,4 = 1000): Exponential acceleration and linear deceleration
F (bit7,6,5,4 = 1111): Soft acceleration/deceleration
HEX-3 Stroke end stop types
0 (bit9,8 = 00): Linear deceleration (Decelerates at G0t1)
1 (bit9,8 = 01): Linear deceleration (Decelerates at 2G0t1)
2 (bit9,8 = 10): Position loop step stop
3 (bit9,8 = 11): Position loop step stop
(Note) OT1(bit8) is valid under the following conditions (valid for dog type zero point return):
- Stop type: Linear deceleration
- Acceleration/deceleration mode: Exponential Acceleration and Linear deceleration
HEX-4
Not used. Set to "0".
(PR) #2003 smgst Acceleration and deceleration modes
bit F E D C B A 9 8 7 6 5 4 3 2 1 0
OT2 OT1 C3 C1 L R3 R1 LR
HEX 4 3 2 1
C2 R2
Stroke end stop types Cutting feed
acceleration
/deceleration type
Rapid traverse
acceleration
/deceleration type
G0t1 2 x G0t1 (OT1=1,OT2=0)
G0t1 (OT1=OT2=0)
Stroke end signal
Speed

Set a linear control time constant for rapid traverse acceleration and deceleration.
This time constant is enabled when LR (rapid traverse feed with linear acceleration/deceleration) or F (soft acceleration/deceleration) is selected in "#2003 smgst" (Acceleration and deceleration modes).
---Setting range---
1 to 4000 (ms)
Set a primary-delay time constant for rapid traverse acceleration and deceleration.
This time constant is enabled when R1 (rapid traverse feed with primary delay) or R3 (exponential acceler ation and linear deceleration) is selected in "#2003 smgst" (Acceleration and deceleration modes).
When the soft acceleration/deceleration is selected, the second-step time constant will be used.
<Rapid traverse feed with primary delay>
<Rapid traverse feed with exponential acceleration and linear deceleration>
<Soft acceleration/deceleration>
When "#1219 aux03/bit7" is set to "0"
(Note) The time constant setting for the soft acceleration/deceleration can be changed by the setting of "#1219 aux03/bit7"
---Setting range---
1 to 5000 (ms)
#2004 G0tL G0 time constant (linear)
#2005 G0t1 G0 time constant(primary delay) / Second-step time constant for soft acceleration/deceleration
G0tL G0tL
Speed
Time
G0t1 G0t1
Speed
Time
G0t1 2 x G0t1
Speed
Time
G0tL G0tL
G0t1
G0t1
G0t1
G0t1 Time
Speed

Not used. Set to "0".
Set a linear control time constant for cutting acceleration and deceleration.
The time constant will be enabled when LC (cutting feed with linear acceleration/deceleration) or F (soft ac celeration/deceleration) is selected in "#2003 smgst" (Acceleration or deceleration modes).
---Setting range---
1 to 4000 (ms)
Set the primary delay time constant for cutting acceleration and deceleration.
The time constant will be enabled when C1 (cutting feed with the primary delay) or C3 (cutting feed with ex ponential acceleration and linear deceleration) is selected in "#2003 smgst" (Acceleration/deceleration modes).
When the soft acceleration/deceleration is selected, the second-step time constant will be used.
<Cutting feed with primary delay>
<Cutting feed with exponential acceleration and linear deceleration>
<Soft acceleration/deceleration>
---Setting range---
1 to 5000 (ms)
#2006 G0t2
#2007 G1tL G1 time constant (linear)
#2008 G1t1 G1 time constant (primary delay)/Second-step time con stant for soft acceleration/deceleration
G1tL G1tL
Speed
Time
G1t1 G1t1
Speed
Time
G1t1 2 x G1t1
Speed
Time
G1tL G1tL
G1t1 G1t1 G1t1 G1t1
Speed
Time

Not used. Set to "0".
Set a feed forward gain for pre-interpolation acceleration/deceleration.
The larger the set value, the smaller the theoretical control error will be. However, if a machine vibration oc curs, set the smaller value.
---Setting range---
0 to 200 (%)
Set up the backlash compensation amount when the direction is reversed with the movement command in rapid traverse feed mode or in manual mode (except for handle feed mode) .
---Setting range---
-9999999 to 9999999
Set up the backlash compensation amount when the direction is reversed with the movement command in cutting mode.
G1 backlash is enabled in handle feed mode.
---Setting range---
-9999999 to 9999999
Set a soft limit area with reference to the zero point of the basic machine coordinate. Set the coordinate in the negative direction for the movable area of stored stroke limit 1. The coordinate in the positive direction is

set in "#2014 OT+".
To narrow the available range in actual use, use the parameters "#8204 OT-" and "#8205 OT+".
When the same value (other than "0") is set in this parameter and "#2014 OT+", this function will be disabled.
---Setting range---
-99999.999 to 99999.999 (mm)
Set a soft limit area with reference to the zero point of the basic machine coordinate. Set the coordinate in the positive direction for the movable area of stored stroke limit 1. The coordinate in the negative direction is set in "#2013 OT-".
To narrow the available range in actual use, use the parameters "#8204 OT-" and "#8205 OT+".
When the same value (other than "0") is set in this parameter and "#2013 OT-", this function will be disabled.
---Setting range---
-99999.999 to 99999.999 (mm)
#2009 G1t2
#2010 fwd_g Feed forward gain
#2011 G0back G0 backlash
#2012 G1back G1 backlash
#2013 OT - Soft limit I -
#2014 OT + Soft limit I +
OT- (Z)
OT- (X)
OT+ (Z)
OT+ (X)
M
Basic machine coordinate
Movable area
OT- (Z)
OT- (X)
OT+ (Z)
OT+ (X)
M
Basic machine coordinate
Movable area

Set a sensor position in the negative direction when using the tool setter.
When the TLM is used, set up the distance of a tool replacement point (reference point) for measuring the tool length from the zero point to the measurement reference point (surface).
(Note) In the case of the basic axis and inclined axis of the inclined axis specifications, set the position on the orthogonal coordinate.
---Setting range---
-99999.999 to 99999.999 (mm)
Set the sensor position in the positive direction when using the tool setter.
When the TLM is used, set the distance from a tool change point (reference position) to the measurement basic point (surface) in order to measure the tool length.
(Note) In the case of the basic axis and inclined axis of the inclined axis specifications, set the position on the orthogonal coordinate.
---Setting range---
-99999.999 to 99999.999 (mm)
Set the position loop gain for special operations (synchronized tapping, interpolation with spindle C axis, etc.).
Set the value in 0.25 increments.
The standard setting value is "10".
---Setting range---
0.25 to 200.00 (rad/s)
Select when performing test operation without connecting the drive unit and motor.
0: Normal operation
1: Test operation
When "1" is set, the operation will be possible even if drive units and motor are not connected, because the drive system alarm will be ignored.
This parameter is used for test operation during start up: Do not use during normal operation. If "1" is set during normal operation, errors will not be detected even if they occur.
Set the steps required for reference position return for each axis.
0: Not execute reference position return.
1 to max. number of NC axes: Steps required for reference position return
Set the distance from the second reference position to the position for checking that the spindle orientation has completed during second reference position return.
When the set value is "0", the above check will be omitted.
---Setting range---
0 to 99999.999 (mm)
Set the maximum speed outside the soft limit range.
---Setting range---
0 to 1000000 (mm/min)
Select whether to disable a soft limit check during the second to the fourth reference position return in both automatic and manual operation modes.
0: Enable
1: Disable
#2015 tlml- Negative direction sensor of tool setter
#2016 tlml+ Positive direction sensor of tool setter or TLM standard length
#2017 tap_g Axis servo gain
(PR) #2018 no_srv Operation with no servo control
#2019 revnum Return steps
#2020 o_chkp Spindle orientation completion check during second reference position return
#2021 out_f Maximum speed outside soft limit range (For L system only)

#2022 G30SLX Validate soft limit (automatic and manual)

Set the minimum speed outside the soft limit range during the second to the fourth reference position return.
---Setting range---
0 to 1000000 (mm/min)
Set the maximum synchronization error, allowable at the synchronization error check, for the master axis.
When "0" is set, the error check will not be carried out.
---Setting range---
0 to 99999.999 (mm)
During simple C-axis synchronous control: 0 to 99999.999()
Set the coordinate of the lower limit of the area where the stored stroke limit IB is inhibited.
Set a value from zero point in the basic machine coordinate system.
If the same value (non-zero) is set for both the sign and numeral value as "#2062 OT_IB+", the stored stroke limit IB function set with #2061 and #2062 will be disabled.
---Setting range---
-99999.999 to 99999.999 (mm)
Set the coordinate of the upper limit of the area where the stored stroke limit IB is inhibited.
Set a value from zero point in the basic machine coordinate system.
---Setting range---
-99999.999 to 99999.999 (mm)
Select the type that applies the settings of "#2062 OT_IB+" and "#2061 OT_IB-" in stored stroke limit I.
0: Soft limit IB
1: Disable
2: Soft limit IC
3: Soft limit is checked for the inclined axis control axis with the program coordinate system.
(Note) This is valid only for inclined axis' basic axis and inclined axis.
Set a feed forward gain for G00 pre-interpolation acceleration/deceleration.
The larger the setting value, the shorter the positioning time during in-position checking.
If a machine vibration occurs, set the smaller value.
---Setting range---
0 to 200 (%)
Set the percentage to increase or decrease the arc radius error correction amount for each axis.
---Setting range---
-100.0 to +100.0 (%)
Set the number of divisions of one turn of the rotary axis under control.
(Example)
When "36" is set, one turn is supposed to be 36.000.
(Note 1) When "0" is set, the normal rotary axis (360.000 degrees for one turn) is assumed.
(Note 2) If this parameter is changed when the absolute position detection specification is used, absolute po sition data will be lost. Initialization must be performed again.
---Setting range---
0 to 999
#2023 ozfmin Set up ATC speed lower limit
#2024 synerr Allowable error
#2061 OT_1B- Soft limit IB-
#2062 OT_1B+ Soft limit IB+
#2063 OT_1B type Soft limit IB type
#2068 G0fwdg G00 feed forward gain
#2069 Rcoeff Axis arc radius error correction coefficient
(PR) #2070 div_RT Rotational axis division count

Select whether the axis is to be under the inclined-axis control or to be the basic axis corresponding to the inclined axis.
0: Not to be under the inclined-axis control
1: Inclined axis
2: Basic axis corresponding to inclined axis
(Note) Each of "1" and "2" values must be set for only one axis. If either value is set for two or more axes, inclined-axis control does not work.
Set the most minus (-) side position where restart search is possible.
If the machine is positioned on the more minus (-) side than the set value in T-command restart mode, restart search in type 3 will be disabled.
---Setting range---
-99999.999 to 99999.999 (mm)
Under the standard specifications, the "Reference position return near-point detection" signal is assigned to a fixed device. Set the device in this parameter to assign this signal to a position other than the fixed device.
(Note1) This parameter is enabled in the following conditions.
NC axis: When "#1226 aux10/bit5" is set to "1".
PLC axis: When "#1246 set18/bit7" is set to "1".
(Note 2) When this parameter is valid, do not set the existing device number. If the existing device number is set, an emergency stop will occur. However, no device number check will be performed for an axis to which the "Near-point dog ignored" signal or the "PLC axis near-point dog ignored" signal is input.
(Note 3) The "Reference position return near-point detection" signal is required to be directly input to the op eration panel I/O unit or the remote I/O unit. The device assigned to an expansion unit such as CC-Link, Profibus, etc, cannot be used. Signals which set in a sequence program cannot be used.
---Setting range---
0000 to 03FF (hexadecimal)
Under the standard specifications, the "Stroke end (+)" signal is assigned to a fixed device. Set the device in this parameter to assign this signal to a position other than the fixed device.
(Note1) This parameter is enabled in the following conditions.
NC axis: When "#1226 aux10/bit5" is set to "1".
PLC axis: When "#1246 set18/bit7" is set to "1".
(Note 2) When this parameter is valid, do not set the existing device number. If the existing device number is set, an emergency stop will occur. However, no device number check will be performed for an axis to which the "OT ignored" signal or the "PLC axis OT ignored" signal is input.

(Note 3) The "Stroke end" signal is required to be directly input to the operation panel I/O unit or the remote
I/O unit. The device assigned to an expansion unit such as CC-Link, Profibus, etc, cannot be used. Signals
which set in a sequence program cannot be used.
---Setting range---
0000 to 03FF (hexadecimal)
(PR) #2071 s_axis Inclined axis selection (for L system only)
#2072 rslimt Restart limit
#2073 zrn_dog Origin dog Random assignment device
#2074 H/W_OT+ H/W OT+ Random assignment device

Under the standard specifications, the "Stroke end (-)" signal is assigned to a fixed device. Set the device in
this parameter to assign this signal to a position other than the fixed device.
(Note1) This parameter is enabled in the following conditions.
NC axis: When "#1226 aux10/bit5" is set to "1".
PLC axis: When "#1246 set18/bit7" is set to "1".
(Note 2) When this parameter is valid, do not set the existing device number. If the existing device number
is set, an emergency stop will occur. However, no device number check will be performed for an axis to
which the "OT ignored" signal or the "PLC axis OT ignored" signal is input.
(Note 3) The "Stroke end" signal is required to be directly input to the operation panel I/O unit or the remote
I/O unit. The device assigned to an expansion unit such as CC-Link, Profibus, etc, cannot be used. Signals
which set in a sequence program cannot be used.
---Setting range---
0000 to 03FF (hexadecimal)
Specify the index table indexing axis.
0: Normal axis
1: Index table indexing axis
(Note) This parameter is valid only for the NC axis. The parameter is invalid if set for the PLC axis.
Set the in-position width for G0.
Between SV024 and this parameter, the parameter with a larger value will be applied.
When "0" is set, this parameter will be invalid. Only SV024 will be available.
When "#1205 G0dbcc" is "1", SV024 is used as the G0 in-position width.
---Setting range---
0.000 to 99.999 (mm)
Set the in-position width for G1.
Between SV024 and this parameter, the parameter with a larger value will be applied.
When "0" is set, this parameter will be invalid. Only SV024 will be available.
---Setting range---
0.000 to 99.999 (mm)
Set the coefficient to be applied to the compensation amount for the insufficient amount caused by servo de lay during chopping.
---Setting range---
0 to 10 (standard value: 8)
Set the tolerance between the commanded stroke and actual stroke.
Compensation will be applied during chopping so that the result of [command width - maximum stroke of top
or bottom dead point/ 2] will be within this tolerance.
---Setting range---
0 to 10.000 (mm)
Set the clamp speed in chopping operation.
When "0" is set, the clamp speed will be determined by "#2002 clamp".
---Setting range---
0 to 60000 (mm/min)
#2075 H/W_OT- H/W OT- Random assignment device
#2076 index_x Index table indexing axis
#2077 G0inps G0 in-position width
#2078 G1inps G1 in-position width
(PR) #2079 chcomp Chopping compensation coefficient
#2080 chwid Bottom dead center position width
#2081 chclsp Maximum chopping speed

Set the No. for each axis in order from the 1st automatically returning axis to the restart position.
When "0" is set, the axis will not return.
Note that when "0" is set for all axes, all of the axes will return simultaneously.
(Note) On the absolute position system, when performing the restart search just after power ON, and when
the axis that is the order 0 is moved by the follow-up, an operation error(M01 0128) may occur.
---Setting range---
0 to 16
Select how to operate the unidirectional positioning when the positioning command (G00) is issued.
0: Carry out unidirectional positioning according to the command and modal.
1: Carry out unidirectional positioning regardless of the command and modal.
Set "1" for the axis to carry out the unidirectional positioning at every positioning command, regardless of
whether the unidirectional positioning command and modal are issued.
<Related parameters>
"#8209 G60 SHIFT" and "#2076 index_x"
Set the maximum feed rate for each axis when the external deceleration signal is ON.
This parameter is valid when "#1239 set11/bit6" is set to "1".
---Setting range---
0 to 1000000 (mm/min)
Set the polarity of synchronized axis with respect to reference axis to the bit corresponding to each axis.
0: Relative to reference axis, polarity is positive
1: Relative to reference axis, polarity is negative
---Setting range---
0 to FF (hexadecimal)
Set the reference axis for synchronous control with the 2nd axis name (axname2). A numerical character

cannot be set as the 1st character.
---Setting range---
1st character: A to Z
2nd character: A to Z, 1 to 9
Set the reference axis of superimposition control using the 2nd axis name (axname2).
Always use an alphabetic character (A to Z) for the first character.
(Note) This parameter is enabled only when "#1280 ext16/bit7" (Control axis superimposition command method) is set to "0".
---Setting range---
Two digits between A to Z and 1 to 9
(Setting is cleared when "0" is set)
Set the rapid traverse rate for superimposition control.
(Equivalent to "#2001 rapid" (Rapid traverse rate).)
---Setting range---
0 to 1000000 (mm/min)
#2082 a_rstax Restart position return order
#2084 G60_ax Unidirectional positioning operation selection
#2086 exdcax External deceleration speed
#2087 syncnt Synchronization/superimposition control setting for each axis
#2088 bsax_sy Reference axis for synchronous control
#2089 bsax_pl Superimposition control reference axis
#2090 plrapid Rapid traverse rate for superimposition control

Set the cutting feed clamp speed for superimposition control.
(Equivalent to "#2002 clamp" (Cutting feed clamp speed).)
---Setting range---
0 to 1000000 (mm/min)
Set the G0 time constant (linear) for superimposition control.
(Equivalent to "#2004 G0tL G0 time constant (linear)".)
---Setting range---
0 to 4000 (ms)
Set the G0 time constant (primary delay) for superimposition control.
(Equivalent to "#2005 G0t1 G0 time constant (primary delay".)
---Setting range---
0 to 5000 (ms)
Set the G1 time constant (linear) for superimposition control.
(Equivalent to "#2007 G1tL G1 time constant (linear)".)
---Setting range---
0 to 4000 (ms)
Set the G1 time constant (primary delay) for superimposition control.
(Equivalent to "#2008 G1t1 G1 time constant (primary delay)".)
---Setting range---
0 to 5000 (ms)
Set the minimum clamp speed for corner deceleration in the high-accuracy control mode. Normally set "0".
(Note) This parameter is invalid during SSS control.
---Setting range---
0 to 1000000 (mm/min)
Set the sensor position (on sub side) in the (-) direction when using the tool setter on the sub spindle side.
(Note) In the case of the basic axis and inclined axis of the inclined axis specifications, set the position on the orthogonal coordinate.
---Setting range---
-99999.999 to 99999.999 (mm)
Set the sensor position (on sub side) in (+) direction when using the tool setter on the sub spindle side.
(Note) In the case of the basic axis and inclined axis of the inclined axis specifications, set the position on the orthogonal coordinate.
---Setting range---
-99999.999 to 99999.999 (mm)
Set the state of the compensation of the rotary axis workpiece position.
0: Disabled
1: Enabled
#2091 plclamp Cutting feed clamp speed for superimposition control
#2092 plG0tL G0 time constant for superimposition control (linear)
#2093 plG0t1 G0 time constant for superimposition control (primary delay)
#2094 plG1tL G1 time constant for superimposition control (linear)
#2095 plG1t1 G1 time constant for superimposition control (primary delay)
#2096 crncsp Minimum corner deceleration speed
#2097 tlml2- Sub side tool setter - direction sensor
#2098 tlml2+ Sub side tool setter + direction sensor
#2100 rpcax Rotary axis workpiece position compensation valid

Set a linear control time constant for variable speed skip acceleration and deceleration, or for an occasion where a skip command issues acceleration/deceleration time constant enabled (R1).
The time constant will be enabled when LC (cutting feed with linear acceleration/deceleration) or F (soft ac celeration/deceleration) is selected in "#2003 smgst" (Acceleration or deceleration modes).
When set to "0", the time constant set by "#2007 G1tL" is used.
---Setting range---
0 to 4000 (ms)
Set a primary-delay time constant for variable speed skip acceleration and deceleration, or for an occasion where a skip command issues acceleration/deceleration time constant enabled (R1).
The time constant will be enabled when C1 (cutting feed with the primary delay) or C3 (cutting feed with ex ponential acceleration and linear deceleration) is selected in "#2003 smgst" (Acceleration/deceleration

modes). When the soft acceleration/deceleration is selected, the second-step time constant will be used.
When set to "0", the time constant set by "#2008 G1t1" is used.
---Setting range---
0 to 5000 (ms)
Set the indexing unit to which the rotary axis can be positioned.
---Setting range---
0 to 360 ()
Set the rapid traverse rate for each axis in the high-accuracy control mode. When 0 is set, "#2001 rapid" is used.
---Setting range---
0 to 1000000 (mm/min)
Set the cutting feed maximum speed for each axis in the high-accuracy control mode. When 0 is set, "#2002 clamp" is used.
---Setting range---
0 to 1000000 (mm/min)
Set whether to enable the quadrant protrusion compensation.
0: Disable
1: Enable
If either of "#2112 Blf motor inertia", "#2115 Blf motor stl trq" or "#2113 Blf visc friction" is set to "0", quadrant protrusion compensation will not work even if this parameter is set to "1".
Set the motor inertia for quadrant protrusion compensation.
Refer to the servo manual and input the value appropriate for the motor.
---Setting range---
1 to 32000 (10-6kgm2)
Set the viscous friction for quadrant protrusion compensation.
After setting the other parameters to the appropriate values, monitor the machine end and gradually adjust the value.
If this parameter setting is small, a recess will form on the inner side of the circle, and if large, a protrusion will form on the outer side of the circle. When the value is appropriate, a spike-shaped quadrant protrusion will form based on normal step-shaped backlash.
---Setting range---
1 to 32767 (1/16 Nm/(rad/s))
#2102 skip_tL Skip time constant linear
#2103 skip_t1 Skip time constant primary delay / Second-step time constant for soft acceleration/deceleration
#2106 Index unit Indexing unit
#2109 Rapid (H-precision) Rapid traverse rate for high-accuracy control mode
#2110 Clamp (H-precision) Cutting feed clamp speed for high-accuracy control mode
#2111 Blf valid Quadrant protrusion compensation valid
#2112 Blf motor inertia Motor inertia
#2113 Blf visc friction Viscous friction

Set the feed forward gain for quadrant protrusion compensation.
After setting the other parameters to the appropriate values, monitor the machine end and gradually adjust the value.
If this parameter setting is small, a large quadrant protrusion will form, and if large, a recess will form on the inner side of the circle.
---Setting range---
0 to 1000 (%)
Set the motor rated current for quadrant protrusion compensation.
Refer to the servo manual and input the value appropriate for the motor.
---Setting range---
1 to 16000 (1/256 Nm)
Select which door group of the speed monitoring the spindle belongs to.
0000: Door 1 group.
0001: Door 1 group.
0002: Door 2 group.
0003: Door 1 and 2 group.
The speed monitoring will not be executed when "#2313 SV113 SSF8/bitF" is OFF regardless of this param eter.
The selected door group must be set when setting the synchronous control.
The spindle/C axis control enables the door selection in "#3071 SscDrSelSp" for the corresponding spindle.
Select whether the variable backlash is to be disabled/enabled/continuous, or variable backlash II enabled.
0: Disabled
1: Enable
2: Continuous
3: Enable variable backlash II
("#2011 G0back" and "#2012 G1back" will not work unless "0: Disable" is selected.)
Set the compensation amount for the range of each position during rapid traverse.
(+: B1, =: B2, -: B3 on the compensation amount table)
---Setting range---
-99999999 to 99999999 (Interpolation unit)
Set the compensation amount for the range of each position during rapid traverse.
(+: B1, =: B2, -: B3 on the compensation amount table)
---Setting range---
-99999999 to 99999999 (Interpolation unit)
Set the compensation amount for the range of each position during rapid traverse.
(+: B1, =: B2, -: B3 on the compensation amount table)
---Setting range---
-99999999 to 99999999 (Interpolation unit)
#2114 Blf fwdg Compensation FF gain
#2115 Blf motor stl trq Motor stall torque
(PR) #2118 SscDrSel Speed monitor Door selection
#2121 vbacklash valid Variable backlash valid/continuous or Variable back lash II valid
#2122 G0vback+ Variable G0 backlash +

#2123 G0vback= Variable G0 backlash =
#2124 G0vback- Variable G0 backlash -

Set the compensation amount for the range of each position during cutting feed.
(+: A1, =: A2, -: A3 on the compensation amount table)
---Setting range---
-99999999 to 99999999 (Interpolation unit)
Set the compensation amount for the range of each position during cutting feed.
(+: A1, =: A2, -: A3 on the compensation amount table)
---Setting range---
-99999999 to 99999999 (Interpolation unit)
Set the compensation amount for the range of each position during cutting feed.
(+: A1, =: A2, -: A3 on the compensation amount table)
---Setting range---
-99999999 to 99999999 (Interpolation unit)
Set the speed range during cutting feed.
(The speed less than 1 is the low speed, and the speed exceeding 2 is the high speed.)
Note that the speed range is identified in the order of low, high and medium speed. Consider whether the set value should be larger or smaller than other values.
---Setting range---
0 to 480000 (mm/min)
Set the speed range during cutting feed.
(The speed less than 1 is the low speed, and the speed exceeding 2 is the high speed.)
Note that the speed range is identified in the order of low, high and medium speed. Consider whether the set value should be larger or smaller than other values.
---Setting range---
0 to 480000 (mm/min)
Set the range of the distance during cutting feed.
(The distance less than 1 is the small distance, and the distance exceeding 2 is the large distance.)
Note that the distance range is identified in the order of small, large and medium. Consider whether the set value should be larger or smaller than other values.
---Setting range---
0 to 999999.999999 (mm)
Set the range of the distance during cutting feed.
(The distance less than 1 is the small distance, and the distance exceeding 2 is the large distance.)
Note that the distance range is identified in the order of small, large and medium. Consider whether the set value should be larger or smaller than other values.
---Setting range---
0 to 999999.999999 (mm)
#2125 G1vback+ Variable G1 backlash +
#2126 G1vback= Variable G1 backlash =
#2127 G1vback- Variable G1 backlash -
#2128 G1vback feed1 G1 variable backlash compensation amount change over speed 1
#2129 G1vback feed2 G1 variable backlash compensation amount change over speed 2
#2130 G1vback dist1 G1 variable backlash compensation amount change over distance 1
#2131 G1vback dist2 G1 variable backlash compensation amount change over distance 2

Set the range of the center of the end point position.
(The range less than position 1 is the - range, and the range exceeding position 2 is the + range.)
The end point position range is determined in the order of -, + , and center. Consider whether the set value should be larger or smaller than other values.
(Note 1) If continuous variable backlash is set with "#2121 vbacklash valid", position 1 will be set as the po sition - point and position 2 will be set as the position + point.
(Note 2) When the size relation of the compensation amount changeover speed and distance 1 and 2 is not appropriate while the variable backlash compensation is valid, the followings will be applied:If the backlash speed and distance are smaller than the compensation amount changeover speed and distance 1, both the speed and distance will be small; if larger than the compensation amount changeover speed and distance 2, both the speed and distance will be large.
---Setting range---
-999999.999999 to 999999.999999 (mm)
Set the range of the center of the end point position.
(The range less than position 1 is the - range, and the range exceeding position 2 is the + range.)
The end point position range is determined in the order of -, + , and center. Consider whether the set value should be larger or smaller than other values.
(Note 1) If continuous variable backlash is set with "#2121 vbacklash valid", position 1 will be set as the po sition - point and position 2 will be set as the position + point.
(Note 2) When the size relation of the compensation amount changeover speed and distance 1 and 2 is not appropriate while the variable backlash compensation is valid, the followings will be applied:If the backlash speed and distance are smaller than the compensation amount changeover speed and distance 1, both the speed and distance will be small; if larger than the compensation amount changeover speed and distance 2, both the speed and distance will be large.
---Setting range---
-999999.999999 to 999999.999999 (mm)
Set the arc compensation coefficient.
---Setting range---
0 to 300(%)
Select the speed range to be used as the reference position.
0: Low speed
1: Medium speed
2: High speed
Select the end point range to be used as the reference position.
0: Position + range
1: Position center range
2: Position - range

Select the entry direction to be used as the reference position.
0: Entry direction +
1: Entry direction -
#2132 vback pos1 Variable backlash compensation amount changeover
end point position 1
#2133 vback pos2 Variable backlash compensation amount changeover
end point position 2
#2134 vback arc K Variable backlash arc compensation coefficient
#2135 vback feed refpt Variable backlash reference position selection (speed)
#2136 vback pos refpt Variable backlash reference position selection (end
point position)
#2137 vback dir refpt Variable backlash reference position selection (entry di rection)

Set the position center point. (This is used only when continuous variable backlash is set with "#2121 vback lash valid".) Set a value between "#2132 vback pos1" and "#2133 vbackpos2" for the position center point.
(Note) When the size relation of the compensation amount changeover speed and distance 1 and 2 is not
appropriate while the variable backlash compensation is valid, the followings will be applied: If the backlash
speed and distance are smaller than the compensation amount changeover speed and distance 1, both the
speed and distance will be small; if larger than the compensation amount changeover speed and distance
2, both the speed and distance will be large.
---Setting range---
-999999.999999 to 999999.999999 (mm)
Select whether to enable or temporarily disable the OMR-FF control when OMR-FF is valid.
0: Enable
1: Temporarily disable
When "1" is selected while OMR-FF is valid, OMR-FF can be temporarily disabled and conventional feed for ward control can be applied instead.
Set the error detection time for when an error of command speed monitoring or feedback speed monitoring
is detected during servo OFF.
An alarm will occur if the time, for which the speed has been exceeding the safe speed or safe rotation speed,
exceeds the error detection time set in this parameter.
If "0" is set, it will be handled as 200 (ms).
---Setting range---
0 to 9999(ms)
Set the first-step time constant for the chopping axis when soft acceleration/deceleration is applied.
Note that, however, there may be cases where actual time constant is shorter than the set time constant,
because the time constant is automatically calculated according to the feedrate so that the acceleration rate
during acceleration/deceleration (clamp speed/chopping time constant) will be constant.
When "0" is set, "#2007 G1tL" will be valid.
---Setting range---
0 to 4000 (ms)
Set the second-step time constant for the chopping axis when soft acceleration/deceleration is applied.
Note that, however, there may be cases where actual time constant is shorter than the set time constant,
because the time constant is automatically calculated so that the ratio between first-step and second-step
time constant will be constant.
When "0" is set, "#2008 G1t1" will be valid.
---Setting range---
0 to 4000 (ms)
#2138 vback pos center Continuous variable backlash position center point
#2139 omrff_off OMR-FF invalid
(PR) #2140 Ssc Svof Filter Speed monitor Error detection time during servo OFF
#2141 chtL Chopping first-step time constant for soft acceleration/
deceleration
#2142 cht1 Chopping second-step time constant for soft accelera tion/deceleration
chclsp
cht1
chtL
Speed[mm/min]
Time[ms]

Set "0" for the reference axis, and set the polarity of the superimposed axis relative to the reference axis.
0: Relative to reference axis, polarity is positive
1: Relative to reference axis, polarity is negative
Set each axis's position of the base machine coordinate zero point when an arbitrary point M on the machine
is regarded as a base point.
Unify the directions of all part systems' machine zero point positions with the direction of the machine coor dinate system of the 1st part system.
If the 1st part system doesn't have a parallel axis, determine the direction arbitrarily.
---Setting range---
-99999.999 to 99999.999 (mm)
#2143 polar Control axis relative polarity
#2144 baseps Base machine coordinate zero point relative distance

X2
X1
Z2(Superimposed axis)
polar=1
Z1(Reference axis)
polar=0
Z1 baseps
Z2 baseps
X2
baseps
X1

baseps
M
Example: System1(X1, Z1), System2(X2, Z2)
System2
base machine coordinate zero point
System1
base machine coordinate zero point

Set the distance for specifying the compensation change rate in position-dependent increasing-type back lash compensation.
When "#2148 Blf_E1" is set to "0", the position-dependent increasing-type backlash compensation function
will be disabled.
---Setting range---
0.000 to 99999.999 (mm)
Set the distance for specifying the compensation change rate in position-dependent increasing-type back lash compensation.
When "#2148 Blf_E1" is set to "0", the position-dependent increasing-type backlash compensation function
will be disabled.
---Setting range---
0.000 to 99999.999 (mm)
Set the compensation amount for specifying the compensation change rate in position-dependent increas ing-type backlash compensation.
When "#2148 Blf_E1" is set to "0", the position-dependent increasing-type backlash compensation function
will be disabled.
---Setting range---
0 to 9999999 (Machine error compensation unit)
#2146 Blf_L1 Reference distance for position-dependent increasing type backlash compensation 1
#2147 Blf_L2 Reference distance for position-dependent increasing type backlash compensation 2
#2148 Blf_E1 Reference amount of position-dependent increasing type backlash compensation 1
Blf_E1
Blf_E2
Blf_L2 Blf_L1
Blf_E1
Blf_E2
Blf_L2 Blf_L1
Blf_E1
Blf_E2
Blf_L2 Blf_L1

Set the compensation amount for specifying the compensation change rate in position-dependent increas ing-type backlash compensation.
When "#2148 Blf_E1" is set to "0", the position-dependent increasing-type backlash compensation function
will be disabled.
---Setting range---
0 to 9999999 (Machine error compensation unit)
Set the farthest distance of the rotating part from the rotation center for executing the 3D machine interfer ence check. When "0" is set, this distance will conform to the rotary axis' specification speed.
---Setting range---
0.000 to 99999.999 (mm)
Set the maximum speed which can be driven with the motor's maximum torque.
(Note 1) This parameter's setting value must be smaller than "#2001 rapid Rapid traverse". If bigger, constant
inclination acceleration/deceleration will be applied.
(Note 2) If rapid traverse constant-gradient multi-step acceleration/deceleration is valid, and also if this pa rameter is set to "0", constant inclination acceleration/deceleration will be applied.
---Setting range---
0 to 1000000 (mm/min)
#2149 Blf_E2 Reference amount of position-dependent increasing type backlash compensation 2
#2150 Rot_len Farthest distance from rotary axis center
#2151 rated_spd Rated speed
Blf_E1
Blf_E2
Blf_L2 Blf_L1
rated_spd rapid
rapid
rated_spd
G0t_rated
Torque Speed
Speed Time

Set the rate in proportion to the maximum acceleration rate in rapid traverse.
(Note) If this parameter is set to "0" or "100", constant inclination acceleration/deceleration will be applied.
---Setting range---
0 to 100 (%)
Set the acceleration rate up to the rated speed of rapid traverse constant-gradient multi-step acceleration/
deceleration.
(Note) If this parameter is set to "0", constant inclination acceleration/deceleration will be applied.
---Setting range---
0 to 4000 (ms)
Set the feed forward gain when controlling as workpiece axis of tool spindle synchronization II (hobbing).
---Setting range---
0 to 200 (%)
When axis-specific acceleration tolerance control is ON:
Specify the maximum speed to be used for calculating each axis' acceleration tolerance. When "0" is set,
"#2001 rapid" is used.
When variable-acceleration pre-interpolation acceleration/deceleration is ON:

Specify the maximum speed to be used for calculating each axis' acceleration. When "0" is set, "#1206
G1bF" is used.
When both axis-specific acceleration tolerance control and variable-acceleration pre-interpolation accelera tion/deceleration are ON:
Specify the maximum speed to be used for calculating each axis' acceleration. When "0" is set, "#1206
G1bF" is used.
When neither axis-specific acceleration tolerance control nor variable-acceleration pre-interpolation acceler ation/deceleration is ON:
This parameter is disabled.
---Setting range---
0 to 999999 (mm/min)
#2152 acc_rate Acceleration rate in proportion to the maximum acceler ation rate
#2153 G0t_rated G0 time constant up to rated speed (multi-step acceler ation/deceleration)
#2155 hob_fwd_g Feed forward gain for hobbing machining
#2157 G1bFx Maximum axis-specific pre-interpolation cutting feed
rate
amax
amin
amax
amin acc_rate = x 100
rated_spd rapid
Acceleration
Speed

When axis-specific acceleration tolerance control is ON:
Specify the time constant (a time to be taken until reaching the maximum speed) to be used for calculating
each axis' acceleration tolerance. When "0" is set, "#2004 G0tL" is used.
When variable-acceleration pre-interpolation acceleration/deceleration is ON:
Specify the time constant (a time to be taken until reaching the maximum speed) to be used for calculating
each axis' acceleration. When "0" is set, "#1207 G1btL" is used.
When both axis-specific acceleration tolerance control and variable-acceleration pre-interpolation accelera tion/deceleration are ON:
Specify the time constant (a time to be taken until reaching the maximum speed) to be used for calculating
each axis' acceleration. When "0" is set, "#1207 G1btL" is used.
When neither axis-specific acceleration tolerance control nor variable-acceleration pre-interpolation acceler ation/deceleration is ON:
This parameter is disabled.
---Setting range---
0 to 5000 (ms)
Specify the compensation coefficient to be used for adjusting a path error and clamp speed at a corner for
each axis during the high-accuracy control mode. If the setting value is larger, the edge accuracy will im prove, but the cycle time may be longer because the corner speed will slow down.
This parameter is disabled when the axis-specific acceleration tolerance control is OFF.
---Setting range---
-1000 to 99 (%)
Set the upper limit value of feedrate for each axis when the external deceleration signal is enabled and ex ternal deceleration speed 1 is selected.
This parameter is valid when "#1239 set11/bit6" is set to "1".
---Setting range---
0 to 1000000 (mm/min)
Set the upper limit value of feedrate for each axis when the external deceleration signal is enabled and ex ternal deceleration speed 2 is selected.
This parameter is valid when "#1239 set11/bit6" is set to "1".
---Setting range---
0 to 1000000 (mm/min)
Set the upper limit value of feedrate for each axis when the external deceleration signal is enabled and ex ternal deceleration speed 3 is selected.
This parameter is valid when "#1239 set11/bit6" is set to "1".
---Setting range---
0 to 1000000 (mm/min)
Set the upper limit value of feedrate for each axis when the external deceleration signal is enabled and ex ternal deceleration speed 4 is selected.
This parameter is valid when "#1239 set11/bit6" is set to "1".
---Setting range---
0 to 1000000 (mm/min)
Set the upper limit value of feedrate for each axis when the external deceleration signal is enabled and ex ternal deceleration speed 5 is selected.
This parameter is valid when "#1239 set11/bit6" is set to "1".
---Setting range---
0 to 1000000 (mm/min)
#2158 G1btLx Axis-specific pre-interpolation cutting feed time con stant
#2159 compx Accuracy coefficient for each axis
#2161 exdcax1 External deceleration speed 1
#2162 exdcax2 External deceleration speed 2
#2163 exdcax3 External deceleration speed 3
#2164 exdcax4 External deceleration speed 4
#2165 exdcax5 External deceleration speed 5

Select the direction of return operation in manual measurement.
0: Opposite to the contact direction
1: Fixed to the + direction
Attempting return in the - direction will cause the operation alarm "0033 Rtn dir err in manual measure".
2: Fixed to the - direction
Attempting return in the + direction will cause the operation alarm "0033 Rtn dir err in manual measure".
Set the lost motion compensation gain in drilling cycle at high-speed retract (CW: - to + direction, CCW: + to
- direction).
Set "-1" when drilling cycle at high-speed retract is not performed.
When set to 0, the performance will follow the setting of "#2171 Lmc2QR (Lost motion compensation gain 2
for high-speed retract)".
---Setting range---
-1, 0 to 200(%)
Set the lost motion compensation gain in drilling cycle at high-speed retract (CW: - to + direction, CCW: + to

- direction).
Set "-1" when drilling cycle at high-speed retract is not performed.
When set to 0, the performance will follow the setting of "#2170 Lmc1QR (Lost motion compensation gain 1 for high-speed retract)".
---Setting range---
-1, 0 to 200(%)
Set the timing of the lost motion compensation in drilling cycle at high-speed retract.
When set to 0, the performance will follow the setting of "#2239 SV039 LMCD (Lost motion compensation timing)".
---Setting range---
0 to 2000 (ms)
Set the machine system's spring constant when using lost motion compensation type 3 in drilling cycle with high-speed retract.
When set to "0", the performance will follow the setting of "#2285 SV085 LMCk (Lost motion compensation 3 spring constant)".
---Setting range---
0 to 32767 (0.01%/m)
Set the machine system's viscous coefficient when using lost motion compensation type 3 in drilling cycle at high-speed retract.
When set to "0", the performance will follow the setting of "#2286 SV086 LMCc (Lost motion compensation 3 viscous coefficient)".
---Setting range---
0 to 32767(0.01%/m)
Set the radius of the special diametral axis.
---Setting range---
0 to 99999.999 (mm)
#2169 Man meas rtrn dir Return direction in manual measurement
#2170 Lmc1QR Lost motion compensation gain 1 for high-speed retract
#2171 Lmc2QR Lost motion compensation gain 2 for high-speed retract
#2172 LmcdQR Lost motion compensation timing for high-speed re tract
#2173 LmckQR Lost motion compensation 3 spring constant for high speed retract
#2174 LmccQR Lost motion compensation 3 viscous coefficient for
high-speed retract
#2175 Special Ax Radius Special diametral axis radius

Set a clamp speed for the special diametral axis control.
Set the limit speed of the drive system in this parameter.
---Setting range---
0 to 1000000 (/min)
(Note) For "#2001 rapid" and "#2002 clamp", set speeds on a machining line.
When the value in "#2176 Special Ax Clamp" is smaller than that in "#2001 rapid", "Special Ax Clamp" value will be applied to the clamp speed.
Set the acceleration/deceleration time constant for manual feed rate B.
(Note) When set to "0", this parameter will not be used: conventional acceleration/deceleration will be per formed.
---Setting range---
0 to 20000 (ms)
Set the door signal input in the drive unit.
Use this parameter only when the axis with a door signal belongs to several door groups.
The correspondence between the door signals and bits are as follows.
bit0: Door1 signal
bit1: Door2 signal
If the axis does not receive any door signal, set to "0".
If 0 is set to the axis to which a door signal is input, the setting of #2118 is applied.
Do not turn ON more than one bit.
Only the door signals set in #2118 can be set.
---Setting range---
0000 to 0002 (HEX)
Set the observation speed, which is at the machine end, in the multi-step speed monitor.
(Note 1) When the setting value is larger than 18000, the last 2 digits will be ignored.
E.g.: 1234567 -> 1234500 (mm/min, /min)
(Note 2) Observation speeds (#2181 to #2186 and #2191 to #2192) need to satisfy the following condition.
If not satisfied, the alarm (Y20 0007) will result.
---Setting range---
0 to 6553500 (mm/min or /min)
Set the observation speed, which is at the machine end, in the multi-step speed monitor.
(Note 1) When the setting value is larger than 18000, the last 2 digits will be ignored.
E.g.: 1234567 -> 1234500 (mm/min, /min)
(Note 2) Observation speeds (#2181 to #2186 and #2191 to #2192) need to satisfy the following condition.
If not satisfied, the alarm (Y20 0007) will result.
---Setting range---
0 to 6553500 (mm/min or /min)
#2176 Special Ax Clamp Special diametral axis clamp speed
#2177 ManualFeedBtL Time constant for manual feed rate B
(PR) #2180 S_DIN Speed observation input door No.
(PR) #2181 sscfeed1 Observation speed 1
(PR) #2182 sscfeed2 Observation speed 2

sscfeed18 SV002:PC2 32767 SV018:PIT SV001:PC1

sscfeed18 SV002:PC2 32767 SV018:PIT SV001:PC1

Set the observation speed, which is at the machine end, in the multi-step speed monitor.

(Note 1) When the setting value is larger than 18000, the last 2 digits will be ignored.
E.g.: 1234567 -> 1234500 (mm/min, /min)
(Note 2) Observation speeds (#2181 to #2186 and #2191 to #2192) need to satisfy the following condition.
If not satisfied, the alarm (Y20 0007) will result.
---Setting range---
0 to 6553500 (mm/min or /min)
Set the observation speed, which is at the machine end, in the multi-step speed monitor.
(Note 1) When the setting value is larger than 18000, the last 2 digits will be ignored.
E.g.: 1234567 -> 1234500 (mm/min, /min)
(Note 2) Observation speeds (#2181 to #2186 and #2191 to #2192) need to satisfy the following condition.
If not satisfied, the alarm (Y20 0007) will result.
---Setting range---
0 to 6553500 (mm/min or /min)
Set the observation speed, which is at the machine end, in the multi-step speed monitor.
(Note 1) When the setting value is larger than 18000, the last 2 digits will be ignored.
E.g.: 1234567 -> 1234500 (mm/min, /min)
(Note 2) Observation speeds (#2181 to #2186 and #2191 to #2192) need to satisfy the following condition.
If not satisfied, the alarm (Y20 0007) will result.
---Setting range---
0 to 6553500 (mm/min or /min)
Set the observation speed, which is at the machine end, in the multi-step speed monitor.
(Note 1) When the setting value is larger than 18000, the last 2 digits will be ignored.
E.g.: 1234567 -> 1234500 (mm/min, /min)
(Note 2) Observation speeds (#2181 to #2186 and #2191 to #2192) need to satisfy the following condition.
If not satisfied, the alarm (Y20 0007) will result.
---Setting range---
0 to 6553500 (mm/min or /min)
Specify the I/F No. of the PLC axis to use when switching between NC axis and PLC axis. Set the I/F No. of a vacant PLC axis.
When not using, set to "0".
---Setting range---
0 to 8
(PR) #2183 sscfeed3 Observation speed 3
(PR) #2184 sscfeed4 Observation speed 4
(PR) #2185 sscfeed5 Observation speed 5
(PR) #2186 sscfeed6 Observation speed 6
(PR) #2187 chgPLCax PLC axis switchover axis No.

sscfeed18 SV002:PC2 32767 SV018:PIT SV001:PC1

sscfeed18 SV002:PC2 32767 SV018:PIT SV001:PC1

sscfeed18 SV002:PC2 32767 SV018:PIT SV001:PC1

sscfeed18 SV002:PC2 32767 SV018:PIT SV001:PC1

This parameter specifies which observation speed change signal is input in the drive unit.
The observation speed change signal corresponds to the following bits of the parameter.
bit0: Observation speed change signal 1 is connected.
bit1: Observation speed change signal 2 is connected.
bit2: Observation speed change signal 3 is connected.
If the axis receives no observation speed change signal, set to "0000".
(Note) When a same setting value is set to more than one axis, or when more than one bit is set to turn ON for one axis, the alarm (Y20 0027) will occur.
---Setting range---
0000 to 0004 (HEX)
Specify the stall torque of the servo motor.
This value is used for calculating the servo motor's power consumption.
---Setting range---
0.000 to 1000.000 (Nm)
Set the head R register No. to be used for setting/checking stored stroke limit I.
Eight consecutive R registers from the R register No. set here will be the area for stored stroke limit I.
Changing the areas for stored stroke limit I will be disabled if an R register that is not in the user area is set.
In addition, make sure to set an even number for the head R register No. Changing the areas for stored stroke limit I will be disabled if an odd number is set.
---Setting range---
0 to 29892
Set the observation speed, which is at the machine end, in the multi-step speed monitor.
(Note 1) When the setting value is larger than 18000, the last 2 digits will be ignored.
E.g.: 1234567 -> 1234500 (mm/min, /min)
(Note 2) Observation speeds (#2181 to #2186 and #2191 to #2192) need to satisfy the following condition.
If not satisfied, the alarm (Y20 0007) will result.
---Setting range---
0 to 6553500 (mm/min or /min)
Set the observation speed, which is at the machine end, in the multi-step speed monitor.
(Note 1) When the setting value is larger than 18000, the last 2 digits will be ignored.
E.g.: 1234567 -> 1234500 (mm/min, /min)
(Note 2) Observation speeds (#2181 to #2186 and #2191 to #2192) need to satisfy the following condition.
If not satisfied, the alarm (Y20 0007) will result.
---Setting range---
0 to 6553500 (mm/min or /min)
(PR) #2188 S_SigIn Safety observation signal input
#2189 StlTrq (PwrCal) Stall torque for power computation
(PR) #2190 OT_Rreg Designate R register for stored stroke limit I
(PR) #2191 sscfeed7 Observation speed 7

(PR) #2192 sscfeed8 Observation speed 8

sscfeed18 SV002:PC2 32767 SV018:PIT SV001:PC1

sscfeed18 SV002:PC2 32767 SV018:PIT SV001:PC1

Set the constant inclination acceleration/deceleration time constant of the hobbing workpiece axis when is suing a hobbing command while the hobbing spindle is rotating. Hobbing workpiece axis time constant is the constant inclination acceleration/deceleration time constant with respect to #2002 Cutting feed rate for clamp function.
If the setting value of hobbing workpiece axis time constant is out of setting range, set the maximum value in the setting range.
---Setting range---
1 to 4000 (ms)
Acceleration/Deceleration is carried out so that the acceleration/deceleration time will not become longer than this parameter's setting when the acceleration/deceleration type of rapid traverse command is constant inclination.
Set a value smaller than "#2004 G0tL".
This parameter is enabled when "#1200 G0_acc" is constant inclination type.
This parameter is enabled only during fixed cycle if "#1253 set25/bit2" (Acceleration/Deceleration mode change in hole drilling cycle) is enabled even if "#1200 G0_acc" is constant inclination type.
This parameter is disabled if "0" or a value larger than "#2004 G0tL" is set.
---Setting range---
0 to 4000 (ms)
Acceleration/Deceleration is carried out so that the acceleration/deceleration time will not become longer than this parameter's setting when the acceleration/deceleration type of linear interpolation command is con stant inclination.
Set a value smaller than "#2007 G1tL".
This parameter is enabled when "#1201 G1_acc" is constant inclination type.
This parameter is enabled only during fixed cycle if "#1253 set25/bit2" (Acceleration/Deceleration mode change in hole drilling cycle) is enabled even if "#1201 G1_acc" is constant inclination type.
This parameter is disabled if "0" or a value larger than "#2007 G1tL" is set.
---Setting range---
0 to 4000 (ms)
Set the changeover speed at speed normalization.
Set a value smaller than that in "#2562 VBL2 VG0".
Normally, the "#2561 VBL2 VG1" value corresponds to the cutting feedrate, the "#2562 VBL2 VG0" value to the rapid traverse rate.
---Setting range---
1 to 1000000 (mm/min)
#2195 hob_tL Hobbing workpiece axis time constant
#2198 G0tMin Minimum time constant for rapid traverse constant-gra dient acc./dec.
#2199 G1tMin Minimum time constant for cutting feed constant incli nation acc./dec.
#2561 VBL2 VG1 Variable backlash comp II Changeover speed 1
#2002 clamp
hob_tL hob_tL
t
Wk axis Wk axis command speed
Hob axis
Hob axis command speed
Rotation speed

Set the changeover speed at speed normalization.
Set a value greater than that in "#2561 VBL2 VG1".
Normally, the "#2561 VBL2 VG1" value corresponds to the cutting feedrate, the "#2562 VBL2 VG0" value to the rapid traverse rate.
---Setting range---
1 to 1000000 (mm/min)
Set the most plus (+) side stroke position among the three.
Set the parameters VBL2 P1 to P3 to be "VBL2 P1 > VBL2 P2 > VBL2 P3".
Normally, divide the axis's stroke by four, and set a dividing position (except for the both ends) to be a stroke position.
---Setting range---
-99999.999 to 99999.999 (mm)
Set the middle stroke position among the three.
Set the parameters VBL2 P1 to P3 to be "VBL2 P1 > VBL2 P2 > VBL2 P3".
Normally, divide the axis's stroke by four, and set a dividing position (except for the both ends) to be a stroke position.
---Setting range---
-99999.999 to 99999.999 (mm)
Set the most minus (-) side stroke position among the three.
Set the parameters VBL2 P1 to P3 to be "VBL2 P1 > VBL2 P2 > VBL2 P3".
Normally, divide the axis's stroke by four, and set a dividing position (except for the both ends) to be a stroke position.
---Setting range---
-99999.999 to 99999.999 (mm)
Set the compensation data (backlash amount) at changeover speed 1 and stroke position 1.
Calculate the current compensation data according to the current speed and position.
---Setting range---
-99999999 to 99999999 (Machine error compensation unit)
Set the compensation data (backlash amount) at changeover speed 1 and stroke position 2.
Calculate the current compensation data according to the current speed and position.
---Setting range---
-99999999 to 99999999 (Machine error compensation unit)

Set the compensation data (backlash amount) at changeover speed 1 and stroke position 3.
Calculate the current compensation data according to the current speed and position.
---Setting range---
-99999999 to 99999999 (Machine error compensation unit)
Set the compensation data (backlash amount) at changeover speed 2 and stroke position 1.
Calculate the current compensation data according to the current speed and position.
---Setting range---
-99999999 to 99999999 (Machine error compensation unit)
#2562 VBL2 VG0 Variable backlash comp II Changeover speed 2
#2563 VBL2 P1 Variable backlash comp II Stroke position 1
#2564 VBL2 P2 Variable backlash comp II Stroke position 2
#2565 VBL2 P3 Variable backlash comp II Stroke position 3
#2566 VBL2 BL11 Variable backlash comp II Comp data at changeover
spd 1 and stroke pos 1
#2567 VBL2 BL12 Variable backlash comp II Comp data at changeover
spd 1 and stroke pos 2
#2568 VBL2 BL13 Variable backlash comp II Comp data at changeover
spd 1 and stroke pos 3
#2569 VBL2 BL01 Variable backlash comp II Comp data at changeover
spd 2 and stroke pos 1

Set the compensation data (backlash amount) at changeover speed 2 and stroke position 2.
Calculate the current compensation data according to the current speed and position.
---Setting range---
-99999999 to 99999999 (Machine error compensation unit)
Set the compensation data (backlash amount) at changeover speed 2 and stroke position 3.
Calculate the current compensation data according to the current speed and position.
---Setting range---
-99999999 to 99999999 (Machine error compensation unit)
Set the time constant in calculating the float amount. Set a value greater than the calculation cycle.
---Setting range---
0 to 10000 (ms)
Set the multiplier in calculating the lost motion amount. When "1000" is set, the multiplier is "1".
---Setting range---
0 to 1000 (1/1000)
Set the boundary value of the speed in calculating the compensation amount.
---Setting range---
1 to 1000000 (mm/min)
Set the compensation magnification in calculating the compensation amount. When "0" is set, the magnifi cation is 100%.
---Setting range---
0 to 300(%)
Set the multiplier in calculating the compensation amount. When "1000" is set, the multiplier is "1".
---Setting range---
0 to 1000 (1/1000)
Set the value to subtract from the compensation amount (CMP) at reversing the axis travel direction.
---Setting range---
-99999999 to 99999999 (Machine error compensation unit)
Set the travel distance to return to the compensation amount (CMP) from the reverse point of the axis travel
direction.
---Setting range---
0 to 99999.999 (mm)
#2570 VBL2 BL02 Variable backlash comp II Comp data at changeover
spd 2 and stroke pos 2
#2571 VBL2 BL03 Variable backlash comp II Comp data at changeover
spd 2 and stroke pos 3
#2572 VBL2 FloatTC Variable backlash comp II Time constant in calculating
float amt
#2573 VBL2 LMMul Variable backlash comp II Multiplier in calculating lost
motion amt
#2574 VBL2 VBound Variable backlash comp II Speed boundary value
#2575 VBL2 CompMag Variable backlash comp II Compensation magnification
#2576 VBL2 CompMul Variable backlash comp II Multiplier in calculating com pensation amount
#2577 VBL2 BLE Variable backlash comp II Gradually increase amount
#2578 VBL2 BLL Variable backlash comp II Gradually increase travel dis tance

Set the feed rate in adjusting the backlash amount.
It is possible to set this parameter also by carrying out a measurement condition adjustment on the backlash
adjustment screen.
---Setting range---
0 to 1000000(mm/min)
The commanded G code of the index table indexing axis is checked.
0: Check is not performed.
1: Cutting feed G command is prohibited.
Set the measurement position in measurement condition adjustment and backlash adjustment on the ma chine coordinate system.
(Note 1) Set the position so that a collision will not occur during adjustment.
(Note 2) Set this parameter for all the axes.
---Setting range---
-99999.999 to 99999.999 (mm)
0: Separate backlash adjustment for master axis and slave axis each.
1: Backlash adjustment is applied only to the master axis. The master axis's backlash amount is applied to
the slave axis.
(Note 1) Set this parameter for the master axis.

(Note 2) In the case of synchronous control of speed/current command, set to "1".
Specify the speed at which compensation scale is reset to 100%.
When "0" is set, this parameter is disabled.
If a set speed is greater than "#2574 VBL2 VBound", the speed is clamped at "#2574 VBL2 VBound".
---Setting range---
0 to 1000000 (mm/min)
Specify whether to enable the cyclic error compensation.
0: Disable
1: Enable
Specify the initial number of the compensation amounts.
The compensation amounts to be applied will start from this number, and the number of compensation
amounts to be applied is specified by "#2587 Cycdv" (Cyclic error compensation: number of divisions).
---Setting range---
4101 to 5999
Specify the number of divisions per cycle of the cyclic error compensation.
---Setting range---
1 to 128
Specify the number of compensation cycles per revolution of the rotary axis.
---Setting range---
0 to 32767
#2579 BLAT_feed Feed rate for automatic backlash adjustment
(PR) #2580 index_Gcmd Indexing axis G command check
#2581 BLAT_pos Measurement position for automatic backlash adjust ment
#2582 BLAT_syn Synchronization setting for automatic backlash adjust ment
#2584 VBL2 Vlimit Variable backlash compensation 2: Speed to reset com pensation scale to 100%
#2585 Cyccmp Enable cyclic error compensation
#2586 Cycstnum Cyclic error compensation: initial number of compensa tion
#2587 Cycdv Cyclic error compensation: number of divisions
#2588 Cycct Cyclic error compensation: cycle constant

Set a linear control time constant for rapid traverse acceleration/deceleration to be applied when the G0 time
constant switchover request signal is ON.
This time constant is enabled when LR (rapid traverse feed with linear acceleration/deceleration) or F (soft
acceleration/deceleration) is selected in "#2003 smgst" (Acceleration and deceleration modes).
If #2598 is 0, the time constant set in "#2004 G0tL (G0 time constant)" will be used.
---Setting range---
0 to 4000(ms)
Set a primary-delay time constant for rapid traverse acceleration/deceleration to be applied when the G0 time
constant switchover request signal is ON.
This time constant is enabled when R1 (rapid traverse feed with primary delay) or R3 (exponential acceler ation and linear deceleration) is selected in "#2003 smgst" (Acceleration and deceleration modes).
When the soft acceleration/deceleration is selected, the second-step time constant will be used.
If #2599 is set to 0, the time constant set in "#2005 G0t1 (G0 time constant (primary delay)/2nd-step time
constant for soft acceleration/deceleration)" will be used.
---Setting range---
0 to 5000 (ms)
Switch jog/handle time constants. Set per axis.
0: Not use
1: (Not used)
2: Enable for handle feed
Set a linear control time constant for jog/handle feed acceleration/deceleration.
When set to "0", the time constant will be clamped at 1 [ms].
---Setting range---
0 to 4000 (ms)
Specify the maximum cutting feed rate to be applied to thread cutting for each axis.
---Setting range---
1 to 1000000
Specify the primary delay time constant to be used in acceleration/deceleration of a thread cut axis.
* This parameter is enabled when either C1 (Primary delay cutting feed) or LC (Linear acceleration/deceler ation cutting feed) is selected for the acceleration/deceleration mode (#2003 smgst).
---Setting range---
0 to 4000
Specify the rapid traverse rate to be applied under 2-axis superimposition control when the axis traverses in
the same direction as the other axis that is travelling at a cutting feed rate.
---Setting range---
0 to 1000000 (mm/min)
#2598 G0tL_2 G0 time constant 2 (linear)
#2599 G0t1_2 G0 time constant 2 (primary delay)/2nd-step time con stant for soft acceleration/deceleration
(PR) #2614 JH_smgSel Jog/handle acceleration/deceleration selection
#2616 JHtL Jog/handle time constant (linear)
#2619 thr_clamp Thread cut clamp speed
#2620 thr_t Thread cut time constant
#2621 plrapid2 Rapid traverse rate for superimposition control 2
JHtL JHtL
Speed
Time

Specify the G0 time constant (linear) to be applied under 3-axis serial superimposition control.
---Setting range---
0 to 4000 (ms)
Specify the G0 time constant (primary delay) to be applied under 3-axis serial superimposition control.
---Setting range---
0 to 5000 (ms)
Specify the G1 time constant (linear) to be applied under 3-axis serial superimposition control.

---Setting range---
0 to 4000 (ms)
Specify the G1 time constant (primary delay) to be applied under 3-axis serial superimposition control.
---Setting range---
0 to 5000 (ms)
Specify the rapid traverse rate to be applied when all the three superimposed axes are rapid-traversing in a single direction under 3-axis serial superimposition control.
---Setting range---
0 to 1000000 (mm/min)
Specify the rapid traverse rate to be applied under 3-axis serial superimposition control when two of the three superimposed axes are rapid-traversing while the remaining one axis is fed at a cutting feed rate in a single direction.
---Setting range---
0 to 1000000 (mm/min)
Specify the rapid traverse rate to be applied under 3-axis serial superimposition control when one of the three superimposed axes is rapid-traversing while the remaining two axes are fed at a cutting feed rate in a single direction.
---Setting range---
0 to 1000000 (mm/min)
Specify the cutting feed clamp speed to be applied under 3-axis serial superimposition control when all the three superimposed axes are fed at a cutting feed rate in a single direction.
---Setting range---
0 to 1000000 (mm/min)
Specify the cutting feed clamp speed to be applied under 3-axis serial superimposition control when one of the three superimposed axes is rapid-traversing while the other two are fed at a cutting feed rate in a single direction.
---Setting range---
0 to 1000000 (mm/min)
#2622 pl3G0tL G0 time constant (linear) for 3-axis serial superimposi tion control
#2623 pl3G0t1 G0 time constant (primary delay) for 3-axis serial super imposition control
#2624 pl3G1tL G1 time constant (linear) for 3-axis serial superimposi tion control
#2625 pl3G1t1 G1 time constant (primary delay) for 3-axis serial super imposition control
#2626 pl3rapid Rapid traverse rate for 3-axis serial superimposition
control
#2627 pl3rapid2 Rapid traverse rate for 3-axis serial superimposition
control 2
#2628 pl3rapid3 Rapid traverse rate for 3-axis serial superimposition
control 3
#2629 pl3clamp Cutting feed clamp speed for 3-axis serial superimposi tion control
#2630 pl3clamp2 Cutting feed clamp speed for 3-axis serial superimposi tion control 2

Specify the in-position width for the rapid traverse block overlap at the joint of consecutively given G00 blocks.
---Setting range---
0.000 to 1000.000 (mm)
Specify the in-position width for the rapid traverse block overlap at the joint of two blocks where G01 is in cluded.
---Setting range---
0.000 to 1000.000 (mm)
Specify the in-position width for the rapid traverse block overlap at the joint of two blocks where G28/G30 is included.
---Setting range---
0.000 to 1000.000 (mm)
bit0: Change output units of servo axis cutting torue
Change the output units of the servo axis cutting torque.
0: Output unit 1%
1: Output unit 0.01%
bit1: Select stop method at collision detection
Set the operation when a collision is detected.
0: Emergency stop.
1: Servo alarm occurs to an axis that the collision was detected.
The axes in the part system that the collision was detected will be in an automatic interlocked state.
Related parameters: SV035/bitE-C, SV035/bitB, SV060, CrshStpSel
Specify a period of time in which torque skip condition is disabled. This is effective when an improper skip is generated due to current flown during acceleration (when G160 is commanded).
---Setting range---
0 to 32767(ms)
Specify the maximum speed to be applied to each axis when manual speed clamp is enabled.
When 0 is set, the rapid traverse rate (#2001 rapid) is applied.
---Setting range---
0 to 1000000 (mm/min)
Specify a feed rate to be applied to each axis during jog mode.
When 0 is set, the manual feed rate selected by Manual feedrate method selection (JVS) signal is applied.
---Setting range---
0 to 1000000 (mm/min)
Specify the servo load current (%) at which the loadmeter displays a caution sign (yellow).
If servo load current exceeds the specified value, the loadmeter displays a caution (yellow).
If you wish to avoid showing the caution (yellow), set this parameter to be the same as "#2644 LdMeter thresholdR".
When "0" is set, the value becomes 100% (default).
---Setting range---
0 to 300(%)
#2631 G0olinps Rapid traverse block overlap G00 in-position width
#2632 G1olinps Rapid traverse block overlap G01 in-position width
#2633 G28olinps Rapid traverse block overlap G28 in-position width
(PR) #2634 SrvFunc01

#2639 tskip_T Non-sensitive band for torque skip
#2641 m_clamp Manual feed clamp speed
#2642 jogfeed Jog feed rate
(PR) #2643 LdMeter thresholdY Loadmeter: Caution (Yellow) threshold

Specify the servo load current (%) at which the loadmeter displays a warning sign (red).
If servo load current exceeds the specified value, the loadmeter displays a warning (red).
If you wish to avoid showing the warning (red), set this parameter to be the same as "#2645 LdMeter load max".
When "0" is set, the value becomes 150% (default).
---Setting range---
0 to 300(%)
Specify the maximum servo load current (%) for loadmeter display.
When "0" is set, the value becomes 200% (default).
---Setting range---
0 to 300(%)
Set the responsiveness in detecting the disturbance torque.
---Setting range---
0 to 1000 (ms) (Default value: 0)
Select whether to enable switching of G0 acceleration/deceleration time constant.
0: Disable switching of G0 acceleration/deceleration time constant.
1: Enable switching of G0 acceleration/deceleration time constant.
Select whether to enable switching of G1 acceleration/deceleration time constant.
0: Disable switching of G1 acceleration/deceleration time constant.
1: Enable switching of G1 acceleration/deceleration time constant.
Set the minimum value of time constant when changing time constant during acceleration and deceleration of G0 command.
Set the time constant which is adjusted when workpiece is not attached.
Note that when 0 is set, the value will be 10 (default).
---Setting range---
0 to 4000 (ms)
Set the minimum value when changing time constant during acceleration and deceleration of G1 command after interpolation.
Set the time constant which is adjusted when workpiece is not attached.
Note that when 0 is set, the value will be 10 (default).
---Setting range---
0 to 4000 (ms)
Set the minimum value when changing time constant during acceleration and deceleration of G1 command before interpolation.
Set the time constant which is adjusted when workpiece is not attached.
Note that when 0 is set, the value will be 10 (default).
---Setting range---
0 to 4000 (ms)
(PR) #2644 LdMeter thresholdR Loadmeter: Warning (Red) threshold
(PR) #2645 LdMeter load max Loadmeter: Maximum servo load current
#2646 distt Load observation disturbance torque filter time con stant
(PR) #2651 RT2G0 RT2: Minimum value of G0 acce/dece time constant
(PR) #2652 RT2G1 RT2: Enable switching of G1 acce/dece time constant
#2653 RT2G0tL RT2: Minimum value of G0 acce/dece time constant
#2654 RT2G1tLA RT2: Minimum value of acce/dece time constant after G1 interpolation
#2655 RT2G1tLB RT2: Minimum value of acce/dece time constant before G1 interpolation

Set the changing amount of time constant when changing time constant during acceleration and deceleration of G0 command based on the estimated inertia ratio.
Note that when 0 is set, the value will be 10 (default).
---Setting range---
0 to 4000 (ms)
Set the changing amount of time constant when changing time constant during acceleration and deceleration of G1 command after interpolation based on the estimated inertia ratio.
Note that when 0 is set, the value will be 10 (default).
---Setting range---
0 to 4000 (ms)
Set the changing amount of time constant when changing time constant during acceleration and deceleration of G1 command before interpolation based on the estimated inertia ratio.
Note that when 0 is set, the value will be 10 (default).
---Setting range---
0 to 4000 (ms)
Specify a tolerance (tolerable error) to be used under tolerance control.
Set a tolerable error for fine segment program created by CAM. (Usually around 0.01(mm))
If 0.000 is set, it is operated with the tolerance of 0.01(mm).
When designating the tolerance amount with the ", K address", this parameter is not used.
---Setting range---
0.000 to 100.000 (mm)
Specify the in-position width at which the standard model gain is switched under OMR-FF control.
When set to "0", command deceleration check is performed.
---Setting range---
0.000 to 99.999 (mm)
In interference check III, select whether to limit the torque at entering the interference warning area.
0: No torque limit
(Use "#2213 SV013 (Current limit value)")

1: Limit the torque
(Use "#2214 SV014 (Current limit value in special control)")
(Note) This setting is invalid if spindle/C axis is the target axis. (Torque cannot be limited.)
In interference check III, if clamping the speed, the clamp speed is set at entering the interference warning area.
(Note) When "0" is set, the speed will not be clamped.
---Setting range---
0 to 1000000 (mm/min)
#2656 RT2 G0rng RT2: Changing amount of G0 acce/dece time constant
#2657 RT2G1rngA RT2: Changing amount of acce/dece time constant after G1 interpolation
#2658 RT2G1rngB RT2: Changing amount of acce/dece time constant before G1 interpolation
#2659 tolerance Tolerance
#2660 omrff_inps OMR-FF in-position width
#2661 ITF3_ILMT Interference check III torque limit at entering interfer ence warning area
#2662 ITF3_Clamp Interference check III clamp speed at entering interfer ence warning area

This parameter is used for the multiple axis synchronization control.
Specify the master axis No. that corresponds to the axis.
Enter the sequential NC axis No., with the 1st axis of the 1st part system set as "1".
You cannot set the No. of the axis targeted for the multiple axis synchronization control in "#1068 slavno".
You cannot set "#1068 slavno" for the axis targeted for the multiple axis synchronization control.
The master axis for multiple axis synchronization control cannot be set in "#2674 primno".
For a multi-part system configuration, you cannot set the axes across different part systems.
---Setting range---
0: No master axis
1 to 32: 1st axis to 32nd axis
This parameter is used for the multiple axis synchronization control.
Specify the starting tool offset No. for the axis.
---Setting range---
0 to 999
Specify whether to enable OMR-CC.
0: Disable OMR-CC
1: Enable OMR-CC
Adjust the compensation amount output by OMR-CC.
When "0" is specified, the compensation amount adjusted by the standard value (50%) is output.
---Setting range---
0 to 100 (%)
Specify the amplitude of compensation signal (fundamental wave component) in the unit of 0.01% of stall current.
When "0" is set, the compensation is disabled.
---Setting range---
0 to 10000 (0.01%)
Set the timing of compensation signal (fundamental wave component). The signal timing is adjusted with one cycle of fundamental wave component taken as 100%.
When "50" is set, the compensation signal is inverted.
Setting it to "100" results in the same signal timing as when "0" is set.
---Setting range---
0 to 100 (%)
Specify the amplitude of compensation signal (second-order component) in the unit of 0.01% of stall current.
When "0" is set, the compensation is disabled.
---Setting range---
0 to 10000 (0.01%)
(PR) #2674 primno Multiple axis synchronization control: Master axis No.
(PR) #2675 tcmp_top Multiple axis synchronization control: starting tool off set No.
#2678 OMRCC_valid OMR-CC ON
#2679 OMRCC_CompMag Factor for OMR-CC compensation amount
#2680 TCMPG1 Cogging torque compensation gain 1 (fundamental wave component)
#2681 TCMPT1 Cogging torque compensation timing 1 (fundamental wave component)
#2682 TCMPG2 Cogging torque compensation gain 2 (second-order component)

Set the timing of compensation signal (second-order component). The signal timing is adjusted with one cy cle of fundamental wave component * 2 taken as 100%.
When "50" is set, the compensation signal is inverted.
Setting it to "100" results in the same signal timing as when "0" is set.
---Setting range---
0 to 100 (%)
Specify the amplitude of compensation signal (third-order component) in the unit of 0.01% of stall current.
When "0" is set, the compensation is disabled.
---Setting range---
0 to 10000 (0.01%)
Set the timing of compensation signal (third-order component). The signal timing is adjusted with one cycle of fundamental wave component * 3 taken as 100%.
When "50" is set, the compensation signal is inverted.
Setting it to "100" results in the same signal timing as when "0" is set.
---Setting range---
0 to 100 (%)
Specify the amplitude of compensation signal (fourth-order component) in the unit of 0.01% of stall current.
When "0" is set, the compensation is disabled.

---Setting range---
0 to 10000 (0.01%)
Specify the timing of compensation signal (fourth-order component). The signal timing is adjusted with one cycle of fundamental wave component * 4 taken as 100%.
When "50" is set, the compensation signal is inverted.
Setting it to "100" results in the same signal timing as when "0" is set.
---Setting range---
0 to 100 (%)
Set the fundamental wave frequency to be used for cogging torque compensation, using the electrical angle: 360[deg] * 1/N.
Setting it to "0" leads to the same fundamental wave frequency magnification as when "2" is set.
For a linear motor, set "0".
For a rotary motor, set the fundamental wave frequency magnification per electrical angle according to the motor to use.
---Setting range---
0 to 32
Specify the travel direction of the secondary axis relative to the primary axis.
0: Secondary axis travels in the same direction as the primary axis.
1: Secondary axis travels in the opposite direction to the primary axis.
#2683 TCMPT2 Cogging torque compensation timing 2 (second-order component)
#2684 TCMPG3 Cogging torque compensation gain 3 (third-order com ponent)
#2685 TCMPT3 Cogging torque compensation timing 3 (third-order component)
#2686 TCMPG4 Cogging torque compensation gain 4 (fourth-order component)
#2687 TCMPT4 Cogging torque compensation timing 4 (fourth-order component)
#2695 TCMPP Fundamental wave cycle of cogging torque
(PR) #2699 mult syn polar Relative polarity of secondary axis

Set the offset amount to shift all workpiece coordinate systems.
Setting this parameter enables the base point for shifting the workpiece coordinate system to be offset to any position.
---Setting range---
-99999.999 to 99999.999 (mm)
When external encoder is used to detect the FB position of the servo axis unit to be displayed on the Drive monitor screen, specify the external encoder No.
When external encoder is used, the position within one revolution from 0 to 360 degrees is displayed on the Machine end FB.
When you want to reverse the rotation direction of external encoder, specify the negative value of the external encoder No.
When external encoder is not used, set "0".
---Setting range---
-1 to 1
Select the acceleration and deceleration type for jog feed and manual rapid traverse.
0: Acceleration and deceleration with constant time
1: Acceleration and deceleration with constant gradient
Specify to which axis the coordinate transformation function applies in the motion control release (coordinate transformation).
0: Not apply
1: Apply
Set the coordinates of the lower limit of the prohibited area of the stored stroke limit IB.
The coordinates should be based on the origin of the basic machine coordinate system.
If the same value is set for both the sign and numeral value as "#2707 OT_1B[2]+", the stored stroke limit IB function set with #2706 and #2707 will be disabled.
(Note) This parameter is valid when "#2063 OT_1Btype" is "0".
---Setting range---
-99999.999 to 99999.999 (mm)
Set the coordinates of the upper limit of the prohibited area of the stored stroke limit IB.
The coordinates should be based on the origin of the basic machine coordinate system.
(Note) This parameter is valid when "#2063 OT_1Btype" is "0".
---Setting range---
-99999.999 to 99999.999 (mm)
Specify the minimum travel distance when approaching the sensor in Manual tool length measurement 2. (radius value)
Axis movement more or longer than the distance set in this parameter determines the direction of movement to the sensor and the contact surface.
(Note) When "0" is set, contact surface identification is not performed after reversing the axis feed direction.
---Setting range---
0 to 99999.999 (mm)
#2701 Work base ofs Workpiece base point offset (for L system only)
#2702 exencno External encoder No. for servo axis
(PR) #2703 manual_acc Enable constant-gradient acceleration/deceleration in manual feed
(PR) #2704 MCR Coord Tr Axis Motion control release (coordinate transformation) axis
#2706 OT_1B[2]- Soft limit IB[2]-
#2707 OT_1B[2]+ Soft limit IB[2]+
#2709 TLM_approach Tool setter approach distance

This parameter specifies whether to enable the vibration cutting control.
0: Disable

1: Enable
(*) For a rotary axis or PLC axis, the vibration cutting control is disabled irrespective of this parameter.
This parameter specifies the maximum cutting feedrate to be applied to each axis during the vibration cutting mode.
If this parameter is set to "0" or a value greater than "#2002 clamp", the value of "#2002 clamp" will be ap plied.
---Setting range---
0 to 1000000 (mm/min)
This parameter specifies the reference model gain (the position response during OMR-FF) to be applied to each axis during the vibration cutting mode.
If this parameter is set to "0", the value of SV197 (PGMsp) or SV106 (PGM) will be applied in this order.
---Setting range---
0 to 300 (rad/s)
Select whether to enable brake wear diagnostics.
0: Disable
1: Enable
Specify the current limit value during brake wear diagnostics as a percent of the stall current.
If "0" is set, an alarm is generated when an attempt is made to start brake wear diagnostics, which will not start.
---Setting range---
0 to 100 (%)
Specify the wait time between the receipt of the brake wear diagnostics start signal (BWDSTm) by the NC and the issuance of the movement command for brake wear diagnostics.
If set to "0", the command wait time is 400 [ms].
---Setting range---
0 to 30000 (ms)
Specify the amount of travel for the command given to the axis to be diagnosed during brake wear diagnos tics.
If "0" is set, an alarm is generated when an attempt is made to start brake wear diagnostics, which will not start.
---Setting range---
-99999.999 to 99999.999 (mm or deg)
Specify the feedrate for the command given to the axis to be diagnosed during brake wear diagnostics.
If "0" is set, an alarm is generated when an attempt is made to start brake wear diagnostics, which will not start.
---Setting range---
0 to 1000000 (mm/min or deg/min)
#12570 VibCutting_VCC Vibration cutting control ON
#12571 VibClamp_VCC Cutting feedrate clamp in vibration cutting mode
#12583 VibPGMsp_VCC VCC reference model gain
(PR) #12590 BWD_Enable Brake wear diagnostics ON
#12591 BWD_ILIM Brake wear diagnostics current limit value
(PR) #12592 BWD_CMDWT Brake wear diagnostics command wait time
(PR) #12593 BWD_FD Brake wear diagnostics command travel amount
(PR) #12594 BWD_FDRATE Brake wear diagnostics feedrate

Specify the duration of the axis travel amount monitoring after the output of the movement command for di agnostics is completed during brake wear diagnostics.
If set to "0", the monitoring time is 1000 [ms].
---Setting range---
0 to 30000 (ms)
Specify the allowable travel amount for the axis to be diagnosed during brake wear diagnostics. (If the travel amount during brake wear diagnostics exceeds the value of this parameter, "BrakeWearDiagnostics (Warn ing)" is generated.)
If set to "0", the allowable travel amount is 100 [mm].
---Setting range---
0 to 99999.999 (mm or deg)
Specify the allowable travel amount for the axis to be diagnosed during brake wear diagnostics. (If the travel amount during brake wear diagnostics exceeds the value of this parameter, "BrakeWearDiagnostics (Cau tion)" is generated.)
If a value greater than or equal to "#12596 BWD_TOL(Warning)" or "0" is set, this parameter becomes inval id, and "BrakeWearDiagnostics (Caution)" is not generated.
Specify a value that satisfies "#12596 BWD_TOL(Warning)" > "#12597 BWD_TOL(Caution)".
---Setting range---
0 to 99999.999 (mm or deg)
Select whether to enable or disable the variable full-closed torsion compensation.
0: Disable
1: Enable
Specify the magnification of time constant for variable full-closed torsion compensation (VDCtex1 to 8).
When not using, set to "0".
---Setting range---
0 to 9999 (%)
Specify the magnification of variable full-closed torsion compensation value (+) (VDCpex1 to 8).
When not using, set to "0".
---Setting range---
0 to 32767 (%)
Specify the magnification of variable full-closed torsion compensation value (-) (VDCnex1 to 8). When not using, set to "0".
---Setting range---
0 to 32767 (%)
Specify the shift amount for variable full-closed torsion compensation time constant (VDCtex1 to 8).
When not using, set to "0".
---Setting range---
-9999 to 9999(ms)
(PR) #12595 BWD_OBTIM Brake wear diagnostics monitoring time
(PR) #12596 BWD_TOL(Warning) Brake wear diagnostics allowable travel amount (Warn ing)
(PR) #12597 BWD_TOL(Caution) Brake wear diagnostics allowable travel amount (Cau tion)
#14301 valVDC Variable full-closed torsion compensation ON
#14302 VDCtex_sc Variable full-closed torsion compensation: time con stant magnification
#14303 VDCpex_sc Variable full-closed torsion compensation: compensa tion (+) magnification
#14304 VDCnex_sc Variable full-closed torsion compensation: compensa tion (-) magnification

#14305 VDCtex_sft Variable full-closed torsion compensation: compensa tion time constant shift

Specify the shift amount for variable full-closed torsion compensation value (+) (VDCpex1 to 8).
When not using, set to "0".
---Setting range---
-32768 to 32767 (0.01 m)
Specify the shift amount for variable full-closed torsion compensation value (-) (VDCnex1 to 8).
When not using, set to "0".
---Setting range---
-32768 to 32767 (0.01 m)
Specify the acceleration at which variable full-closed torsion compensation is applied. (n=1 to 8)
Set the acceleration at reversal of machine travel direction.
When not using, set to "0".
---Setting range---
0 to 2147483647 (m/s2)
Specify the time constant for variable full-closed torsion compensation. (n=1 to 8)
This sets the timing of applying the variable full-closed torsion compensation.
When 0 is set, the compensation is applied at the timing when the speed reaches the acceleration set in Vari able full-closed torsion compensation acceleration n.
---Setting range---
0 to 9999(ms)
Specify the compensation value of variable full-closed torsion compensation in the positive (+) direction.
(n=1 to 8)
Set the length of torsion (+) at reversal of machine travel direction.
When not using, set to "0".
---Setting range---
0 to 32767 (0.01 m)
Specify the compensation value of variable full-closed torsion compensation in the negative (-) direction. (n=1
to 8)
Set the length of torsion (-) at reversal of machine travel direction.
When not using, set to "0".
---Setting range---
0 to 32767 (0.01 m)
Select whether to enable the backlash compensation II function.
0: Disable
1: Enabled
#14306 VDCpex_sft Variable full-closed torsion compensation: compensa tion value (+) shift
#14307 VDCnex_sft Variable full-closed torsion compensation: compensa tion value (-) shift
#14311+5(n-1) VDCan Variable full-closed torsion compensation acceleration
n
#14312+5(n-1) VDCtexn Variable full-closed torsion compensation: compensa tion time constant n
#14313+5(n-1) VDCpexn Variable full-closed torsion compensation: compensa tion value n (+)
#14314+5(n-1) VDCnexn Variable full-closed torsion compensation: compensa tion value n (-)
#14360 valBL2 Backlash compensation II valid

Specify the acceleration rate at which the backlash compensation II function should be applied.
Set the acceleration rate at reversal of machine's travel direction.
When not using, set to "0".
---Setting range---
0 to 2147483647 (m/s2)
Specify the compensation amount to be used for backlash compensation II.
---Setting range---
-9999999 to 9999999 (Machine error compensation unit)
Specify the acceleration rate at which the backlash compensation II function should be applied.
Set the acceleration rate at reversal of machine's travel direction.
When not using, set to "0".
---Setting range---
0 to 2147483647 (m/s2)
Specify the compensation amount to be used for backlash compensation II.
---Setting range---
-9999999 to 9999999 (Machine error compensation unit)
Specify the acceleration rate at which the backlash compensation II function should be applied.
Set the acceleration rate at reversal of machine's travel direction.
When not using, set to "0".
---Setting range---
0 to 2147483647 (m/s2)
Specify the compensation amount to be used for backlash compensation II.
---Setting range---
-9999999 to 9999999 (Machine error compensation unit)
Specify the acceleration rate at which the backlash compensation II function should be applied.
Set the acceleration rate at reversal of machine's travel direction.
When not using, set to "0".
---Setting range---
0 to 2147483647 (m/s2)
Specify the compensation amount to be used for backlash compensation II.
---Setting range---
-9999999 to 9999999 (Machine error compensation unit)
#14361 BL2_a1 Backlash compensation II acceleration rate 1
#14362 BL2_c1 Backlash compensation II compensation amount 1
#14363 BL2_a2 Backlash compensation II acceleration rate 2
#14364 BL2_c2 Backlash compensation II compensation amount 2
#14365 BL2_a3 Backlash compensation II acceleration rate 3
#14366 BL2_c3 Backlash compensation II compensation amount 3

#14367 BL2_a4 Backlash compensation II acceleration rate 4
#14368 BL2_c4 Backlash compensation II compensation amount 4

Set a rapid traverse rate for the dog type reference position return command.
This is not used for the distance-coded reference position detection.
---Setting range---
1 to 1000000 (mm/min)
Set up the speed of approach to the reference point in the reference point return command. This speed is attained after the system stops with deceleration by dog detection.
In the distance-coded reference position detection, the set value will be applied from the start of reference position establishment.
(Note) The G28 approach speed unit is (10/min) only when using the Z-phase type encoder (#1226 aux10/bit3=1) for the spindle/C-axis reference position return type. The same unit is used for both the micrometric and sub-micrometric specifications.
---Setting range---
1 to 60000 (mm/min)
Set the distance from the electrical zero-point detection position to the reference position.
This is not used for the distance-coded reference position detection.
(Note 1) When "#1240 set12/bit2" is ON, a magnification (C: 10-fold, D: 100-fold and E: 1000-fold) corre sponding to the input setting unit ("#1003 iunit") will be applied to the setting value.
(Note 2) The sign of setting value is will be following: the direction of "#2030 dir (-)" Reference position di rection (-) is plus, and the opposite direction is minus.
(Note 3) When set value is set to minus, the axis moves to electrical zero-point detection position at first and then moves in opposite direction.
---Setting range---
-99.999 to +99.999 (mm)
Set the distance where the grid point will be ignored when near-point dog OFF signals are close to that grid point during reference position return.
The grid mask is valid for one grid.
This is not used for the distance-coded reference position detection.
---Setting range---
0.000 to 99.999 (mm)
#2025 G28rap G28 rapid traverse rate
#2026 G28crp G28 approach speed
#2027 G28sft Reference position shift distance
#2028 grmask Grid mask amount
Grid
Near-point dog
Grid mask setup distance
Axis speed
Position
(Encoder F/B)
Electrical zero point

Set the distance between grids.
Generally, set up the value equal to the ball screw pitch. However, if the encoder grid interval is not equal to the screw pitch when measured with a linear scale, set up the encoder grid interval.
To make the grid space smaller, set a divisor of the grid space.
This is not used for the distance-coded reference position detection.
(Note) Set the grid interval "#2029 grspc" according to the reference encoder for grid interval "#2041 grsp cref".
(1) Semi-closed loop control
If "#2041 grspcref" is set to "0" (grid interval by the motor-side), set "#2029 grspc" to the same value as the ball screw pitch.
If "#2041 grspcref" is set to "1" (grid interval by the machine-side), set "#2029 grspc" to the moving amount calculation value per a motor rotation ("#2201 SV001 PC1" / "#2202 SV002 PC2" x "#2218 SV018 PIT").
(2) Full-closed loop control
If "#2041 grspcref" is set to "1" (grid interval by the machine-side), set "#2029 grspc" to the same value as the Z phase pitch.
If "#2041 grspcref" is set to "0" (grid interval by the motor-side), set "#2029 grspc" to the moving amount calculation value per Z phase pitch ("#2202 SV002 PC2" / "#2201 SV001 PC1" x the Z phase pitch of the machine-side).
(*) If "#2029 grspc" is set to "0", the ball screw pitch "#2218 SV018 PIT" is used instead of the grid interval.
---Setting range---
0.000 to 999.999 (mm)
Select which side of the near-point dog the reference position is established.
For a rotary axis, select a direction that heads to the zero point from the intermediate point during automatic zero point return.
0: Positive direction
1: Negative direction
Directions in which reference position is established as viewed from the near-point dog
Select whether the reference position is provided for the axis.
0: Reference position is provided. (Normal controlled axis)
1: No reference position is provided.
When "1" is set, reference position return is not required before automatic operation starts.
#2029 grspc Grid interval
(PR) #2030 dir (-) Reference position direction (-)
#2031 noref Axis without reference position
Grid
- direction + direction
Near-point dog
Reference position
Reference position

- direction + direction
Grid
Near-point dog

Select whether to check the reference position return completion.
0: Check the reference position return completion.
1: Not check the reference position return completion.
When "1" is set, the absolute and incremental commands can be executed even if dog type (or Z phase pulse
system) reference position return is not completed.
Note that this setting is available for a rotary axis only.
Not used. Set to "0".
Set the offset value from the position for the initial reference position setting to the machine's actual zero point
in reference position return in the distance-coded reference position detection.
Input the value of the machine value counter that is displayed immediately after the reference position is es tablished.
When the power is turned ON and this parameter is set to "0", the manual reference position return is regard ed as initial reference position setting.
If this parameter is set to "0", automatic operation won't be available.
---Setting range---
-99999.999 to 99999.999 (mm)
Set the maximum distance for scanning the reference marks when the reference position is not established
in the distance-coded reference position detection.
For the scan distance, set the distance that fully covers the number of reference marks as you wish to detect.
(Example) When adding about 10% of additional coverage:
Scan distance = Base reference mark interval [mm] * 2 * 1.1
---Setting range---
0.000 to 99999.999 (mm)
#2032 nochk Whether reference position return is completed not
checked
(PR) #2033 zp_no Z phase pulse system reference position return spindle
encoder No.
(PR) #2034 rfpofs Distance-coded reference position detection offset
#2035 srchmax Distance-coded reference position detection scan dis tance

Set the distance from the first grid point after leaving the near point dog on the slave axis to the position where
the reference position is actually established in dog-type reference position return in synchronous control.
(Reference position shift amount is not included.)
The adjustment value will be automatically set in the slave axis's parameter according to the reference posi tion adjustment complete signal from PLC.
Fine adjustment is also available from the parameter screen.
In the distance-coded reference position detection, the reference position adjustment value will be invalid.
(Note 1) This parameter is enabled when the synchronization at zero point initialization ("#1493 ref_syn" =
"1" of the master axis) is applied.
(Note 2) This parameter can be set when one of the following settings is applied.
- Relative position detection ("#2049 type" = "0")
- Dog-type absolute position detection ("#2049 type" = "3")
- Simple absolute position ("#2049 type" = "9")
(Note 3) Set "0" when using the speed/current command synchronization control.
(Note 4) A setting unit of this parameter is [mm]. It is not influenced by the content of the following parameters
setting.
- "#1003 iunit"
- "#1004 ctrl_unit"
- "#1005 plcunit"
- "#1040 M_inch"
- "#1041 I_inch"
- "#1240 set12/bit2" (Zero point shift amount magnification)
(Note 5) The number of the significant digits after decimal point follows "#1004 ctrl_unit".
(Note 6) A change of this parameter requires reference position return. When the automatic operation starts
without reference position return, an alarm will occur.
---Setting range---
0 to 99999.999999 (mm)
#2036 slv_adjust Reference position adjustment value
Master axis start position
Master axis
Near-point dog
Slave axis
Slave axis start position
Grid
Reference position adjustment
amount
Reference position
adjustment completion
signal ON
Basic machine coordinate system
zero point
G28sft
G28sft
(6) (2)(1) (3) (4) (5)
(6) (7)

Set the position of the first reference position from the zero point of the basic machine coordinate.
---Setting range---

-99999.999 to 99999.999 (mm)
Set the position of the second reference position from the zero point of the basic machine coordinate.
---Setting range---
-99999.999 to 99999.999 (mm)
Set the position of the third reference position from the zero point of the basic machine coordinate.
---Setting range---
-99999.999 to 99999.999 (mm)
#2037 G53ofs Reference position #1
#2038 #2_rfp Reference position #2
#2039 #3_rfp Reference position #3
Reference position #3
(#2039 #3_rfp)
Basic machine coordinate
Reference position #4
(#2040 #4_rfp)
Reference position #2
(#2038 #2_rfp)
Reference position #1
(#2037 G53ofs)
Reference position #3
(#2039 #3_rfp)
Basic machine coordinate
Reference position #4
(#2040 #4_rfp)
Reference position #2
(#2038 #2_rfp)
Reference position #1
(#2037 G53ofs)
Reference position #3
(#2039 #3_rfp)
Basic machine coordinate
Reference position #4
(#2040 #4_rfp)
Reference position #2
(#2038 #2_rfp)
Reference position #1
(#2037 G53ofs)

Set the position of the fourth reference position from the zero point of the basic machine coordinate.
---Setting range---
-99999.999 to 99999.999 (mm)
Select the reference encoder (motor-side or machine-side) based on which the grid interval "#2029 grspc" is set.
0: Motor-side
1: Machine-side
(Note) When an MPI scale made by Mitsubishi Heavy Industries Machine Tool Co., Ltd.is used, set the zero point return parameters so that Z phase of the MPI scale becomes the grid point (electric basic position), and then perform zero point initialization setting.
#2040 #4_rfp Reference position #4
#2041 grspcref Reference encoder for grid interval
Reference position #3
(#2039 #3_rfp)
Basic machine coordinate
Reference position #4
(#2040 #4_rfp)
Reference position #2
(#2038 #2_rfp)
Reference position #1
(#2037 G53ofs)

Select the absolute position zero point alignment method.
0: Not absolute position detection
1: Stopper method (push against mechanical stopper)
2: Marked point alignment method I (The grid point is the reference position.)
3: Dog-type (align with dog and near point detection switch)
4: Marked point alignment method II (The position with which the mark was aligned is the reference posi tion.)
9: Simple absolute position (Not absolute position detection, but the position when the power is turned off is registered.)
Select the direction of the grid point immediately before the machine basic position (basic point of encoder) in the marked point alignment.
0: Positive direction
1: Negative direction
Set the tolerable range of travel distance (deviation distance) while the power is turned OFF.
If the distance between the position when the power is turned OFF and when the power is turned ON again is larger than the set value, the information is notified to the PLC. (signal name: Absolute position warning)
Set "0" to omit the check.
---Setting range---
0 to 99999.999 (mm)
Set the current limit value during the stopper operation in the dogless-type absolute position detection.
The setting value is the ratio of the current limit value to the rated current value.
---Setting range---

0 to 100 (%)
Set the feedrate for the automatic initial setting during stopper method.
---Setting range---
1 to 999 (mm/min)
Set the approach distance of the stopper when deciding the absolute position basic point with the stopper method.
After using stopper once, the tool returns with this distance, and then use stopper again.
---Setting range---
0 to 999.999 (mm)
Set the positive direction width where the near reference position signal is output.
When set to "0", the value is the same as #2218 SV018(PIT).
(Note) When "#1240 set12/bit2" is ON, a magnification (C: 10-fold, D: 100-fold, E: 1000-fold) corresponding to the input setting increment ("#1003 iunit") will be applied to the setting value.
---Setting range---
0 to 999.999 (mm)
(Input setting increment applied)
(PR) #2049 type Absolute position detection method
#2050 absdir Basic point of Z direction
#2051 check Check
#2054 clpush Current limit (%)
#2055 pushf Push speed
#2056 aproch Approach
#2057 nrefp Near zero point +

Set the negative direction width where the near reference position signal is output.
When set to "0", the value is the same as #2218 SV018(PIT).
(Note) When "#1240 set12/bit2" is ON, a magnification (C: 10-fold, D: 100-fold, E: 1000-fold) corresponding to the input setting increment ("#1003 iunit") will be applied to the setting value.
---Setting range---
0 to 999.999 (mm)
(Input setting increment applied)
Select which is to be the zero point coordinate position during absolute position initial setting.
0: Position where the axis was stopped.
1: Grid point just before stopper.
#2058 nrefn Near zero point -
#2059 zerbas Select zero point parameter and basic point

Set the gear ratio in the motor side when there is the gear between the servo motor's shaft and machine (ball screw, etc.).
For the rotary axis, set the total deceleration (acceleration) ratio.
Even if the gear ratio is within the setting range, the electronic gears may overflow and an initial parameter error (servo alarm 37) may occur.
For linear servo system
Set to "1".
---Setting range---
1 to 32767
Set the gear ratio in the machine side when there is the gear between the servo motor's shaft and machine (ball screw, etc.).
For the rotary axis, set the total deceleration (acceleration) ratio.
Even if the gear ratio is within the setting range, the electronic gears may overflow and an initial parameter error (servo alarm 37) may occur.
For linear servo system
Set to "1".
---Setting range---
1 to 32767
Set the position loop gain. The standard setting is "33".
The higher the setting value is, the more accurately the command can be followed, and the shorter the set tling time in positioning gets, however, note that a bigger shock will be applied to the machine during accel eration/deceleration.
When using the SHG control, also set SV004 (PGN2) and SV057 (SHGC).
When using the OMR-FF control, set the servo rigidity against quadrant projection or cutting load, etc. For the tracking ability to the command, set by SV106(PGM).
---Setting range---
1 to 200 (rad/s)
When performing the SHG control, set the value of "SV003 x 8/3" to "SV004".
When not using the SHG control, set to "0".
When using the OMR-FF control, set to "0".
Related parameters: SV003, SV057
---Setting range---
0 to 999 (rad/s)
Set the speed loop gain.
The higher the setting value is, the more accurate the control will be, however, vibration tends to occur.
If vibration occurs, adjust by lowering by 20 to 30%.
The value should be determined to the 70 to 80% of the value at which the vibration stops.
The value differs depending on servo motors.
Aim at the standard value determined by the servo motor type and load inertia ratio to adjust.
---Setting range---
1 to 30000
(PR) #2201 SV001 PC1 Motor side gear ratio
(PR) #2202 SV002 PC2 Machine side gear ratio
#2203 SV003 PGN1 Position loop gain 1
#2204 SV004 PGN2 Position loop gain 2
#2205 SV005 VGN1 Speed loop gain 1

Set the speed loop gain at the motor limitation speed VLMT with "VCS(SV029: Speed at the change of speed loop gain)".
Use this to suppress noise at high speed rotation during rapid traverse, etc. Then, the speed loop gain de creases at faster speed than the setting value of VCS. When not using, set to "0".
---Setting range---
-1000 to 30000
Set this when the limit cycle occurs in the full-closed loop, or overshooting occurs in positioning. The speed loop delay compensation method can be selected with SV027/bit1,0.
Normally, use "Changeover type 2". Changeover type 2 controls the occurrence of overshooting by lowering the speed loop lead compensation after the position droop gets 0.
When setting this parameter, make sure to set the torque offset (SV032).
---Setting range---
0 to 32767
Set the gain of the speed loop integral control.
Standard setting: 1364
Standard setting in the SHG control: 1900
Adjust the value by increasing/decreasing this by about 100 at a time.
Raise this value to improve contour tracking accuracy in high-speed cutting.
Lower this value when the position droop does not stabilize (when the vibration of 10 to 20Hz occurs).
---Setting range---
1 to 9999
Set the fixed value of each motor.
Set the standard value for each motor described in the standard parameter list.
---Setting range---
1 to 20480
Set the fixed value of each motor.
Set the standard value for each motor described in the standard parameter list.
---Setting range---
1 to 20480
Set the fixed value of each motor.
Set the standard value for each motor described in the standard parameter list.
---Setting range---
1 to 8192
Set the fixed value of each motor.
Set the standard value for each motor described in the standard parameter list.
---Setting range---
1 to 8192
#2206 SV006 VGN2 Speed loop gain 2
#2207 SV007 VIL Speed loop delay compensation
#2208 SV008 VIA Speed loop lead compensation
#2209 SV009 IQA Current loop q axis lead compensation
#2210 SV010 IDA Current loop d axis lead compensation
#2211 SV011 IQG Current loop q axis gain
#2212 SV012 IDG Current loop d axis gain
VGN1
VGN2
0 VCS VLMT
Gain
Speed

Set the current (torque) limit value in a normal operation.
This is a limit value in forward run and reverse run (for linear motors: forward and reverse direction).
When the standard setting value is "800", the maximum torque is determined by the specification of the mo tor.
Set this parameter as a proportion (%) to the stall current.
---Setting range---
0 - 999 (Stall current %)
Set the current (torque) limit value in a special operation (absolute position initial setting, stopper control and etc.).
This is a limit value in forward and reverse directions.
Set to "800" when not using.
Set this parameter as a proportion (%) to the stall current.
---Setting range---
0 - 999 (Stall current %)
However, when SV084/bitB=1, the setting range is from 0 to 32767 (Stall current 0.01%).
When a relative error in synchronous control is too large, set this parameter to the axis that is delaying.
The standard setting is "0". The standard setting in the SHG control is "100".
To adjust a relative error in acceleration/deceleration, increase the value by 50 at a time.
---Setting range---
0 to 999 (%)
Set this parameter when the protrusion (that occurs due to the non-sensitive band by friction, torsion, back lash, etc.) at quadrant change is too large. This sets the compensation torque at quadrant change (when an axis feed direction is reversed) by the proportion (%) to the stall torque. Whether to enable the lost motion compensation and the method can be set with other parameters.
Type 2: When SV027/bit9, 8=10 (Compatible with obsolete type)
Set the type 2 method compensation torque. The standard setting is double the friction torque.
Related parameters: SV027/bit9,8, SV033/bitF, SV039, SV040, SV041, SV082/bit2
Type 3: When SV082/bit1=1
Set the compensation torque equivalent of dynamic friction amount of the type 3 method compensation amount. The standard setting is double the dynamic friction torque.
Related parameters: SV041, SV082/bit2,1, SV085, SV086
To vary compensation amount according to the direction.
When SV041 (LMC2) is "0", compensate with the value of SV016 (LMC1) in both +/-directions.
If you wish to change the compensation amount depending on the command direction, set this and

SV041 (LMC2).
(SV016: + direction, SV041: - direction. However, the directions may be opposite depending on other set tings.)
When "-1" is set, the compensation will not be performed in the direction of the command.
---Setting range---
-1 to 200 (Stall current %)
Note that when SV082/bit2 is "1", the setting range is between -1 and 20000 (Stall current 0.01%).
#2213 SV013 ILMT Current limit value
#2214 SV014 ILMTsp Current limit value in special control
#2215 SV015 FFC Acceleration rate feed forward gain
#2216 SV016 LMC1 Lost motion compensation 1

Select the servo specifications.
A function is allocated to each bit.
Set this in hexadecimal format.
bit F-C : spm Motor series selection
0: 200V HK motor (Standard)
1: 200V HG motor (Standard)
2: 400V HK-H motor (Standard)
3: 400V HG-H, HQ-H motor (Standard)
6: 200V LM-F linear motor
7: 200V direct-drive motor
8: 400V LM-F linear motor
9: 400V direct-drive motor
bit B :
Not used. Set to "0".
bit A : drvup Combined drive unit:
0: Normal setting (Combined drive unit: normal)
1: Combined drive unit: one upgrade
(Note) It is not available for MDS-EJ/EJH Series.
bit 9 :
Not used. Set to "0".
bit 8 : mp MPI scale pole number setting
0: 360 poles 1: 720 poles
bit 7 : abs Position control
These parameters are set automatically by the NC system.
0: Incremental 1: Absolute position control
bit 6-5 :
Not used. Set to "0".
bit 4 : sdir Sub side encoder feedback
Set the machine side encoder's installation polarity.
0: Forward polarity 1: Reverse polarity
bit 3 : vfb Speed feedback filter
0: Stop 1: Start (4500Hz)
bit 2 : seqh Ready on sequence
0: Normal 1: High-speed
bit 1 : dfbx Dual feedback control
Control the position FB signal in full closed control by the combination of a motor side encoder and machine side encoder.
0: Stop 1: Start
Related parameters: SV051, SV052
bit 0 : mdir Machine side encoder feedback (for Linear/direct-drive motor)
Set the encoder installation polarity in the linear servo and direct-drive motor control.
0: Forward polarity 1: Reverse polarity
(PR) #2217 SV017 SPEC1 Servo specification 1
abs
spm
mdir
dfbx
seqh
vfb
sdir
mp
drvup

For servo motor:
Set the ball screw pitch. For the rotary axis, set to "360".
For direct-drive motor
Set to "360".
For linear motor
Set the ball screw pitch. (For LM-F series, set to "48")
---Setting range---
For general motor: 1 to 32767 (mm/rev)
- For linear motor 1 to 32767 (mm)
For semi-closed loop control
Set the same value as SV020.
For full-closed loop control
Set the number of pulses per ball screw pitch.
For direct-drive motor
Set the same value as SV020.
For 1000 pulse unit resolution encoder, set the number of pulses in SV019 in increments of 1000 pulse (kp).
The value must be input in increments of 10K pulses (the 1st digit of the setting value is "0").
In this case, make sure to set "0" to SV117.

For high-accuracy binary resolution encoder, set the number of pulses to four bite data of SV117 (high-order) and SV019 (low-order) in pulse (p) unit.
SV117 = number of pulses / 65536 (when =0, set "-1" to SV117)
SV019 = the remainder of number of "pulses / 65536"
---Setting range---
When SV117 = 0, the setting range is from 0 to 32767 (kp)
When SV1170, the setting range is from 0 to 65535 (p)
Normally, set to "0".
For linear motor
Set the number of pulses of the encoder per magnetic pole pitch with SV118.
For direct-drive motor
Set the number of pulses per revolution of the motor side encoder.
For 1000 pulse unit resolution encoder, set the number of pulses to SV020 in increments of 1000 pulse(kp).
The value must be input in increments of 10K pulses (the 1st digit of the setting value is "0").
In this case, make sure to set SV118 to "0". For high-accuracy binary resolution encoder, set the number of pulses to four bite data of SV118 (high-order) and SV020 (low-order) in pulse(p) unit.
SV118 = number of pulses / 65536 (when =0, set "-1" to SV118)
SV020 = the remainder of "number of pulses / 65536"
---Setting range---
When SV118 = 0, the setting range is from 0 to 32767 (kp)
When SV1180, the setting range is from 0 to 65535 (p)
Normally, set to "60". (For Mitsubishi Electric adjustment.)
Related parameters: SV022
---Setting range---
1 to 999 (s)
Set the "Overload 1" (Alarm 50) current detection level as percentage to the stall current.
Normally set this parameter to "150". (For Mitsubishi Electric adjustment.)
Related parameters: SV021
---Setting range---
110 to 500 (Stall current %)
(PR) #2218 SV018 PIT Ball screw pitch/Magnetic pole pitch
(PR) #2219 SV019 RNG1 Sub side encoder resolution
(PR) #2220 SV020 RNG2 Main side encoder resolution
#2221 SV021 OLT Overload detection time constant
#2222 SV022 OLL Overload detection level

Set the excessive error detection width in servo ON.
When set to "0", the excessive error alarm detection will be ignored, so do not set to "0".
<Standard setting value>
OD1=OD2= (Rapid traverse rate [mm/min]) / (60PGN1) / 2 [mm]

Related parameters: SV026
---Setting range---
0 to 32767 (mm)
However, when SV084/bitC=1, the setting range is from 0 to 32767 (m).
Set the in-position detection width.
Set the positioning accuracy required for the machine.
The lower the setting is, the higher the positioning accuracy will be. However the cycle time (settling time) becomes longer.
The standard setting value is "50".
---Setting range---
1 to 32767 (m)
Set the position encoder type, speed encoder type and motor type.
The setting value is a four-digit hex (HEX).
bit F-C: pen(HEX-4) Position encoder
Semi-closed loop control by general motor
pen=2
Full-closed loop control by general motor
- Ball screw end encoder (OSA405ET2AS, OSA676ET2AS)
pen=6
- For serial signal output rotary scale (including MDS-EX-HR)
pen=6
- For rectangular wave signal output linear scale
pen=8
- For serial signal output linear scale (including MDS-EX-HR and MPI scale)
pen=A
- For speed command synchronization control
Primary axis pen=A
Secondary axis pen=D
- For common encoder current command synchronous control
Primary axis pen=2 (Rotary motor)
pen=A (Linear motor)
Secondary axis pen=D
For a linear motor
pen=A
For a direct-drive motor
pen=2
bit B-8: ent(HEX-3) Speed encoder
For a general motor: ent=2
For common encoder current command synchronous control
Primary axis pen=2 (Rotary motor)
pen=A (Linear motor)
Secondary axis pen=D
For a linear motor: ent=A
For a direct-drive motor: ent=2

#2223 SV023 OD1 Excessive error detection width during servo ON
#2224 SV024 INP In-position detection width
(PR) #2225 SV025 MTYP Motor/Encoder type
mtyp
ent
pen
HEX- 1234

bit 7-0: mtyp(HEX-2,1) Motor type
Set the motor type. Set this with SV017/bitF-C.
For SV017/bitF-C = 0 (200V HK motor series)
HK76 : 51h HK154 (E-V3-80) : 91h HK303 : 68h
HK105 : 52h HK154 (E-V3-40) : 98h HK354 : 58h
HK55 : 53h HK223 : 66h HK453 : 59h
HK104 : 54h HK224 : 56h HK603 : 69h
HK123 : 64h HK224 (E-V1/V2-160) : 81h HK702 : 6Ah
HK142 : 65h HK204 : 57h HK703 : 5Ah
HK154 : 55h HK302 : 67h
For SV017/bitF-C = 1 (200V HG motor series)
HG46 : BAh HG154 (E-V3-40) : 4Fh HG603 : 69h
HG56 : BBh HG224 : 46h HG702 : 6Ah
HG96 : BCh HG204 : 47h HG703 : 4Ah
HG75 : 41h HG354 : 48h HG903 : 4Bh
HG105 : 42h HG123 : 64h HG1103 : 4Ch
HG54 : 43h HG223 : 66h HG142 : 65h
HG104 : 44h HG303 : 68h HG302 : 67h
HG154 : 45h HG453 : 49h
For SV017/bitF-C = 2 (400V HK-H motor series)
HK-H76 : 51h HK-H223 : 66h HK-H453 : 59h
HK-H105 : 52h HK-H224 : 56h HK-H603 : 69h
HK-H55 : 53h HK-H224 (EH-V1/V2-80) : 81h HK-H702 : 6Ah
HK-H104 : 54h HK-H204 : 57h HK-H703 : 5Ah
HK-H123 : 64h HK-H302 : 67h
HK-H154 : 55h HK-H303 : 68h
HK-H154 (EH-V3-40) : 91h HK-H354 : 58h

For SV017/bitF-C = 3 (400V HG-H, HQ-H motor series)
HG-H75 : 41h HG-H224 : 46h HG-H903 : 4Bh
HG-H105 : 42h HG-H204 : 47h HG-H1502 : 4Dh
HG-H54 : 43h HG-H354 : 48h HQ-H903 : 58h
HG-H104 : 44h HG-H453 : 49h HQ-H1103 : 59h
HG-H154 : 45h HG-H703 : 4Ah
For linear motor and direct-drive motor, follow the settings stated in respective materials.
Set the excessive error detection width during servo OFF.
When set to "0", the excessive error alarm detection will be ignored, so do not set to "0".
<Standard setting value>
OD1=OD2= (Rapid traverse rate [mm/min]) / (60PGN1) / 2 [mm]
Related parameters: SV023
---Setting range---
0 to 32767 (mm)
However, when SV084/bitC=1, the setting range is from 0 to 32767 (m).
#2226 SV026 OD2 Excessive error detection width during servo OFF

Select the servo functions.
A function is assigned to each bit.
Set this in hexadecimal format.
bit F : hfrf Higher harmonic suppression filter
0: Stop
1: Start
bit E : zrn2
Set to "1". (Fixed)
bit D :
Not used. Set to "0".
bit C :
Not used. Set to "0".
bit B-A : ovs Overshooting compensation
Set this if overshooting occurs during positioning.
bitB,A=
00: Compensation stop
01: Setting prohibited
10: Setting prohibited
11: Type 3
Set the compensation amount in SV031(OVS1) and SV042(OVS2).
Related parameters: SV031, SV042, SV034/bitF-C
bit 9-8 : lmc Lost motion compensation type
Set this parameter when the protrusion at quadrant change is too large.
Type 2 has an obsolete type compatible control.
bit9,8=
00: Compensation stop
01: Setting prohibited
10: Type 2
11: Setting prohibited

Set the compensation amount in SV016(LMC1) and SV041(LMC2).
(Note) When "SV082/bit1=1", the lost motion compensation type 3 will be selected regardless of this setting.
bit 7 :
Not used. Set to "0".
bit 6 :
Not used. Set to "0".
bit 5-4 : vfct Jitter compensation pulse number
Suppress vibration by machine backlash when axis stops.
bit5,4=
00: Disable
01: 1 pulse
10: 2 pulse
11: 3 pulses
bit 3 :
Not used. Set to "0".
bit 2 :
Not used. Set to "0".
#2227 SV027 SSF1 Servo function 1

bit 1-0 : vcnt Speed loop delay compensation changeover type selection
Normally, use "Changeover type 2".
bit1,0=
00: Disable
01: Changeover type 1
10: Changeover type 2
11: Setting prohibited
Related parameters: SV007
Set this parameter to adjust the motor magnetic pole position and encoder's installation phase when using linear motors or direct-drive motors.
During the DC excitation of the initial setup (SV034/bit4=1), set the same value displayed in "AFLT gain" on the NC monitor screen.
Related parameters: SV034/bit4, SV061, SV062, SV063
For general motor:
Not used. Set to "0".
---Setting range---
-18000 to 18000 (electrical angle 0.01)
Noise at high speed rotation including rapid traverse can be reduced by lowering the speed loop gain at high speeds.
Set the speed at which the speed loop gain changes. Use this with SV006 (VGN2).
When not using, set to "0".
---Setting range---
0 to 9999 (r/min)
When 100% is set, the voltage reduction amount equivalent to the logical non-energization in the PWM con trol will be compensated.
When "0" is set, 100% compensation will be performed.
Adjust in increments of 10% from the default value of 100%.
If increased too much, vibration or vibration noise may be generated.
---Setting range---
0 to 255 (%)
This compensates the motor torque when overshooting occurs during positioning. This is valid only when the overshooting compensation (SV027/bitB,A) is selected.
Type 3 SV027/bitB,A=11
Set the compensation amount based on the motor stall current. Observing positioning droop waveform, increase in increments of 1% and find the value where overshooting does not occur.
To vary compensation amount depending on the direction.
When SV042 (OVS2) is "0", change the SV031 (OVS1) value in both of the +/- directions to compensate.
To vary the compensation amount depending on the command direction, set this and SV042 (OVS2).
(SV031: + direction, SV042: - direction. However, the directions may be opposite depending on other set tings.)
When "-1" is set, the compensation will not be performed in the direction of the command.
Related parameters: SV027/bitB,A, SV034/bitF-C, SV042, SV082/bit2
---Setting range---
-1 to 100 (Stall current %)
Note that the range will be "-1 - 10000" (Stall current 0.01%) when SV082/bit2 is "1".
(PR) #2228 SV028 MSFT Magnetic pole shift amount (for linear/direct-drive mo tor)
#2229 SV029 VCS Speed at the change of speed loop gain
#2230 SV030 IVC Voltage non-sensitive band compensation
#2231 SV031 OVS1 Overshooting compensation 1

Set the unbalance torque on vertical axis and inclined axis.
When the vertical axis pull up function is enabled, the pull up compensation direction is determined by this parameter's sign. When set to "0", and the pull up function is enabled (SV033/bitE=1), the alarm "S02 2233 Initial parameter error" occurs.
This can be used for speed loop delay compensation and collision detection function.
To use load inertia estimation function (drive monitor display), set this parameter, friction torque (SV045) and load inertia display enabling flag(SV035/bitF).
Related parameters: SV007, SV033/bitE, SV059
---Setting range---
-100 to 100 (Stall current %)
#2232 SV032 TOF Torque offset

Select the servo functions.
A function is assigned to each bit.
Set this in hexadecimal format.
bit F : lmc2a Lost motion compensation 2 timing
0: Normal 1: Change
bit E : zup Vertical axis pull up function
0: Stop 1: Enable
Related parameters: SV032, SV095
bit D : rps Safely limited speed setting increment
Change the setting units of the specified speed signal output speed (SV073).
0: mm/min 1: 100mm/min
Related parameters: SV073
bit C-8 :
Not used. Set to "0".
bit 7-5 : nfd2 Depth of Notch filter 2
Set the depth of Notch filter 2 (SV046).
bit7,6,5=
000: -
001: -18.1[dB]
010: -12.0[dB]
011: -8.5[dB]
100: -6.0[dB]
101: -4.1[dB]
110: -2.5[dB]
111: -1.2[dB]
bit 4 : fhz3 Notch filter 3
0: Stop 1: Start (1125Hz)
bit 3-1 : nfd1 Depth of Notch filter 1
Set the depth of Notch filter 1 (SV038).
bit3,2,1=
000: -
001: -18.1[dB]
010: -12.0[dB]
011: -8.5[dB]
100: -6.0[dB]
101: -4.1[dB]
110: -2.5[dB]
111: -1.2[dB]
bit 0 :
Not used. Set to "0".
#2233 SV033 SSF2 Servo function 2
zup
nfd1
fhz3
nfd2
rps
lmc2a

Select the servo functions.
A function is assigned to each bit.
Set this in hexadecimal format.
bit F-C: ovsn Overshooting compensation type 3 Non-sensitive band
Set the non-sensitive band of the model position droop overshooting amount in increments of 2m.
In the feed forward control, set the non-sensitive band of the model position droop and ignore the overshoot ing of the model.
0 : 0 m, 1: 2 m, 2: 4m,---, E : 28 m, F: 30m
bit B-8 : linN The number of parallel connections when using linear motors (for linear)
Set to"2" to perform 1 amplifier 2 motor control by linear servo.
bit 7-5 :
Not used. Set to "0".
bit 4 : dcd (linear/direct-drive motor)
0: Normal setting 1: DC excitation mode
Related parameters: SV061, SV062, SV063
bit 3 :
Not used. Set to "0".
bit 2 : mohn Thermistor temperature detection (linear/direct-drive motor)
0: Normal setting 1: Disable
bit 1 : has HAS control
This stabilizes the speed overshooting by torque saturation phenomenon.
0: Normal setting 1: Enable
Related parameters: SV084/bitF
bit 0 :
Not used. Set to "0".
#2234 SV034 SSF3 Servo function 3
has2
ovsn
mohn
dcd
linN

Select the servo functions.
A function is assigned to each bit.
Set this in hexadecimal format.

bit F: clt Inertia ratio display
0: Setting for normal use
1: Display the total inertia ratio estimated at acceleration/deceleration at the inertia ratio on the servo monitor screen
To display it on the screen, set an imbalance torque and friction torque to both SV032 and SV045 and repeat acceleration/deceleration operations for several times.
bit E-C: clG1 G1 Collision detection level
Set the collision detection level in the collision detection method 1 during cutting feed (G1) in multiples of that of rapid traverse (G0). When set to "0", detection of collision detection method 1 during cutting feed will be ignored.
G1 Collision detection level = G0 collision detection level (SV060) clG1
bit B: cl2n Collision detection method 2
0: Enable 1: Disable
bit A: clstp Collision detection method 1 disabled during stop
0: Collision detection method 1 enabled during stop
1: Collision detection method 1 disabled during stop
bit 9-8: cltq Retract torque in collision detection
Set the retract torque in collision detection using the ratio of motor's maximum torque.
bit9,8=
00: 100%
01: 90%
10: 80% (Standard)
11: 70%
bit 7: ckab No signal detection 2
Set this to use rectangular wave output linear scale.
This enables the detection of No signal 2 (alarm 21).
0: Disable 1: Enable
bit 6: stod Alarm 4D-2 detection disabled during deceleration and stop
0: Normal 1: Alarm 4D-2 detection disabled during deceleration and stop
bit 5-4:
Not used. Set to "0".
bit 3: clof Collision detection estimated disturbance torque offset
0: Disable 1: Enable
bit 2-0:
Not used. Set to "0".
#2235 SV035 SSF4 Servo function 4
cltq
clstp
ckab
clof
stod
cl2n
clG1
clt

MDS-E/EH Series: Power supply type
When connecting a power supply unit, set a code for each power supply unit.
bit F-C : amp
Set the power backup function to be used.
No function used : 0
Deceleration and stop function at power failure : 8
Retraction function at power failure : C
bit B-8 : rtyp
Not used. Set to "0".
bit 7-0 : ptyp External emergency stop setting
When the emergency stop input signal of the power supply unit is "disabled"
Power supply unit is not connected : 00
MDS-E-CV-37 / MDS-EH-CV-37 : 04
MDS-E-CV-75 / MDS-EH-CV-75 : 08
MDS-E-CV-110 / MDS-EH-CV-110 : 11
MDS-E-CV-185 / MDS-EH-CV-185 : 19
MDS-E-CV-300 / MDS-EH-CV-300 : 30
MDS-E-CV-370 / MDS-EH-CV-370 : 37
MDS-E-CV-450 / MDS-EH-CV-450 : 45
MDS-E-CV-550 / MDS-EH-CV-550 : 55
MDS-EH-CV-750 : 75
When the emergency stop input signal of the power supply unit is "enabled"
(Note) Set the power supply rotary switch to "4".
Power supply unit is not connected : 00
MDS-E-CV-37 / MDS-EH-CV-37 : 44
MDS-E-CV-75 / MDS-EH-CV-75 : 48
MDS-E-CV-110 / MDS-EH-CV-110 : 51
MDS-E-CV-185 / MDS-EH-CV-185 : 59
MDS-E-CV-300 / MDS-EH-CV-300 : 70
MDS-E-CV-370 / MDS-EH-CV-370 : 77
MDS-E-CV-450 / MDS-EH-CV-450 : 85
MDS-E-CV-550 / MDS-EH-CV-550 : 95
MDS-EH-CV-750 : B5
MDS-EM/EMH Series
Not used. Set to "0000".
External emergency stop power supply type is set by spindle parameter (SP032).
(PR) #2236 SV036 PTYP Power supply type/ Regenerative resistor type
ptyp
rtyp
amp

MDS-EJ/EJH Series: Regenerative resistor type
Set the regenerative resistor type.
bit F-8 : amp(bit F-C) / rtyp(bit B-8)
Resistor built-in drive unit : 10
Setting prohibited : 11
MR-RB032 : 12
MR-RB12 or GZG200W39OHMK : 13
MR-RB32 or GZG200W120OHMK 3 units connected in parallel : 14
MR-RB30 or GZG200W39OHMK 3 units connected in parallel : 15
MR-RB50 or GZG300W39OHMK 3 units connected in parallel : 16
MR-RB31 or GZG200W20OHMK 3 units connected in parallel : 17
MR-RB51 or GZG300W20OHMK 3 units connected in parallel : 18
Setting prohibited : 19-1F
Setting prohibited : 20-23
FCUA-RB22 : 24
FCUA-RB37 : 25
FCUA-RB55 : 26
FCUA-RB75/2 : 27
Setting prohibited : 28
R-UNIT2 : 29
Setting prohibited : 2A-2C
FCUA-RB75/2 2 units connected in parallel : 2D
FCUA-RB55 2 units connected in parallel : 2E
Setting prohibited : 2F
MR-RB1H-4 : 33
MR-RB3M-4 : 34
MR-RB3G-4 : 35
MR-RB5G-4 : 36
bit 7-4 : emgx External emergency stop function
Set the external emergency stop function.
0: Disable 4: Enable
bit 3-0 :
Not used. Set to "0".
Set the motor axis conversion total load inertia including motor itself in proportion to the motor inertia.
SV037(JL)=(Jm+Jl)/Jm100
Jm: Motor inertia
Jl: Motor axis conversion load inertia
For linear motor, set the gross mass of the moving sections in kg unit.
<<Drive monitor load inertia ratio display>>
Set SV035/bitF=1 and imbalance torque and friction torque to both SV032 and SV045, and then repeat ac celeration/deceleration for several times.
---Setting range---
For general motor: 0 to 5000 (%)
For linear motor 0 to 5000 (kg)
Set the vibration frequency to suppress when machine vibration occurs.
(Normally, do not set 80 or less.)
Set to "0" when not using.
Related parameters: SV033/bit3-1, SV115
---Setting range---
0 to 5000 (Hz)
#2237 SV037 JL Load inertia scale
#2238 SV038 FHz1 Notch filter frequency 1
emgx
rtyp
amp
0 00 0

Set this when the timing of lost motion compensation type 2 does not match.
Adjust increments of 10 at a time.
---Setting range---
0 to 2000 (ms)
Set the non-sensitive band of the lost motion compensation in the feed forward control.
When "0" is set, 2m is the actual value to be set. Adjust increments of 1m.
---Setting range---
0 to 255 (m)
Set this with SV016 (LMC1) only when you wish to vary the lost motion compensation amount depending on
the command directions.
Normally, set to "0".
---Setting range---
-1 to 200 (Stall current %)
Note that when SV082/bit2 is "1", the setting range is between -1 and 20000 (Stall current 0.01%).
Set this with SV031 (OVS1) only when you wish to vary the overshooting compensation amount depending
on the command directions.
Normally, set to "0".
---Setting range---
-1 to 100 (Stall current %)
Note that when SV082/bit2 is "1", the setting range is between -1 and 10000 (Stall current 0.01%).
Set the disturbance observer filter band.
Normally, set to "100". Setting values of 49 or less is equal to "0" setting.
To use the disturbance observer, also set SV037 (JL) and SV044 (OBS2).
When disturbance observer related parameters are changed, lost motion compensation needs to be read justed.
Set to "0" when not using.

---Setting range---
0 to 1000 (rad/s)
Set the disturbance observer gain. The standard setting is "100 to 300".
To use the disturbance observer, also set SV037 (JL) and SV043 (OBS1).
When disturbance observer related parameters are changed, lost motion compensation needs to be read justed.
Set to "0" when not using.
---Setting range---
0 to 500 (%)
Set the frictional torque when using the collision detection function.
To use load inertia estimation function (drive monitor display), set this parameter, imbalance torque (SV032)
and load inertia display enabling flag (SV035/bitF).
---Setting range---
0 to 255 (Stall current %)
Set the vibration frequency to suppress when machine vibration occurs.
(Normally, do not set 80 or less.)
Set to "0" when not using.
Related parameters: SV033/bit7-5, SV115
---Setting range---
0 to 5000 (Hz)
#2239 SV039 LMCD Lost motion compensation timing
#2240 SV040 LMCT Lost motion compensation non-sensitive band
#2241 SV041 LMC2 Lost motion compensation 2
#2242 SV042 OVS2 Overshooting compensation 2
#2243 SV043 OBS1 Disturbance observer filter frequency
#2244 SV044 OBS2 Disturbance observer gain
#2245 SV045 TRUB Friction torque
#2246 SV046 FHz2 Notch filter frequency 2

Set the inductive voltage compensation gain. Standard setting value is "100".
If the current FB peak exceeds the current command peak, lower the gain.
---Setting range---
0 to 200 (%)
Input the time required to prevent the vertical axis from dropping by delaying READY OFF until the brake
works at an emergency stop.
Increase in increments of 100ms at a time, find and set the value where the axis does not drop.
When using a motor with a break of HG(-H) Series, HQ-H Series, and HK(-H) Series set to "200ms" as a
standard.
When the pull up function is enabled (SV033/bitE=1), the pull up is established during the drop prevention
time.
(Note) When not using the spindle drive unit, use the servo axis that controls vertical axis drop prevention
control to control the power supply (connect with CN4).
Related parameters: SV033/bitE, SV055, SV056
---Setting range---
0 to 20000 (ms)
When set to "0", and the pull up function is enabled (SV033/bitE=1), the alarm "S02 2233 Initial param eter error" occurs.
Set the position loop gain during spindle synchronization control (synchronous tapping and synchronization
control with spindle C-axis).
Set the same value as that of the position loop gain for spindle synchronous tapping control.
When performing the SHG control, set this parameter with SV050 (PGN2sp) and SV058 (SHGCsp).
When changing the value, change the value of "#2017 tap_g Axis servo gain".
---Setting range---
1 to 200 (rad/s)
When using SHG control during spindle synchronous control (synchronous tapping and synchronization con trol with spindle C-axis), set this parameter with SV049 (PGN1sp) and SV058 (SHGCsp).
Make sure to set the value 8/3 times that of SV049.
When not using the SHG control, set to "0".
---Setting range---
0 to 999 (rad/s)
Set the control time constant in dual feed back.
When "0" is set, it operates at 1ms.
The higher the time constant is, the closer it gets to the semi-closed control, so the limit of the position loop
gain will be raised.
For linear servo/direct-drive motor system
Not used. Set to "0".
Related parameters: SV017/bit1, SV052
---Setting range---
0 to 9999 (ms)
Set the non-sensitive band in the dual feedback control.
Normally, set to "0".
For linear servo/direct-drive motor system
Not used. Set to "0".
Related parameters: SV017/bit1, SV052
---Setting range---
0 to 9999 (m)
#2247 SV047 EC Inductive voltage compensation gain
#2248 SV048 EMGrt Vertical axis drop prevention time
#2249 SV049 PGN1sp Position loop gain 1 in spindle synchronous control
#2250 SV050 PGN2sp Position loop gain 2 in spindle synchronous control
#2251 SV051 DFBT Dual feedback control time constant
#2252 SV052 DFBN Dual feedback control non-sensitive band

Set the excessive error detection width when servo ON in a special control (initial absolute position setting,
stopper control and etc.).

When "0" is set, excessive error detection will not be performed when servo ON during a special control.
---Setting range---
0 to 32767 (mm)
However, when SV084/bitC=1, the setting range is from 0 to 32767 (m).
Set the overrun detection width in the full-closed loop control.
When the gap between the motor side encoder and the linear scale (machine side encoder) exceeds the val ue set by this parameter, it will be judged as overrun and "Alarm 43" will be detected.
When "-1" is set, if the differential velocity between the motor side encoder and the machine side encoder
exceeds the 30% of the maximum motor speed, it will be judged as overrun and "Alarm 43" will be detected.
When "0" is set, overrun will be detected with a 2mm width.
For linear servo/direct-drive motor system
Not used. Set to "0".
---Setting range---
-1 to 32767 (mm)
However, when SV084/bitD=1, the setting range is from -1 to 32767 (m).
Set the time required between an emergency stop and forced READY OFF.
Set the maximum value "+ 100ms" of the SV056 setting value of the servo drive unit electrified by the same
power supply unit.
When executing the vertical axis drop prevention, the gate off will be delayed for the length of time set at
SV048 even when SV055's is smaller than that of SV048.
Related parameters: SV048, SV056
---Setting range---
0 to 20000 (ms)
Set the time constant used for the deceleration control at emergency stop.
Set the time required to stop from rapid traverse rate (rapid).
The standard setting value is EMGtG0tL0.9.
However, note that the standard setting value differs from the above-mentioned value when the setting value
of "#2003:smgst Acceleration and deceleration modes bit 3-0:Rapid traverse acceleration/deceleration type"
is 8 or F. Refer to Instruction Manual of the drive unit (section "5.5.1 Deceleration Control") for details.
Related parameters: SV048, SV055
---Setting range---
0 to 20000 (ms)
When performing the SHG control, set to SV003(PGN1)6.
When not using the SHG control, set to "0".
When using the OMR-FF control, set to "0".
Related parameters: SV003, SV004
---Setting range---
0 to 1200 (rad/s)
When using SHG control during spindle synchronization control (synchronous tapping and synchronous con trol with spindle C-axis), set this parameter with SV049 (PGN1sp) and SV050 (PGN2sp).
Make sure to set the value 6 times that of SV049.
When not using the SHG control, set to "0".
---Setting range---
0 to 1200 (rad/s)
#2253 SV053 OD3 Excessive error detection width in special control
#2254 SV054 ORE Overrun detection width in closed loop control
#2255 SV055 EMGx Max. gate off delay time after emergency stop
#2256 SV056 EMGt Deceleration time constant at emergency stop
#2257 SV057 SHGC SHG control gain
#2258 SV058 SHGCsp SHG control gain in spindle synchronous control

Set the torque estimated gain when using the collision detection function.
The standard setting value is the same as the load inertia ratio (SV037 setting value) including motor inertia.
Set to "0" when not using the collision detection function.
Related parameters: SV032, SV035/bitF-8, SV037, SV045, SV060
<<Drive monitor load inertia ratio display>>
Set SV035/bitF=1 and imbalance torque and friction torque to both SV032 and SV045, and then repeat ac celeration/deceleration for several times.
---Setting range---
For general motor: 0 to 5000 (%)
For linear motor: 0 to 5000 (kg)
When using the collision detection function, set the collision detection level at the G0 feeding.
When "0" is set, none of the collision detection function will work.
Related parameters: SV032, SV035/bitF-8, SV037, SV045, SV059
---Setting range---
0 to 999 (Stall current %)
Input the data number you wish to output to the D/A output channel 1.
When using the 2-axis drive unit, set "-1" to the axis that the data will not be output.
When the DC excitation is running (SV034/bit4=1):
Use this when the DC excitation is running (SV034/bit4=1) to adjust the initial magnetic pole position
(when measuring the magnetic pole shift amount) for linear motor and direct-drive motor.
Set the initial excitation level in DC excitation control.
Set 10% as standard.
Related parameters: SV062, SV063
---Setting range---
-32768 to 32767
When the DC excitation is running (SV034/bit4=1): 0 to 100 (Stall current %)
Input the data number you wish to output to the D/A output channel 2.
When using the 2-axis drive unit, set "-1" to the axis that the data will not be output.
When the DC excitation is running (SV034/bit4=1):
Use this when the DC excitation is running (SV034/bit4=1) to adjust the initial magnetic pole position
(when measuring the magnetic pole shift amount) for linear motor and direct-drive motor.
Set the final excitation level in DC excitation control.
Set 10% as standard.
When the magnetic pole shift amount measurement value is unsteady, adjust the value in increments of
5%.
Related parameters: SV061, SV063
---Setting range---

-32768 to 32767
When the DC excitation is running (SV034/bit4=1): 0 to 100 (Stall current %)
#2259 SV059 TCNV Collision detection torque estimated gain
#2260 SV060 TLMT Collision detection level
#2261 SV061 DA1NO D/A output ch1 data No. / Initial DC excitation level
#2262 SV062 DA2NO D/A output ch2 data No. / Final DC excitation level

Set output scale of the D/A output channel 1 in increment of 1/100.
When "0" is set, the magnification is the same as when "100" is set.
When the DC excitation is running (SV034/bit4=1):
Use this when the DC excitation is running (SV034/bit4=1) to adjust the initial magnetic pole position
(when measuring the magnetic pole shift amount) for linear motor and direct-drive motor.
Set the initial excitation time in DC excitation control.
Set 1000ms as standard.
When the magnetic pole shift amount measurement value is unsteady, adjust the value in increments of
500ms.
Related parameters: SV061, SV062
---Setting range---
-32768 to 32767 (1/100-fold)
When the DC excitation is running (SV034/bit4=1): 0 to 10000 (ms)
Set output scale of the D/A output channel 2 in increment of 1/100.
When "0" is set, the magnification is the same as when "100" is set.
---Setting range---
-32768 to 32767 (1/100-fold)
The shape of the machine end is compensated by compensating the spring effect from the machine end to
the motor end.
Set the machine end compensation gain. Measure the error amount by roundness measurement and esti mate the setting value by the following formula.
Compensation amount (m) = Command speed F(mm/min)2 * SV065 / (Radius R(mm) * SV003 *
16,200,000)
Set to "0" when not using.
---Setting range---
-30000 to 30000 (Acceleration ratio 0.1%)
This parameter is set automatically by the NC system.
Set the specified speed.
Also set SV082/bit9,8 to output digital signal.
---Setting range---
0 to 32767 (mm/min)
However, when SV033/bitD=1, the setting range is from 0 to 32767 (100mm/min).
(Only for MDS-E/EH and MDS-EM/EMH)
This parameter is set automatically by the NC system.
#2263 SV063 DA1MPY D/A output ch1 output scale / Initial DC excitation time
#2264 SV064 DA2MPY D/A output ch2 output scale
#2265 SV065 TLC Machine end compensation gain
#2266-2272 SV066 - SV072
(PR) #2273 SV073 FEEDout Specified speed output speed
#2274-2280 SV074 - SV080

Select the servo functions.
A function is assigned to each bit.
Set this in hexadecimal format.
bit F-A:
Not used. Set to "0".
bit 9: npg Earth fault detection
0: Disable 1: Enable (standard)
Set "0" and it is constantly "Enable" for MDS-EJ/EJH Series.
bit 8: cbc motor brake axis selection control
0: Standard 1: Motor brake axis selection control enabled
(Only for MDS-EJ-V2)
bit 7: szchk Distance-coded reference scale reference mark
0: Check at 4 points (standard) 1: Check at 3 points
bit 6-4:
Not used. Set to "0".
bit 3: absc Distance-coded reference scale
0: Disable 1: Enable
bit 2-0:
Not used. Set to "0".
(PR) #2281 SV081 SPEC2 Servo specification 2
absc
szchk
npg
cbc

Select the servo functions.
A function is assigned to each bit.
Set this in hexadecimal format.
bit F-C:
Not used. Set to "0".
bit B-A: dos3 Digital signal output 3 selection
bitB,A=

00: Disable
01: Setting prohibited
10: Contactor control signal output (For MDS-EJ/EJH)
11: Setting prohibited
bit 9-8: dos2 Digital signal output 2 selection
bit9,8=
00: Disable
01: Specified speed output
10: Setting prohibited
11: Setting prohibited
bit 7-3:
Not used. Set to "0".
bit 2: ccu Lost motion overshoot compensation compensation amount setting increment
0: Stall current % 1: Stall current 0.01%
bit 1: lmc3 Lost motion compensation type 3
Set this when protrusion at a quadrant change is too big.
0: Stop 1: Start
Related parameters: SV016, SV041, SV085, SV086
bit 0:
Not used. Set to "0".
#2282 SV082 SSF5 Servo function 5
lmc3
ccu
dos2
dos3

Select the servo functions.
A function is assigned to each bit.
Set this in hexadecimal format.
bit F-8 :
Not used. Set to "0".
bit 7-5 : nfd5 Depth of Notch filter 5
Set the depth of Notch filter 5 (SV088).
bit7,6,5=
000: -
001: -18.1[dB]
010: -12.0[dB]
011: -8.5[dB]
100: -6.0[dB]
101: -4.1[dB]
110: -2.5[dB]
111: -1.2[dB]
bit 4 :
Not used. Set to "0".
bit 3-1 : nfd4 Depth of Notch filter 4
Set the depth of Notch filter 4 (SV087).
bit3,2,1=
000: -
001: -18.1[dB]
010: -12.0[dB]
011: -8.5[dB]
100: -6.0[dB]
101: -4.1[dB]
110: -2.5[dB]
111: -1.2[dB]
bit 0 :
Not used. Set to "0".
#2283 SV083 SSF6 Servo function 6
nfd4
nfd5

Select the servo functions.
A function is assigned to each bit.
Set this in hexadecimal format.
bit F : h2c HAS control cancel amount
0: 1/4 (standard) 1: 1/2
Related parameters: SV034/bit1
bit E :
Not used. Set to "0".
bit D : oru Overrun detection width unit
0: mm (normal setting) 1: m
bit C : odu Excessive error detection width unit
0: mm (normal setting) 1: m
bit B : ilm2u Current limit value (SV014) in special control setting unit
0: Stall current % (normal setting) 1: Stall current 0.01%
bit A-1 :
Not used. Set to "0".
bit 0 : irms Motor current display
0: Motor q axis current display (normal) 1: Motor effective current display
Set the machine system's spring constant when selecting lost motion compensation type 3.
When not using, set to "0".
Related parameters: SV016, SV041, SV082/bit2,1, SV086

---Setting range---
0 to 32767 (0.01%/m)
Set the machine system's viscous coefficient when selecting lost motion compensation type 3.
When not using, set to "0".
Related parameters: SV016, SV041, SV082/bit2,1, SV086
---Setting range---
0 to 32767 (0.01%s/mm)
Set the vibration frequency to suppress when machine vibration occurs.
(Normally, do not set 80 or less.)
Set to "0" when not using.
Related parameters: SV083/bit3-1, SV115
---Setting range---
0 to 5000 (Hz)
#2284 SV084 SSF7 Servo function 7
#2285 SV085 LMCk Lost motion compensation 3 spring constant
#2286 SV086 LMCc Lost motion compensation 3 viscous coefficient
#2287 SV087 FHz4 Notch filter frequency 4
irms
h2c
ilm2u
odu
oru
M800V/M80V Series Alarm/Parameter Manual
15 Machine Parameters
15.7 Servo Parameters
545 IB-1501623-F
Set the vibration frequency to suppress when machine vibration occurs.
(Normally, do not set 80 or less.)
Set to "0" when not using.
Related parameters: SV083/bit7-5, SV115
---Setting range---
0 to 5000 (Hz)
Not used. Set to "0".
Not used. Set to "0".
Use this with LMC compensation type 3. As the delay in path tracking is monitored and compensated, the
delay in path tracking will be minimized even if machine friction amount changes by aging. Use the lost mo tion compensation amount (SV016) * 5 (10% of the dynamic friction torque) as the target. The higher the set ting value is, the more accurate the quadrant change be; however, the more likely vibrations occur.
---Setting range---
0 to 20000 (Stall current 0.01%)
Not used. Set to "0".
Not used. Set to "0".
The magnetic pole position detection function monitors the command speed and motor speed at the position
command stop and detects the magnetic pole position error alarm (3E) if any. Set the error detection level
for the command speed and motor speed at the position command stop.
Be aware when setting the parameter as the setting units for general motors and linear motors are different.
<<For general motor>>
When the command speed error detection level is set to "0", the magnetic pole position error (3E) is
detected at 10r/min.
Set "10" as standard.
This detects the magnetic pole position error (3E) when the motor rotation speed is 100r/min and more.
<<For linear motor>>
When the command motor speed level is set to "0", the magnetic pole position error (3E) is detected at
1mm/s.
Set "10" as standard.
This detects the magnetic pole position error (3E) when the motor speed is 10mm/s and more.
---Setting range---
0 to 31999
<<For general motor>>
Ten-thousands digit, Thousands digit ---------- Command speed error detection level (10r/min)
Hundreds digit, Tens digit, Ones digit ---------- Motor speed error detection level (10r/min)
<<For linear motor>>
Ten-thousands digit, Thousands digit ---------- Command speed error detection speed level (1mm/s)
Hundreds digit, Tens digit, Ones digit ---------- Motor speed error detection level (1mm/s)
#2288 SV088 FHz5 Notch filter frequency 5
#2289 SV089
#2290 SV090
#2291 SV091 LMC4G Lost motion compensation 4 gain
#2292 SV092
#2293 SV093
#2294 SV094 MPV Magnetic pole position error detection speed
M800V/M80V Series Alarm/Parameter Manual
15 Machine Parameters
15.7 Servo Parameters
IB-1501623-F 546
Set this parameter to adjust the pull up distance when the vertical axis pull up function is enabled. When the
pull up function is enabled and this parameter is set to "0", for a rotary motor, 8/1000 of a rotation at the motor
end is internally set as the pull up distance, and for a linear motor, 80[m] is set.
Related parameters:
SV032 : The pull up direction is determined. When "0" is set, the alarm occurs.
SV033/bitE : Start-up of the pull up function
SV048 : Set the drop prevention time. When "0" is set, the alarm occurs.
---Setting range---
0 to 2000 (m)
Not used. Set to "0".
Set the scale model gain (position response) in OMR-FF control.
Set the same value as SV003(PGN1).
Increase the setting value to perform a high-speed machining such as a fine arc or to improve the path er ror.Lower the value when vibration occurs during acceleration/deceleration.
Set to "0" when not using OMR-FF control.

---Setting range---
0 to 300 (rad/s)
Not used. Set to "0".
Set the current feed forward rate in OMR-FF control.
The standard setting is "10000".
Setting value of "0" is equal to "10000(100%)" setting.
Set to "0" when not using OMR-FF control.
---Setting range---
0 to 32767 (0.01%)
Select the servo functions.
A function is assigned to each bit.
Set this in hexadecimal format.
bit F-9 :
Not used. Set to "0".
bit 8 : sto Dedicated wiring STO function
Set this parameter to use dedicated wiring STO function.
0: Dedicated wiring STO function unused 1: Dedicated wiring STO function used
(Only for MDS-E/EH and MDS-EJ/EJH)
bit 7 : nmerc Machine error compensation amount
(Note) Do not turn ON the NC power supply with the setting as disable (set to "1"). The initial parameter error alarm is detected.
0: Enable (Normal setting) 1: Disable
bit 0 : omrffon OMR-FF control enabled
0: Disable 1: Enable
#2295 SV095 ZUPD Vertical axis pull up distance
#2296-2305 SV096 - SV105
#2306 SV106 PGM OMR-FF scale model gain
#2307-2311 SV107 - SV111
#2312 SV112 IFF OMR-FF current feed forward gain
#2313 SV113 SSF8 Servo function 8
omrffon
sto
nmerc

Select the servo functions.
A function is assigned to each bit.
Set this in hexadecimal format.
bit F-9 :
Set to "8" when HG46, 56, 96 motors are driven by MDS-E-V3.
Set to "0" for other cases.
bit 8 : nohis History of communication error alarm between NC and DRV (34, 36, 38, 39)
0: Enable 1: Disable
bit 7 : cse Command speed monitoring function
0: Disable 1: Enable (Normal setting)
bit 6-0 :
Not used. Set to "0".
#2314 SV114 SSF9 Servo function 9
cse
nohis

Select the servo functions.
A function is assigned to each bit.
Set this in hexadecimal format.
bit F : are Notch filter5 all frequencies adapted
When enabled, Notch filter5 all frequencies adaptive range is not limited regardless of SV115/bit4,5 setting.
0: Disable 1: Enable
bit E-C: dsl Notch filter frequency display
Switch the "AFLT frequency" display on drive monitor screen to check every notch filter frequency.
When the selected notch filter is not used, "0" is displayed.
bitE,D,C=
000 : Estimated resonance frequency (Normal display)
001 : Notch filter 1 frequency
010 : Notch filter 2 frequency
011 : Notch filter 3 frequency (always displays 1125Hz)
100 : Notch filter 4 frequency
101 : Notch filter 5 frequency
Other settings: setting prohibited
bit B : ade5 Notch filter 5 / Adaptive follow-up function
0: Disable 1: Enable
bit A : ade4 Notch filter 4 / Adaptive follow-up function
0: Disable 1: Enable
bit 9 : ade2 Notch filter 2 / Adaptive follow-up function
0: Disable 1: Enable
bit 8 : ade1 Notch filter 1 / Adaptive follow-up function
0: Disable 1: Enable
bit 7-6 : dsn Estimated resonance frequency display holding time
Set the estimated resonance frequency display holding time to the "AFLT frequency" display on drive monitor screen.
bit7,6=
00: 4 [s]
01: 8 [s]
10: 12 [s]

11: 16 [s]
bit 5-4 : dfhz Notch filter frequency range
Set the adaptive range of the notch filter frequency. When the adaptive follow-up function is enabled and if the estimated resonance frequency exists in the set range, the notch filter will be adapted. Normally set this parameter to "00".
bit5,4=
00: -10 to 10 [%]
01: -20 to 20 [%]
10: -30 to 30 [%]
11: -40 to 40 [%]
#2315 SV115 SSF10 Servo function 10
esn
dfhz
dsn
ade1
ade2
ade4
ade5
dsl
are

bit 3-0 : esn Sensitivity of estimated resonance frequency
Set the sensitivity of the estimated resonance frequency. When the notch filter adaptive follow-up function is enabled, smaller setting value enables to detect smaller vibration component, however, adaptive movement will be repeated frequently. Normally set this parameter to "0".
0 : Normal setting (same sensitivity as A) 1 : Sensitivity high to F : Sensitivity low
bit1: fctcfw Full-closed torsion compensation function forward direction compensation enabled
Compensate the torsion amount in the forward direction with the full-closed torsion compensation function.
When compensating the torsion amount in the reverse direction only, set to "0".
0: Stop 1: Start
For high-accuracy binary resolution encoder, set the number of pulses to four bite data of SV117 (high-order) and SV019 (low-order) by pulse (p).
When SV117=0, the setting unit of SV019 is (kp).
Refer to SV019 for details.
Related parameters: SV019, SV020, SV118
---Setting range---
-1 to 32767
When using high-accuracy binary resolution encoder, set the number of pulses to four bite data of SV118 (high-order) and SV020 (low-order) by pulse (p).
When SV118=0, the setting unit of SV020 is (kp).
Refer to SV020 for details.
Related parameters: SV019, SV020, SV117
---Setting range---
-1 to 32767
Not used. Set to "0".
Set the acceleration rate feed forward filter frequency in high-speed synchronous tapping control. The stan dard setting is "600".
Related parameters: SV244
---Setting range---
0 to 32767 (rad/s)
Set the base reference mark intervals of distance-coded reference scale. When the distance-coded refer ence scale is not used, set to "0".
The interval of basic reference mark (SV130) and auxiliary interval (SV131) must be in the specified relation ship. Other settings cause the initial parameter error (alarm 37).
Following is the specified relationship.
The quotient of (SV1301000) / SV131 must be 4 or more and leaves no remainder.
Related parameters: SV081/bit7,3, SV131, SV134 to SV137
---Setting range---
0 to 32767 (mm)
#2316 SV116 SSF11 Servo function 11
(PR) #2317 SV117 RNG1ex Expansion sub side encoder resolution
(PR) #2318 SV118 RNG2ex Expansion main side encoder resolution
#2319-2328 SV119 - SV128
#2329 SV129 Kwf Synchronous control feed forward filter frequency
(PR) #2330 SV130 RPITS Base reference mark interval

Set the auxiliary interval of reference mark in the distance-coded reference scale. When the distance-coded reference scale is not used, set to "0".
The interval of basic reference mark (SV130) and auxiliary interval (SV131) must be in the specified relation ship. Other settings cause the initial parameter error (alarm 37).
Following is the specified relationship.
The quotient of (SV1301000) / SV131 must be 4 or more and leaves no remainder.
Related parameters: SV081/bit7,3, SV130, SV134 to SV137
---Setting range---
0 to 32767 (m)
Not used. Set to "0".
Not used. Set to "0".
Set this parameter to operate distance-coded reference check when using distance-coded reference scale.
During the distance-coded reference check initial setup (SV137:RAER=-1), set the following items on the NC drive monitor screen after the distance-coded reference check initial setup warning A3 turns OFF.
SV134=Rn, SV135=Pn, SV136=MPOS
When reference point is set, the warning A3 turns OFF.
To enable the distance-coded reference check function, SV081/bit3=1setting and a battery option are need ed.
Related parameters: SV081/bit3,7, SV130, SV131, SV134 to SV137
---Setting range---
-32768 to 32767

Set this parameter to operate distance-coded reference check when using distance-coded reference scale.
During the distance-coded reference check initial setup (SV137:RAER=-1), set the following items on the NC
drive monitor screen after the distance-coded reference check initial setup warning A3 turns OFF.
SV134=Rn, SV135=Pn, SV136=MPOS
When reference point is set, the warning A3 turns OFF.
To enable the distance-coded reference check function, SV081/bit3=1setting and a battery option are need ed.
Related parameters: SV081/bit3,7, SV130, SV131, SV134 to SV137
---Setting range---
-32768 to 32767
Set this parameter to operate distance-coded reference check when using distance-coded reference scale.
During the distance-coded reference check initial setup (SV137:RAER=-1), set the following items on the NC
drive monitor screen after the distance-coded reference check initial setup warning A3 turns OFF.
SV134=Rn, SV135=Pn, SV136=MPOS
When reference point is set, the warning A3 turns OFF.
To enable the distance-coded reference check function, SV081/bit3=1setting and a battery option are need ed.
Related parameters: SV081/bit3,7, SV130, SV131, SV134 to SV137
---Setting range---
-32768 to 32767
(PR) #2331 SV131 DPITS Auxiliary reference mark interval
#2332 SV132
#2333 SV133
#2334 SV134 RRn0 Distance-coded reference check / revolution counter
#2335 SV135 RPn0H Distance-coded reference check /position within one
rotation High
#2336 SV136 RPn0L Distance-coded reference check / position within one
rotation Low

For the distance-coded reference check function when using distance-coded reference scale, set the allow able gap from the reference point position data calculated by the main side encoder. When the gap exceeds
the allowable range, reference point created by distance-code is judged as wrong and detects alarm 42.
The standard setting value is "basic reference mark interval (SV130) / 4".
SV137=0 setting carries out the same operation as the standard setting value.
SV137=-1 setting enables the distance-coded reference initial set up mode and displays setting values of
SV134 to SV136 on NC drive monitor.
To enable the distance-coded reference check function, SV081/bit3=1setting and a battery option are need ed.
When SV137=32767, the distance-coded reference check function is disabled.
Related parameters: SV081/bit3,7, SV130, SV131, SV134 to SV136
---Setting range---
-1 to 32767 (mm)
Not used. Set to "0".
Set the special detection width for the no signal 2 (alarm 21).
This detects no signal 2 (alarm 21) when machine side feedback is not invoked even if the motor side encod er feedback exceeds this setting in the rectangular wave signal output linear scale.
When "0" is set, the detection will be performed with a 15m width.
---Setting range---
0 to 32767 (m)
In case that machine resonance is induced when mounting a workpiece, the speed loop gain is switched au tomatically in response to inertia by setting the speed loop gain and workpiece inertia multiplier in advance.
The speed loop gain SV199(RTGM) changes in response to the estimated inertia ratio SV200(RTJX) based
on the speed loop gain SV005(VGN1) and the inertia multiplier SV037(JL) which were adjusted when no
workpiece was mounted.
When SV199 is set to "0", the adaptation of the speed loop gain will be disabled.
Related parameters: SV005, SV037, SV200
---Setting range---
0 to 5000 (%)
#2337 SV137 RAER Distance-coded reference check allowable width
#2338-2397 SV138 - SV197
#2398 SV198 NSE No signal 2 special detection width
#2399 SV199 RTGM Real-time tuning: maximum adaptive gain multiplier

RTGM
(SV199)
JL
(SV037)
RTJX
(SV200)
VGN1
(SV005)
Estimated inertia ratio [%]
Speed control gain multiplier [%]

In case that machine resonance is induced when mounting a workpiece, the speed loop gain is switched au tomatically in response to inertia by setting the speed loop gain and workpiece inertia multiplier in advance.
The speed loop gain SV199(RTGM) changes in response to the estimated inertia ratio SV200(RTJX) based
on the speed loop gain SV005(VGN1) and the inertia multiplier SV037(JL) which were adjusted when no
workpiece was mounted.
When SV199 is set to "0", the adaptation of the speed loop gain will be disabled.
Related parameters: SV005, SV037, SV199
---Setting range---
0 to 32767 (%)
Not used. Set to "0".
Set the compensation amount of full-closed torsion compensation function.
Set the torsion amount between the motor-end position and the machine-end position right after the stop as
a standard setting value.
When not using, set to "0".
---Setting range---

0 to 32767 (0.01m)
Not used. Set to "0".
Set the conversion factor to convert analog voltage into position data.
Specify the distance per volt in increments of 0.1 mm.
The sign (+/-) of the analog input conversion factor is used to specify the compensation direction.
Positive value: compensation in + direction
Negative value: compensation in - direction
---Setting range---
-32768 to 32767 (0.1mm/V)
Not used. Set to "0".
Set the upper limit value for the compensation amount that is automatically applied by profiling control to the
value after approach has completed.
This limitation prevents excessive compensation after completion of approach.
---Setting range---
0 to 32767 (0.1mm)
#2400 SV200 RTJX Real-time tuning: maximum adaptive inertia ratio
#2401-2405 SV201 - SV205
#2406 SV206 FCTC Full-closed torsion compensation control torsion
amount
#2407-2409 SV207 - SV209
#2410 SV210 GAPC Height control (Analog input conversion factor)
#2411 SV211
#2412 SV212 GAPL Height control (Compensation limit value)

RTGM
(SV199)
JL
(SV037)
RTJX
(SV200)
VGN1
(SV005)
Estimated inertia ratio [%]
Speed control gain multiplier [%]

Set the following accuracy with height change during profiling control.
Set "100" as the initial value.
---Setting range---
0 to 999 (%)
Set the time constant for filter cut-off for derivative gain.
When "0" is set, the value "100" applies.
---Setting range---
0 to 20000 (ms)
Set the following accuracy with height change.
Set "10" as the initial value.
---Setting range---
0 to 300 (rad/s)
Set the upper speed limit during approach/retraction.
Set the product of "SV018*100" as the initial value.
---Setting range---
0 to 32767 (mm/min)
Not used. Set to "0".
Set the in-position width applied to the positioning up to the setpoint height in the approach motion upon ac tivation of height control.
When "0" is set, the value "10" applies.
Approach completion width must be smaller than the setpoint height.
---Setting range---
0 to 10000 (0.1mm)
Not used. Set to "0".
Set the filter for the torque command.
The standard value is "3000" when using HG46, HG56, or HG96.
---Setting range---
0 to 5000 (rad/s)
Set the machine's safely limited speed for the SLS (Safely Limited Speed) function.
Set this parameter within the following setting ranges.
For linear axis: 2000mm/min or less
For rotary axis: 18000/min (50r/min) or less
When not using, set to "0".
---Setting range---
0 to 18000 (mm/min) or (/min)
However, when SV033/bitD = 1, the setting range is from -32768 to 32767 (100mm/min) or (100/min).
#2413 SV213 HITMAG Height control (Derivative gain scale factor)
#2414 SV214 HITT Height control (Derivative filter time constant)
#2415 SV215 HITGN Height control (Integral gain)
#2416 SV216 SLL Height control (Speed limit value)
#2417 SV217
#2418 SV218 HITA Height control (Approach completion width)
#2419-2436 SV219 - SV236
(PR) #2437 SV237 TCF Torque command filter
#2438 SV238 SSCFEED Safely limited speed

Set the motor's safely limited speed for the SLS (Safely Limited Speed) function.
Set a value to hold the following relationship.

Be aware when setting the parameter as the setting units for general motors and linear motors are different.
<<For general motor>>
SV239 = (SV238/SV018) (SV002/SV001)
Only when the product is 0, set to "1".
<<For linear motor>>
SV239 = SV238/60
Only when the product is 0, set to "1".
When not using, set to "0".
---Setting range---
For general motor: 0 to 32767 (r/min)
For linear motor: 0 to 32767 (mm/s)
(Note) The value of the safely limited speed and safely limited motor speed must satisfy the above relation.
If this relation is not satisfied, the parameter error (37 or E4) will occur. (Error parameter No. is 239.)
Checking this relation is executed when the drive unit is turned ON and parameter is changed and speed observation mode (states when a speed observation command is turned ON) is entered.
Note that "1 (r/min)" is applied when the calculation result is "0 (r/min)"
Not used. Set to "0".
Set the communication interpolation unit among drive units in high-speed synchronous tapping control.
When set to "0", it will be regarded as 20 (0.05m) is set.
Related parameters: SV129
---Setting range---
0 to 2000 (1/m)
Not used. Set to "0".
#2439 SV239 SSCRPM Safely limited motor speed
#2440-2443 SV240 - SV243
(PR) #2444 SV244 DUNIT Communication interpolation unit for communication among drive units
#2445-2456 SV245 - SV256
SV238 :SSCFEED SV002 :PC2
SV018 :PIT
X
SV001 :PC1
= SV239 :SSCRPM

Set the spindle rotation speed for maximum motor speed when gear 00 is selected.
Set the spindle rotation speed for the S analog output=10V during analog spindle control.
---Setting range---
0 to 999999 (r/min)
Set the spindle rotation speed for maximum motor speed when gear 01 is selected.
Set the spindle rotation speed for the S analog output=10V during analog spindle control.
---Setting range---
0 to 999999 (r/min)
Set the spindle rotation speed for maximum motor speed when gear 10 is selected.
Set the spindle rotation speed for the S analog output=10V during analog spindle control.
---Setting range---
0 to 999999 (r/min)
Set the spindle rotation speed for maximum motor speed when gear 11 is selected.
Set the spindle rotation speed for the S analog output=10V during analog spindle control.
---Setting range---
0 to 999999 (r/min)
Set the maximum spindle rotation speed which is actually commanded when gear 00 is selected.
Set this as smax1(#3005)<= slimt1(#3001).
By comparing the S command value and the values of gear 1 - 4, a spindle gear shift command will be output automatically.
---Setting range---
0 to 999999 (r/min)
Set the maximum spindle rotation speed which is actually commanded when gear 01 is selected.
Set this as smax2(#3006)<= slimt2 (#3002).
By comparing the S command value and the values of gear 1 - 4, a spindle gear shift command will be output automatically.
---Setting range---
0 to 999999 (r/min)
Set the maximum spindle rotation speed which is actually commanded when gear 10 is selected.
Set this as smax3(#3007)<= slimt3 (#3003).
By comparing the S command value and the values of gear 1 - 4, a spindle gear shift command will be output automatically.
---Setting range---
0 to 999999 (r/min)
Set the maximum spindle rotation speed which is actually commanded when gear 11 is selected.
Set this as smax4(#3008)<= slimt4 (#3004).
By comparing the S command value and the values of gear 1 - 4, a spindle gear shift command will be output automatically.
---Setting range---
0 to 999999 (r/min)
#3001 slimt1 Limit rotation speed (Gear: 00)
#3002 slimt2 Limit rotation speed (Gear: 01)
#3003 slimt3 Limit rotation speed (Gear: 10)
#3004 slimt4 Limit rotation speed (Gear: 11)
#3005 smax 1 Maximum rotation speed (Gear: 00)
#3006 smax 2 Maximum rotation speed (Gear: 01)
#3007 smax 3 Maximum rotation speed (Gear: 10)
#3008 smax 4 Maximum rotation speed (Gear: 11)

Set the spindle speed for gear shifting with gear 00.
(Note) Setting too large value may cause a gear nick when changing gears.
---Setting range---
0 to 32767 (r/min)
Set the spindle speed for gear shifting with gear 01.
(Note) Setting too large value may cause a gear nick when changing gears.
---Setting range---
0 to 32767 (r/min)
Set the spindle speed for gear shifting with gear 10.
(Note) Setting too large value may cause a gear nick when changing gears.
---Setting range---
0 to 32767 (r/min)
Set the spindle speed for gear shifting with gear 11.
(Note) Setting too large value may cause a gear nick when changing gears.
---Setting range---
0 to 32767 (r/min)
Set the speed which switches from 1st step to 2nd step in synchronous tapping multi-step acceleration/de celeration control when gear 00 is selected.
The inclination of linear acceleration/deceleration control for 1st step is determined by the ratio of
"stap1"(#3013) to "stapt1"(#3017).
When the inclination is not set after 2nd step or it is higher than that of 1st step, the acceleration/deceleration
control is executed with the same inclination as the 1st step for the rotation speed of "stap1" or higher.
---Setting range---
0 to 99999 (r/min)
Set the speed which switches from 1st step to 2nd step in synchronous tapping multi-step acceleration/de celeration control when gear 01 is selected.
The inclination of linear acceleration/deceleration control for 1st step is determined by the ratio of "stap2"
(#3014) to "stapt2" (#3018).
When the inclination is not set after 2nd step or it is higher than that of 1st step, the acceleration/deceleration
control is executed with the same inclination as the 1st step for the rotation speed of "stap2" or higher.
---Setting range---
0 to 99999 (r/min)
Set the speed which switches from 1st step to 2nd step in synchronous tapping multi-step acceleration/de celeration control when gear 10 is selected.
The inclination of linear acceleration/deceleration control for 1st step is determined by the ratio of "stap3"
(#3015) to "stapt3" (#3019).
When the inclination is not set after 2nd step or it is higher than that of 1st step, the acceleration/deceleration
control is executed with the same inclination as the 1st step for the rotation speed of "stap3" or higher.
---Setting range---
0 to 99999 (r/min)
#3009 ssift 1 Shift rotation speed (Gear: 00)
#3010 ssift 2 Shift rotation speed (Gear: 01)
#3011 ssift 3 Shift rotation speed (Gear: 10)
#3012 ssift 4 Shift rotation speed (Gear: 11)
#3013 stap 1 Synchronous tapping 1st step rotation speed (Gear: 00)
#3014 stap 2 Synchronous tapping 1st step rotation speed (Gear: 01)
#3015 stap 3 Synchronous tapping 1st step rotation speed (Gear: 10)

Set the speed which switches from 1st step to 2nd step in synchronous tapping multi-step acceleration/de celeration control when gear 11 is selected.
The inclination of linear acceleration/deceleration control for 1st step is determined by the ratio of "stap4"
(#3016) to "stapt4" (#3020).
When the inclination is not set after 2nd step or it is higher than that of 1st step, the acceleration/deceleration
control is executed with the same inclination as the 1st step for the rotation speed of "stap4" or higher.
---Setting range---
0 to 99999 (r/min)
Set the time constant for synchronous tapping 1st step linear acceleration/deceleration control when gear 00
is selected. (linear acceleration/deceleration pattern)
---Setting range---
1 to 5000 (ms)
Set the time constant for synchronous tapping 1st step linear acceleration/deceleration control when gear 01
is selected. (linear acceleration/deceleration pattern)
---Setting range---
1 to 5000 (ms)
Set the time constant for synchronous tapping 1st step linear acceleration/deceleration control when gear 10
is selected. (linear acceleration/deceleration pattern)
---Setting range---
1 to 5000 (ms)
Set the time constant for synchronous tapping 1st step linear acceleration/deceleration control when gear 11
is selected. (linear acceleration/deceleration pattern)
---Setting range---
1 to 5000 (ms)
#3016 stap 4 Synchronous tapping 1st step rotation speed (Gear: 11)
#3017 stapt 1 Synchronous tapping 1st step acceleration/decelera tion time constant (Gear: 00)
#3018 stapt 2 Synchronous tapping 1st step acceleration/decelera tion time constant (Gear: 01)
#3019 stapt 3 Synchronous tapping 1st step acceleration/decelera tion time constant (Gear: 10)
#3020 stapt 4 Synchronous tapping 1st step acceleration/decelera tion time constant (Gear: 11)

<Relation of spindle limit rotation speed and spindle maximum rotation speed>
The spindle rotation speed which can be attained at the spindle motor's maximum rotation speed is set for the limit rotation
speed (slimt). This value is obtained by multiplying the gear ratio on the spindle motor maximum rotation speed (SP026).
Set the maximum rotation speed (smax) when the rotation speed is to be limited according to the machine specifications,
such as the spindle gear specifications. Up to four value can be set for gear changeover.
<Synchronous tapping multi-step acceleration/deceleration control parameter>

The acceleration/deceleration control can be set up to three steps in synchronous tapping control to carry out an optimal acceleration/deceleration control in accordance with the spindle motor characteristics whose output torque steps down when exceeding the base rotation speed.
Set the inclination for 2nd step or subsequent steps when the maximum rotation speed exceeds the base rotation speed during synchronous tapping control.
When the inclination is not set after 2nd step or it is higher than that of 1st step, the acceleration/deceleration control is executed with the same inclination as the 1st step for all the rotation speed.
SP026
0
smax1 slimt1 smax2 smax slimt2 slimt (n) (n)
Spindle motor rotation speed
(r/min)
Spindle rotation speed (r/min)
2000
4000
6000
8000
taps21=3000
stap1=1500
0
0 1000 2000 3000 4000
stapt1=300
tapt21=900
tapt31=5000
slimt1=10000 10000
Spindle rotation speed [r/min]
Time [ms]

<Spindle synchronization multi-step acceleration/deceleration control parameter>
The acceleration/deceleration control can be set up to eight steps in spindle synchronization control to carry out an optimal acceleration/deceleration control in accordance with the spindle motor characteristics whose output torque steps down when exceeding the base rotation speed and further attenuate in output stepdown zone.
For 2nd step or subsequent steps, the specification allows to set the time constant magnification and changeover rotation speed based on the acceleration/deceleration setting of the 1st step.
Set the value of limit rotation speed or higher as the changeover rotation speed for the step not to be shifted when not car rying out a step shift.
4000
6000
8000
sptc7=9200
sptc6=8200
sptc5=7200
sptc4=6000
sptc3=4800
sptc2=3000
sptc1=1000
0
spt=400
slimt1=10000
1200(=spt * spdiv1 = 400 * 3)
2000(=spt * spdiv2 = 400 * 5)
2800(=spt * spdiv3 = 400 * 7)
4000(=spt * spdiv4 = 400 * 10)
5600(=spt * spdiv5 = 400 * 14)
8000(=spt * spdiv6 = 400 * 20)
11200(=spt * spdiv7 = 400 * 28)
0 1000 2000 3000 4000
10000
2000
Time [ms]
Spindle rotation speed [r/min]

Not used. Set to "0".
Set the deceleration rate of the encoder to the spindle when inputting ABZ pulse output encoder feedback to NC during analog spindle control.
0: 1/1
1: 1/2
2: 1/4
3: 1/8
---Setting range---
0 to 3
Set the minimum spindle speed.
If an S command below this setting is issued, the spindle will rotate at the minimum speed set by this param eter.
---Setting range---
0 to 32767 (r/min)
Select the connection interface with the spindle drive unit.
0: No unit to connect
1: Digital optical (Mitsubishi spindle drive unit)
2-5: S-analog (Analog I/F spindle drive unit)
10: Pulse train (Analog I/F spindle drive unit)
Set the connection specifications of a spindle's encoder.
0: Without encoder feedback when using analog spindle and connecting to NC
1: With encoder feedback when using analog spindle and connecting to NC

2: Mitsubishi spindle drive unit
Select the coil control in orientation mode for the spindle motor which performs coil changeover.
0: Perform coil changeover based on the command from NC. (depending on the setting of parameter
#1239/bit0)
1: Use the coil L
Select the coil control in spindle synchronization control mode for the spindle motor which performs coil
changeover.
0: Perform coil changeover based on the command from NC. (depending on the setting of parameter
#1239/bit0)
1: Use the coil H
Set the M codes for the spindle forward run/reverse run commands during tapping cycle.
High-order 3 digits: Set the M code for spindle forward run command.
Low-order 3 digits: Set the M code for spindle reverse run command.
When "0" is set, it is handled assuming that "3004" is set (the M code for spindle forward run command is "3"
and the M code for spindle reverse run command is "4").
---Setting range---
0 to 999999
#3021
#3022 sgear Encoder gear ratio
#3023 smini Minimum rotation speed
(PR) #3024 sout Spindle connection interface
(PR) #3025 enc-on Spindle encoder
#3026 cs_ori Selection of winding in orientation mode
#3027 cs_syn Selection of winding in spindle synchronization control
mode
#3028 sprcmm Tap cycle M command selection

Select the speed which is compared with S command at gear selection when using asynchronous tapping
control with the spindle which performs gear changeover.
0: Synchronous tapping 1st step rotation speed (stap)--- Multi-step acceleration/deceleration is not used.
1: Maximum speed (smax)--- Multi-step acceleration/deceleration is used.
This parameter is enabled only when "#1272 ext08/bit1 is 1".
Not used. Set to "0".
Set the interface channel No. of CNC control unit to which the spindle is connected and the axis No. within
each channel.
Set this parameter in 4-digit hexadecimal format.
HEX-4: Drive unit interface channel No.
HEX-3: Not used. Set to "0".
HEX-2, 1: Axis No.
For an analog spindle, set to "0000".
---Setting range---
0000, 1001 to 1010, 2001 to 2010
Not used. Set to "0".
Select the data unit for communication with the spindle drive unit.
This selection is applied to the data communicated between the NC and spindle drive unit as well as the spin dle movement data. Although the standard setting is B (0.001deg), set the same value as "#1004 ctrl_unit"
when using Spindle/C axis control.
B: 0.001deg (1m)
C: 0.0001deg (0.1m)
D: 0.00001deg (10nm)
E: 0.000001deg (1nm)
Set the speed which switches from 2nd step to 3rd step in synchronous tapping multi-step acceleration/de celeration control when gear 00 is selected.
The inclination of linear acceleration/deceleration control for 2nd step is determined by the ratio of "taps21"
(#3037) to "tapt21" (#3041).
When the inclination is not set for 3rd step or it is higher than that of 2nd step, the acceleration/deceleration
control is executed with the same inclination as the 2nd step for the rotation speed of "taps21" or higher.
---Setting range---
0 to 99999 (r/min)
#3029 tapsel Asynchronous tap gear selection
#3030
(PR) #3031 smcp_no Drive unit I/F channel No. (spindle)
#3032
(PR) #3035 spunit Output unit
#3037 taps21 Synchronous tapping 2nd step rotation speed (Gear:
00)
1 2 3
HEX- 1234
0
Axis No.
Interface channel
No.
Channel No.=2
Axis No.= 2 n
Axis No.=
Rotary switch settings
CNC
control
unit
Channel No.=1
Spindle drive
unit
Channel No.=m

Set the speed which switches from 2nd step to 3rd step in synchronous tapping multi-step acceleration/de celeration control when gear 01 is selected.
The inclination of linear acceleration/deceleration control for 2nd step is determined by the ratio of "taps22"
(#3038) to "tapt22" (#3042).
When the inclination is not set for 3rd step or it is higher than that of 2nd step, the acceleration/deceleration
control is executed with the same inclination as the 2nd step for the rotation speed of "taps22" or higher.
---Setting range---
0 to 99999 (r/min)
Set the speed which switches from 2nd step to 3rd step in synchronous tapping multi-step acceleration/de celeration control when gear 10 is selected.
The inclination of linear acceleration/deceleration control for 2nd step is determined by the ratio of "taps23"
(#3039) to "tapt23" (#3043).
When the inclination is not set for 3rd step or it is higher than that of 2nd step, the acceleration/deceleration
control is executed with the same inclination as the 2nd step for the rotation speed of "taps23" or higher.
---Setting range---
0 to 99999 (r/min)
Set the speed which switches from 2nd step to 3rd step in synchronous tapping multi-step acceleration/de celeration control when gear 11 is selected.
The inclination of linear acceleration/deceleration control for 2nd step is determined by the ratio of "taps24"
(#3040) to "tapt24" (#3044).
When the inclination is not set for 3rd step or it is higher than that of 2nd step, the acceleration/deceleration
control is executed with the same inclination as the 2nd step for the rotation speed of "taps24" or higher.
---Setting range---
0 to 99999 (r/min)
Set the time constant for synchronous tapping 2nd step linear acceleration/deceleration control when gear
00 is selected.
---Setting range---
1 to 5000 (ms)
Set the time constant for synchronous tapping 2nd step linear acceleration/deceleration control when gear
01 is selected.
---Setting range---
1 to 5000 (ms)
Set the time constant for synchronous tapping 2nd step linear acceleration/deceleration control when gear
10 is selected.
---Setting range---
1 to 5000 (ms)
Set the time constant for synchronous tapping 2nd step linear acceleration/deceleration control when gear
11 is selected.
---Setting range---
1 to 5000 (ms)
#3038 taps22 Synchronous tapping 2nd step rotation speed (Gear:
01)
#3039 taps23 Synchronous tapping 2nd step rotation speed (Gear:
10)
#3040 taps24 Synchronous tapping 2nd step rotation speed (Gear:
11)
#3041 tapt21 Synchronous tapping 2nd step acceleration/decelera tion time constant (Gear: 00)
#3042 tapt22 Synchronous tapping 2nd step acceleration/decelera tion time constant (Gear: 01)
#3043 tapt23 Synchronous tapping 2nd step acceleration/decelera tion time constant (Gear: 10)
#3044 tapt24 Synchronous tapping 2nd step acceleration/decelera tion time constant (Gear: 11)

Set the time constant for synchronous tapping 3rd step linear acceleration/deceleration control when gear 00
is selected.
The inclination of linear acceleration/deceleration control for 3rd step is determined by the ratio of
slimt1(#3001) to tapt31(#3045).
---Setting range---
1 to 5000 (ms)
Set the time constant for synchronous tapping 3rd step linear acceleration/deceleration control when gear 01
is selected.
The inclination of linear acceleration/deceleration control for 3rd step is determined by the ratio of
slimt2(#3002) to tapt32 (#3046).
---Setting range---
1 to 5000 (ms)
Set the time constant for synchronous tapping 3rd step linear acceleration/deceleration control when gear 10
is selected.
The inclination of linear acceleration/deceleration control for 3rd step is determined by the ratio of
slimt3(#3003) to tapt33(#3047).
---Setting range---
1 to 5000 (ms)
Set the time constant for synchronous tapping 3rd step linear acceleration/deceleration control when gear 11
is selected.
The inclination of linear acceleration/deceleration control for 3rd step is determined by the ratio of
slimt4(#3004) to tapt34(#3048).
---Setting range---
1 to 5000(ms)
Set the acceleration/deceleration time constant under spindle synchronization control.
The inclination of acceleration/deceleration control is determined by the ratio to limit rotation speed (slimt).
Set the same value for the reference axis and synchronized axis.
The time constant for 2nd step or subsequent steps is the magnification setting on the basis of this setting
value.
---Setting range---
0 to 9999 (ms)
Set the level of speed difference between the reference and synchronized spindles during spindle synchro nization control. Setting of the synchronized spindle side is enabled. When the difference becomes below the setting level, the spindle speed synchronization complete signal will turn ON.
---Setting range---
0 to 4095 (pulse) (1 pulse = 0.088)
Set the level of phase difference between the reference and synchronized spindles during spindle synchro nization. Setting of the synchronized spindle side is enabled. When the difference becomes below the setting

level, the spindle phase synchronization complete signal will go ON.
---Setting range---
0 to 4095 (pulse) (1 pulse = 0.088)
#3045 tapt31 Synchronous tapping 3rd step acceleration/decelera tion time constant (Gear: 00)
#3046 tapt32 Synchronous tapping 3rd step acceleration/decelera tion time constant (Gear: 01)
#3047 tapt33 Synchronous tapping 3rd step acceleration/decelera tion time constant (Gear: 10)
#3048 tapt34 Synchronous tapping 3rd step acceleration/decelera tion time constant (Gear: 11)
#3049 spt Spindle synchronization acceleration/deceleration time
constant
#3050 sprlv Spindle synchronization rotation speed attainment lev el
#3051 spplv Spindle phase synchronization attainment level

Set the polarity to match the rotation direction between the spindles which perform synchronization control under spindle synchronization control.
0: Positive polarity (Spindle CW rotation at motor CW rotation)
1: Negative polarity (Spindle CCW rotation at motor CW rotation)
---Setting range---
0000/0001 (HEX)
Set the deviation amount from the spindle's basic point to the spindle encoder's Z phase.
Obtain the deviation amount, considering a clockwise direction as positive when viewed from the spindle's front side.
---Setting range---
0 to 359999 (1/1000)
Set the speed which switches from 1st step to 2nd step in spindle synchronization multi-step acceleration/deceleration control.
Set the same value for the reference axis and synchronized axis.
Set the value of limit rotation speed (slimt) or higher not to carry out a step shift.
---Setting range---
0 to 99999 (r/min)
Set the speed which switches from 2nd step to 3rd step in spindle synchronization multi-step acceleration/deceleration control.
Set the same value for the reference axis and synchronized axis.
Set the value of limit rotation speed (slimt) or higher not to carry out a step shift.
---Setting range---
0 to 99999 (r/min)
Set the speed which switches from 3rd step to 4th step in spindle synchronization multi-step acceleration/deceleration control.
Set the same value for the reference axis and synchronized axis.
Set the value of limit rotation speed (slimt) or higher not to carry out a step shift.
---Setting range---
0 to 99999 (r/min)
Set the speed which switches from 4th step to 5th step in spindle synchronization multi-step acceleration/deceleration control.
Set the same value for the reference axis and synchronized axis.
Set the value of limit rotation speed (slimt) or higher not to carry out a step shift.
---Setting range---
0 to 99999 (r/min)
Set the speed which switches from 5th step to 6th step in spindle synchronization multi-step acceleration/deceleration control.
Set the same value for the reference axis and synchronized axis.
Set the value of limit rotation speed (slimt) or higher not to carry out a step shift.
---Setting range---
0 to 99999 (r/min)
#3052 spplr Spindle synchronization relative polarity
#3053 sppst Spindle encoder Z -phase position
#3054 sptc1 Spindle synchronization multi-step acceleration/decel eration changeover speed 1
#3055 sptc2 Spindle synchronization multi-step acceleration/decel eration changeover speed 2
#3056 sptc3 Spindle synchronization multi-step acceleration/decel eration changeover speed 3
#3057 sptc4 Spindle synchronization multi-step acceleration/decel eration changeover speed 4
#3058 sptc5 Spindle synchronization multi-step acceleration/decel eration changeover speed 5

Set the speed which switches from 6th step to 7th step in spindle synchronization multi-step acceleration/deceleration control.
Set the same value for the reference axis and synchronized axis.
Set the value of limit rotation speed (slimt) or higher not to carry out a step shift.
---Setting range---
0 to 99999 (r/min)
Set the speed which switches from 7th step to 8th step in spindle synchronization multi-step acceleration/deceleration control.
Set the same value for the reference axis and synchronized axis.
Set the value of limit rotation speed (slimt) or higher not to carry out a step shift.
---Setting range---
0 to 99999 (r/min)
Set the acceleration/deceleration time constant to be used at the speed of changeover speed 1 (sptc1) and higher in spindle synchronization multi-step acceleration/deceleration control. Set this as a magnification in relation to the spindle synchronization acceleration/deceleration time constant (spt).
---Setting range---
0 to 127
Set the acceleration/deceleration time constant to be used at the speed of changeover speed 2 (sptc2) and higher in spindle synchronization multi-step acceleration/deceleration control. Set this as a magnification in relation to the spindle synchronization acceleration/deceleration time constant (spt).
---Setting range---

0 to 127
Set the acceleration/deceleration time constant to be used at the speed of changeover speed 3 (sptc3) and higher in spindle synchronization multi-step acceleration/deceleration control. Set this as a magnification in relation to the spindle synchronization acceleration/deceleration time constant (spt).
---Setting range---
0 to 127
Set the acceleration/deceleration time constant to be used at the speed of changeover speed 4 (sptc4) and higher in spindle synchronization multi-step acceleration/deceleration control. Set this as a magnification in relation to the spindle synchronization acceleration/deceleration time constant (spt).
---Setting range---
0 to 127
Set the acceleration/deceleration time constant to be used at the speed of changeover speed 5 (sptc5) and higher in spindle synchronization multi-step acceleration/deceleration control. Set this as a magnification in relation to the spindle synchronization acceleration/deceleration time constant (spt).
---Setting range---
0 to 127
Set the acceleration/deceleration time constant to be used at the speed of changeover speed 6 (sptc6) and higher in spindle synchronization multi-step acceleration/deceleration control. Set this as a magnification in relation to the spindle synchronization acceleration/deceleration time constant (spt).
---Setting range---
0 to 127
#3059 sptc6 Spindle synchronization multi-step acceleration/decel eration changeover speed 6
#3060 sptc7 Spindle synchronization multi-step acceleration/decel eration changeover speed 7
#3061 spdiv1 Time constant magnification for changeover speed 1
#3062 spdiv2 Time constant magnification for changeover speed 2
#3063 spdiv3 Time constant magnification for changeover speed 3
#3064 spdiv4 Time constant magnification for changeover speed 4
#3065 spdiv5 Time constant magnification for changeover speed 5
#3066 spdiv6 Time constant magnification for changeover speed 6

Set the acceleration/deceleration time constant to be used at the speed of changeover speed 7 (sptc7) and higher in spindle synchronization multi-step acceleration/deceleration control. Set this as a magnification in relation to the spindle synchronization acceleration/deceleration time constant (spt).
---Setting range---
0 to 127
Set the time to confirm that synchronization is attained before spindle phase synchronization control is start ed.
When "0" is set, the time will be 2000ms. When "100" or less is set, the time will be 100ms.
---Setting range---
0 to 9999 (ms)
Set a period of waiting time for spindle phase synchronization control's completion as a time in which the speed stays within the attainment range.
When "0" is set, the time will be 500ms. When "100" or less is set, the time will be 100ms.
---Setting range---
0 to 9999(ms)
Set the amount of speed fluctuation of synchronized spindle during spindle phase synchronization control.
Set this as a proportion to commanded speed.
When "0" is set, the amount will be 5%.
---Setting range---
0 to 100 (%)
Select which door group of the speed monitoring a spindle belongs to.
0000: Belong to the door 1 group.
0001: Belong to the door 1 group.
0002: Belong to the door 2 group.
0003: Belong to the door 1 and 2 groups.
(Note) Speed monitoring function is validated when "SP229/bitF=1".
---Setting range---
0000 to 0003 (HEX)
Set the error detection time for when an error of command speed monitoring or feedback speed monitoring is detected during servo OFF.
The alarm will occur if actual speed exceeds safe speed or safe rotation speed for a period of time longer than this setting.
When "0" is set, the detection time will be 200 (ms).
(Note) Speed monitoring function is validated when "SP229/bitF=1".
---Setting range---
0 to 9999(ms)
Set the reference spindle and G/B spindle.
1: Reference spindle
2: Guide bushing spindle
0: Other
#3067 spdiv7 Time constant magnification for changeover speed 7
#3068 symtm1 Phase synchronization start confirmation time
#3069 symtm2 Phase synchronization end confirmation time
#3070 syprt Phase synchronization alignment speed
(PR) #3071 SscDrSelSp Speed monitor Door selection
(PR) #3072 Ssc Svof Filter Sp Speed monitor Error detection time during servo OFF
#3074 GBsp Guide bushing spindle synchronization control

Specify a spindle name to be used for giving a spindle command.
When spindle command name has been set for all the spindles, the spindle name type is used. If "0" is set to any spindle, the spindle No. type is selected.
(Note) Do not set an identical name to two or more of all the spindles.
---Setting range---

0 to 9
Set the acceleration/deceleration time constant with S command (speed operation mode) when gear 00 is selected. Set the linear acceleration/deceleration time up to limit rotation speed (slimt1). Set the short time constant that the motor torque at acceleration is always saturated, however, when an abnormal noise or V belt slip occurs, increase the time constant.
---Setting range---
0 to 30000(ms)
Set the acceleration/deceleration time constant with S command (speed operation mode) when gear 01 is selected. Set the linear acceleration/deceleration time up to limit rotation speed (slimt2). Set the short time constant that the motor torque at acceleration is always saturated, however, when an abnormal noise or V belt slip occurs, increase the time constant.
---Setting range---
0 to 30000 (ms)
Set the acceleration/deceleration time constant with S command (speed operation mode) when gear 10 is selected. Set the linear acceleration/deceleration time up to limit rotation speed (slimt3). Set the short time constant that the motor torque at acceleration is always saturated, however, when an abnormal noise or V belt slip occurs, increase the time constant.
---Setting range---
0 to 30000 (ms)
Set the acceleration/deceleration time constant with S command (speed operation mode) when gear 11 is selected. Set the linear acceleration/deceleration time up to limit rotation speed (slimt4). Set the short time constant that the motor torque at acceleration is always saturated, however, when an abnormal noise or V belt slip occurs, increase the time constant.
---Setting range---
0 to 30000 (ms)
Set the speed deviation rate with respect to the commanded speed, at which the speed reach signal will be output.
It will be 15% when set to "0".
If the speed deviation is smaller than 45r/min, it will be set as 45r/min.
---Setting range---
0 to 100 (%)
(PR) #3077 Sname Spindle command name
#3101 sp_t 1 Acceleration/deceleration time constant with S com mand (Gear: 00)
#3102 sp_t 2 Acceleration/deceleration time constant with S com mand (Gear: 01)
#3103 sp_t 3 Acceleration/deceleration time constant with S com mand (Gear: 10)
#3104 sp_t 4 Acceleration/deceleration time constant with S com mand (Gear: 11)
#3105 sut Speed reach range

Select the zero point return specification.
Functions are allocated to each bit.
Set this in hexadecimal format.
bitF: Spindle zero point detection with proximity switch
0: Normal
1: Enable spindle zero point detection using proximity switch
bitE: Interpolation mode selection 2 (Return to zero when stopping)
0: Interpolation mode (Follow the setting of "#1256 set28/bit1")
1: Non-interpolation mode (Use "#13001 SP001 PGV")
bitD: Interpolation mode selection 1 (Return to zero when rotating)
0: Non-interpolation mode
1: Interpolation mode
bitC: Z phase detection method
0: Follows Z phase detection direction (bit0).
1: Rotates in the commanded direction at Z phase detection speed to detect Z phase.
(*) To enable Z phase detection operation, set the parameter "#3106 zrn_typ/bit3" (Z phase detection oper ation ON) to "1".
bitB: Direction of zero point return initiated during spindle rotation
0: Follow the setting of zero point return direction
Follow the direction setting of orientation (bit2-1)
Follow the setting of synch tap zero return (bit6-5)
Follow the setting of spindle C axis zero return (bitA-9)
1: Follow the spindle rotation direction
bitA-9: Spindle/C axis zero point return direction
bitA,9=
00: Short-cut
01: Forward run
10: Reverse run
#3106 zrn_typ Zero point return specifications
Orientation direction
Synchronous tapping zero point return
Synchronous tapping zero point return direction
Synchronous tapping command polarity
Spindle/C axis zero point return
Spindle/C axis zero point return direction
Spindle zero point proximity switch detection
Interpolation mode selection 2 (Return to zero when stopping)
Z phase detection direction
Z phase detection operation ON
Z phase detection method
Direction of zero point return initiated during spindle rotation
Interpolation mode selection 1 (Return to zero when rotating)

bit8: Spindle/C axis zero point return
0: Zero point return type
1: Deceleration stop type (standard setting)
(*) For Program command method, when "#1711 cfg11/bit3" is set to "0" (Zero point return type), Zero point return type is forcibly set.
bit7: Synchronous tapping command polarity

0: Forward direction
1: Reverse direction (The standard setting when spindle and motor are directly coupled)
bit6-5: Synchronous tapping zero point return direction
bit6,5=
00: Short-cut
01: Forward run
10: Reverse run
bit4: Synchronous tapping zero point return
0: Automatically return to zero point before synchronous tapping is started (tapping phase alignment)
1: Not return to zero point and immediately synchronous tapping is started
bit3: Z phase detection operation ON
0: When Z phase is not detected, detect Z phase during the rotation executed by a rotation command with out performing the detection operation.
1: When Z phase is not detected, perform the detection operation according to the settings of bitC and bit0,
and then rotate the motor according to a rotation command.
bit2-1: Orientation direction
bit2,1=
00: Short-cut
01: Forward run
10: Reverse run
bit0: Z phase detection direction
0: Forward direction
1: Reverse direction
Set the spindle speed during orientation command.
When the spindle is not running or running to the different direction with the orientation, the orientation is car ried out with this speed after a stop. When the spindle is running to the same direction with the orientation,
this parameter does not have a meaning because it decelerates directly and the orientation is carried out.
---Setting range---
1 to 99999 (r/min)
The orientation stop position can be moved by this parameter setting although normally the position is Z phase position.
During multi-point orientation control, the stop position is determined by the total value of this parameter and
the position data for multi-point orientation of PLC input.
---Setting range---
-35999 to 35999 (0.01)
#3107 ori_spd Orientation command speed
#3108 ori_sft Position shift amount for orientation
M800V/M80V Series Alarm/Parameter Manual
15 Machine Parameters
15.8 Spindle Specification Parameters
IB-1501623-F 570
For the first S command after power is turned ON, the spindle rotates at the speed of setting value for this
parameter until Z phase is detected twice.
When "#3106/bitF = 1" (Spindle zero point proximity switch detection enabled), also proximity switch is de tected.
(Note) When spindle zero point proximity switch detection is enabled, the rotation direction of the orientation/
zero point return (synchronous tapping, spindle/C axis) will follow Z phase detection direction. And the
speed will follow Z phase detection speed.
---Setting range---
1 to 99999 (r/min)
Set the zero point return speed during synchronous tapping control.
---Setting range---
1 to 99999 (r/min)
Set the zero point return shift amount during synchronous tapping control. Zero point angle shifts from Z
phase according to the setting angle.
---Setting range---
0 to 35999 (0.01)
Set the zero point return speed during spindle C axis control.
---Setting range---
1 to 99999 (r/min)
Set the spindle C axis zero point return shift amount. Zero point angle shifts from Z phase according to the
setting angle.
---Setting range---
0 to 359999 (0.001)
Parameter switches when switching the encoder system between normal spindle control and C axis control,
such as using spindle side encoder only for C axis control in spindle drive system. It is validated with replacing
a certain servo parameter of the corresponding servo axis to a spindle parameter.
0: Not switch
1: Switch
---Setting range---
0/1 (Standard: 0)
Set the linear acceleration/deceleration time constant for zero point return control (#3106/bit4,8) which is au tomatically started at the time of switching orientation control, C axis control and synchronous tapping control
when gear 00 is selected. The inclination is determined by the ratio to limit rotation speed (slimt1). Set the
sufficiently large value compared to the acceleration/deceleration time constant with S command (sp_t1) so
that the output torque is not saturated. When executing C axis zero point return manually, it depends on the
axis specification parameter.
---Setting range---
0 to 30000 (ms)
#3109 zdetspd Z phase detection speed
#3110 tap_spd Synchronous tapping zero point return speed
#3111 tap_sft Synchronous tapping zero point return shift amount
#3112 cax_spd Spindle C axis zero point return speed
#3113 cax_sft Spindle C axis zero point return shift amount
#3114 cax_para_chg Spindle/C axis parameter switch
#3115 sp2_t1 Time constant in orientation/interpolation mode auto matic reference position return (Gear: 00)
M800V/M80V Series Alarm/Parameter Manual
15 Machine Parameters
15.8 Spindle Specification Parameters
571 IB-1501623-F
Set the linear acceleration/deceleration time constant for zero point return control (#3106/bit4,8) which is au tomatically started at the time of switching orientation control, C axis control and synchronous tapping control
when gear 01 is selected. The inclination is determined by the ratio to limit rotation speed (slimt2). Set the
sufficiently large value compared to the acceleration/deceleration time constant with S command (sp_t2) so

that the output torque is not saturated. When executing C axis zero point return manually, it depends on the
axis specification parameter.
---Setting range---
0 to 30000 (ms)
Set the linear acceleration/deceleration time constant for zero point return control (#3106/bit4,8) which is au tomatically started at the time of switching orientation control, C axis control and synchronous tapping control
when gear 10 is selected. The inclination is determined by the ratio to limit rotation speed (slimt3). Set the
sufficiently large value compared to the acceleration/deceleration time constant with S command (sp_t3) so
that the output torque is not saturated. When executing C axis zero point return manually, it depends on the
axis specification parameter.
---Setting range---
0 to 30000 (ms)
Set the linear acceleration/deceleration time constant for zero point return control (#3106/bit4,8) which is au tomatically started at the time of switching orientation control, C axis control and synchronous tapping control
when gear 11 is selected. The inclination is determined by the ratio to limit rotation speed (slimt4). Set the
sufficiently large value compared to the acceleration/deceleration time constant with S command (sp_t4) so
that the output torque is not saturated. When executing C axis zero point return manually, it depends on the
axis specification parameter.
---Setting range---
0 to 30000 (ms)
When performing high-speed synchronous tapping control(#1281/bit5), set the reduction rate of the time con stant compared to the time constant in normal synchronous tapping.
(Setting "0" or "100" will be regarded as reduction rate zero, so the time constant won't be reduced.)
E.g.) When set to "10", time constant in high-speed synchronous tapping will be 90% of that in normal syn chronous tapping.
---Setting range---
0 to 100 (%)
Select the validity of turret indexing.
0: Disabled
1: Enable
Set the number of teeth on the turret side when the gear selection command (control input 4/bit6, 5) is set to
00. Set a value of GRC so that the ratio of GRC to the spindle side gear ratio (#13057 SP057) will be 1: N
(an integer). If GRC is set to "0", it will be regarded as "1".
---Setting range---
0 to 32767
Set the turret end indexing speed when in turret indexing.
When this parameter is set to 0, it follows the value set for Orientation command speed (#3107).
---Setting range---
0 to 32767(r/min)
#3116 sp2_t2 Time constant in orientation/interpolation mode auto matic reference position return (Gear: 01)
#3117 sp2_t3 Time constant in orientation/interpolation mode auto matic reference position return (Gear: 10)
#3118 sp2_t4 Time constant in orientation/interpolation mode auto matic reference position return (Gear: 11)
#3120 staptr Time constant reduction rate in high-speed synchro nous tapping
#3121 tret Turret indexing
#3122 GRC Turret side gear ratio
#3123 tret_spd Turret indexing speed

Set the acceleration/deceleration time constant to reach Limit rotation speed (slimt1) at gear 00 when in turret
indexing. Set this parameter to a larger value than time constant in orientation (#3115).
---Setting range---
0 to 30000 (ms)
Set the position error range in which the index positioning complete signal is output when in turret indexing.
When this parameter is set to 0, the value of In-position width (#13024 SP024) will be used for this width.
---Setting range---
0 to 32767(1/1000)
Set the time to forcedly turn OFF the index positioning complete signal since the indexing start signal turns
ON. If this period of time has not passed yet, the index positioning complete signal will not turn ON even at
the completion of index positioning.
---Setting range---
0 to 10000 (ms)
bit4: Change the timing of thread cutting start
0: Start thread cutting after receiving the Z-phase signal from the encoder.
1: Start thread cutting after receiving an external signal.
bit3: Spindle rotation direction
Define the relationship between the motor's actual direction of rotation and the spindle rotation signals (Spin dle forward run start/Spindle reverse run start).
0: Forward
1: Reverse
bit1: Spindle cycle counter direction
Select whether to count up or down the cycle counter when the spindle turns forward.
0: Count up in forward run
1: Count down in forward run
bit0: Select the gear changeover method.
0: Gear change type 1 (When the spindle stop signal is ON and the selected gear differs from the recom mended gear of NC side, the gear changeover is performed.)
1: Gear change type 2 (When the spindle stop signal is ON and the spindle gear shift signal is ON, the gear
changeover is performed.)
---Setting range---
0x0000 to 0xffff (hexadecimal)
bit1: High-speed proximity-switch orientation
Select whether to enable high-speed proximity-switch orientation.
This orientation can be used when Proximity-switch spindle zero point detection (#3106 zrn_typ/bitF) is en abled.
0: Disable high-speed
1: Enable high-speed
bit0: Orientation in-position advance output
Reduce the orientation time by detecting an in-position faster.
The in-position detection width is changed from SP024(#13024) to ori_inp2.
0: Disable
1: Enable
---Setting range---
0x0000 to 0xffff (hexadecimal)

#3124 tret_t Turret indexing time constant
#3125 tret_inpos Turret indexing in-position width
#3126 tret_fin_off Index positioning complete signal OFF time
#3127 SPECSP Spindle specification
#3128 ori_spec Orientation control specification

bit5: Retention of coordinate system setting offset at switchover to C axis mode
Select whether to retain the offset for the coordinate system setting(G92/G50) or local coordinate system set ting (G52) when the control is switched to C axis mode.
0: Not retain the offset for coordinate system setting
1: Retain the offset for coordinate system setting
bit4: Gain switchover for all the axes within the part system when C axis is selected
0: The gains of servo axes except C axis are not switched when C axis is selected.
1: The gains of servo axes except C axis are switched when C axis is selected.
#2203 (PGN1) SV003 --> #2249 (PGN1sp) SV049
#2204 (PGN2) SV004 --> #2250 (PGN2sp) SV050
#2257 (SHGC) SV057 --> #2258 (SHGCsp) SV058
bit3: Mode selection at reset when the program command method is selected
0: Spindle mode
1: The mode at reset is retained.
This parameter is enabled when the program command method is selected (#3129 cax_spec/bit0 = 1).
bit2: Mode selection at Power ON when the program command method is selected
0: Spindle mode
1: C axis mode
This parameter is enabled when the program command method is selected (#3129 cax_spec/bit0 = 1).
bit1: Coordinate system setting when the deceleration stop type (no zero point return) is selected
Select the C axis coordinate system setting method when the deceleration stop type (no zero point return) is
selected.
0: Establish the coordinates of the deceleration stop position by using the Z-phase position as the coordi nate zero point.
1: The deceleration stop position is used as the coordinate zero point.
bit0: Spindle position control changeover method
Select the method of changing the mode between C axis and spindle.
0: PLC signal method
1: Program command method
---Setting range---
0x0000 to 0xffff (hexadecimal)
bit2: Error compensation between reference and synchronized spindles
0: Error compensation is performed.
1: Error compensation is not performed.
(*) Set this parameter for the synchronized spindle.
bit1: Phase alignment method selection
0: Phase alignment method type 1 (step alignment method)
1: Phase alignment method type 2 (multi-step acceleration/deceleration method)
(*) Set this parameter for the synchronized spindle.
bit0: Tool spindle synchronization II (hobbing) automatic compensation selection
0: No compensation.
1: Compensate hobbing axis delay (advance) with workpiece axis.
---Setting range---
0x0000 to 0xffff (hexadecimal)
#3129 cax_spec Spindle/C axis control specification
#3130 syn_spec Spindle synchronization control specification

bitF: Analog spindle encoder polarity
This parameter specifies the polarity of the encoder with respect to the spindle rotation.
0: Forward
1: Reverse
---Setting range---
0x0000 to 0xffff (hexadecimal)
Set the in-position width when in-position advance output control (#3128/bit0) is valid. Reduce the orientation
time by setting a bigger value than the value of conventional SP024 and detecting an in-position faster.
Conventional SP024 is used for 2nd in-position signal detection width.
---Setting range---
0 to 32767 (1deg/1000)
Set the allowable angle between the commanded position and actual position of hobbing axis when it is in
tool spindle synchronization II (hobbing) mode (X18AE ON), and also when hobbing axis and workpiece axis
are synchronizing (X18A9 ON).
---Setting range---
0 to 32767 (1deg/1000)
Set the primary delay time constant of hobbing axis automatic compensation primary delay filter control in
tool spindle synchronization II (hobbing).
When set to "0", primary delay filter control is invalid.
---Setting range---
0 to 32767 (ms)
Set the feed forward gain for the hobbing axis in tool spindle synchronization II (hobbing) mode.
---Setting range---
0 to 200 (%)
Specify the rate of reduction for the time constant of Punch Tap cycle to be applied when Punch Tap cycle
is executed with the high-speed synchronized tap being enabled (#1281 ext17/bit5 = 1).
When "0" or "100" is set, the reduction rate will be interpreted as "0" and the time constant will not be reduced.
(Example) When "10" is set, the time constant for normal Punch Tap cycle will be reduced to 90%.
---Setting range---
0 to 100 (%)
Not used. Set to "0".

Set the spindle motor type. The set type will be displayed on the drive monitor screen, and it will be also out put to the system configuration data.
---Setting range---
Character string within 26 characters including A-Z, a-z, 0-9, "." (decimal point), "-" (hyphen), "/" (slash)
(Setting is cleared when "0" is set)
Select whether to enable spindle control using a servo drive unit and servo motor (spindle-mode servo con trol).
0: Disable spindle-mode servo control
1: Enable spindle-mode servo control
#3131 tap_spec Synchronous tapping control specification
#3132 ori_inp2 2nd in-position width for orientation
#3133 spherr Hobbing axis delay (advance) allowable angle
#3134 sphtc Primary delay time constant for hobbing axis automatic
compensation
#3135 sfwd_g Feed forward gain for hobbing axis
#3136 ptaptr Reduction rate of time constant for high-speed Punch
Tap cycle
#3137 stap_ax_off High-speed synchronous tapping disabled axis
#3138 motor_type Spindle motor type
(PR) #3139 sp_srvdrv Spindle-mode servo control

Set the door signal input in the drive unit.
Use this parameter only when the axis with a door signal belongs to several door groups.
The correspondence between the door signals and bits are as follows.
bit0: Door1 signal
bit1: Door2 signal
If the axis does not receive any door signal, set to "0".
An error (Y20 0027) will occur in the following cases.
- Several bits are enabled.
- Any bit other than those set in "#3071 S_DSlSp" is enabled.
---Setting range---
0000 to 0002 (HEX)
Set the observation speed, which is at the machine end, in the multi-step speed monitor.
(Note) When the setting value is larger than 18000, the last 2 digits will be ignored.
E.g.: 1234567 -> 1234500 (deg/min)
---Setting range---
0 to 6553500 (deg/min)
Set the observation speed, which is at the machine end, in the multi-step speed monitor.
(Note) When the setting value is larger than 18000, the last 2 digits will be ignored.
E.g.: 1234567 -> 1234500 (deg/min)
---Setting range---
0 to 6553500 (deg/min)
Set the observation speed, which is at the machine end, in the multi-step speed monitor.
(Note) When the setting value is larger than 18000, the last 2 digits will be ignored.
E.g.: 1234567 -> 1234500 (deg/min)
---Setting range---
0 to 6553500 (deg/min)
Set the observation speed, which is at the machine end, in the multi-step speed monitor.
(Note) When the setting value is larger than 18000, the last 2 digits will be ignored.
E.g.: 1234567 -> 1234500 (deg/min)
---Setting range---
0 to 6553500 (deg/min)
This parameter specifies which observation speed change signal is input in the drive unit. The observation
speed change signal corresponds to the following bits of the parameter.
bit0: Observation speed change signal 1 is connected.
bit1: Observation speed change signal 2 is connected.
bit2: Observation speed change signal 3 is connected.
If the axis receives no observation speed change signal, set to "0000".
(Note) When a same setting value is set to more than one axis, or when more than one bit is set to turn ON
for one axis, the alarm (Y20 0027) will occur.
---Setting range---
0000 to 0004 (HEX)
(PR) #3140 S_DINSp Speed observation input door No.
(PR) #3141 spsscfeed1 Observation speed 1
(PR) #3142 spsscfeed2 Observation speed 2
(PR) #3143 spsscfeed3 Observation speed 3
(PR) #3144 spsscfeed4 Observation speed 4
(PR) #3145 S_SigInSP Safety observation signal input

Specify the short-time rated output of the spindle motor (for L-coil).
This value is used for calculating the power consumption of the spindle motor.
---Setting range---
0 to 99999999 (W)
Specify the short-time rated output of the spindle motor (for H-coil).
This value is used for calculating the power consumption of the spindle motor.
This parameter is used also when the coil switch function is OFF.
---Setting range---
0 to 99999999 (W)
When a period of time set in this parameter has elapsed after turning-ON of the spindle chuck close (SPC MPC) signal, you can temporarily cancel spindle sync error by turning ON the spindle sync error temporary cancel (SPDRPO) signal.
If the specified time has not elapsed when the spindle sync error temporary cancel (SPDRPO) signal is
turned ON, temporary cancel of spindle sync error is enabled first when the time of this parameter has
elapsed.
When "0" is set in this parameter, the delay time will be 284 (ms).

---Setting range---
0 to 30000 (ms)
Set the observation speed, which is at the machine end, in the multi-step speed monitor.
(Note) When the setting value is larger than 18000, the last 2 digits will be ignored.
E.g.: 1234567 -> 1234500 (deg/min)
---Setting range---
0 to 6553500 (deg/min)
Set the observation speed, which is at the machine end, in the multi-step speed monitor.
(Note) When the setting value is larger than 18000, the last 2 digits will be ignored.
E.g.: 1234567 -> 1234500 (deg/min)
---Setting range---
0 to 6553500 (deg/min)
Set the observation speed, which is at the machine end, in the multi-step speed monitor.
(Note) When the setting value is larger than 18000, the last 2 digits will be ignored.
E.g.: 1234567 -> 1234500 (deg/min)
---Setting range---
0 to 6553500 (deg/min)
Set the observation speed, which is at the machine end, in the multi-step speed monitor.
(Note) When the setting value is larger than 18000, the last 2 digits will be ignored.
E.g.: 1234567 -> 1234500 (deg/min)
---Setting range---
0 to 6553500 (deg/min)
#3146 RatedOutL(PwrCal) Short-time rated output for power computation (L-coil)
#3147 RatedOutH(PwrCal) Short-time rated output for power computation (H-coil)
#3148 sycmpctm Temporary error cancel calculation delay time
(PR) #3149 spsscfeed5 Observation speed 5
(PR) #3150 spsscfeed6 Observation speed 6
(PR) #3151 spsscfeed7 Observation speed 7
(PR) #3152 spsscfeed8 Observation speed 8

Set the spindle viscosity friction coefficient.
These parameters are used to estimate the estimated disturbance torque of spindle.
#13018 SP018/bit5 = 0 (Mechanical gear)
#3153 cms1: Coefficient for the mechanical gear 1
#3154 cms2: Coefficient for the mechanical gear 2
#3155 cms3: Coefficient for the mechanical gear 3
#3156 cms4: Coefficient for the mechanical gear 4
#13018 SP018/bit5 = 1 (Coil changeover)
#3153 cms1: Coefficient for the H coil
#3154 cms2: Coefficient for the L coil
#3155 cms3: Not used
#3156 cms4: Not used
---Setting range---
0 to 9999999 (0.00001%/rpm)
Set the spindle viscosity friction coefficient.
These parameters are used to estimate the estimated disturbance torque of spindle.
#13018 SP018/bit5 = 0 (Mechanical gear)
#3157 fms1: Coefficient for the mechanical gear 1
#3158 fms2: Coefficient for the mechanical gear 2
#3159 fms3: Coefficient for the mechanical gear 3
#3160 fms4: Coefficient for the mechanical gear 4
#13018 SP018/bit5 = 1 (Coil changeover)
#3157 fms1: Coefficient for the H coil
#3158 fms2: Coefficient for the L coil
#3159 fms3: Not used
#3160 fms4: Not used
---Setting range---
0 to 9999999 (0.0001%/Nm)
Set the responsiveness in detecting the disturbance torque.
---Setting range---
0 to 1000 (ms) (Default value: 0)
Calculate the efficiency between the motor current value and the output torque, and compensate the distur bance torque detection at acceleration/deceleration.
When set to "0", it controls as 100%.
---Setting range---
0 to 100 (%)
(Default value: 0)
Specify the stall torque of spindle-mode servo motor.
This value is used for calculating the power consumption of the spindle-mode servo motor.
---Setting range---
0.000 to 1000.000 (Nm)
#3153-3156 cms1-cms4 Spindle viscosity friction coefficient 1 to 4
#3157-3160 fms1-fms4 Spindle coulomb friction coefficient 1 to 4
#3166 disttrq_t Disturbance torque detection filter time constant
#3167 spef Spindle motor efficency
#3168 StlTrqSPSV(PwrCal) Stall torque of spindle-mode servo motor for power
computation

Set the motor rotation speed to which the zero speed detection is executed. When the motor speed goes
below the set speed, the zero speed detection turns ON. The standard setting value is "50". When the setting
value is "0", it is on the standard setting value.
---Setting range---
0 to 1000 (r/min)

Set the motor speed to which the speed detection is executed. When the motor speed goes below the set speed, the speed detection turns ON. The standard setting value is 10% of the "#3001 slimt1" setting value.
When the setting value is "0", it is on the standard setting value.
---Setting range---
0 to 32767(r/min)
Specify the spindle load (%) at which the loadmeter displays a caution sign (yellow).
If spindle load exceeds the specified value, the loadmeter displays a caution (yellow).
If you wish to avoid showing the caution (yellow), set this parameter to be the same as "#3193 LdMeter thresholdR".
When "0" is set, the value becomes 100% (default).
---Setting range---
0 to 300(%)
Specify the spindle load (%) at which the loadmeter displays a warning sign (red).
If spindle load exceeds the specified value, the loadmeter displays a warning (red).
If you wish to avoid showing the warning (red), set this parameter to be the same as "#3194 LdMeter load max".
When "0" is set, the value becomes 150% (default).
---Setting range---
0 to 300(%)
Specify the maximum spindle load (%) for loadmeter display.
When "0" is set, the value becomes 200% (default).
---Setting range---
0 to 300(%)
Specify which of the spindle's machine group No. parameters to use for the machine groupwise alarm stop function.
0: "#3196 mgrspnum1" (Spindle's machine group No. 1)
1: "#3197 mgrspnum2" (Spindle's machine group No. 2)
Specify the machine group No. to which each spindle belongs. This parameter is enabled when the param eter "#3195 mgrsptyp" (Spindle's machine group setting type) is set to "0".
---Setting range---
0 to 32
Specify the machine group No. to which each spindle belongs, by setting the corresponding bit. This param eter is enabled when the parameter "#3195 mgrsptyp" (Spindle's machine group setting type) is set to "1".
---Setting range---
00 to FF
Set this in hexadecimal format.
#3169 rotspzsp Spindle-mode rotary axis Motor zero speed (For spin dle-mode rotary axis only)
#3170 rotspsdts Spindle-mode rotary axis Speed detection setting value
(For spindle-mode rotary axis only)
(PR) #3192 LdMeter thresholdY Loadmeter: Caution (Yellow) threshold
(PR) #3193 LdMeter thresholdR Loadmeter: Warning (Red) threshold
(PR) #3194 LdMeter load max Loadmeter: Maximum spindle load
(PR) #3195 mgrsptyp Spindle's machine group setting type
(PR) #3196 mgrspnum1 Spindle's machine group No. 1
(PR) #3197 mgrspnum2 Spindle's machine group No. 2

Set the spindle speed for changing the 1st step's acceleration/deceleration time constant at gear 00.
---Setting range---
0 to 99999 (r/min)
Set the spindle speed for changing the 1st step's acceleration/deceleration time constant at gear 01.
---Setting range---
0 to 99999 (r/min)
Set the spindle speed for changing the 1st step's acceleration/deceleration time constant at gear 10.
---Setting range---
0 to 99999 (r/min)
Set the spindle speed for changing the 1st step's acceleration/deceleration time constant at gear 11.
---Setting range---
0 to 99999 (r/min)
Set the time constant to reach the variable speed thread multi-step acceleration/deceleration changeover speed 1 at gear 00.
---Setting range---
0 to 30000 (10 ms)
Set the time constant to reach the variable speed thread multi-step acceleration/deceleration changeover speed 1 at gear 01.
---Setting range---
0 to 30000 (10 ms)
Set the time constant to reach the variable speed thread multi-step acceleration/deceleration changeover speed 1 at gear 10.
---Setting range---
0 to 30000 (10 ms)
Set the time constant to reach the variable speed thread multi-step acceleration/deceleration changeover speed 1 at gear 11.
---Setting range---
0 to 30000 (10 ms)
Set the spindle speed for changing the 2nd step's acceleration/deceleration time constant at gear 00.
---Setting range---
0 to 99999 (r/min)
#13501 vfths11 Variable speed thread multi-step accel/decel change over speed 1 (Gear00)
#13502 vfths12 Variable speed thread multi-step accel/decel change over speed 1 (Gear01)
#13503 vfths13 Variable speed thread multi-step accel/decel change over speed 1 (Gear10)
#13504 vfths14 Variable speed thread multi-step accel/decel change over speed 1 (Gear11)
#13505 vftht11 Variable speed thread multi-step accel/decel change
time constant 1 (Gear00)
#13506 vftht12 Variable speed thread multi-step accel/decel change
time constant 1 (Gear01)
#13507 vftht13 Variable speed thread multi-step accel/decel change
time constant 1 (Gear10)

#13508 vftht14 Variable speed thread multi-step accel/decel change
time constant 1 (Gear11)
#13509 vfths21 Variable speed thread multi-step accel/decel change over speed 2 (Gear00)

Set the spindle speed for changing the 2nd step's acceleration/deceleration time constant at gear 01.
---Setting range---
0 to 99999 (r/min)
Set the spindle speed for changing the 2nd step's acceleration/deceleration time constant at gear 10.
---Setting range---
0 to 99999 (r/min)
Set the spindle speed for changing the 2nd step's acceleration/deceleration time constant at gear 11.
---Setting range---
0 to 99999 (r/min)
Set the time constant to reach the variable speed thread multi-step acceleration/deceleration changeover
speed 2 at gear 00.
---Setting range---
0 to 30000 (10 ms)
Set the time constant to reach the variable speed thread multi-step acceleration/deceleration changeover
speed 2 at gear 01.
---Setting range---
0 to 30000 (10 ms)
Set the time constant to reach the variable speed thread multi-step acceleration/deceleration changeover
speed 2 at gear 10.
---Setting range---
0 to 30000 (10 ms)
Set the time constant to reach the variable speed thread multi-step acceleration/deceleration changeover
speed 2 at gear 11.
---Setting range---
0 to 30000 (10 ms)
Set the time constant to reach the limit rotation speed at gear 00.
---Setting range---
0 to 30000 (10 ms)
Set the time constant to reach the limit rotation speed at gear 01.
---Setting range---
0 to 30000 (10 ms)
#13510 vfths22 Variable speed thread multi-step accel/decel change over speed 2 (Gear01)
#13511 vfths23 Variable speed thread multi-step accel/decel change over speed 2 (Gear10)
#13512 vfths24 Variable speed thread multi-step accel/decel change over speed 2 (Gear11)
#13513 vftht21 Variable speed thread multi-step accel/decel change
time constant 2 (Gear00)
#13514 vftht22 Variable speed thread multi-step accel/decel change
time constant 2 (Gear01)
#13515 vftht23 Variable speed thread multi-step accel/decel change
time constant 2 (Gear10)
#13516 vftht24 Variable speed thread multi-step accel/decel change
time constant 2 (Gear11)
#13517 vftht31 Variable speed thread multi-step accel/decel change
time constant 3 (Gear00)
#13518 vftht32 Variable speed thread multi-step accel/decel change
time constant 3 (Gear01)

Set the time constant to reach the limit rotation speed at gear 10.
---Setting range---
0 to 30000 (10 ms)
Set the time constant to reach the limit rotation speed at gear 11.
---Setting range---
0 to 30000 (10 ms)
Spindle synchronization acceleration/deceleration time constant (Gear: 01)
Specify the acceleration/deceleration time constant to be used when the rotation speed of spindle synchro nization command is changed with the 2nd gear selected under the spindle-mode servo control or spindle
synchronization control.
---Setting range---
0 to 9999(ms)
Specify the spindle speed at which a changeover to the 1st step's acceleration/deceleration time constant is
made when the 2nd step gear is selected.
---Setting range---
0 to 99999 (r/min)
Specify the spindle speed at which a changeover to the 2nd step's acceleration/deceleration time constant
is made when the 2nd step gear is selected.
---Setting range---
0 to 99999 (r/min)
Specify the spindle speed at which a changeover to the 3rd step's acceleration/deceleration time constant is
made when the 2nd step gear is selected.
---Setting range---
0 to 99999 (r/min)
Specify the spindle speed at which a changeover to the 4th step's acceleration/deceleration time constant is
made when the 2nd step gear is selected.
---Setting range---
0 to 99999 (r/min)
Specify the spindle speed at which a changeover to the 5th step's acceleration/deceleration time constant is
made when the 2nd step gear is selected.
---Setting range---
0 to 99999 (r/min)

#13519 vftht33 Variable speed thread multi-step accel/decel change
time constant 3 (Gear10)
#13520 vftht34 Variable speed thread multi-step accel/decel change
time constant 3 (Gear11)
#13521 spt2 Spindle synchronization acceleration/deceleration time
constant (Gear: 01)
#13522 sptc21 Spindle sync multistep acceleration/deceleration
changeover speed 1 (Gear: 01)
#13523 sptc22 Spindle sync multistep acceleration/deceleration
changeover speed 2 (Gear: 01)
#13524 sptc23 Spindle sync multistep acceleration/deceleration
changeover speed 3 (Gear: 01)
#13525 sptc24 Spindle sync multistep acceleration/deceleration
changeover speed 4 (Gear: 01)
#13526 sptc25 Spindle sync multistep acceleration/deceleration
changeover speed 5 (Gear: 01)

Specify the spindle speed at which a changeover to the 6th step's acceleration/deceleration time constant is
made when the 2nd step gear is selected.
---Setting range---
0 to 99999 (r/min)
Specify the spindle speed at which a changeover to the 7th step's acceleration/deceleration time constant is
made when the 2nd step gear is selected.
---Setting range---
0 to 99999 (r/min)
Time constant magnification for changeover speed 1 (Gear: 01)
Specify the acceleration/deceleration time constant to be used in a range of the spindle-mode servo control/
spindle synchronization multi-step acceleration/deceleration changeover speed 1 (sptc21) to the spindle
sync multi-step acceleration/deceleration changeover speed 2 (sptc22) when the 2nd step gear is selected.
Set this as a magnification with respect to the spindle-mode servo control/spindle synchronization accelera tion/deceleration time constant (spt2).
---Setting range---
0 to 127
Time constant magnification for changeover speed 2 (Gear: 01)
Specify the acceleration/deceleration time constant to be used in a range of the spindle-mode servo control/
spindle synchronization multi-step acceleration/deceleration changeover speed 2 (sptc22) to the spindle
sync multi-step acceleration/deceleration changeover speed 3 (sptc23) when the 2nd step gear is selected.
Set this as a magnification with respect to the spindle-mode servo control/spindle synchronization accelera tion/deceleration time constant (spt2).
---Setting range---
0 to 127
Time constant magnification for changeover speed 3 (Gear: 01)
Specify the acceleration/deceleration time constant to be used in a range of the spindle-mode servo control/
spindle synchronization multi-step acceleration/deceleration changeover speed 3 (sptc23) to the spindle
sync multi-step acceleration/deceleration changeover speed 4 (sptc24) when the 2nd step gear is selected.
Set this as a magnification with respect to the spindle-mode servo control/spindle synchronization accelera tion/deceleration time constant (spt2).
---Setting range---
0 to 127
Time constant magnification for changeover speed 4 (Gear: 01)
Specify the acceleration/deceleration time constant to be used in a range of the spindle-mode servo control/
spindle synchronization multi-step acceleration/deceleration changeover speed 4 (sptc24) to the spindle
sync multi-step acceleration/deceleration changeover speed 5 (sptc25) when the 2nd step gear is selected.
Set this as a magnification with respect to the spindle-mode servo control/spindle synchronization accelera tion/deceleration time constant (spt2).
---Setting range---
0 to 127
#13527 sptc26 Spindle sync multistep acceleration/deceleration
changeover speed 6 (Gear: 01)
#13528 sptc27 Spindle sync multistep acceleration/deceleration
changeover speed 7 (Gear: 01)
#13529 spdiv21 Time constant magnification for changeover speed 1
(Gear: 01)
#13530 spdiv22 Time constant magnification for changeover speed 2
(Gear: 01)
#13531 spdiv23 Time constant magnification for changeover speed 3
(Gear: 01)
#13532 spdiv24 Time constant magnification for changeover speed 4
(Gear: 01)

Time constant magnification for changeover speed 5 (Gear: 01)
Specify the acceleration/deceleration time constant to be used in a range of the spindle-mode servo control/
spindle synchronization multi-step acceleration/deceleration changeover speed 5 (sptc25) to the spindle
sync multi-step acceleration/deceleration changeover speed 6 (sptc26) when the 2nd step gear is selected.
Set this as a magnification with respect to the spindle-mode servo control/spindle synchronization accelera tion/deceleration time constant (spt2).
---Setting range---
0 to 127
Time constant magnification for changeover speed 6 (Gear: 01)
Specify the acceleration/deceleration time constant to be used in a range of the spindle-mode servo control/
spindle synchronization multi-step acceleration/deceleration changeover speed 6 (sptc26) to the spindle
sync multi-step acceleration/deceleration changeover speed 7 (sptc27) when the 2nd step gear is selected.
Set this as a magnification with respect to the spindle-mode servo control/spindle synchronization accelera tion/deceleration time constant (spt2).
---Setting range---
0 to 127
Time constant magnification for changeover speed 7 (Gear: 01)
Specify the acceleration/deceleration time constant to be used for the spindle-mode servo control/spindle

synchronization multi-step acceleration/deceleration changeover speed 7 (sptc27) or a higher speed when
the 2nd step gear is selected. Set this as a magnification with respect to the spindle-mode servo control/spin dle synchronization acceleration/deceleration time constant (spt2).
---Setting range---
0 to 127
Spindle synchronization acceleration/deceleration time constant(Gear: 10)
Specify the acceleration/deceleration time constant to be used when the commanded spindle synchroniza tion rotation speed is changed with the 3rd gear selected during the spindle-mode servo control or spindle
synchronization control.
---Setting range---
0 to 9999(ms)
Specify the spindle speed at which a changeover to the 1st step's acceleration/deceleration time constant is
made when the 3rd step gear is selected.
---Setting range---
0 to 99999 (r/min)
Specify the spindle speed at which a changeover to the 2nd step's acceleration/deceleration time constant
is made when the 3rd step gear is selected.
---Setting range---
0 to 99999 (r/min)
Specify the spindle speed at which a changeover to the 3rd step's acceleration/deceleration time constant is
made when the 3rd step gear is selected.
---Setting range---
0 to 99999 (r/min)
#13533 spdiv25 Time constant magnification for changeover speed 5
(Gear: 01)
#13534 spdiv26 Time constant magnification for changeover speed 6
(Gear: 01)
#13535 spdiv27 Time constant magnification for changeover speed 7
(Gear: 01)
#13536 spt3 Spindle synchronization acceleration/deceleration time
constant(Gear: 10)
#13537 sptc31 Spindle sync multistep acceleration/deceleration
changeover speed 1 (Gear: 10)
#13538 sptc32 Spindle sync multistep acceleration/deceleration
changeover speed 2 (Gear: 10)
#13539 sptc33 Spindle sync multistep acceleration/deceleration
changeover speed 3 (Gear: 10)

Specify the spindle speed at which a changeover to the 4th step's acceleration/deceleration time constant is
made when the 3rd step gear is selected.
---Setting range---
0 to 99999 (r/min)
Specify the spindle speed at which a changeover to the 5th step's acceleration/deceleration time constant is
made when the 3rd step gear is selected.
---Setting range---
0 to 99999 (r/min)
Specify the spindle speed at which a changeover to the 6th step's acceleration/deceleration time constant is
made when the 3rd step gear is selected.
---Setting range---
0 to 99999 (r/min)
Specify the spindle speed at which a changeover to the 7th step's acceleration/deceleration time constant is
made when the 3rd step gear is selected.
---Setting range---
0 to 99999 (r/min)
Time constant magnification for changeover speed 1 (Gear: 10)
Specify the acceleration/deceleration time constant to be used in a range of the spindle-mode servo control/
spindle synchronization multi-step acceleration/deceleration changeover speed 1 (sptc31) to the spindle
sync multi-step acceleration/deceleration changeover speed 2 (sptc32) when the 3rd step gear is selected.
Set this as a magnification with respect to the spindle-mode servo control/spindle synchronization accelera tion/deceleration time constant (spt3).
---Setting range---
0 to 127
Time constant magnification for changeover speed 2 (Gear: 10)
Specify the acceleration/deceleration time constant to be used in a range of the spindle-mode servo control/
spindle synchronization multi-step acceleration/deceleration changeover speed 2 (sptc32) to the spindle
sync multi-step acceleration/deceleration changeover speed 3 (sptc33) when the 3rd step gear is selected.
Set this as a magnification with respect to the spindle-mode servo control/spindle synchronization accelera tion/deceleration time constant (spt3).
---Setting range---
0 to 127
Time constant magnification for changeover speed 3 (Gear: 10)
Specify the acceleration/deceleration time constant to be used in a range of the spindle-mode servo control/
spindle synchronization multi-step acceleration/deceleration changeover speed 3 (sptc33) to the spindle
sync multi-step acceleration/deceleration changeover speed 4 (sptc34) when the 3rd step gear is selected.
Set this as a magnification with respect to the spindle-mode servo control/spindle synchronization accelera tion/deceleration time constant (spt3).
---Setting range---
0 to 127
#13540 sptc34 Spindle sync multistep acceleration/deceleration
changeover speed 4 (Gear: 10)
#13541 sptc35 Spindle sync multistep acceleration/deceleration
changeover speed 5 (Gear: 10)
#13542 sptc36 Spindle sync multistep acceleration/deceleration
changeover speed 6 (Gear: 10)
#13543 sptc37 Spindle sync multistep acceleration/deceleration
changeover speed 7 (Gear: 10)
#13544 spdiv31 Time constant magnification for changeover speed 1
(Gear: 10)
#13545 spdiv32 Time constant magnification for changeover speed 2
(Gear: 10)

#13546 spdiv33 Time constant magnification for changeover speed 3
(Gear: 10)

Time constant magnification for changeover speed 4 (Gear: 10)
Specify the acceleration/deceleration time constant to be used in a range of the spindle-mode servo control/
spindle synchronization multi-step acceleration/deceleration changeover speed 4 (sptc34) to the spindle
sync multi-step acceleration/deceleration changeover speed 5 (sptc35) when the 3rd step gear is selected.
Set this as a magnification with respect to the spindle-mode servo control/spindle synchronization accelera tion/deceleration time constant (spt3).
---Setting range---
0 to 127
Time constant magnification for changeover speed 5 (Gear: 10)
Specify the acceleration/deceleration time constant to be used in a range of the spindle-mode servo control/
spindle synchronization multi-step acceleration/deceleration changeover speed 5 (sptc35) to the spindle
sync multi-step acceleration/deceleration changeover speed 6 (sptc36) when the 3rd step gear is selected.
Set this as a magnification with respect to the spindle-mode servo control/spindle synchronization accelera tion/deceleration time constant (spt3).
---Setting range---
0 to 127
Time constant magnification for changeover speed 6 (Gear: 10)
Specify the acceleration/deceleration time constant to be used in a range of the spindle-mode servo control/
spindle synchronization multi-step acceleration/deceleration changeover speed 6 (sptc36) to the spindle
sync multi-step acceleration/deceleration changeover speed 7 (sptc37) when the 3rd step gear is selected.
Set this as a magnification with respect to the spindle-mode servo control/spindle synchronization accelera tion/deceleration time constant (spt3).
---Setting range---
0 to 127
Time constant magnification for changeover speed 7 (Gear: 10)
Specify the acceleration/deceleration time constant to be used for the spindle-mode servo control/spindle
synchronization multi-step acceleration/deceleration changeover speed 7 (sptc37) or a higher speed when
the 3rd step gear is selected. Set this as a magnification with respect to the spindle-mode servo control/spin dle synchronization acceleration/deceleration time constant (spt3).
---Setting range---
0 to 127
Spindle synchronization acceleration/deceleration time constant (Gear: 11)
Specify the acceleration/deceleration time constant to be used when the commanded spindle synchroniza tion rotation speed is changed with the 4th gear selected during the spindle-mode servo control or spindle
synchronization control.
---Setting range---
0 to 9999(ms)
Specify the spindle speed at which a changeover to the 1st step's acceleration/deceleration time constant is
made when the 4th step gear is selected.
---Setting range---
0 to 99999 (r/min)
#13547 spdiv34 Time constant magnification for changeover speed 4
(Gear: 10)
#13548 spdiv35 Time constant magnification for changeover speed 5
(Gear: 10)
#13549 spdiv36 Time constant magnification for changeover speed 6
(Gear: 10)
#13550 spdiv37 Time constant magnification for changeover speed 7
(Gear: 10)
#13551 spt4 Spindle synchronization acceleration/deceleration time
constant (Gear: 11)
#13552 sptc41 Spindle sync multistep acceleration/deceleration
changeover speed 1 (Gear: 11)

Specify the spindle speed at which a changeover to the 2nd step's acceleration/deceleration time constant
is made when the 4th step gear is selected.
---Setting range---
0 to 99999 (r/min)
Specify the spindle speed at which a changeover to the 3rd step's acceleration/deceleration time constant is
made when the 4th step gear is selected.
---Setting range---
0 to 99999 (r/min)
Specify the spindle speed at which a changeover to the 4th step's acceleration/deceleration time constant is
made when the 4th step gear is selected.
---Setting range---
0 to 99999 (r/min)
Specify the spindle speed at which a changeover to the 5th step's acceleration/deceleration time constant is
made when the 4th step gear is selected.
---Setting range---
0 to 99999 (r/min)
Specify the spindle speed at which a changeover to the 6th step's acceleration/deceleration time constant is
made when the 4th step gear is selected.
---Setting range---
0 to 99999 (r/min)
Specify the spindle speed at which a changeover to the 7th step's acceleration/deceleration time constant is
made when the 4th step gear is selected.
---Setting range---
0 to 99999 (r/min)
Time constant magnification for changeover speed 1 (Gear: 11)
Specify the acceleration/deceleration time constant to be used in a range of the spindle-mode servo control/
spindle synchronization multi-step acceleration/deceleration changeover speed 1 (sptc41) to the spindle
sync multi-step acceleration/deceleration changeover speed 2 (sptc42) when the 4th step gear is selected.
Set this as a magnification with respect to the spindle-mode servo control/spindle synchronization accelera tion/deceleration time constant (spt4).
---Setting range---

0 to 127
#13553 sptc42 Spindle sync multistep acceleration/deceleration
changeover speed 2 (Gear: 11)
#13554 sptc43 Spindle sync multistep acceleration/deceleration
changeover speed 3 (Gear: 11)
#13555 sptc44 Spindle sync multistep acceleration/deceleration
changeover speed 4 (Gear: 11)
#13556 sptc45 Spindle sync multistep acceleration/deceleration
changeover speed 5 (Gear: 11)
#13557 sptc46 Spindle sync multistep acceleration/deceleration
changeover speed 6 (Gear: 11)
#13558 sptc47 Spindle sync multistep acceleration/deceleration
changeover speed 7 (Gear: 11)
#13559 spdiv41 Time constant magnification for changeover speed 1
(Gear: 11)

Time constant magnification for changeover speed 2 (Gear: 11)
Specify the acceleration/deceleration time constant to be used in a range of the spindle-mode servo control/
spindle synchronization multi-step acceleration/deceleration changeover speed 2 (sptc42) to the spindle
sync multi-step acceleration/deceleration changeover speed 3 (sptc43) when the 4th step gear is selected.
Set this as a magnification with respect to the spindle-mode servo control/spindle synchronization accelera tion/deceleration time constant (spt4).
---Setting range---
0 to 127
Time constant magnification for changeover speed 3 (Gear: 11)
Specify the acceleration/deceleration time constant to be used in a range of the spindle-mode servo control/
spindle synchronization multi-step acceleration/deceleration changeover speed 3 (sptc43) to the spindle
sync multi-step acceleration/deceleration changeover speed 4 (sptc44) when the 4th step gear is selected.
Set this as a magnification with respect to the spindle-mode servo control/spindle synchronization accelera tion/deceleration time constant (spt4).
---Setting range---
0 to 127
Time constant magnification for changeover speed 4 (Gear: 11)
Specify the acceleration/deceleration time constant to be used in a range of the spindle-mode servo control/
spindle synchronization multi-step acceleration/deceleration changeover speed 4 (sptc44) to the spindle
sync multi-step acceleration/deceleration changeover speed 5 (sptc45) when the 4th step gear is selected.
Set this as a magnification with respect to the spindle-mode servo control/spindle synchronization accelera tion/deceleration time constant (spt4).
---Setting range---
0 to 127
Time constant magnification for changeover speed 5 (Gear: 11)
Specify the acceleration/deceleration time constant to be used in a range of the spindle-mode servo control/
spindle synchronization multi-step acceleration/deceleration changeover speed 5 (sptc45) to the spindle
sync multi-step acceleration/deceleration changeover speed 6 (sptc46) when the 4th step gear is selected.
Set this as a magnification with respect to the spindle-mode servo control/spindle synchronization accelera tion/deceleration time constant (spt4).
---Setting range---
0 to 127
Time constant magnification for changeover speed 6 (Gear: 11)
Specify the acceleration/deceleration time constant to be used in a range of the spindle-mode servo control/
spindle synchronization multi-step acceleration/deceleration changeover speed 6 (sptc46) to the spindle
sync multi-step acceleration/deceleration changeover speed 7 (sptc47) when the 4th step gear is selected.
Set this as a magnification with respect to the spindle-mode servo control/spindle synchronization accelera tion/deceleration time constant (spt4).
---Setting range---
0 to 127
#13560 spdiv42 Time constant magnification for changeover speed 2
(Gear: 11)
#13561 spdiv43 Time constant magnification for changeover speed 3
(Gear: 11)
#13562 spdiv44 Time constant magnification for changeover speed 4
(Gear: 11)
#13563 spdiv45 Time constant magnification for changeover speed 5
(Gear: 11)
#13564 spdiv46 Time constant magnification for changeover speed 6
(Gear: 11)

Time constant magnification for changeover speed 7 (Gear: 11)
Specify the acceleration/deceleration time constant to be used for the spindle-mode servo control/spindle
synchronization multi-step acceleration/deceleration changeover speed 7 (sptc47) or a higher speed when
the 4th step gear is selected. Set this as a magnification with respect to the spindle-mode servo control/spin dle synchronization acceleration/deceleration time constant (spt4).
---Setting range---
0 to 127
Select whether to enable OMR-CC when Spindle position control function is used together.
0: Disable OMR-CC
1: Enable OMR-CC
Select whether to enable turret gear change control (gear change at the spindle gear ratios SGRA1 to
SGRB4) for a spindle that is under semi-closed loop control.
0: Disable
1: Enable
This ratio is enabled under turret gear change control.
Specify the number of spindle-side gear teeth for gear selection command GI1=0/GI2=0.
When 0 is set, the operation will be the same as when 1 is set.
---Setting range---
0 to 32767
This ratio is enabled under turret gear change control.
Specify the number of spindle-side gear teeth for gear selection command GI1=1/GI2=0.

When 0 is set, the operation will be the same as when 1 is set.
---Setting range---
0 to 32767
This ratio is enabled under turret gear change control.
Specify the number of spindle-side gear teeth for gear selection command GI1=0/GI2=1.
When 0 is set, the operation will be the same as when 1 is set.
---Setting range---
0 to 32767
This ratio is enabled under turret gear change control.
Specify the number of spindle-side gear teeth for gear selection command GI1=1/GI2=1.
When 0 is set, the operation will be the same as when 1 is set.
---Setting range---
0 to 32767
This ratio is enabled under turret gear change control.
Specify the number of teeth of the motor shaft side gear 1 for gear selection command GI1=0/GI2=0.
When 0 is set, the operation will be the same as when 1 is set.
---Setting range---
0 to 32767
#13565 spdiv47 Time constant magnification for changeover speed 7
(Gear: 11)
#13678 OMRCC_valid_sp OMR-CC valid
(PR) #43001 sgear_tret Turret gear change ON
#43002 SGRA1 Spindle-side gear ratio 1
#43003 SGRA2 Spindle-side gear ratio 2
#43004 SGRA3 Spindle-side gear ratio 3
#43005 SGRA4 Spindle-side gear ratio 4
#43006 SGRB1 Motor shaft-side gear ratio 1

This ratio is enabled under turret gear change control.
Specify the number of teeth of the motor shaft side gear 1 for gear selection command GI1=1/GI2=0.
When 0 is set, the operation will be the same as when 1 is set.
---Setting range---
0 to 32767
This ratio is enabled under turret gear change control.
Specify the number of teeth of the motor shaft side gear 1 for gear selection command GI1=0/GI2=1.
When 0 is set, the operation will be the same as when 1 is set.
---Setting range---
0 to 32767
This ratio is enabled under turret gear change control.
Specify the number of teeth of the motor shaft side gear 1 for gear selection command GI1=1/GI2=1.
When 0 is set, the operation will be the same as when 1 is set.
---Setting range---
0 to 32767
Specify the maximum rotation speed in synchronous tapping multi-step acceleration/deceleration control when gear 00 is selected.
Inclination of 3rd linear acceleration/deceleration control is determined by the ratio of smax_tap1(#43046) and tapt31(#3045).
When "0" is set to smax_tap1, use smax1(#3005).
When smax_tap1 is smax1 or more, use smax1.
---Setting range---
0 to 99999 (r/min)
Specify the maximum rotation speed in synchronous tapping multi-step acceleration/deceleration control when gear 01 is selected.
Inclination of 3rd linear acceleration/deceleration control is determined by the ratio of smax_tap2(#43047) and tapt32(#3046).
When "0" is set to smax_tap2, use smax2 (#3006).
When smax_tap2 is smax2 or more, use smax2.
---Setting range---
0 to 99999 (r/min)
Specify the maximum rotation speed in synchronous tapping multi-step acceleration/deceleration control when gear 10 is selected.
Inclination of 3rd linear acceleration/deceleration control is determined by the ratio of smax_tap3(#43048) and tapt33(#3047).
When "0" is set to smax_tap3, use smax3 (#3007).
When smax_tap3 is smax3 or more, use smax3.
---Setting range---
0 to 99999 (r/min)
Specify the maximum rotation speed in synchronous tapping multi-step acceleration/deceleration control when gear 11 is selected.
Inclination of 3rd linear acceleration/deceleration control is determined by the ratio of smax_tap4(#43049) and tapt34(#3048).
When 0 is set to smax_tap4, use smax4(#3008).
When smax_tap4 is smax4 or more, use smax4.
---Setting range---
0 to 99999 (r/min)
#43007 SGRB2 Motor shaft-side gear ratio 2
#43008 SGRB3 Motor shaft-side gear ratio 3
#43009 SGRB4 Motor shaft-side gear ratio 4
#43046 smax_tap1 Synchro tapping spindle Max rotation speed (Gear: 00)
#43047 smax_tap2 Synchro tapping spindle Max rotation speed (Gear: 01)
#43048 smax_tap3 Synchro tapping spindle Max rotation speed (Gear: 10)
#43049 smax_tap4 Synchro tapping spindle Max rotation speed (Gear: 11)

Specify the equivalent load factor of the spindle motor that causes the warning at the start of automatic op eration.
The warning appears when the equivalent load factor has exceeded the specified value.
0: Disable the warning
1 to 200: Warning display threshold [%]
This parameter is used when address P is omitted from the spindle speed fluctuation detection command
(G162). Specify a length of delay time from when G162 command is given to when the control detects a fluc tuation.
This delay time is also applied to a change in spindle speed command. A change in spindle speed command
means a difference in the final command given to the spindle drive unit.
---Setting range---
0 to 99.999 (s)
Specify the allowable spindle speed fluctuation rate to be applied to the spindle speed fluctuation detection
command (G162) from which address R is omitted.
When "0" is set, the allowable rate is 15%.
If a speed deviation with respect to the command speed is smaller than 45 r/min, the speed deviation is treat ed as 45 r/min.
---Setting range---
0 to 100 (%)
Specify the allowable spindle speed fluctuation range to be applied to the spindle speed fluctuation detection
command (G162) from which address I is omitted.
When "0" is set, the allowable range is treated as 45 r/min.
---Setting range---
0 to 999999 (r/min)
Specify the maximum number of revolutions for the Z phase detection of proximity-switch orientation.
If Z phase is not yet detected when the spindle has reached the specified number of revolutions, the opera tion error (M01 0301) occurs.
When this parameter is "0", the maximum number of revolutions is treated as 2.
---Setting range---
0 to 255 (revolutions)
Specify the number of spindle-side gear teeth for "Gear selection command (Control input 4/bit6, 5) = 00".
When 0 is set, extended gear ratio is disabled.
When not using, set to "0".
---Setting range---
0 to 2147483647
Specify the number of spindle-side gear teeth for "Gear selection command (Control input 4/bit6, 5) = 01".
When 0 is set, extended gear ratio is disabled.
When not using, set to "0".
---Setting range---
0 to 2147483647
Specify the number of spindle-side gear teeth for "Gear selection command (Control input 4/bit6, 5) = 10".
When 0 is set, extended gear ratio is disabled.
When not using, set to "0".
---Setting range---
0 to 2147483647
#43070 loadrate_warn Spindle motor equivalent load factor excess warning
#43071 sp_spd_flc_dtc_p Delay time for starting spindle speed fluctuation detec tion
#43072 sp_spd_flc_dtc_r Allowable spindle speed fluctuation rate
#43073 sp_spd_flc_dtc_i Allowable spindle speed fluctuation range
#43074 zdet_num Maximum number of revolutions for Z phase detection
(PR) #43076 GRA1ex Spindle-side extended gear ratio 1
(PR) #43077 GRA2ex Spindle-side extended gear ratio 2
(PR) #43078 GRA3ex Spindle-side extended gear ratio 3

Specify the number of spindle-side gear teeth for "Gear selection command (Control input 4/bit6, 5) = 11".
When 0 is set, extended gear ratio is disabled.
When not using, set to "0".
---Setting range---
0 to 2147483647
Specify the number of motor-side gear teeth for "Gear selection command (Control input 4/bit6, 5) = 00".
When 0 is set, extended gear ratio is disabled.
When not using, set to "0".
---Setting range---
0 to 2147483647
Specify the number of motor-side gear teeth for "Gear selection command (Control input 4/bit6, 5) = 01".
When 0 is set, extended gear ratio is disabled.
When not using, set to "0".
---Setting range---
0 to 2147483647
Specify the number of motor-side gear teeth for "Gear selection command (Control input 4/bit6, 5) = 10".
When 0 is set, extended gear ratio is disabled.
When not using, set to "0".
---Setting range---
0 to 2147483647
Specify the number of motor-side gear teeth for "Gear selection command (Control input 4/bit6, 5) = 11".
When 0 is set, extended gear ratio is disabled.
When not using, set to "0".
---Setting range---
0 to 2147483647
Specify the motor temperature at which spindle protection starts.
When the spindle motor temperature reaches the set temperature or higher, the acceleration/deceleration
time constant is switched from that of S command to that for spindle protection.
Set a temperature that is the same as or higher than the spindle protection cancel temperature.
When 0 is set, the spindle acceleration/deceleration time constant is not switched according to the tempera ture.
---Setting range---
0 to 200 (C)
Specify the motor temperature at which spindle protection is cancelled.
When the spindle motor temperature drops below the set temperature, the acceleration/deceleration time

constant is switched from that for spindle protection to that of S command.
Set a temperature that is the same as or lower than the spindle protection start temperature.
When the set temperature is 0 or higher than the spindle protection start temperature, the cancel temperature is set 10 degrees lower than the start temperature.
---Setting range---
0 to 200 (C)
(PR) #43079 GRA4ex Spindle-side extended gear ratio 4
(PR) #43080 GRB1ex Motor-side extended gear ratio 1
(PR) #43081 GRB2ex Motor-side extended gear ratio 2
(PR) #43082 GRB3ex Motor-side extended gear ratio 3
(PR) #43083 GRB4ex Motor-side extended gear ratio 4
#43084 protect_sp_st_tmp Spindle protection start temperature
#43085 protect_sp_rls_tmp Spindle protection cancel temperature

Specify the acceleration/deceleration time constant for S command (speed operation mode) to be applied to the spindle motor (gear 00) that is being protected against increased temperature.
Set the linear acceleration/deceleration time up to limit rotation speed (slimt1).
When 0 or any value smaller than "#3101 sp_t1" is set, switchover of the time constant is disabled, and ac celeration/deceleration is performed with the time constant "#3101 sp_t1".
---Setting range---
0 to 30000 (ms)
Specify the acceleration/deceleration time constant for S command (speed operation mode) to be applied to the spindle motor (gear 01) that is being protected against increased temperature.
Set the linear acceleration/deceleration time up to limit rotation speed (slimt2).
When 0 or any value smaller than "#3102 sp_t2" is set, switchover of the time constant is disabled, and ac celeration/deceleration is performed with the time constant "#3102 sp_t2".
---Setting range---
0 to 30000 (ms)
Specify the acceleration/deceleration time constant for S command (speed operation mode) to be applied to the spindle motor (gear 10) that is being protected against increased temperature.
Set the linear acceleration/deceleration time up to limit rotation speed (slimt3).
When "0" or any value smaller than "#3103 sp_t3" is set, switchover of the time constant is disabled, and acceleration/deceleration is performed with the time constant "#3103 sp_t3".
---Setting range---
0 to 30000 (ms)
Specify the acceleration/deceleration time constant for S command (speed operation mode) to be applied to the spindle motor (gear 11) that is being protected against increased temperature.
Set the linear acceleration/deceleration time up to limit rotation speed (slimt4).
When "0" or any value smaller than "#3104 sp_t4" is set, switchover of the time constant is disabled, and acceleration/deceleration is performed with the time constant "#3104 sp_t4".
---Setting range---
0 to 30000 (ms)
This parameter specifies the position loop gain that is applied when the spindle is controlled in C axis mode.
If the parameter is set to "0", the value of the spindle parameter "#13002 SP002 (PGN)" will be used.
---Setting range---
0 to 200 (rad/s)
When using the "Spindle control with pulse train output" function, subtract 1 from the number of pulses per revolution of the spindle motor, and enter the result in this parameter.
(Example) When the number of pulses per revolution of the motor connected is 4096, enter "4095" in this parameter.
---Setting range---
0 to 32767
#43086 protect_sp_t1 Acceleration/Deceleration time constant during spindle protection (Gear: 00)
#43087 protect_sp_t2 Acceleration/Deceleration time constant during spindle protection (Gear: 01)
#43088 protect_sp_t3 Acceleration/Deceleration time constant during spindle protection (Gear: 10)
#43089 protect_sp_t4 Acceleration/Deceleration time constant during spindle protection (Gear: 11)
#43095 SP002cax(PGNcax) Position loop gain for C axis mode
(PR) #43097 sprotpls Number of pulses per motor revolution

Specify the form of the pulse train to be output.
bit8: Output logic
Specify the logic of the pulse train to be output.
0: Positive logic (Active high)
1: Negative logic (Active low)
bit7-4: Multiplying factor
Specify the multiplying factor for the frequency of the pulse train.
0: 1-fold
1: 1/4-fold
bit3-0: Output mode
Specify the form of the pulse train for forward/reverse rotation.
0: A/B phase mode
1: PULSE/SIGN mode
2: CW/CCW mode
---Setting range---
0000 to FFFF (HEX)
Specify the maximum rotation speed of the spindle motor that should be controlled with the pulse train output.
---Setting range---
0 to 999999 (r/min)
Specify the time period to determine there is an error in feedback signal from the spindle encoder.
If the feedback signal from the spindle encoder does not change significantly when the parameterized time

period has elapsed after start of output to the spindle, the system determines there is an error in the spindle encoder, and an alarm stop takes place.
If "0" is specified, the system behaves as if "200" was specified.
This parameter is only valid when "#3025 enc-on" (Spindle encoder) is "1".
---Setting range---
0 to 1000 (ms)
Adjust the value to be displayed and output as the equivalent load factor of the spindle motor using this pa rameter.
(Example) When converting to continuous rating:
Continuous rating / short-time rating * 100
---Setting range---
0 to 150 (%)
Note that when set to "0", 100% applies.
Hide (blank) the spindle unit temperature on the drive monitor screen.
0: Show
1: Hide
(Note) Regardless of the setting of "#1251 set23/bit1" (Spindle temperature display), the temperature of the spindle for which "1" is set in this parameter is hidden (blank).
(PR) #43098 plsspec Form of pulse train output
(PR) #43099 plsmot Maximum rotation speed of spindle motor controlled with pulse train output
#43100 plschk Time to check spindle encoder output for control with pulse train output
#43101 loadrate_ratio Spindle motor equivalent load factor rating ratio
#43105 sp_temp_hide Hide Spindle temperature

Specify the second character following the "S" in the spindle name to be displayed on the screen.
(Example) "SA" is displayed as the spindle name when "A" is set.
(Note) If even one spindle has a blank name, the spindle No. is displayed as the second character following the S in the name of all spindles.
---Setting range---
A to Z and 1 to 9
(Setting is cleared when "0" is set.)
(PR) #43107 S_disp_name Sp disp name

Set the position loop gain for "Non-interpolation" control mode.
When the setting value increases, the command tracking ability will enhance and the positioning settling time can be shorter. However, the impact on the machine during acceleration/deceleration will increase.
Use the selection command, the control mode "bit 2, 1, 0 = 000" in control input 4.
(Note) The control mode is commanded by NC.
---Setting range---
1 to 200 (rad/s)
Set the position loop gain for "interpolation" control mode.
When the setting value increases, the command tracking ability will enhance and the positioning settling time can be shorter. However, the impact on the machine during acceleration/deceleration will increase.
Use the selection command, the control mode "bit 2, 1, 0 = 010 or 100" in control input 4.
(Note) The control mode is commanded by NC.
When carrying out the SHG control, set SP035/bitC to "1".
---Setting range---
1 to 200 (rad/s)
Set the position loop gain for "spindle synchronization" control mode.
When the setting value increases, the command tracking ability will enhance and the positioning settling time can be shorter. However, the impact on the machine during acceleration/deceleration will increase.
Use the selection command, the control mode "bit 2, 1, 0 = 001" in control input 4.
(Note 1) The control mode is commanded by NC.
When carrying out the SHG control, set SP036/bit4 to "1".
(Note 2) Set the same value for the basic and synchronous spindles in spindle synchronization.
---Setting range---
1 to 200 (rad/s)
Not used. Set to "0".
Set the speed loop gain.
Set this according to the load inertia size.
The higher setting value will increase the accuracy of control, however, vibration tends to occur.
If vibration occurs, adjust by lowering by 20 to 30%.
The final value should be 70 to 80% of the value at which the vibration stops.
---Setting range---
1 to 9999
Set the speed loop integral control gain.
The standard setting is "1900". Adjust the value by increasing/decreasing the value by about 100.
Raise this value to improve the contour tracking accuracy in high-speed cutting.
Lower this value when the position droop does not stabilize (when the vibration of 10 to 20Hz occurs).
---Setting range---
1 to 9999
Set this parameter when the limit cycle occurs in the full-closed loop or overshooting occurs in positioning.
When setting this parameter, make sure to set the torque offset "SP050(TOF)".
When not using, set to "0".
---Setting range---
0 to 32767
#13001 SP001 PGV Position loop gain non-interpolation mode
#13002 SP002 PGN Position loop gain interpolation mode
#13003 SP003 PGS Position loop gain spindle synchronization
#13004 SP004

#13005 SP005 VGN1 Speed loop gain 1
#13006 SP006 VIA1 Speed loop lead compensation 1
#13007 SP007 VIL1 Speed loop delay compensation 1

Normally SP005(VGN1) is used.
By setting "SP035/bit1, SP035/bit9 or SP036/bit1=1", gain 2 can be used according to the application.
Gain 2 can also be used by setting "Speed gain set 2 changeover request (control input 5/ bitC) = 1".
Refer to SP005(VGN1) for adjustment procedures.
---Setting range---
1 to 9999
Normally SP006(VIA1) is used.
By setting "SP035/bit1, SP035/bit9 or SP036/bit1=1", gain 2 can be used according to the application.
Gain 2 can also be used by setting "Speed gain set 2 changeover request (control input 5/ bitC) = 1".
Refer to SP006(VIA1) for adjustment procedures.
---Setting range---
1 to 9999
Normally SP007(VIL1) is used.
By setting "SP035/bit1, SP035/bit9 or SP036/bit1=1", gain 2 can be used according to the application.
Gain 2 can also be used by setting "Speed gain set 2 changeover request (control input 5/ bitC) = 1".
Refer to SP007(VIL1) for adjustment procedures.
---Setting range---
0 to 32767
Not used. Set to "0".
Not used. Set to "0".
Not used. Set to "0".
Set the minimum value for the variable excitation rate. The standard setting is "50".
Set to "0" when using an IPM spindle motor.
If noise including gear noise is loud, select a small value. However, a larger setting value is more effective
for impact response.
(Note) When setting a value at "50 or more", check if there is no problem with gear noise, motor excitation
noise, vibration during low-speed rotation or vibration when the servo is locked during orientation stop, etc.
When setting a value at "less than 50", check if there is no problem with the impact load response or rigidity
during servo lock.
---Setting range---
0 to 100 (%)
Normally, SP014(PY1) is used.
By setting "SP035/bit2, SP035/bitA or SP036/bit2=1", the excitation rate 2 can be used according to the ap plication.
The excitation rate 2 can also be used by setting "the minimum excitation rate 2 changeover request (control
input 5/ bitB) = 1". Refer to SP014(PY1) for adjustment procedures.
Set to "0" when using an IPM spindle motor.
---Setting range---
0 to 100 (%)
#13008 SP008 VGN2 Speed loop gain 2
#13009 SP009 VIA2 Speed loop lead compensation 2
#13010 SP010 VIL2 Speed loop delay compensation 2
#13011 SP011
#13012 SP012
#13013 SP013
#13014 SP014 PY1 Minimum excitation rate 1
#13015 SP015 PY2 Minimum excitation rate 2

Set the single-rotation position alignment deceleration rate for orientation stopping, phase alignment while
rotating and switching from non-interpolation mode to spindle synchronization mode while rotating.
When the load inertia is larger, the setting value should be smaller.
When the setting value is larger, the orientation in-position and single-rotation position alignment complete
faster, but the impact applied on the machine will increase.
To change the deceleration rate only during rotation command (command F T 0), set this parameter to gether with SP070 (KDDT).
---Setting range---
1 to 32767 (0.1(r/min)/ms)
Select the spindle specification.
A function is allocated to each bit.
Set this in hexadecimal format.
bit F-C : msr Motor series selection
0: 200V specification IM spindle motor
1: 200V specification IPM spindle motor
2: 400V specification IM spindle motor
3: 400V specification IPM spindle motor
4: 200V specification Tool spindle motor
bit B-5 :
Not used. Set to "0".
bit 4 : fdir Position feedback
Set the machine side encoder's installation polarity.
0: Forward polarity 1: Reverse polarity
bit 3 : vfb Speed feedback filter
0: Disable 1: Enable (4500Hz)
bit 2 : seqh READY ON sequence
0: Normal 1: High-speed
bit 1 : dfbx Dual feedback control
Control the position FB signal in full closed control by the combination of a motor side encoder and machine
side encoder.
0: Stop 1: Start
Related parameters: SP051, SP052

bit 0 : fdir2 Speed feedback polarity
Set the motor side encoder's installation polarity by a built-in motor.
0: Forward polarity 1: Reverse polarity
#13016 SP016 DDT Phase alignment deceleration rate
(PR) #13017 SP017 SPEC1 Spindle specification 1
msr
fdir
vfb
seqh
fdir2
dfbx

Select the spindle specification.
A function is allocated to each bit.
Set this in hexadecimal format.
bit F-A :
Not used. Set to "0".
bit 9 : mpg Earth fault detection
0: Disable 1: Enable (standard)
Set "0" and it is constantly "Enable" for MDS-EJ-SP Series.
bit 8 : spsu Command speed limit value
0: 33,750 r/min 1: 135,000 r/min
bit 7-6 :
Not used. Set to "0".
bit 5 : mkch Coil switch function
0: Disable 1: Enable
bit 4-2 :
Not used. Set to "0".
bit 1 : oplp Open loop control
This allows the operation in which no encoder feedback signals are used.
It is used when adjusting the encoder, etc.
0: Disable 1: Enable
bit 0 :
Not used. Set to "0".
[For semi-closed loop]
Set the same value as SP020 (RNG2). (Refer to the explanation of SP020.)
[For full-closed loop]
Set the number of pulses per revolution of the machine side encoder.
When using the encoder interface unit MDS-EX-HR, use this with SP097(RNG1ex).
Encoder
OSE-1024 (ABZ pulse): SP019=4096, SP097=-1
TS5690(64 teeth): SP019 = 2000, SP097=0
TS5690(90 teeth): SP019 = 2880, SP097=0
TS5690(128 teeth): SP019 = 4000, SP097=0
TS5690(192 teeth): SP019 = 6000, SP097=0
TS5690(256 teeth): SP019 = 8000, SP097=0
TS5690(384 teeth): SP019 =12000, SP097=0
ERM280(1200 teeth): SP019 = 4800, SP097=0
ERM280(2048 teeth): SP019 = 8000, SP097=0
MPCI : SP019 = 7200, SP097=0
MBE205: SP019 = 2000, SP097=0
GEL2449M(524,288(p/rev)): SP019=0, SP097=8
MHS-04B Series(1,048,576(p/rev)): SP019=0, SP097=16
---Setting range---
When SP097=0, the setting range is from 0 to 32767 (kp)
When SP0970, the setting range is from 0 to 65535 (p)
(PR) #13018 SP018 SPEC2 Spindle specification 2
(PR) #13019 SP019 RNG1 Sub side encoder resolution
mpg
oplp
mkch
spsu

Set the number of pulses per revolution of the motor side encoder. Set the standard parameters for the motor with frame.
---Setting range---
When SP098=0, the setting range is from 0 to 32767 (kp)
When SP0980, the setting range is from 0 to 65535 (p)
Set the detection time constant of Overload 1 (Alarm 50). (For Mitsubishi Electric adjustment)
Normally, set to "60".
Set to "300" when using an IPM spindle motor.
---Setting range---
1 to 15300 (s)
Set the current detection level of "Overload 1" (Alarm 50) as a percentage against the motor short-time rated output current. (For Mitsubishi Electric adjustment)
Normally, set to "120".
Set to "100" when using an IPM spindle motor.
---Setting range---
1 to 200 (Short-time rated %)
Set the excessive error detection width for the interpolation mode and spindle synchronization.
The standard setting is "120".
When set to "0", the excessive error detection will be ignored, so do not set to "0".

---Setting range---
1 to 32767 ()
Set the in-position detection width.
Set the positioning accuracy required to the machine.
Lower setting value increases the positioning accuracy, but makes the cycle time (settling time) longer.
The standard setting is "875".
---Setting range---
0 to 32767 (1/1000)
Use this when detecting an in-position different from normal in-position width such as advancing the in-posi tion signal. The adjustment procedure is the same as SP024 (INP).
The standard setting is "875".
---Setting range---
0 to 32767 (1/1000)
Set the maximum motor speed.
If the motor speed exceeds the set maximum speed, an overspeed alarm will occur.
---Setting range---
1 to 32767 (r/min)
Set the motor speed for detecting zero speed.
If the motor speed drops below the set speed, the zero speed signal turns ON.
The standard setting is "50".
---Setting range---
1 to 1000 (r/min)
(PR) #13020 SP020 RNG2 Main side encoder resolution
(PR) #13021 SP021 OLT Overload detection time constant
#13022 SP022 OLL Overload detection level
#13023 SP023 OD1 Excessive error detection width (interpolation mode -
spindle synchronization)
#13024 SP024 INP In-position width
#13025 SP025 INP2 2nd in-position width
(PR) #13026 SP026 TSP Maximum motor speed
#13027 SP027 ZSP Motor zero speed
M800V/M80V Series Alarm/Parameter Manual
15 Machine Parameters
15.9 Spindle Parameters
IB-1501623-F 600
Set the motor speed for detecting the speed.
If the motor speed drops below the set speed, the speed detection signal turns ON.
The standard setting is 10% of the maximum motor speed.
---Setting range---
10 to 32767 (r/min)
Set the hysteresis width in which the speed detection changes from ON to OFF.
If the setting value is small, the speed detection will chatter easily.
The standard setting is "30".
---Setting range---
10 to 1000 (r/min)
Set the specified speed of the specified speed output.
When carrying out digital output of the specified speed output, set SP229/bitC to "1".
It is not available for MDS-EJ-SP Series.
---Setting range---
0 to 32767 (r/min)
Set the control system of the spindle drive unit.
2200: Semi closed loop control
4200: Full closed loop control by using spindle side ABZ pulse output encoder
6200: Full closed loop control by using spindle side serial output encoder
#13028 SP028 SDTS Speed detection set value
#13029 SP029 SDTR Speed detection reset width
#13030 SP030 SDT2 2nd speed detection setting value
(PR) #13031 SP031 MTYP Motor type
M800V/M80V Series Alarm/Parameter Manual
15 Machine Parameters
15.9 Spindle Parameters
601 IB-1501623-F
MDS-E/EH Series: Power supply type
When connecting a power supply unit, set a code for each power supply unit.
bit F-C : amp
Set the power backup function to be used.
No function used : 0
Deceleration and stop function at power failure : 8
Retraction function at power failure: C
bit B-8 : rtyp
Not used. Set to "0".
bit 7-0 : ptyp External emergency stop setting
When the emergency stop input signal of the power supply unit is "disabled"
Power supply unit is not connected : 00
MDS-E-CV-37 / MDS-EH-CV-37 : 04
MDS-E-CV-75 / MDS-EH-CV-75 : 08
MDS-E-CV-110 / MDS-EH-CV-110 : 11
MDS-E-CV-185 / MDS-EH-CV-185 : 19
MDS-E-CV-300 / MDS-EH-CV-300 : 30
MDS-E-CV-370 / MDS-EH-CV-370 : 37
MDS-E-CV-450 / MDS-EH-CV-450 : 45
MDS-E-CV-550 / MDS-EH-CV-550 : 55
MDS-EH-CV-750 : 75
When the emergency stop input signal of the power supply unit is "enabled"
(Note) Set the power supply rotary switch to "4".
Power supply unit is not connected : 00
MDS-E-CV-37 / MDS-EH-CV-37 : 44
MDS-E-CV-75 / MDS-EH-CV-75 : 48
MDS-E-CV-110 / MDS-EH-CV-110 : 51

MDS-E-CV-185 / MDS-EH-CV-185 : 59
MDS-E-CV-300 / MDS-EH-CV-300 : 70
MDS-E-CV-370 / MDS-EH-CV-370 : 77
MDS-E-CV-450 / MDS-EH-CV-450 : 85
MDS-E-CV-550 / MDS-EH-CV-550 : 95
MDS-EH-CV-750 : B5
MDS-EM/EMH Series: Power supply type
Set as follows for the spindle drive section of the MDS-EM/EMH-SPV3.
bit F-C : amp
Not used. Set to "0".
bit B-8 : rtyp
Not used. Set to "0".
bit 7-0 : ptyp External emergency stop setting
Normal
MDS-EM: 20, MDS-EMH: 22, MDS-EM-SPV3-16040S: 16, MDS-EM-SPV3-320120: 37
External emergency stop function
MDS-EM: 60, MDS-EMH: 62, MDS-EM-SPV3-16040S: 56, MDS-EM-SPV3-320120: 77
(PR) #13032 SP032 PTYP Power supply type/ Regenerative resistor type
ptyp
rtyp
amp
ptyp
rtyp
amp

MDS-EJ-SP Series: Regenerative resistor type
Set the regenerative resistor type.
bit F-8 : amp(bit F-C) / rtyp(bit B-8)
Setting prohibited : 10-12
MR-RB12 or GZG200W39OHMK : 13
MR-RB32 or GZG200W120OHMK 3 units connected in parallel : 14
MR-RB30 or GZG200W39OHMK 3 units connected in parallel : 15
MR-RB50 or GZG300W39OHMK 3 units connected in parallel : 16
Setting prohibited : 17-1F
Setting prohibited : 20-23
FCUA-RB22 : 24
FCUA-RB37 : 25
FCUA-RB55 : 26
FCUA-RB75/2 1 unit : 27
R-UNIT1 : 28
R-UNIT2 : 29
R-UNIT3 : 2A
R-UNIT4 : 2B
R-UNIT5 : 2C
FCUA-RB75/2 2 units connected in parallel : 2D
FCUA-RB55/2 2 units connected in parallel : 2E
Setting prohibited : 2F
bit 7-4 : emgx External emergency stop function
Set the external emergency stop function.
0: Disable 4: Enable
bit 3-0 :
Not used. Set to "0".
emgx
rtyp
amp
0 00 0

Select the spindle specification.
A function is allocated to each bit.
Set this in hexadecimal format.
bit F : hfrf Higher harmonic suppression filter
0: Stop
1: Start
bit E-C :
Not used. Set to "0".
bit B-A : ovs Overshoot compensation
Set this parameter when overshooting occurs during positioning.
bitB,A=
00: Compensation stop
01: Setting prohibited
10: Setting prohibited
11: Compensation type 3
Set the compensation amount in SP043(OVS1) and SP042(OVS2).
bit 9-8 : lmc Lost motion compensation type2
Set this parameter when the protrusion at quadrant change is too large.
bit9,8=
00: Compensation stop
01: Setting prohibited
10: Compensation type 2
11: Setting prohibited
Set the compensation amount in SP048(LMC1) and SP041(LMC2).
bit 7 : lmc2a Lost motion compensation 2 timing

0: Normal 1: Change
bit 6 :
Not used. Set to "0".
bit 5-4 : vfct Jitter compensation pulse number
Suppress vibration by machine backlash when axis stops.
bit5,4=
00: Disable
01: 1 pulse
10: 2 pulse
11: 3 pulses
bit 3-0 :
Not used. Set to "0".
#13033 SP033 SFNC1 Spindle function 1
vfct

Select the spindle function.
A function is allocated to each bit.
Set this in hexadecimal format.
bit F-D : nfd5 Depth of Notch filter 5
Set the depth of Notch filter 5 (SP088).
bit F,E,D=
000: -
001: -18.1[dB]
010: -12.0[dB]
011: -8.5[dB]
100: -6.0[dB]
101: -4.1[dB]
110: -2.5[dB]
111: -1.2[dB]
bit C :
Not used. Set to "0".
bit B-9 : nfd4 Depth of Notch filter 4
Set the depth of Notch filter 4 (SP087).
bit B,A,9=
000: -
001: -18.1[dB]
010: -12.0[dB]
011: -8.5[dB]
100: -6.0[dB]
101: -4.1[dB]
110: -2.5[dB]
111: -1.2[dB]
bit 8 : pwm Current control
0: Standard current control 1: High frequency current control
bit 7-5 : nfd2 Depth of Notch filter 2
Set the depth of Notch filter 2 (SP046).
bit7,6,5=
000: -
001: -18.1[dB]
010: -12.0[dB]
011: -8.5[dB]
100: -6.0[dB]
101: -4.1[dB]
110: -2.5[dB]
111: -1.2[dB]
bit 4 : fhz3 Notch filter 3
0: Stop 1: Start (1125Hz)
bit 3-1 : nfd1 Depth of Notch filter 1
Set the depth of Notch filter 1 (SP038).
bit3,2,1=
000: -
001: -18.1[dB]
010: -12.0[dB]
011: -8.5[dB]
100: -6.0[dB]
101: -4.1[dB]
110: -2.5[dB]
111: -1.2[dB]
#13034 SP034 SFNC2 Spindle function 2
fhz3

bit 0 :
Not used. Set to "0".
Select the spindle function.
A function is allocated to each bit.
Set this in hexadecimal format.
bit F-D :
Not used. Set to "0".
bit C : shgn SHG control in interpolation mode
0: Stop 1: Start
When using the OMR-FF control, set to "0".
bit B :

Not used. Set to "0".
bit A : pyn Excitation rate selection in interpolation mode
0: Select Excitation rate 1 1: Select Excitation rate 2
bit 9 : vgn Speed loop gain set selection in interpolation mode
0: Select Set 1 1: Select Set 2
bit 8-7 :
Not used. Set to "0".
bit 6 : rtt_vgn Real-time tuning I in non-interpolation mode / speed gain adaptation stop
0: Stop 1: Start
bit 5-3 :
Not used. Set to "0".
bit 2 : pyin Excitation rate selection in non-interpolation mode
The excitation rate after the in-position can be selected.
0: Select Excitation rate 1 1: Select Excitation rate 2
bit 1 : vgin Speed loop gain set selection in non-interpolation mode
The speed loop gain set after the in-position can be selected.
0: Select Set 1 1: Select Set 2
bit 0 :
Not used. Set to "0".
(PR) #13035 SP035 SFNC3 Spindle function 3
pyin
vgin
rtt_vgn
vgn
pyn
shgn

Select the spindle function.
A function is allocated to each bit.
Set this in hexadecimal format.
bit F-8 :
Not used. Set to "0".
bit 7 : mksl Coil selection in spindle synchronization mode
0: Select the coil commanded during synchronization 1: Select high-speed coil
bit 6 : rtt_vgns Real-time tuning I in spindle synchronization mode / speed gain adaptation stop
0: Stop 1: Start
bit 5 :
Not used. Set to "0".
bit 4 : shgs SHG control in spindle synchronization mode
0: Stop 1: Start
When using the OMR-FF control, set to "0".
bit 3 :
Not used. Set to "0".
bit 2 : pys Excitation rate selection in spindle synchronization mode
0: Select Excitation rate 1 1: Select Excitation rate 2
bit 1 : vgs Speed loop gain set selection in spindle synchronization mode
0: Select Set 1 (SP005,SP006,SP007) 1: Select Set 2 (SP008,SP009,SP010)
bit 0 :
Not used. Set to "0".
Set the motor axis conversion total load inertia including motor itself in proportion to the motor inertia.
SV037(JL)=(Jm+Jl)/Jm100
Jm: Motor inertia
Jl: Motor axis conversion load inertia
---Setting range---
0 to 5000 (%)
Set the vibration frequency to suppress when machine vibration occurs.
(Enabled at 50 or more.)
When not using, set to "0".
Related parameters: SP034/bit3-1
---Setting range---
0 to 5000 (Hz)
Set this parameter when the lost motion compensation type2 timing does not match.
Adjust by increasing the value by 10 at a time.
---Setting range---
0 to 2000 (ms)
(PR) #13036 SP036 SFNC4 Spindle function 4
#13037 SP037 JL Load inertia scale
#13038 SP038 FHz1 Notch filter frequency 1
#13039 SP039 LMCD Lost motion compensation timing
vgs
pys
shgs
rtt_vgns
mksl

Set the non-sensitive band of the lost motion compensation in the feed forward control.
When "0" is set, 2/1000 is set. Adjust by increasing the value by 1/1000 at a time.
---Setting range---
-32768 to 32767 (1/1000)
Set this parameter with SP048(LMC1) only to vary the lost motion compensation amount depending on the command directions.
Normally, set to "0".

---Setting range---
-1 to 200 (Short-time rated %)
Note that when SP227/bit2 is "1", the range will be -1 to 20000 (Short-time rated 0.01%).
Set this parameter with SP043(OVS1) only to vary the lost motion compensation amount depending on the command directions.
Normally, set to "0".
---Setting range---
-1 to 100 (Short-time rated %)
Note that when SP227/bit2 is "1", the range will be -1 to 10000 (Short-time rated 0.01%).
Set this parameter when overshooting occurs during positioning. This compensates the motor torque during positioning.
This is valid only when the overshooting compensation SP033 (SFNC1/ovs) is selected.
[Type 3 "When SP033/ bitB,A=11"]
Use this when performing overshoot compensation in the feed forward control during arc cutting mode.
Set the compensation amount based on the motor short-time rated current.
Increase the value in increments of 1% to find the value where overshooting ceases.
[To vary compensation amount depending on the direction]
When SV042 (OVS2) is "0", change the SP043 (OVS1) value in both +/- directions to compensate.
To change the compensation amount depending on the command direction, set this with SP042 (OVS2).
(SP043: + direction, SP042: - direction, However, the directions may be opposite depending on other set tings.)
When "-1" is set, the compensation will not be performed in the command direction.
---Setting range---
-1 to 100 (Short-time rated %)
Note that when SP227/bit2 is "1", the range will be -1 to 10000 (Short-time rated 0.01%).
Set the disturbance observer gain. The standard setting is "100".
To use the disturbance observer, also set SP037(JL), SP045(OBS1) and SP226/ bitE.
When not using, set to "0".
---Setting range---
0 to 500 (%)
Set the disturbance observer filter band.
Normally, set to "100".
To use the disturbance observer, also set SP037(JL), SP044(OBS2) and SP226/ bitE.
When not using, set to "0".
---Setting range---
0 to 1000 (rad/s)
#13040 SP040 LMCT Lost motion compensation non-sensitive band
#13041 SP041 LMC2 Lost motion compensation 2
#13042 SP042 OVS2 Overshooting compensation 2
#13043 SP043 OVS1 Overshooting compensation 1
#13044 SP044 OBS2 Disturbance observer gain
#13045 SP045 OBS1 Disturbance observer filter frequency

Set the vibration frequency to suppress when machine vibration occurs.
(Enabled at 50 or more.)
When not using, set to "0".
Related parameters: SP034/bit7-5
---Setting range---
0 to 5000 (Hz)
Set the inductive voltage compensation gain. Normally, set to "100".
Lower the gain when the current FB peak exceeds the current command peak.
---Setting range---
0 to 200 (%)
Set this parameter when the protrusion (that occurs due to the non-sensitive band by friction, torsion, back lash, etc.) at quadrant change is too large.
This sets the compensation torque at quadrant change (when an axis feed direction is reversed) by Short time rated %.
Whether to enable the lost motion compensation and the method can be set with other parameters.
[Type 2 "When SP033/bit9,8=10"]
Set the compensation amount based on the motor short-time rated current.
The standard setting is double of the friction torque. The compensation amount will be 0 when "0" is set.
Related parameters: SP033/bit9-8, SP039, SP040, SP041, SP227/bit2
[To vary compensation amount depending on the direction]
When SP041 (LMC2) is "0", change SP048 (LMC1) value in both of +/- directions to compensate.
To vary the compensation amount depending on the command direction, set this with SP041 (LMC2).
(SP048: + direction, SP041: - direction, However, the directions may be opposite depending on other set tings.)
When "-1" is set, the compensation will not be performed in the command direction.
---Setting range---
-1 to 200 (Short-time rated %)
Note that when SP227/bit2 is "1", the range will be -1 to 20000 (Short-time rated 0.01%).
When a relative error in the synchronous control is too large, set this parameter to the axis that is delaying.
The standard setting is "0". The standard setting in the SHG control is "50".
Adjust relative errors in acceleration/deceleration by increasing the value by 50.
---Setting range---
0 to 999 (%)
Set the imbalance torque.
---Setting range---
-100 to 100 (Short-time rated %)
Set the control time constant in dual feed back.
When the function is valid, the standard setting is "100". When "0" is set, the value is 1 ms.
When the time constant is increased, the operation will get closer to the semi-closed control and the limit of the position loop gain will be raised.
However, this cannot be used when the spindle slip occurs in machine configuration such as V-belt drive.
Related parameters: SP017/bit1, SP052
---Setting range---
0 to 9999 (ms)
#13046 SP046 FHz2 Notch filter frequency 2
#13047 SP047 EC Inductive voltage compensation gain

#13048 SP048 LMC1 Lost motion compensation 1
#13049 SP049 FFC Acceleration rate feed forward gain
#13050 SP050 TOF Torque offset
#13051 SP051 DFBT Dual feed back control time constant

Set the non-sensitive band in the dual feedback control.
Normally set to "0".
Related parameters: SP017/bit1, SP051
---Setting range---
0 to 9999 (1/1000)
Set the excessive error detection width in non-interpolation mode.
Standard setting value: ODS = Maximum motor speed [r/min] 6/PGV/2
When set to "0", the excessive error detection will not be performed.
---Setting range---
0 to 32767 ()
Set the overrun detection width in the full-closed loop control.
When the gap between the motor side encoder and the machine side encoder exceeds the set value, it is judged as an overrun and "Alarm 43" is detected.
When "-1" is set, if the differential velocity between the motor side encoder and the machine side encoder exceeds the 30% of the maximum motor speed, it will be judged as overrun and "Alarm 43" will be detected.
When "0" is set, overrun will be detected with 2.
In the full-closed loop control, normally set this parameter to "360". During V-belt drive, set to "-1".
---Setting range---
-1 to 32767 ()
Set the time required to forcibly execute READY OFF after the emergency stop is input.
Normally set to "5000".
When 5000ms or more is set for deceleration time constant at emergency stop(SP056), set the same value as SP056.
When using the power backup system (MDS-D/DH-PFU) and setting the value of this parameter to 5000ms or more, a communication error between NC and drive unit may occur when power restarts after a instanta neous power interrupt.
It is not a problem so turn the NC power ON again to start up.
When "0" is set, 7000ms is the actual value to be set.

Related parameters: SP056, SP230
---Setting range---
0 to 29900 (ms)
Set the time constant used for the deceleration control at emergency stop. Set the time required to stop from the maximum motor speed (TSP).
When "0" is set, the deceleration control is executed with "7000ms".
Related parameters: SP055, SP230
---Setting range---
0 to 29900 (ms)
Set the number of gear teeth on the spindle side when "the gear selection command (control input 4/bit6, 5)" is set to "00".
---Setting range---
1 to 32767
Set the number of gear teeth on the spindle side when "the gear selection command (control input 4/bit6, 5)" is set to "01".
---Setting range---
1 to 32767
#13052 SP052 DFBN Dual feedback control non-sensitive band
#13053 SP053 ODS Excessive error detection width (non-interpolation mode)
#13054 SP054 ORE Overrun detection width in closed loop control
#13055 SP055 EMGx Max. gate off delay time after emergency stop
#13056 SP056 EMGt Deceleration time constant at emergency stop
(PR) #13057 SP057 GRA1 Spindle side gear ratio 1
(PR) #13058 SP058 GRA2 Spindle side gear ratio 2

Set the number of gear teeth on the spindle side when "the gear selection command (control input 4/bit6, 5)" is set to "10".
---Setting range---
1 to 32767
Set the number of gear teeth on the spindle side when "the gear selection command (control input 4/bit6, 5)" is set to "11".
---Setting range---
1 to 32767
Set the number of gear teeth on the motor side when "the gear selection command (control input 4/bit6, 5)" is set to "00".
---Setting range---
1 to 32767
Set the number of gear teeth on the motor side when "the gear selection command (control input 4/bit6, 5)" is set to "01".
---Setting range---
1 to 32767
Set the number of gear teeth on the motor side when "the gear selection command (control input 4/bit6, 5)" is set to "10".
---Setting range---
1 to 32767
Set the number of gear teeth on the motor side when "the gear selection command (control input 4/bit6, 5)" is set to "11".
---Setting range---

1 to 32767
Set the torque limit value when the torque limit (spindle control input 1/bitA, 9, 8) is set to "001" (TL3, TL2,
TL1 = 001).
---Setting range---
0 to 999 (Short-time rated %)
Set the torque limit value when the torque limit (spindle control input 1/bitA, 9, 8) is set to "010" (TL3, TL2,
TL1 = 010).
---Setting range---
0 to 999 (Short-time rated %)
Set the torque limit value when the torque limit (spindle control input 1/bitA, 9, 8) is set to "011" (TL3, TL2,
TL1 = 011).
---Setting range---
0 to 999 (Short-time rated %)
Set the torque limit value when the torque limit (spindle control input 1/bitA, 9, 8) is set to "100" (TL3, TL2,
TL1 = 100).
---Setting range---
0 to 999 (Short-time rated %)
(PR) #13059 SP059 GRA3 Spindle side gear ratio 3
(PR) #13060 SP060 GRA4 Spindle side gear ratio 4
(PR) #13061 SP061 GRB1 Motor side gear ratio 1
(PR) #13062 SP062 GRB2 Motor side gear ratio 2
(PR) #13063 SP063 GRB3 Motor side gear ratio 3
(PR) #13064 SP064 GRB4 Motor side gear ratio 4
#13065 SP065 TLM1 Torque limit 1
#13066 SP066 TLM2 Torque limit 2
#13067 SP067 TLM3 Torque limit 3
#13068 SP068 TLM4 Torque limit 4

Set the single-rotation position alignment completion width for phase alignment and changing from non-in terpolation to spindle synchronization mode during rotation.
Set the rotation error that is required to the machine.
When the setting value decreases, the rotation error will decrease, but the cycle time (settling time) will get
longer. The standard setting is "875".
---Setting range---
0 to 32767 (1/1000)
Set the scale for SP016 (DDT) to change the deceleration rate only during rotation command (command F
T 0).
When the setting value increases, the single-rotation position alignment will be completed faster, but the im pact to the machine will also increase. When not using, set to "0".
---Setting range---
0 to 255 (1/16-fold)
Set this parameter to adjust the deceleration time by changing the current limit value during deceleration de pending on the motor speed.
As shown below, set the lower limit rate of the current limit in SP071 (DIQM), and use with SP072 (DIQN).
When DIQM is set to 100%, the standard current limit value in deceleration (SP152) is applied.
---Setting range---
0 to 999 (%)
Set this parameter to adjust the deceleration time by changing the current limit value during deceleration de pending on the motor speed.
As shown below, set the lower limit rate of the current limit in SP071 (DIQM), and use with SP072 (DIQN).
When DIQM is set to 100%, the standard current limit value in deceleration (SP152) is applied.
---Setting range---
1 to 32767 (r/min)
#13069 SP069 PCMP Phase alignment completion width
#13070 SP070 KDDT Phase alignment deceleration rate scale
#13071 SP071 DIQM Variable current limit during deceleration, lower limit
value
#13072 SP072 DIQN Variable current limit during deceleration, break point
speed
0 DIQN
DIQM
100%
SP152
Motor speed
0 DIQN
DIQM
100%
SP152
Motor speed

If noise is bothersome during high speed rotation, it may be reduced by lowering the speed loop gain at high
speed.
Set this value to ensure the adequate response by suppressing noise and vibration at low speeds and in creasing the speed loop gain at high speeds for a high-speed spindle of machining center, etc.
As shown below, set the speed loop gain rate for the overspeed detection speed in SP073 (VGVN), and use
with SP074 (VGVS).
When not using, set to "0".
This function can be used when either Speed loop gain set 1 or Speed loop gain set 2 is selected.
---Setting range---
0 to 999 (%)
If noise is bothersome during high speed rotation, it may be reduced by lowering the speed loop gain at high
speed.
Set this value to ensure the adequate response by suppressing noise and vibration at low speeds and in creasing the speed loop gain at high speeds for a high-speed spindle of machining center, etc.
As shown below, set the speed loop gain rate for the overspeed detection speed in SP073 (VGVN), and use
with SP074 (VGVS).
When not using, set to "0".
This function can be used when either Speed loop gain set 1 or Speed loop gain set 2 is selected.

---Setting range---
0 to 32767 (r/min)
Set the slip frequency scale during deceleration.
Normally, set to "0". (For Mitsubishi Electric adjustment)
---Setting range---
0 to 255 (1/16-fold)
#13073 SP073 VGVN Variable speed gain target value
#13074 SP074 VGVS Variable speed gain change start speed
#13075 SP075 DWSH Slip compensation scale during regeneration high speed coil
VGVN
(SP073)
<100
VGVS
(SP074)
100
VGVN
(SP073)
>100
VGVS
(SP074)
100
Scale[%] Scale[%]
Motor speed
[r/min]
When lowering the speed loop gain at high speed When increasing the speed loop gain at high speed
Motor speed
[r/min] VLMT
(Motor limitation speed)
VLMT
(Motor limitation speed)
VGVN
(SP073)
<100
VGVS
(SP074)
100
VGVN
(SP073)
>100
VGVS
(SP074)
100
Scale[%] Scale[%]
Motor speed
[r/min]
When lowering the speed loop gain at high speed When increasing the speed loop gain at high speed
Motor speed
[r/min] VLMT
(Motor limitation speed)
VLMT
(Motor limitation speed)

Set the slip frequency scale at deceleration when using the low-speed coil.
Normally, set to "0". (For Mitsubishi Electric adjustment)
---Setting range---
0 to 255 (1/16-fold)
Set the current loop gain.
To use the coil switch function, set the current loop gain for when the high-speed coil is selected.
The setting value is determined by the motor's electrical characteristics so that the value is fixed to each mo tor used.
Set the value given in the spindle parameter list. (For Mitsubishi Electric adjustment)
---Setting range---
1 to 20480
Set the current loop gain.
To use the coil switch function, set the current loop gain for when the high-speed coil is selected.
The setting value is determined by the motor's electrical characteristics so that the value is fixed to each mo tor used.
Set the value given in the spindle parameter list. (For Mitsubishi Electric adjustment)
---Setting range---
1 to 20480
Set the current loop gain.
To use the coil switch function, set the current loop gain for when the high-speed coil is selected.
The setting value is determined by the motor's electrical characteristics so that the value is fixed to each mo tor used.
Set the value given in the spindle parameter list. (For Mitsubishi Electric adjustment)
---Setting range---
1 to 8192
Set the current loop gain.
To use the coil switch function, set the current loop gain for when the high-speed coil is selected.
The setting value is determined by the motor's electrical characteristics so that the value is fixed to each mo tor used.
Set the value given in the spindle parameter list. (For Mitsubishi Electric adjustment)
---Setting range---
1 to 8192
When using coil switch function, set the current loop gain for when the low-speed coil is selected.
The setting value is determined by the motor's electrical characteristics so that the value is fixed to each mo tor used.
Set the value given in the spindle parameter list. (For Mitsubishi Electric adjustment)
---Setting range---
1 to 20480

When using coil switch function, set the current loop gain for when the low-speed coil is selected.
The setting value is determined by the motor's electrical characteristics so that the value is fixed to each mo tor used.
Set the value given in the spindle parameter list. (For Mitsubishi Electric adjustment)
---Setting range---
1 to 20480
#13076 SP076 DWSL Slip compensation scale during regeneration low speed coil
#13077 SP077 IQA Q axis current lead compensation
#13078 SP078 IDA D axis current lead compensation
#13079 SP079 IQG Q axis current gain
#13080 SP080 IDG D axis current gain
#13081 SP081 IQAL Q axis current lead compensation low-speed coil
#13082 SP082 IDAL D axis current lead compensation low-speed coil

When using coil switch function, set the current loop gain for when the low-speed coil is selected.
The setting value is determined by the motor's electrical characteristics so that the value is fixed to each mo tor used.
Set the value given in the spindle parameter list. (For Mitsubishi Electric adjustment)
---Setting range---
1 to 8192
When using coil switch function, set the current loop gain for when the low-speed coil is selected.
The setting value is determined by the motor's electrical characteristics so that the value is fixed to each mo tor used.
Set the value given in the spindle parameter list. (For Mitsubishi Electric adjustment)
---Setting range---
1 to 8192
Not used. Set to "0".
Not used. Set to "0".
Set the vibration frequency to suppress when machine vibration occurs.
(Enabled at 50 or more.)
When not using, set to "0".
Related parameters: SP034/bitB-9
---Setting range---
0 to 5000 (Hz)
Set the vibration frequency to suppress when machine vibration occurs.
(Enabled at 50 or more.)
When not using, set to "0".
Related parameters: SP034/bitF-D
---Setting range---
0 to 5000 (Hz)
Set the magnification of the torque current stabilizing gain. (For Mitsubishi Electric adjustment)
When set to "0", the torque current stabilization is disabled.
When not using, set to "0".
---Setting range---
0 to 32767
Set the magnification of the excitation current stabilizing gain. (For Mitsubishi Electric adjustment)
When set to "0", the excitation current stabilization is disabled.
When not using, set to "0".
---Setting range---
0 to 32767
Not used. Set to "0".
Not used. Set to "0".
Not used. Set to "0".
#13083 SP083 IQGL Q axis current gain low-speed coil
#13084 SP084 IDGL D axis current gain low-speed coil
#13085 SP085
#13086 SP086
#13087 SP087 FHz4 Notch filter frequency 4
#13088 SP088 FHz5 Notch filter frequency 5
#13089 SP089 TMKQ Spindle output stabilizing gain Q axis
#13090 SP090 TMKD Spindle output stabilizing gain D axis
#13091 SP091
#13092 SP092
#13093 SP093

In the magnetic pole position detection function, the command motor speed and motor speed during the po sition command stop are monitored.
Set the command motor speed level and motor speed level during the position command stop in "r/min" unit.
When the command motor speed level is set to "0", the magnetic pole position error is detected at 10r/min.
Set to "10" as a standard setting when the magnetic pole position error detection function is enabled.
This detects the magnetic pole position error when the motor speed is "100r/min".
Ten-thousands digit, Thousands digit ---------- Command motor speed level (10r/min)
Hundreds digit, Tens digit, Ones digit ---------- Motor speed level (10r/min)
---Setting range---
0 to 31999
Set the magnification against delay/lead compensation (SP006) of the high-response acceleration/deceler ation (valid when SP226/ bitD is set to "1").
Normally, set to "0". Set this parameter to suppress overshooting when the speed is reached.
---Setting range---
0 to 10000 (0.01%)
When the spindle slows down due to multiple cutting, set the processable speed as percentage against the
NC command speed.
If the speed reduces below the tolerable range, the alarm 23 (Excessive speed error) will occur.
(E.g.) When set to 90 [%]
If S1000 is commanded, the speed reduced by 900r/min (=1000r/min 90%) is the allowable lower limit.
Thus if the spindle speed reduces to 100r/min or below, the alarm will occur.
When "0" is set, the magnification is the same as when "85" is set. When set to "-1", the allowable width will

be disabled.
---Setting range---
-1,0 to 100 (%)
When setting the machine side encoder resolution in pulse (p) unit, set the number of pulses to four bite data of SP097 (high-order) and SP019 (low-order) in pulse (p) unit.
When SP097=0, the setting unit of SP019 is (kp).
Refer to SP019 for details.
Related parameters: SP019, SP020, SP098
---Setting range---
-1 to 32767
When setting the motor side encoder resolution in pulse (p) unit, set the number of pulses to four bite data of SP098 (high-order) and SP020 (low-order) in pulse (p) unit.
When SP098=0, the setting unit of SP020 is (kp).
Refer to SP020 for details.
Related parameters: SP019, SP020, SP097
---Setting range---
-1 to 32767
Not used. Set to "0".
#13094 SP094 MPV Magnetic pole error detection speed
#13095 SP095 VIAX Lead compensation scale during high-response accel eration/deceleration
#13096 SP096 SDW Speed slowdown allowable width
#13097 SP097 RNG1ex Extension sub side encoder resolution
#13098 SP098 RNG2ex Extension main side encoder resolution
#13099-
13105
SP099-SP105

Set the scale model gain (position response) in OMR-FF control.
Set the same value as SV002(PGN).
Increase the setting value to perform a high-speed machining such as a fine arc or to improve the path error.
Lower the value when vibration occurs during acceleration/deceleration.
Set to "0" when not using OMR-FF control.
---Setting range---
0 to 300 (rad/s)
Not used. Set to "0".
Set the current feed forward rate in OMR-FF control.
The standard setting is "10000".
Setting value of 0 is equal to "10000(100%)" setting.
Set to "0" when not using OMR-FF control.
---Setting range---
0 to 32767 (0.01%)
Set the current command value for when the open loop control is enabled.
When "0" is set, the state will be the same as when "50" is set.
When not using, set to "0".
The open loop control is enabled when "SP018/bit1" is set to "1".
---Setting range---
0 to 999 (Short-time rated %)
Set the time required to cut off the gate when turning OFF/ON the coil switch contactor.
The value should be longer than the coil switch contactor's OFF/ON time.
The standard setting is "150".
---Setting range---
0 to 3500 (ms)
Set the time required to limit the current immediately after the coil switch contactor ON/OFF is completed and the gate is turned ON.
The standard setting is "250".
---Setting range---
0 to 3500 (ms)
Set the time required to limit the current immediately after the coil switch contactor ON/OFF is completed and the gate is turned ON.
The standard setting is "120".
---Setting range---
0 to 999 (Short-time rated %)
Set the time to detect the speed excessive error alarm.
Set the time required to the machine.
The standard setting is "12".
---Setting range---
0 to 60 (s)
#13106 SP106 PGM OMR-FF scale model gain
#13107-
13111
SP107-SP111
#13112 SP112 IFF OMR-FF current feed forward gain
#13113 SP113 OPLP Current command value for open loop
#13114 SP114 MKT Coil changeover gate cutoff timer
#13115 SP115 MKT2 Coil changeover current limit timer
#13116 SP116 MKIL Coil changeover current limit value
#13117 SP117 SETM Excessive speed deviation timer

Set the magnetic pole shift amount of IPM spindle motor.
During DC excitation of the initial setup: Set the same value displayed in the "AFLT gain" on the NC monitor screen in SP225/bit4=1.
When not using, set to "0".

---Setting range---
-18000 to 18000 (electrical angle 0.01)
Not used. Set to "0".
Not used. Set to "0".
Set the position loop gain in the magnetic polar detection loop.
This is used in the initial magnetic polar detection when the IPM spindle motor is turned ON.
Set to "0" when using an IM spindle motor.
---Setting range---
0 to 32767
Set the speed loop gain in the magnetic polar detection loop.
This is used in the initial magnetic polar detection when the IPM spindle motor is turned ON.
Set to "0" when using an IM spindle motor.
---Setting range---
0 to 32767
Set the speed loop lead compensation in the magnetic polar detection loop.
This is used in the initial magnetic polar detection when the IPM spindle motor is turned ON.
Set to "0" when using an IM spindle motor.
---Setting range---
0 to 32767
Set the current limit value for the magnetic polar detection loop.
This is used in the initial magnetic polar detection when the IPM spindle motor is turned ON.
Set to "0" when using an IM spindle motor.
---Setting range---
0 to 999 (Short-time rated %)
Input the desired data number to D/A output channel.
When using the 2-axis drive unit, set "-1" to the axis that the data will not be output.
When the DC excitation is running:
Use in the DC excitation function.
DC excitation: Set the initial excitation level when SP225/bit4=1.
When "0" is set, the state will be the same as when "20" is set.
---Setting range---
-32768 to 32767
Input the desired data number to D/A output channel.
When using the 2-axis drive unit, set "-1" to the axis that the data will not be output.
When the DC excitation is running:
Use in the DC excitation function.
DC excitation: Set the final excitation level when SP225/bit4=1.
When "0" is set, the state will be the same as when "50" is set.
---Setting range---
-32768 to 32767
(PR) #13118 SP118 MSFT Magnetic pole shift amount
#13119 SP119
#13120 SP120
#13121 SP121 MP Kpp Magnetic pole detection position loop gain
#13122 SP122 MP Kvp Magnetic pole detection speed loop gain
#13123 SP123 MP Kvi Magnetic pole detection speed loop lead compensation
#13124 SP124 ILMTsp Magnetic pole detection current limit value
#13125 SP125 DA1NO D/A output ch1 data No. / Initial DC excitation level
#13126 SP126 DA2NO D/A output ch2 data No. / Final DC excitation level

Set the output scale in increments of 1/100.
When "0" is set, the scale is the same as when "100" is set.
When the DC excitation is running:
Use in the DC excitation function.
DC excitation: Set the initial excitation time when SP225/bit4=1.
When "0" is set, the state will be the same as when "10000" is set.
---Setting range---
-32768 to 32767 (1/100-fold)
Set the output scale in increments of 1/100.
When "0" is set, the scale is the same as when "100" is set.
---Setting range---
-32768 to 32767 (1/100-fold)
Set the unique constants for the spindle motor. (High-speed coil)
The setting value is determined by the motor's mechanical and electrical characteristics and specifications,
so normally set the value given in the spindle parameter list.
Set the unique constants for the spindle motor. (High-speed coil)
The setting value is determined by the motor's mechanical and electrical characteristics and specifications,
so normally set the value given in the spindle parameter list.
For IPM spindle motor
This parameter is used in initial magnetic pole detection of IPM spindle motor.
(1) Pulse application time: Set it in [s] unit.(0 < application time < 350)
(2) Pulse application coil: To select a low-speed coil, add 1000 to the pulse application time.
(3) Polarity of estimated magnetic pole: When it is set to the reverse polarity, add "-" to the total of (1) and (2).
E.g.: When performing 333s pulse-applied magnetic pole estimation in a low-speed coil and selecting the
reverse polarity for the estimated polarity
SP142 = -(333+1000) = -1333
Set the unique constants for the spindle motor. (High-speed coil)
The setting value is determined by the motor's mechanical and electrical characteristics and specifications,
so normally set the value given in the spindle parameter list.
Set the unique constants for the spindle motor. (Low-speed coil)
The setting value is determined by the motor's mechanical and electrical characteristics and specifications,
so normally set the value given in the spindle parameter list.
Set the standard output to be displayed as 100% in load meter using the short-time rated output ratio.
To display the continuous rated output as 100%, set as follows.
Continuous rated output/Short-time rated output 100

When "0" is set, the standard output to be displayed as 100% in load meter will be the short-time rated output.
(Note) When several output characteristics such as 15-minute rating and 30-minute rating are plotted on the characteristics figure, set the change magnification for the characteristic with the highest rated output.
---Setting range---
0 to 100 (%)
#13127 SP127 DA1MPY D/A output ch1 output scale / Initial DC excitation time
#13128 SP128 DA2MPY D/A output ch2 output scale
(PR) #13129-
13141
SP129-SP141
(PR) #13142 SP142
(PR) #13143-
13160
SP143-SP160
(PR) #13161-
13192
SP161-SP192
#13193 SP193 LMR Change magnification for load meter standard output
(High-speed coil)

Set the base speed of the standard output to be displayed as 100% in load meter.
To display the continuous rated output as 100%, set the base speed of the continuous rated output as fol lows.
When "0" is set, the base speed of the short-time rated output will be applied.
(Note) When the speed is less than the base speed, the standard output to be displayed as 100% in load meter changes with the motor speed.
---Setting range---
0 to 32767 (r/min)
Set the standard output to be displayed as 100% in load meter using the short-time rated output ratio.
To display the continuous rated output as 100%, set as follows.
Continuous rated output/Short-time rated output 100
When "0" is set, the standard output to be displayed as 100% in load meter will be the short-time rated output.
(Note) When several output characteristics such as 15-minute rating and 30-minute rating are plotted on the characteristics figure, set the change magnification for the characteristic with the highest rated output.
---Setting range---
0 to 100 (%)
#13194 SP194 LMN Base speed for load meter standard output (High-speed
coil)
#13195 SP195 LMRL Change magnification for load meter standard output
(Low-speed coil)
SP194
(LMN)
(kW)
Base speed of short-time (r/min)
rated output
Output
Speed
Short-time rated output
Continuous rated output

Set the base speed of the standard output to be displayed as 100% in load meter.
To display the continuous rated output as 100%, set the base speed of the continuous rated output as fol lows.
When "0" is set, the base speed of the short-time rated output will be applied.
(Note) When the speed is less than the base speed, the standard output to be displayed as 100% in load meter changes with the motor speed.
---Setting range---
0 to 32767 (r/min)
Not used. Set to "0".
#13196 SP196 LMNL Base speed for load meter standard output (Low-speed
coil)
#13197-
13198
SP197-SP198
SP196
(LMNL)
(kW)
Base speed of short-time (r/min)
rated output
Output
Speed
Short-time rated output
Continuous rated output

In case that machine resonance is induced when mounting a workpiece, the speed loop gain is switched au tomatically in response to inertia by setting the speed loop gain and workpiece inertia multiplier in advance.
The speed loop gain SP199(RTGM) changes in response to the estimated inertia ratio SP200(RTJX) based on the speed loop gain SP005(VGN1) and the inertia multiplier SP037(JL) which were adjusted when no workpiece was mounted.
When SP199 is set to "0", the adaptation of the speed loop gain will be disabled.
Related parameters: SP005, SP037, SP200
---Setting range---

0 to 5000 (%)
In case that machine resonance is induced when mounting a workpiece, the speed loop gain is switched au tomatically in response to inertia by setting the speed loop gain and workpiece inertia multiplier in advance.
The speed loop gain SP199(RTGM) changes in response to the estimated inertia ratio SP200(RTJX) based
on the speed loop gain SP005(VGN1) and the inertia multiplier SP037(JL) which were adjusted when no
workpiece was mounted.
When SP199 is set to "0", the adaptation of the speed loop gain will be disabled.
Related parameters: SP005, SP037, SP199
---Setting range---
0 to 32767 (%)
#13199 SP199 RTGM Real-time tuning: maximum adaptive gain multiplier
#13200 SP200 RTJX Real-time tuning: maximum adaptive inertia ratio

RTGM
(SP199)
JL
(SP037)
RTJX
(SP200)
VGN1
(SP005)
Speed control gain multiplier [%]
Estimated inertia ratio [%]

RTGM
(SP199)
JL
(SP037)
RTJX
(SP200)
VGN1
(SP005)
Speed control gain multiplier [%]
Estimated inertia ratio [%]

Not used. Set to "0".
Select the spindle functions.
Functions are allocated to each bit.
Set this in hexadecimal format.
bit F-C: ovsn Overshooting compensation type 3 non-sensitive band
Set the non-sensitive band of the overshooting compensation type 3 in increments of 2/1000.
In the feed forward control, set the non-sensitive band for the model position droop and ignore the model
overshooting. Set to "2/1000" as a standard.
bit B-9:
Not used. Set to "0".
bit 8: mken Coil switch allowance in deceleration control
This enables a coil changeover while decelerating after an emergency stop for a spindle motor with coil
changeover specification. A coil changeover may enable an excessive load inertia to stop within the maxi mum delay time.
0: Normal (Disable)
1: Enable
bit 7-6: thno
Select the thermistor characteristics.
When SP225/bit3=0 (N type) is selected
bit7,6=
00: For Mitsubishi Electric spindle motor
01: For Mitsubishi Electric spindle motor
10: PT3-51F
11: Setting prohibited
When SP225/bit3=1 (P type) is selected
bit7,6=
00: KTY84-130 (Manufactured by Philips)
01: Setting prohibited
10: Pt1000 (Platinum resistance temperature detector)
11: Setting prohibited
bit 5: ddir Proximity switch signal enable edge
0: Falling edge 1: Rising edge
bit 4: dcd DC excitation mode
0: Normal 1: Start
bit 3: thtyp
Select the thermistor type.
0: Type N thermistor (Mitsubishi Electric standard)
1: Type P thermistor or platinum resistance temperature detector
bit 2: mohn Thermistor temperature detection
0: Normal 1: Disable (Except for TS5690/5691)
bit 1-0:
Not used. Set to "0".
#13201-
13224
SP201-SP224
#13225 SP225 SFNC5 Spindle function 5
ddir
ovsn
dcd
mohn
mken
thtyp

thno

Select the spindle functions.
Functions are allocated to each bit.
Set this in hexadecimal format.
bit F :
Not used. Set to "0".
bit E : obs Disturbance observer
0: Normal 1: Enable
bit D : vup High response acceleration / deceleration
This suppresses a temporal delay which occurs when the target speed is attained from acceleration and when the spindle stops from deceleration.
0: Normal acceleration/deceleration 1: High response acceleration/deceleration Enable
bit C : tqof Spindle output stabilization during acceleration
0: Normal 1: Disable
bit B-9 :
Not used. Set to "0".
bit 8 : r2c Temperature compensation adjustment indicator
0: Normal 1: Display
bit 7 :
Not used. Set to "0".
bit 6 : stod 4D-2 detection disabled during deceleration and stop
0: Normal 1: Alarm 4D-2 detection disabled during deceleration and stop
bit 5 : pon IPM spindle pulse application magnetic pole estimation
0: Normal 1: Enable
bit 4 :
Not used. Set to "0".
bit 3 : dd2 High-speed synchronous tapping 2
0: Normal 1: Enable
bit 2-0 :
Not used. Set to "0".
#13226 SP226 SFNC6 Spindle function 6
r2c
tqof
pon
stod
dd2
vup
obs

Select the spindle functions.
Functions are allocated to each bit.
Set this in hexadecimal format.
bit F-C : dis Digital signal input selection
0: No signal
4: Proximity switch signal detection
Other settings: setting prohibited
bit B-A : dos3 Digital signal output 3 selection (MDS-EJ-SP/SP2)
bitB,A=
00: Disable
01: Setting prohibited
10: Contactor control signal output
11: Setting prohibited
bit 9-3 :
Not used. Set to "0".
bit 2 : ccu Lost motion/overshoot compensation compensation amount setting unit
0: Short-time rated % 1: Short-time rated 0.01%
bit 1-0 :
Not used. Set to "0".
Not used. Set to "0000".
#13227 SP227 SFNC7 Spindle function 7
#13228 SP228 SFNC8 Spindle function 8
ccu
dos3
dis

Select the spindle functions.
Functions are allocated to each bit.
Set this in hexadecimal format.
bit F-E :
Not used. Set to "0".
bit D : rps Safely limited speed setting unit
0: Normal 1: 100/min
bit C : sdt2 Specified speed output digital signal 2 output
0: Normal 1: Enable
bit B-9 :
Not used. Set to "0".
bit 8 : sto Dedicated wiring STO function
Set this parameter to use dedicated wiring STO function.

0: Dedicated wiring STO function unused 1: Dedicated wiring STO function used
(Only for MDS-E/EH and MDS-EJ/EJH)
bit 7-1 :
Not used. Set to "0".
bit 0 : omrffon OMR-FF control enabled
0: Disable 1: Enable
Select the spindle functions.
Functions are allocated to each bit.
Set this in hexadecimal format.
bit F-C :
Not used. Set to "0".
bit B : pfdsr
Set the spindle stop operation at a power failure when the deceleration and stop function at power failure is enabled.
Normal (Coast to a stop at power failure) : 0
Deceleration and stop at power failure : 1
bit A-9 :
Not used. Set to "0".
bit 8 : nohis History of communication error alarm between NC and DRV(34,36,38,39)
0: Enable 1: Disable
bit 7 : cse Spindle C axis command speed monitoring function
0: Normal setting (function disabled) 1: Function enabled
bit 6-0 :
Not used. Set to "0".
Related parameters: SP055, SP056
#13229 SP229 SFNC9 Spindle function 9
#13230 SP230 SFNC10 Spindle function 10
sdt2
rps
sto
omrffon
cse
nohis
pfdsr

bit 3-0 : Sensitivity of estimated resonance frequency
Set the sensitivity of the estimated resonance frequency.
Smaller setting value enables to detect smaller vibration component
0: Normal setting 1: Sensitivity high to F: Sensitivity low.
Not used. Set to "0000".
When 100% is set, the voltage equivalent to the logical non-energized time will be compensated.
When "0" is set, 100% compensation will be performed.
Adjust in increments of 10% from the default value 100%.
If the value is too large, vibration or vibration noise may be generated.
---Setting range---
0 to 255 (%)
Not used. Set to "0".
Set the magnification in converting the thermistor temperature to the control compensation amount.
When "0" is set, the temperature compensation function is disabled.
When not using, or when using an IPM spindle motor, set to "0".
---Setting range---
0 to 400 (%)
Set the delay time constant from the thermistor temperature to the control compensation amount.
When "0" is set, the delay time constant is disabled.
When not using, or when using an IPM spindle motor, set to "0".
---Setting range---
0 to 150 (min)
Set the filter for the torque command.
The standard value is "500".
---Setting range---
0 to 5000 (rad/s)
Set the safely limited speed at the spindle end for the SLS (Safely Limited Speed) function.
When not using, set to "0".
---Setting range---
0 to 18000 (/min)
However, when SP229/bitD is set to "1", the setting range is from -32768 to 32767 (100/min).
#13231 SP231
#13232 SP232
#13233 SP233 IVC Voltage non-sensitive band compensation
#13234 SP234
(PR) #13235 SP235 R2H Temperature compensation gain
(PR) #13236 SP236 WIH Temperature compensation time constant
(PR) #13237 SP237 TCF Torque command filter
#13238 SP238 SSCFEED Safely limited speed

Set the motor's safely limited speed for the SLS (Safely Limited Speed) function.
When not using, set to "0".
---Setting range---
0 to 32767 (r/min)
(Note) The value of the safely limited speed and safely limited motor speed must satisfy the following relation.
If this relation is not satisfied, the parameter error (37 or E4) will occur. (Error parameter No. is 239.)
Checking this relation is executed when the drive unit is turned ON and parameter is changed and speed

observation mode (states when a speed observation command is turned ON) is entered.
Note that "1 (r/min)" is applied when the calculation result is "0 (r/min)"
Not used. Set to "0".
This is automatically set by the NC system.
#13239 SP239 SSCRPM Safely limited motor speed
(PR) #13240 SP240
(PR) #13241-
13256
SP241-SP256
SP238 :SSCFEED
360
X = SP239 :SSCRPM
SP057 :GRA1
SP061 :GRB1

[Exclusive for spindle-mode servo motor]
bit0: Selection of position loop gain when C axis is selected
0: Use the position loop gain (#52203 SV003, #52204 SV004, #52257 SV057)
1: Use the spindle sync control position loop gain (#52249 SV049, #52250 SV050, #52258 SV058)
bit1: Selection of sync tap cycle position loop gain
0: Use the position loop gain (#52203 SV003, #52204 SV004, #52257 SV057)
1: Use the spindle sync control position loop gain (#52249 SV049, #52250 SV050, #52258 SV058)
---Setting range---
00 to FFFF (HEX)
[Exclusive for spindle-mode servo motor]
Specify the motor rotation speed at which zero speed detection is carried out. When the actual motor speed drops to the specified speed or below, the zero speed detection signal turns ON. The standard setting value is "50". When the setting value is "0", it is on the standard setting value.
---Setting range---
0 to 1000 (r/min)
[Exclusive for spindle-mode servo motor]
Specify the motor speed at which speed detection is carried out. When the actual motor speed drops to the specified speed or below, the speed detection signal turns ON. The standard setting value is 10% of the "#3001 slimt1" setting value. When the setting value is "0", it is on the standard setting value.
---Setting range---
0 to 32767(r/min)
[Exclusive for spindle-mode servo motor]
Specify the torque limit value to be applied when Torque limit (Control input 1/bitA,9,8)=001.
---Setting range---
0 to 999 (Short-time rated %)
[Exclusive for spindle-mode servo motor]
Specify the torque limit value to be applied when Torque limit (Control input 1/bitA,9,8)=010.
---Setting range---
0 to 999 (Short-time rated %)
[Exclusive for spindle-mode servo motor]
Specify the torque limit value to be applied when Torque limit (Control input 1/bitA,9,8)=011.
---Setting range---
0 to 999 (Short-time rated %)
The description and setting range for these parameters are the same as Servo parameters "#2201 SV001" to "#2456 SV256". Refer to "15.7 Servo Parameters" for details.
(Note) Set the same value to "#52203 SV003(PGN)" for the reference and synchronized spindles in spindle synchronization.
#52001 SVSPEC Spindle-mode servo: Specification
#52002 svzsp Spindle-mode servo: Motor zero speed
#52003 svsdts Spindle-mode servo: Speed detection set value
#52004 svtlm1 Spindle-mode servo: Torque limit 1
#52005 svtlm2 Spindle-mode servo: Torque limit 2
#52006 svtlm3 Spindle-mode servo: Torque limit 3
#52201-52456 SV001-SV256 Spindle-type Servo Parameters

Set the name of the horizontal axis in the orthogonal coordinate system.
Set "0" when horizontal axis is not used.
---Setting range---
A,B,C,U,V,W,X,Y,Z
Two digits between A to Z and 1 to 9
0: Mechanical axis specifications
Set the name of the vertical axis in the orthogonal coordinate system.
Set "0" when vertical axis is not used.
---Setting range---
A,B,C,U,V,W,X,Y,Z
Two digits between A to Z and 1 to 9
0: Mechanical axis specifications
Set the name of the height axis in the orthogonal coordinate system.
Set "0" when height axis is not used.
---Setting range---
A,B,C,U,V,W,X,Y,Z
Two digits between A to Z and 1 to 9
0: Mechanical axis specifications
Select the coordinate to preset when issuing an origin zero command (G92X_Y_Z_;).
0: Tool center coordinate

1: Holder center coordinate
Select whether to enable the tool handle feed.
0: Enable (tool handle feed)
1: Disable (standard)
Select how to update the display of tool axis travel amount.
0: Update at ABS switch OFF
1: Update at every ON and OFF of ABS switch
Select the movement after passing through a singular point.
0: Type 1
The direction depends on the sign of the rotation angle of A axis or B axis at the start of tool center point control/tool cutting point control.
1: Type 2
The direction where the amount of rotation of C axis on the singular point is smaller.
Set the angle for judging a position near the singular point.
When "0.000" is set, it will operate as 1.000 ().
---Setting range---
0.000 to 5.000 ()
Select the coordinate system for the programming coordinate.
0: Table coordinate system (coordinate system that rotates together with workpiece)
1: Workpiece coordinate system
(PR) #7900 RCDAX_I Orthogonal coordinate horizontal axis name
(PR) #7901 RCDAX_J Orthogonal coordinate vertical axis name
(PR) #7902 RCDAX_K Orthogonal coordinate height axis name
#7903 G92_CRD Origin zero set coordinate selection
#7904 NO_TIP Tool handle feed function selection
#7905 NO_ABS Selection of tool axis travel amount display at manual ABS switch ON/OFF
#7906 PASSTYP Singular point passage type
#7907 CHK_ANG Near singular judgment angle
#7908 SLCT_PRG_COORD Programming coordinate system selection

Select whether to enable the mirror image on the posture vector (IJK) when Type 2 is selected in "#7906 PASSTYP".
0: Disable
1: Enable
Select the interpolation method.
When combining spline interpolation 2 and tool center point control, only the joint interpolation method is val id.
0: Joint interpolation method
1: Single axis rotation interpolation method
Select the reference point of the rotary axis.
0: The origin of the workpiece coordinate system
1: The position at the time of tool center point control/tool cutting point control start command
Select whether to enable the 3-dimensional manual feed
0: Enable (3-dimensional manual feed)
1: Disable (standard manual feed)
Select whether to suppress the machine speed fluctuation due to rotary axis movement.
0: Not suppress
1: Suppress
(Note) This parameter is disabled when SSS control is enabled.
Set the time constant for rotary axis prefilter.
By setting this time constant, the orientation change of the tool (rotary axis motion) during tool center point control/tool cutting point control becomes smoother.
This parameter can also be set from [Setup] screen ([User] - [Hi-prec param]).
When "0" is specified, the rotary axis prefiltering function is disabled.
---Setting range---
0 to 200 (ms)
Set the basic position of rotary axis to establish the feature coordinate system when inclined surface machin ing is commanded.
* The position will not change when inclined surface machining is running. It will change when the next in clined surface machining is commanded.
0: At zero degree
1: At the start position
Select the compensation method of rotation center error.
0: Compensation with orthogonal axis only.
1: Compensation with orthogonal and rotary axes.
Specify in which order to rotate the rotary axes when the address Q is unspecified in G53.6 and when the number of simultaneous contour control axes is limited to 4.
0: In the order of primary and secondary rotary axes
1: In the order of secondary and primary rotary axes
#7909 IJK_VEC_MR Posture vector mirror image selection
#7910 SLCT_INT_MODE Interpolation method selection
#7911 SLCT_STANDARD_POS Reference position of rotary axis
#7912 NO_MANUAL Selection of 3-dimensional manual feed
#7913 MCHN_SPEED_CTRL Machine speed fluctuation suppression
#7914 ROT_PREFILT Rotary axis prefilter time constant
#7915 SLCT_SLOPE_CRD_MOD Rotary axis basic position in inclined surface machin ing
#7916 ROT_ERR_MODE Rotation center error compensation method
(PR) #7917 SLCT_G53_6_ROTAX G53.6 rotary axes rotation order

Select the solution that defines the calculated angle of the primary rotary axis when address P is omitted from G53.1 or G53.6 command.
0: Default solution of each machine type
1: Solution that makes the primary rotary axis value positive
2: Solution that makes the primary rotary axis value negative

Select in which axis direction to rotate the base-side rotary axis of the rotary head. When the base-side rotary axis is tilting, use the tens place to select the axis around which the rotary axis is tilted.
0: Invalid
1: I axis
2: J axis
3: K axis
1x: Tilted around I axis
2x: Tilted around J axis
3x: Tilted around K axis
(Note) A value from 0 to 99 can be set from the screen. However when an invalid value is set, the operation error (M01 0127) occurs at the power ON.
---Setting range---
0 to 3
12, 13, 21, 23, 31, 32
Set the tilt angle if the base-side rotary axis of the rotary head is tilted. Set the angle with the CCW direction of the tilted plane being defined as the positive direction.
---Setting range---
-89.999 to 89.999 ()
Set the name of the tool rotating type base-side rotary axis.
---Setting range---
A,B,C,U,V,W,X,Y,Z
Two digits between A to Z and 1 to 9
0: Mechanical axis specifications
Set the rotation direction of the tool rotating type base-side rotary axis.
The rotation direction specifications vary according to the setting of "#1450 5axis_Spec/bit3" (Select specifi cations of rotation direction parameter).
- When "#1450 5axis_Spec/bit3" = "0"
The specifications vary for each function.
- When "#1450 5axis_Spec/bit3" = "1"
The specifications are common to the functions.
0: When the tool motion viewed from the workpiece is in right-hand screw direction, it is taken as the pos itive direction.
1: When the tool motion viewed from the workpiece is in left-hand screw direction, it is taken as the positive direction.
Set the distance in the horizontal axis direction between the rotation centers of the tool-side rotary axis and the base-side rotary axis.
---Setting range---
-99999.999 to 99999.999 (mm)
#7918 SLCT_ROTAX_ANS Selection of solution for defining primary rotary axis an gle
(PR) #7920 SLCT_T1 Rotary axis selection
(PR) #7921 TIANGT1 Tilt angle
(PR) #7922 ROTAXT1 Rotary axis name
#7923 DIR_T1 Rotation direction
#7924 COFST1H Horizontal axis rotation center offset

Set the distance in the vertical axis direction between the rotation centers of the tool-side rotary axis and the base-side rotary axis.
---Setting range---
-99999.999 to 99999.999 (mm)
Set the distance in the height axis direction between the rotation centers of the tool-side rotary axis and the base-side rotary axis.
---Setting range---
-99999.999 to 99999.999 (mm)
Set the position deviation in the horizontal axis direction of the tool rotating type base-side rotary axis rotation center. When tool rotating type base rotary axis is I axis rotation, set the position deviation of J axis rotation. When tool rotating type base rotary axis is J axis rotation, set the position deviation of K axis rotation. When tool rotating type base rotary axis is K axis rotation, set the position deviation of I axis rotation.
* Radius value is need to be set.
---Setting range---
-99999.999 to 99999.999 (mm)
(Follow as "#1006 mcmpunit" (Machine error compensation unit))
Set the position deviation in the vertical axis direction of the tool rotating type base-side rotary axis rotation center. When tool rotating type base rotary axis is I axis rotation, set the position deviation of K axis rotation. When tool rotating type base rotary axis is J axis rotation, set the position deviation of I axis rotation. When tool rotating type base rotary axis is K axis rotation, set the position deviation of J axis rotation.
* Radius value is need to be set.
---Setting range---
-99999.999 to 99999.999 (mm)
(Follow as "#1006 mcmpunit" (Machine error compensation unit))
Select in which axis direction to rotate the tool-side rotary axis of the rotary head. When the tool-side rotary axis is tilting, use the tens place to select the axis around which the rotary axis is tilted.
0: Invalid
1: I axis
2: J axis
3: K axis
1x: Tilted around I axis
2x: Tilted around J axis
3x: Tilted around K axis
(Note) A value from 0 to 99 can be set from the screen. However when an invalid value is set, the operation error (M01 0127) occurs at the power ON.
---Setting range---
0 to 3
12, 13, 21, 23, 31, 32
Set the tilt angle if the tool-side rotary axis of the rotary head is tilted. Set the angle with the CCW direction of the tilted plane being defined as the positive direction.
---Setting range---
-89.999 to 89.999 ()

#7925 COFST1V Vertical axis rotation center offset
#7926 COFST1T Height axis rotation center offset
#7927 CERRT1H Horizontal axis rotation center position deviation
#7928 CERRT1V Vertical axis rotation center position deviation
(PR) #7930 LCT_T2 Rotary axis selection
(PR) #7931 TIANGT2 Tilt angle

Set the name of the tool rotating type tool-side rotary axis.
---Setting range---
A,B,C,U,V,W,X,Y,Z
Two digits between A to Z and 1 to 9
0: Mechanical axis specifications
Set the rotation direction of the tool rotating type tool-side rotary axis.
The rotation direction specifications vary according to the setting of "#1450 5axis_Spec/bit3" (Select specifi cations of rotation direction parameter).
- When "#1450 5axis_Spec/bit3" = "0"
The specifications vary for each function.
- When "#1450 5axis_Spec/bit3" = "1"
The specifications are common to the functions.
0: When the tool motion viewed from the workpiece is in right-hand screw direction, it is taken as the pos itive direction.
1: When the tool motion viewed from the workpiece is in left-hand screw direction, it is taken as the positive direction.
Set the distance in the horizontal axis direction between the spindle holder center and the rotation center of the tool-side rotary axis.
---Setting range---
-99999.999 to 99999.999 (mm)
Set the distance in the vertical axis direction between the spindle holder center and the rotation center of the tool-side rotary axis.
---Setting range---
-99999.999 to 99999.999 (mm)
Set the distance in the height axis direction between the spindle holder center and the rotation center of the tool-side rotary axis.
---Setting range---
-99999.999 to 99999.999 (mm)
Set the position deviation in the horizontal axis direction of the tool rotating type tool-side rotary axis rotation center. When tool rotating type tool rotary axis is I axis rotation, set the position deviation of J axis rotation. When tool rotating type tool rotary axis is J axis rotation, set the position deviation of K axis rotation. When tool rotating type tool rotary axis is K axis rotation, set the position deviation of I axis rotation.
* Radius value is need to be set.
---Setting range---
-99999.999 to 99999.999 (mm)
(Follow as "#1006 mcmpunit" (Machine error compensation unit))
Set the position deviation in the vertical axis direction of the tool rotating type tool-side rotary axis rotation center. When tool rotating type tool rotary axis is I axis rotation, set the position deviation of K axis rotation. When tool rotating type tool rotary axis is J axis rotation, set the position deviation of I axis rotation. When tool rotating type tool rotary axis is K axis rotation, set the position deviation of J axis rotation.
* Radius value is need to be set.
---Setting range---
-99999.999 to 99999.999 (mm)
(Follow as "#1006 mcmpunit" (Machine error compensation unit))
(PR) #7932 ROTAXT2 Rotary axis name
#7933 DIR_T2 Rotation direction
#7934 COFST2H Horizontal axis rotation center offset
#7935 COFST2V Vertical axis rotation center offset
#7936 COFST2T Height axis rotation center offset
#7937 CERRT2H Horizontal axis rotation center position deviation
#7938 CERRT2V Vertical axis rotation center position deviation

Select in which axis direction to rotate the base-side rotary axis of the rotary table. When the base-side rotary axis is tilting, use the tens place to select the axis around which the rotary axis is tilted.
0: Invalid
1: I axis
2: J axis
3: K axis
1x: Tilted around I axis
2x: Tilted around J axis
3x: Tilted around K axis
(Note) A value from 0 to 99 can be set from the screen. However when an invalid value is set, the operation error (M01 0127) occurs at the power ON.
---Setting range---
0 to 3
12, 13, 21, 23, 31, 32
Set the tilt angle if the base-side rotary axis of the rotary table is tilted. Set the angle with the CCW direction of the tilted plane being defined as the negative direction.
---Setting range---
-89.999 to 89.999 ()
Set the name of the table rotating type base-side rotary axis.
---Setting range---
A,B,C,U,V,W,X,Y,Z
Two digits between A to Z and 1 to 9
0: Mechanical axis specifications
Set the rotation direction for the table rotating type base-side rotary axis.
The rotation direction specifications vary according to the setting of "#1450 5axis_Spec/bit3" (Select specifi cations of rotation direction parameter).

- When "#1450 5axis_Spec/bit3" = "0"
The specifications vary for each function.
- When "#1450 5axis_Spec/bit3" = "1"
The specifications are common to the functions.
0: When the tool motion viewed from the workpiece is in right-hand screw direction, it is taken as the pos itive direction.
1: When the tool motion viewed from the workpiece is in left-hand screw direction, it is taken as the positive
direction.
When all axes are at the machine zero point, set the distance in the horizontal axis direction from the machine
zero point to the rotation center of the base-side rotary axis.
---Setting range---
-99999.999 to 99999.999 (mm)
When all axes are at the machine zero point, set the distance in the vertical axis direction from the machine
zero point to the rotation center of the base-side rotary axis.
---Setting range---
-99999.999 to 99999.999 (mm)
When all axes are at the machine zero point, set the distance in the height axis direction from the machine
zero point to the rotation center of the base-side rotary axis.
---Setting range---
-99999.999 to 99999.999 (mm)
(PR) #7940 SLCT_W1 Rotary axis selection
(PR) #7941 TIANGW1 Tilt angle
(PR) #7942 ROTAXW1 Rotary axis name
#7943 DIR_W1 Rotation direction
#7944 COFSW1H Horizontal axis rotation center offset
#7945 COFSW1V Vertical axis rotation center offset
#7946 COFSW1T Height axis rotation center offset
M800V/M80V Series Alarm/Parameter Manual
15 Machine Parameters
15.11 Rotary Axis Configuration Parameters
635 IB-1501623-F
Set the position deviation in the horizontal axis direction of the table rotating type base-side rotary axis rota tion center. When table rotating type base rotary axis is I axis rotation, set the position deviation of J axis rotation. When table rotating type base rotary axis is J axis rotation, set the position deviation of K axis rota tion. When table rotating type base rotary axis is K axis rotation, set the position deviation of I axis rotation.
* Radius value is need to be set.
---Setting range---
-99999.999 to 99999.999 (mm)
(Follow as "#1006 mcmpunit" (Machine error compensation unit))
Set the position deviation in the vertical axis direction of the table rotating type base-side rotary axis rotation
center. When table rotating type base rotary axis is I axis rotation, set the position deviation of K axis rotation.
When table rotating type base rotary axis is J axis rotation, set the position deviation of I axis rotation. When
table rotating type base rotary axis is K axis rotation, set the position deviation of J axis rotation.
* Radius value is need to be set.
---Setting range---
-99999.999 to 99999.999 (mm)
(Follow as "#1006 mcmpunit" (Machine error compensation unit))
Select in which axis direction to rotate the workpiece-side rotary axis of the rotary table. When the workpiece side rotary axis is tilting, use the tens place to select the axis around which the rotary axis is tilted.
0: Invalid
1: I axis
2: J axis
3: K axis
1x: Tilted around I axis
2x: Tilted around J axis
3x: Tilted around K axis
(Note) A value from 0 to 99 can be set from the screen. However when an invalid value is set, the operation
error (M01 0127) occurs at the power ON.
---Setting range---
0 to 3
12, 13, 21, 23, 31, 32
Set the tilt angle if the workpiece-side rotary axis of the rotary table is tilted. Set the angle with the CCW di rection of the tilted plane being defined as the negative direction.
---Setting range---
-89.999 to 89.999 ()
Set the name of the table rotating type workpiece-side rotary axis.
---Setting range---
A,B,C,U,V,W,X,Y,Z
Two digits between A to Z and 1 to 9
0: Mechanical axis specifications
#7947 CERRW1H Horizontal axis rotation center position deviation
#7948 CERRW1V Vertical axis rotation center position deviation
(PR) #7950 SLCT_W2 Rotary axis selection
(PR) #7951 TIANGW2 Tilt angle
(PR) #7952 ROTAXW2 Rotary axis name
M800V/M80V Series Alarm/Parameter Manual
15 Machine Parameters
15.11 Rotary Axis Configuration Parameters
IB-1501623-F 636
Set the rotation direction for the table rotating type workpiece-side rotary axis.
The rotation direction specifications vary according to the setting of "#1450 5axis_Spec/bit3" (Select specifi cations of rotation direction parameter).
- When "#1450 5axis_Spec/bit3" = "0"
The specifications vary for each function.
- When "#1450 5axis_Spec/bit3" = "1"
The specifications are common to the functions.
0: When the tool motion viewed from the workpiece is in right-hand screw direction, it is taken as the pos itive direction.
1: When the tool motion viewed from the workpiece is in left-hand screw direction, it is taken as the positive
direction.
When all axes are at the machine zero point, set the distance in the horizontal axis direction between rotation
centers of the base-side rotary axis and the workpiece-side rotary axis.
---Setting range---
-99999.999 to 99999.999 (mm)
When all axes are at the machine zero point, set the distance in the vertical axis direction between rotation

centers of the base-side rotary axis and the workpiece-side rotary axis.
---Setting range---
-99999.999 to 99999.999 (mm)
When all axes are at the machine zero point, set the distance in the height axis direction between rotation
centers of the base-side rotary axis and the workpiece-side rotary axis.
---Setting range---
-99999.999 to 99999.999 (mm)
Set the position deviation in the horizontal axis direction of the table rotating type workpiece-side rotary axis
rotation center. When table rotating type workpiece side rotary axis is I axis rotation, set the position deviation
of J axis rotation. When table rotating type workpiece side rotary axis is J axis rotation, set the position devi ation of K axis rotation. When table rotating type workpiece side rotary axis is K axis rotation, set the position
deviation of I axis rotation.
* Radius value is need to be set.
---Setting range---
-99999.999 to 99999.999 (mm)
(Follow as "#1006 mcmpunit" (Machine error compensation unit))
Set the position deviation in the vertical axis direction of the table rotating type workpiece-side rotary axis
rotation center. When table rotating type workpiece side rotary axis is I axis rotation, set the position deviation
of K axis rotation. When table rotating type workpiece side rotary axis is J axis rotation, set the position de viation of I axis rotation. When table rotating type workpiece side rotary axis is K axis rotation, set the position
deviation of J axis rotation.
* Radius value is need to be set.
---Setting range---
-99999.999 to 99999.999 (mm)
(Follow as "#1006 mcmpunit" (Machine error compensation unit))
When 1st rotary axis is I axis rotation, set the angular deviation of J axis rotation. When 1st rotary axis is J
axis rotation, set the angular deviation of K axis rotation. When 1st rotary axis is K axis rotation, set the an gular deviation of I axis rotation.
---Setting range---
-1.000000 to 1.000000 (deg)
#7953 DIR_W2 Rotation direction
#7954 COFSW2H Horizontal axis rotation center offset
#7955 COFSW2V Vertical axis rotation center offset
#7956 COFSW2T Height axis rotation center offset
#7957 CERRW2H Horizontal axis rotation center position deviation
#7958 CERRW2V Vertical axis rotation center position deviation
#7960 Rot1 Ang Geo Dev1 Angular deviation 1 of center line of 1st rotary axis

When 1st rotary axis is I axis rotation, set the angular deviation of K axis rotation. When 1st rotary axis is J
axis rotation, set the angular deviation of I axis rotation. When 1st rotary axis is K axis rotation, set the angular
deviation of J axis rotation.
---Setting range---
-1.000000 to 1.000000 (deg)
When 2nd rotary axis is I axis rotation, set the angular deviation of J axis rotation. When 2nd rotary axis is J
axis rotation, set the angular deviation of K axis rotation. When 2nd rotary axis is K axis rotation, set the an gular deviation of I axis rotation.
---Setting range---
-1.000000 to 1.000000 (deg)
When 2nd rotary axis is I axis rotation, set the angular deviation of K axis rotation. When 2nd rotary axis is J
axis rotation, set the angular deviation of I axis rotation. When 2nd rotary axis is K axis rotation, set the an gular deviation of J axis rotation.
---Setting range---
-1.000000 to 1.000000 (deg)
When all axes are at the machine zero point, set the distance in the horizontal axis direction from the machine
zero point to the spindle end.
This parameter can be used only when Tool head hot swapping function is enabled.
---Setting range---
-99999.999 to 99999.999 (mm)
When all axes are at the machine zero point, set the distance in the vertical axis direction from the machine
zero point to the spindle end.
This parameter can be used only when Tool head hot swapping function is enabled.
---Setting range---
-99999.999 to 99999.999 (mm)
When all axes are at the machine zero point, set the distance in the height axis direction from the machine
zero point to the spindle end.
This parameter can be used only when Tool head hot swapping function is enabled.
---Setting range---
-99999.999 to 99999.999 (mm)
#7961 Rot1 Ang Geo Dev2 Angular deviation 2 of center line of 1st rotary axis
#7962 Rot2 Ang Geo Dev1 Angular deviation 1 of center line of 2nd rotary axis
#7963 Rot2 Ang Geo Dev2 Angular deviation 2 of center line of 2nd rotary axis
#7967 SPINDLE_END_OFS_H Spindle end offset for horizontal axis
#7968 SPINDLE_END_OFS_V Spindle end offset for vertical axis
#7969 SPINDLE_END_OFS_T Spindle end offset for height axis

15.12 PLC Timer
Set the time for the timer used in the PLC program (ladder).
The 10ms timer and 100ms timer are identified by the command used.
This setting value is valid when #6449/bit0 = 0.
The timer T setting method (variable/fixed) and No. of points can be set with #6454/bit3-bit0.
When #6454/bit3-0 = 0000, variable T: None, Fixed T: #16000-#16703
When #6454/bit3-0 = 0001, variable T: #16000-#16099, Fixed T: #16100-#16703
When #6454/bit3-0 = 0010, variable T: #16000-#16199, Fixed T: #16200-#16703
When #6454/bit3-0 = 0011, variable T: #16000-#16299, Fixed T: #16300-#16703
:
When #6454/bit3-0=0111, variable T: #16000-#16703 Fixed T: None
The time unit of the time set by this parameter can be changed with the setting of "#8142 PLC timer unit".

When #8142 = 0, the time unit of the timer (10 ms or 100 ms) is determined by the PLC program instruc tion.
When #8142 = 1, the time unit of the timer is 1 ms.
---Setting range---
When #8142 = 0: 0 to 32767 (x 10 ms or x 100 ms)
When #8142 = 1, and 10 ms timer is used: 0 to 327670 (ms)
When #8142 = 1, and 100 ms timer is used: 0 to 3276700 (ms)
#16000-
16703
T0 - T703 PLC timer <10ms/100ms>

15.13 PLC Integrated Timer
Set the time for the integrated timer used in the PLC program (ladder).
This setting value is valid when #6449/bit0 = 0.
The timer ST setting method (variable/fixed) and No. of points can be set with #6453/bit7-bit5.
When #6453/bit7-5 = 000, variable ST: None, Fixed ST: #17000-#17063
When #6453/bit7-5 = 001, variable ST: #17000-#17019, Fixed ST: #17020-#17063
When #6453/bit7-5 = 010, variable ST: #17000-#17039, Fixed ST: #17040-#17063
When #6453/bit7-5 = 011, variable ST: #17000-#17063, Fixed ST: None
The time unit of the time set by this parameter can be changed with the setting of "#8143 PLC int.timer unit".
When #8143 = 0, the time unit of the timer is determined by the PLC program instruction.
When #8143 = 1, the time unit of the timer is 1 ms.
When #8143 = 2, the time unit of the timer is 10 ms.
---Setting range---
When #8143 = 0: 0 to 32767 (x 100 ms)
When #8143 = 1, and integrated timer is used: 0 to 3276700 (ms)
When #8143 = 2, and integrated timer is used: 0 to 327670 (x 10 ms)
#17000-
17063
ST0 - ST63 PLC integrated timer <100ms INC.>

15.14 PLC Counter
Set the counter used in the PLC program (ladder).
This setting value is valid when #6449/bit0 = 0.
The counter C setting method (variable/fixed) and No. of points can be set with #6454/bit7-bit4.
When #6454/bit7-4 = 0000, variable C: None, Fixed C: #17200-#17455
When #6454/bit7-4 = 0001, variable C: #17200-#17239, Fixed C: #17240-#17455
When #6454/bit7-4 = 0010, variable C: #17200-#17279, Fixed C: #17280-#17455
When #6454/bit7-4 = 0011, variable C: #17200-#17319, Fixed C: #17320-#17455
:
When #6454/bit7-4 = 0111, variable C: #17200-#17455, Fixed C: None
---Setting range---
0 to 32767
#17200-
17455
C000 - C255 Counter

15.15 PLC Constants
Set the value to be set in the data type R register used in the PLC program (ladder).
Even if the data is set in the R register that corresponds to the PLC side when this parameter is displayed,
the screen will not change. Enter a different screen once, and then select this screen again.
---Setting range---
-2 to the power of 31 to 2 to the power of 31 -1
Set the value to be set in the data type R register(R8300 to R9799) used in the PLC program (ladder).
The area is valid for the number of PLC constant extension points "#1326 PLC Const Ext. Num" setting value,
starting with #18151.
Even if the data is set in the R register that corresponds to the PLC side when this parameter is displayed,
the screen will not change. Enter a different screen once, and then select this screen again.
#18151 to #18900 is used as the PLC constant extended area.
The area is valid for the number of PLC constant extension points ("#1326 PLC Const Ext. Num" setting val ue), starting with #18151.
---Setting range---
-2 to the power of 31 to 2 to the power of 31 -1
#18001-
18150
R7500,7501 - R7798,7799 PLC constant (Base area)
#18151-
18900
R8300,8301 - R9798,9799 PLC constant (Extension area)

15.16 PLC Bit Selection
(Note) Even if the data is set in the R register(R7800 to R7897) that corresponds to the PLC side when this parameter
is displayed, the screen will not change. Enter a different screen once, and then select this screen again. #6449 to
#6496 are PLC operation parameters used by Mitsubishi Electric.
Refer to "PLC Development Manual" and "PLC Programming Manual" for details.
These bit type parameters are used in the user PLC (ladder).
bit7: Control unit thermal alarm valid
bit6: Setting and display unit thermal management valid (This function may not be available for some NC

models.)
bit5: Set to "0".
bit4: Battery alarm/warning detection disabled
(Note) When the parameter is set to "1", the "Battery alarm" signal and the "Battery warning" signal will not be turned ON, and the alarm messages will not be displayed.
bit3: Counter C retention
bit2: Integrated timer ST retention
bit1: PLC counter program valid
bit0: PLC timer program valid
bit7: Set to "0".
bit6: External alarm message display (This function may not be available for some NC models.)
bit5: Alarm/operator change (This function may not be available for some NC models.)
bit4: Full screen display of message (This function may not be available for some NC models.)
bit3: Set to "0".
bit2: Operator message valid
bit1: Alarm message display interface
1: R method
0: F method
bit0: Alarm message valid
bit7-3: Set to "0".
bit2: Built-in edit function edit invalid (This function may not be available for some NC models.)
bit1: Set to "0".
bit0: Built-in edit function valid (This function may not be available for some NC models.)
bit7: Set to "0".
bit6: Branch destination label check valid
bit5: Set to "0".
bit4: Serial handy terminal communication valid
bit3-0: Set to "0".
bit7-5: Integrated timer ST Variable/fixed Number of points setting
bit4: Set to "0".
bit3: Operation by the menu [Ladder Monitor]
0: Screen can transit to PLC on-board screen after MTB password is input.
1: Screen can transit to PLC on-board screen without MTB password input.
bit2-0: Message language change code
#6401-6448 R7800-Low - R7823-High Bit selection
#6449 R7824-Low Bit selection
#6450 R7824-High Bit selection
#6451 R7825-Low Bit selection
#6452 R7825-High Bit selection
#6453 R7826-Low Bit selection

bit7-4: Counter C Variable/fixed Number of points setting
bit3-0: Timer T Variable/fixed Number of points setting
bit7: Enable ladder program writing during RUN
bit6: Enable ladder program writing during RUN (in high-speed processing)
bit5-4: Set to "0".
bit3: Display type switching for operator message
1: R method
0: F method
bit2-0: R device access variables decimal point valid region
bit7-5: Set to "0".
bit4: Motor insulation deterioration detection ON
bit3: Set to "0".
bit2: PLS/PLF instruction Holding PLC in STOP state valid
bit1-0: Set to "0".
High-speed input specification 1
High-speed input specification 2
High-speed output specification 1
High-speed output specification 2
High-speed input specification 3
High-speed input specification 4
Set to "0".
bit7-6: Operation mode of the user safety sequence project
bit5-2: Set to "0".
bit1: Enable layout
bit0: Set to "0".
Operation mode of the machine sequence project
High-speed output specification 3
High-speed output specification 4
Set to "0".
This is reserved for debugging by Mitsubishi Electric. Set to "0".
#6454 R7826-High Bit selection
#6455 R7827-Low Bit selection
#6456 R7827-High Bit selection
#6457-6458 R7828-Low - R7828-High Bit selection
#6459-6460 R7829-Low - R7829-High Bit selection
#6461-6462 R7830-Low - R7830-High Bit selection
#6463-6464 R7831-Low - R7831-High Bit selection
#6465-6466 R7832-Low - R7832-High Bit selection
#6467-6468 R7833-Low - R7833-High Bit selection
#6469-6470 R7834-Low - R7834-High Bit selection
#6471 R7835-Low Bit selection
#6472 R7835-High Bit selection
#6473-6474 R7836-Low - R7836-High Bit selection
#6475-6476 R7837-Low - R7837-High Bit selection

#6477-6480 R7838-Low - R7839-High Bit selection
#6481-6496 R7840-Low - R7847-High Bit selection

These bit type parameters are used in the user PLC (ladder).
#6497-6596 R7848-Low - R7897-High Bit selection

15.17 Machine Error Compensation Parameters
Select the method to set the machine error compensation data.
0: Absolute amount method
1: Incremental amount method
Set the name of the base axis for machine error compensation.
(1) For the pitch error compensation, set the name (#1013 axname) of the axis to be compensated.
(2) For the relative position compensation, set the name (#1013 axname) of the axis to be used as the refer ence.
For a system configured with a single part system, set the axis name only.
For a system configured with multiple part systems, set the part system number and the axis name.
(Example) Z axis of the 2nd part system: 2Z
This parameter can also be set with the axis name and the serial number.
(Example) When $1: with C axis, $2: without C axis, and $3: with C axis, the C axis of the 3rd part system
($3) is set with "C2".
To set a PLC axis as the base axis, set it with P and the serial number of the PLC axis.
(Example) 3rd PLC axis: P3
---Setting range---
Axis name, e.g. X, Y, Z, U, V, W, A, B, C or H
Part system number + Axis name, e.g. 1X, 1Y, 1Z, 2X, 2Y and 2Z
Axis name + Serial number of the axis, e.g. X1, Y1, Z1, P1, P2 and P3
Set the name of the compensation axis for machine error compensation.
(1) For the pitch error compensation, set the same axis name as in "#4001 cmpax".
(2) For the relative position compensation, set the name (#1013 axname) of the axis to be actually compen sated.
For a system configured with a single part system, set the axis name only.
For a system configured with multiple part systems, set the part system number and the axis name.
(Example) Z axis of the 2nd part system: 2Z
This parameter can also be set with the axis name and the serial number.
(Example) When $1: with C axis, $2: without C axis, and $3: with C axis, the C axis of the 3rd part system
($3) is set with "C2".
To set a PLC axis as the compensation axis, set it with P and the serial number of the PLC axis.
(Example) 3rd PLC axis: P3
---Setting range---
Axis name, e.g. X, Y, Z, U, V, W, A, B, C or H
Part system number + Axis name, e.g. 1X, 1Y, 1Z, 2X, 2Y and 2Z
Axis name + Serial number of the axis, e.g. X1, Y1, Z1, P1, P2 and P3
Set the compensation data No. corresponding to the reference position. As the reference position is actually
the base position, there is no compensation No. Therefore set the number that is decremented by 1.
(Note) When bidirectional pitch error compensation is enabled, set compensation data No. corresponding to
reference point in shifting in plus direction.
---Setting range---
4101 to 5999
(PR) #4000 Pinc Machine error compensation increment method
#4001 cmpax Base axis <n-th axis>
#4002 drcax Compensation axis <n-th axis>
#4003 rdvno Division point number at reference position <n-th axis>

Set the compensation data No. at the farthest end on the negative side.
(Note) When the axis moves in positive direction with bidirectional pitch error compensation enabled, set
compensation data No. of which locates on the nearest point to negative side. The compensation point
should be set with even number.
---Setting range---
4101 to 5999
Set the compensation data No. at the farthest end on the positive side.
(Note) When the axis moves in negative direction with bidirectional pitch error compensation enabled, set
compensation data No. of which locates on the nearest point to positive side. The compensation point
should be set with even number.
---Setting range---
4101 to 5999
Set the scale factor for the compensation amount.
---Setting range---
0 to 99
Set the interval to divide the basic axis.
Each compensation data will be the compensation amount for each of these intervals.
---Setting range---
0.001 to 9999.999 (mm)
Select whether to enable bidirectional pitch error compensation.
0: Disable
1: Enable
When bidirectional pitch error compensation is enabled, set the compensation amount of the reference po sition when the axis moves to the position from the opposite direction of the zero point return.
(Note) The actual compensation amount will be the value obtained by multiplying the setting value with the
compensation scale.
---Setting range---
-32768 to 32767
Set the compensation amount for each axis.

(Note) The actual compensation amount will be the value obtained by multiplying the setting value with the compensation scale.
---Setting range---
-32768 to 32767
#4004 mdvno Division point number at the most negative side <n-th axis>
#4005 pdvno Division point number at the most positive side <n-th axis>
#4006 sc Compensation scale factor <n-th axis>
#4007 spcdv Division interval <n-th axis>
#4008 twopc Bidirectional pitch error compensation <n-th axis>
#4009 refcmp Reference position compensation amount <n-th axis>
#4101-5999

Set the M code used for calling out the macro with the M command.
Select codes to be entered other than the codes basically required by the machine and M codes of M0, M1, M2, M30, M96 through M99, and M198.
This is valid when "#1195 Mmac" is set to "1".
---Setting range---
0 to 9999
Specify the macro call type.
0: Equivalent to M98 P****;
1: Equivalent to G65 P****;
2: Equivalent to G66 P****;
3: Equivalent to G66.1 P****;
4: Equivalent to G144 D0 A****; (Sub part system control II complete wait method) (for L system only)
5: Equivalent to G144 D1 A****; (Sub part system control II parallel process method) (for L system only)
Others: Equivalent to M98 P****;
Set the No. of the program or file name to be called out. The file name can contain up to 32 characters.
---Setting range---
Program name or file name (up to 32 characters)
The setting method is same as "#7001".
The setting method is same as "#7002".
The setting method is same as "#7003".
The setting method is same as "#7001".
The setting method is same as "#7002".
The setting method is same as "#7003".
The setting method is same as "#7001".
The setting method is same as "#7002".
The setting method is same as "#7003".
The setting method is same as "#7001".
The setting method is same as "#7002".
The setting method is same as "#7003".
The setting method is same as "#7001".
#7001 M[01] Code
#7002 M[01] TYPE
#7003 M[01] Program No.
#7011 M[02] Code
#7012 M[02] Type
#7013 M[02] Program No.
#7021 M[03] Code
#7022 M[03] Type
#7023 M[03] Program No.
#7031 M[04] Code
#7032 M[04] Type
#7033 M[04] Program No.
#7041 M[05] Code
#7042 M[05] Type
#7043 M[05] Program No.
#7051 M[06] Code

The setting method is same as "#7002".
The setting method is same as "#7003".
The setting method is same as "#7001".
The setting method is same as "#7002".
The setting method is same as "#7003".
The setting method is same as "#7001".
The setting method is same as "#7002".
The setting method is same as "#7003".
The setting method is same as "#7001".
The setting method is same as "#7002".
The setting method is same as "#7003".
The setting method is same as "#7001".
The setting method is same as "#7002".
The setting method is same as "#7003".
Set the type for when calling out the macro with the 2nd miscellaneous command.
The macro will be called out with the "#1170 M2name" address command when "#1198 M2mac" is set to "1".
The setting method is same as "M call macro".
---Setting range---
0 to 3
Set the program No. for when calling out the macro with the 2nd miscellaneous command.

The macro will be called out with the "#1170 M2name" address command when "#1198 M2mac" is set to "1".
The setting method is same as "M call macro".
---Setting range---
Program name or file name (up to 32 characters)
Set the G code to be used when calling the macro with a G command.
Do not set a G code used in the system.
G101 to G110 and G200 to G202 are user macro I codes. However, if a parameter is set for the G code call code, the G code call will have the priority, and these cannot be used as the user macro I.
---Setting range---
1 to 999
#7052 M[06] Type
#7053 M[06] Program No.
#7061 M[07] Code
#7062 M[07] Type
#7063 M[07] Program No.
#7071 M[08] Code
#7072 M[08] Type
#7073 M[08] Program No.
#7081 M[09] Code
#7082 M[09] Type
#7083 M[09] Program No.
#7091 M[10] Code
#7092 M[10] Type
#7093 M[10] Program No.
#7102 M2mac Type
#7103 M2mac Program No.
#7201 G[01] Code

Specify the macro call type.
0: Equivalent to M98 P****;
1: Equivalent to G65 P****;
2: Equivalent to G66 P****;
3: Equivalent to G66.1 P****;
Set the No. of the program or file name to be called out. The file name can contain up to 32 characters.
---Setting range---
Program name or file name (up to 32 characters)
The setting method is same as "#7201".
The setting method is same as "#7202".
The setting method is same as "#7203".
The setting method is same as "#7201".
The setting method is same as "#7202".
The setting method is same as "#7203".
The setting method is same as "#7201".
The setting method is same as "#7202".
The setting method is same as "#7203".
The setting method is same as "#7201".
The setting method is same as "#7202".
The setting method is same as "#7203".
The setting method is same as "#7201".
The setting method is same as "#7202".
The setting method is same as "#7203".
The setting method is same as "#7201".
The setting method is same as "#7202".
The setting method is same as "#7203".
#7202 G[01] Type
#7203 G[01] Program No.
#7211 G[02] Code
#7212 G[02] Type
#7213 G[02] Program No.
#7221 G[03] Code
#7222 G[03] Type
#7223 G[03] Program No.
#7231 G[04] Code
#7232 G[04] Type
#7233 G[04] Program No.
#7241 G[05] Code
#7242 G[05] Type
#7243 G[05] Program No.
#7251 G[06] Code
#7252 G[06] Type
#7253 G[06] Program No.
#7261 G[07] Code
#7262 G[07] Type
#7263 G[07] Program No.

The setting method is same as "#7201".
The setting method is same as "#7202".
The setting method is same as "#7203".
The setting method is same as "#7201".
The setting method is same as "#7202".
The setting method is same as "#7203".
The setting method is same as "#7201".

The setting method is same as "#7202".
The setting method is same as "#7203".
Set the type No. for when calling the macro with an S command.
This is valid when "#1196 Smac" is set to "1".
The setting method is same as "M call macro".
---Setting range---
0 to 3
Set the program No. for when calling the macro with an S command.
This is valid when "#1196 Smac" is set to "1".
The setting method is same as "M call macro".
---Setting range---
Program name or file name (up to 32 characters)
Set the type for when calling the macro with a T command.
This is valid when "#1197 Tmac" is set to "1".
The setting method is same as "M call macro".
---Setting range---
0 to 3
Set the program No. for when calling the macro with a T command.
This is valid when "#1197 Tmac" is set to "1".
The setting method is same as "M call macro".
---Setting range---
Program name or file name (up to 32 characters)
#7271 G[08] Code
#7272 G[08] Type
#7273 G[08] Program No.
#7281 G[09] Code
#7282 G[09] Type
#7283 G[09] Program No.
#7291 G[10] Code
#7292 G[10] Type
#7293 G[10] Program No.
#7302 Smac Type
#7303 Smac Program No.
#7312 Tmac Type
#7313 Tmac Program No.

Specify the macro program number to be called with the T code input through a manual numerical value com mand.
When a nonzero value is set in the parameter, macro call is executed irrespective of the setting of "#1197
Tmac".
---Setting range---
Program name or file name (up to 32 characters)
(Setting is cleared when "0" is set)
Specify the macro call type.
0: Equivalent to M98 P****;
1: Equivalent to G65 P****;
2: Equivalent to G66 P****;
3: Equivalent to G66.1 P****;
Specify the figures in the hundreds and higher places of the macro program No. to be called.
---Setting range---
90 to 99, or 1000100 to 1999999
(Note) To set the program No. to "1000100 to 1999999", set the macro call out type to 0 (M98) or 1 (G65).
The setting method is same as "#7322".
The setting method is same as "#7323".
The setting method is same as "#7322".
The setting method is same as "#7323".
The setting method is same as "#7322".
The setting method is same as "#7323".
The setting method is same as "#7322".
The setting method is same as "#7323".
The setting method is same as "#7322".
The setting method is same as "#7323".
The setting method is same as "#7322".
The setting method is same as "#7323".
The setting method is same as "#7322".
#7314 Man Tmac prg No.
#7322 G200 type
#7323 G200 program No.
#7332 G300 type
#7333 G300 program No.
#7342 G400 type
#7343 G400 program No.
#7352 G500 type
#7353 G500 program No.
#7362 G600 type
#7363 G600 program No.
#7372 G700 type
#7373 G700 program No.
#7382 G800 type
#7383 G800 program No.
#7392 G900 type

The setting method is same as "#7323".

The ASCII code macro parameters (#7402 to 7405) are validated.
0: Disable
1: Enable
Set the ASCII code used to call macros with the ASCII code.
L system: A,B,D,F,H,I,J,K,M,Q,R,S,T
M system: A,B,F,H,I,K,M,Q,R,S,T
Set the macro call type.
0: M98
1: G65
2: G66
3: G66.1
Set the program No. called with macro call.
---Setting range---
Program name or file name (up to 32 characters)
When the call type is "0", set the variable No. set after the ASCII code.
---Setting range---
100 to 149
The ASCII code macro parameters (#7412 to 7415) are validated.
0: Disable
1: Enable
Set the ASCII code used to call macros with the ASCII code.
L system: A,B,D,F,H,I,J,K,M,Q,R,S,T
M system: A,B,F,H,I,K,M,Q,R,S,T
Set the macro call type.
0: M98
1: G65
2: G66
3: G66.1
Set the program No. called with macro call.
---Setting range---
Program name or file name (up to 32 characters)
When the call type is "0", set the variable No. set after the ASCII code.
---Setting range---
100 to 149
#7393 G900 program No.
#7401 ASCII[01] Valid
#7402 ASCII[01] Code
#7403 ASCII[01] Type
#7404 ASCII[01] Program No.
#7405 ASCII[01] Variable
#7411 ASCII[02] Valid
#7412 ASCII[02] Code
#7413 ASCII[02] Type
#7414 ASCII[02] Program No.
#7415 ASCII[02] Variable

Specify the initial G code to be used when the macro call via G command is set all at once.
---Setting range---
0 to 9999
Select the type of the macro call.
0: equivalent to M98 P****;
1: equivalent to G65 P****;
2: equivalent to G66 P****;
3: equivalent to G66.1 P****;
Others: equivalent to M98 P****;
Specify the initial program No. to be used when the macro call via G command is set all at once.
This parameter cannot be specified with the file name.
When the parameter is set to "0", the batch settings of the macro call via G command will be invalid.
---Setting range---
0 to 99999999
Specify the number of sequential macro programs to be called when the macro call via G command is set all at once.
When the parameter is set to "0", the batch settings of the macro call via G command will be invalid.
---Setting range---
0 to 255
Specify the initial G code to be used when the macro call via G command with decimal point is set all at once.
---Setting range---
0.0 to 999.9
Select the type of the macro call.
0: equivalent to M98 P****;
1: equivalent to G65 P****;
2: equivalent to G66 P****;
3: equivalent to G66.1 P****;
Others: equivalent to M98 P****;
Specify the initial program No. to be used when the macro call via G command with decimal point is set all at once.
This parameter cannot be specified with the file name.
When the parameter is set to "0", the batch settings of the macro call via G command with decimal point will be invalid.
---Setting range---
0 to 99999999
Specify the number of sequential macro programs to be called when the macro call via G command with dec imal point is set all at once.
When the parameter is set to "0", the batch settings of the macro call via G command with decimal point will be invalid.
---Setting range---

0 to 255
#7421 Gmac initial Gcode
#7422 Gmac batch type
#7423 Gmac initial prog.
#7424 Gmac qty of macros
#7431 Gm.n initial Gcode
#7432 Gm.n batch type
#7433 Gm.n initial prog.
#7434 Gm.n qty of macros

Specify the initial M code to be used when the macro call via M command is set all at once.
This is valid when "#1195 Mmac" is set to "1".
---Setting range---
0 to 9999
Specify the macro call type.
0: Equivalent to M98 P****;
1: Equivalent to G65 P****;
2: Equivalent to G66 P****;
3: Equivalent to G66.1 P****;
4: Equivalent to G144 D0 A****; (Sub part system control II complete wait method) (for L system only)
5: Equivalent to G144 D1 A****; (Sub part system control II parallel process method) (for L system only)
Others: Equivalent to M98 P****;
Specify the initial program No. to be used when the macro call via M command is set all at once.
This parameter cannot be specified with the file name.
When the parameter is set to "0", the batch settings of the macro call via M command will be invalid.
---Setting range---
0 to 99999999
Specify the number of sequential macro programs to call when the macro call via M command is set all at once.
When the parameter is set to "0", the batch settings of the macro call via M command will be invalid.
---Setting range---
0 to 9999
The setting method is same as "#7441".
The setting method is same as "#7442".
The setting method is same as "#7443".
The setting method is same as "#7444".
The setting method is same as "#7441".
The setting method is same as "#7442".
The setting method is same as "#7443".
The setting method is same as "#7444".
Specify the G code to be used for the macro call via G command with decimal point. Specify it with one dec imal place.
When the parameter is set to "0.0", the macro call via G command with decimal point will be invalid.
---Setting range---
0.0 to 999.9
#7441 Mmac[1] init Mcode
#7442 Mmac[1] batch type
#7443 Mmac[1] init prog.
#7444 Mmac[1] qty macros
#7451 Mmac[2] init Mcode
#7452 Mmac[2] batch type
#7453 Mmac[2] init prog.
#7454 Mmac[2] qty macros
#7461 Mmac[3] init Mcode
#7462 Mmac[3] batch type
#7463 Mmac[3] init prog.
#7464 Mmac[3] qty macros
#56501 Gm.n[01] code

Select the type of the macro call.
0: equivalent to M98 P****;
1: equivalent to G65 P****;
2: equivalent to G66 P****;
3: equivalent to G66.1 P****;
Others: equivalent to M98 P****;
Specify the number of the program or the name of the file to be called up.
The file name can be up to 32 characters long.
---Setting range---
Program name or file name (up to 32 characters long)
The setting method is same as "#56501".
The setting method is same as "#56502".
The setting method is same as "#56503".
The setting method is same as "#56501".
The setting method is same as "#56502".
The setting method is same as "#56503".
The setting method is same as "#56501".
The setting method is same as "#56502".
The setting method is same as "#56503".
The setting method is same as "#56501".
The setting method is same as "#56502".
The setting method is same as "#56503".
The setting method is same as "#56501".
The setting method is same as "#56502".

The setting method is same as "#56503".
The setting method is same as "#56501".
The setting method is same as "#56502".
#56502 Gm.n[01] type
#56503 Gm.n[01] prog. No.
#56511 Gm.n[02] code
#56512 Gm.n[02] type
#56513 Gm.n[02] prog. No.
#56521 Gm.n[03] code
#56522 Gm.n[03] type
#56523 Gm.n[03] prog. No.
#56531 Gm.n[04] code
#56532 Gm.n[04] type
#56533 Gm.n[04] prog. No.
#56541 Gm.n[05] code
#56542 Gm.n[05] type
#56543 Gm.n[05] prog. No.
#56551 Gm.n[06] code
#56552 Gm.n[06] type
#56553 Gm.n[06] prog. No.
#56561 Gm.n[07] code
#56562 Gm.n[07] type

The setting method is same as "#56503".
The setting method is same as "#56501".
The setting method is same as "#56502".
The setting method is same as "#56503".
The setting method is same as "#56501".
The setting method is same as "#56502".
The setting method is same as "#56503".
The setting method is same as "#56501".
The setting method is same as "#56502".
The setting method is same as "#56503".
#56563 Gm.n[07] prog. No.
#56571 Gm.n[08] code
#56572 Gm.n[08] type
#56573 Gm.n[08] prog. No.
#56581 Gm.n[09] code
#56582 Gm.n[09] type
#56583 Gm.n[09] prog. No.
#56591 Gm.n[10] code
#56592 Gm.n[10] type
#56593 Gm.n[10] prog. No.

15.19 Position Switches
Specify whether to perform position switch area checking at high speeds.
0: Do not perform position switch area checking at high speed (do it the same as before).
1: Perform position switch area checking at high speed.
"n" represents the position switch No. (n=1 to 24)
Specify the name of the axis for which a position switch is provided.
---Setting range---
Axis address such as X, Y, Z, U, V, W, A, B, C or H
"n" represents the position switch No. (n=1 to 24)
When the machine enters the range between imaginary dog positions 1 and 2, a signal is output to the PLC.
For the device No., refer to "PLC Interface Manual".
---Setting range---
-99999.999 to 99999.999 (mm)
"n" represents the position switch No. (n=1 to 24)
When the machine enters the range between imaginary dog positions 1 and 2, a signal is output to the PLC.
For the device No., refer to "PLC Interface Manual".
---Setting range---
-99999.999 to 99999.999 (mm)
"n" represents the position switch No. (n=1 to 24)
When position switch area checking at high speed is selected, specify the mode of area checking, i.e., wheth er to use the command type machine position or encoder feedback position, for each position switch.
0: Use the command type machine position as the machine position for position switch area checking.
1: Use the encoder feedback position as the machine position for position switch area checking.
(Note) This parameter is valid only when "1" set in "#7500 Pcheck".
#7500 Pcheck High-speed switching of position switch
#7501+10(n-1) PSWn axis Axis name
#7502+10(n-1) PSWn dog1 Imaginary dog position 1
#7503+10(n-1) PSWn dog2 Imaginary dog position 2
#7504+10(n-1) PSWn check Selection of area check method

15.20 RIO Device Allocation Parameters
Select whether the fixed allocation method or arbitrary allocation method is used to assign devices to each
remote I/O unit station.
0: Fixed allocation
1: Arbitrary allocation
Specify the channel No. of the 1st remote I/O unit station.

* When 0 is set, all the RIO allocation parameters of the 1st station will be disabled.
---Setting range---
0, 1 to 3
Specify the station No. of the 1st remote I/O unit station.
* Set this parameter to be the same as the rotary switch of the remote I/O unit to which PLC devices are assigned.
---Setting range---
0 to 63
Specify the name of DI allocation devices for the 1st remote I/O unit station.
* When 0 is set, this will be left blank.
---Setting range---
0, X, R, ZR
Specify the head device No. of DI allocation devices for the 1st remote I/O unit station.
For device X: Hexadecimal
For others: Decimal
* This parameter changes to "0" if you change the device name "DI dev name #1".
* Specify "DI dev name #1" ahead of this parameter.
* The devices corresponding to the occupied station of the operation panel cannot be set.
---Setting range---
Decimal: 0 to 65535
Hexadecimal: 0 to FFFF
Specify the name of DO allocation devices for the 1st remote I/O unit station.
* When 0 is set, this will be left blank.
---Setting range---
0, Y, R, ZR
Specify the head device No. of DO allocation devices for the 1st remote I/O unit station.
For device Y: Hexadecimal
For others: Decimal
* This parameter changes to "0" if you change the device name "DO dev name #1".
* Specify "DO dev name #1" ahead of this parameter.
* The devices corresponding to the occupied station of the operation panel cannot be set.
---Setting range---
Decimal: 0 to 65535
Hexadecimal: 0 to FFFF
(PR) #53001 RIO dev assign RIO device allocation method
(PR) #53011 RIO CH No. #1 Remote I/O channel No. for allocation
(PR) #53012 RIO Station No. #1 Remote I/O station No. for allocation
(PR) #53013 DI dev name #1 DI device name #1
(PR) #53014 DI dev No. #1 DI device number #1
(PR) #53015 DO dev name #1 DO device name #1
(PR) #53016 DO dev No. #1 DO device number #1

Select at which speed to input 32 points of input data to the 1st remote I/O unit station: PLC high-speed or PLC medium-speed.
0: PLC medium-speed
1: PLC high-speed
Select at which speed to output 32 points of output data from the 1st remote I/O unit station: PLC high-speed or PLC medium-speed.
0: PLC medium-speed
1: PLC high-speed
(PR) #53017 DI Hi-Spd #1 High-speed input designation #1
(PR) #53018 DO Hi-Spd #1 High-speed output designation #1

Parameter Nos and Names for the RIO device 2nd and following stations are shown below.
Refer to the description of RIO 1st station by replacing its station No. (or # No) for details of each parameter.
Parameter list for RIO device 2nd and following stations
RIO CH No. RIO Sta.
No.
DI dev
name
DI dev No. DO dev
name
DO dev No. DI Hi-Spd DO Hi Spd
#1
Station
No.: 1
#53011
RIO CH No. #1
#53012
RIO Sta.
No. #1
#53013
DI dev
name #1
#53014
DI dev No. #1
#53015
DO dev
name #1
#53016
DO dev No.
#1

#53017
DI Hi-Spd #1
#53018
DO Hi-Spd
#1
#2
Station
No.: 2
#53021
RIO CH No. #2
#53022
RIO Sta.
No. #2
#53023
DI dev
name #2
#53024
DI dev No. #2
#53025
DO dev
name #2
#53026
DO dev No.
#2
#53027
DI Hi-Spd #2
#53028
DO Hi-Spd
#2
#3
Station
No.: 3
#53031
RIO CH No. #3
#53032
RIO Sta.
No. #3
#53033
DI dev
name #3
#53034
DI dev No. #3
#53035
DO dev
name #3
#53036
DO dev No.
#3
#53037
DI Hi-Spd #3
#53038
DO Hi-Spd
#3
#4
Station
No.: 4
#53041
RIO CH No. #4
#53042
RIO Sta.
No. #4
#53043
DI dev
name #4
#53044
DI dev No. #4
#53045
DO dev
name #4
#53046
DO dev No.
#4
#53047
DI Hi-Spd #4
#53048
DO Hi-Spd
#4
#5
Station
No.: 5
#53051
RIO CH No. #5
#53052
RIO Sta.
No. #5
#53053
DI dev
name #5

#53054
DI dev No. #5
#53055
DO dev
name #5
#53056
DO dev No.
#5
#53057
DI Hi-Spd #5
#53058
DO Hi-Spd
#5
#6
Station
No.: 6
#53061
RIO CH No. #6
#53062
RIO Sta.
No. #6
#53063
DI dev
name #6
#53064
DI dev No. #6
#53065
DO dev
name #6
#53066
DO dev No.
#6
#53067
DI Hi-Spd #6
#53068
DO Hi-Spd
#6
#7
Station
No.: 7
#53071
RIO CH No. #7
#53072
RIO Sta.
No. #7
#53073
DI dev
name #7
#53074
DI dev No. #7
#53075
DO dev
name #7
#53076
DO dev No.
#7
#53077
DI Hi-Spd #7
#53078
DO Hi-Spd
#7
#8
Station
No.: 8
#53081
RIO CH No. #8
#53082
RIO Sta.
No. #8
#53083
DI dev
name #8
#53084
DI dev No. #8
#53085
DO dev
name #8
#53086
DO dev No.
#8
#53087
DI Hi-Spd #8
#53088
DO Hi-Spd
#8
#9
Station
No.: 9

#53091
RIO CH No. #9
#53092
RIO Sta.
No. #9
#53093
DI dev
name #9
#53094
DI dev No. #9
#53095
DO dev
name #9
#53096
DO dev No.
#9
#53097
DI Hi-Spd #9
#53098
DO Hi-Spd
#9
#10
Station
No.: 10
#53101
RIO CH No.
#10
#53102
RIO Sta.
No. #10
#53103
DI dev
name #10
#53104
DI dev No.
#10
#53105
DO dev
name #10
#53106
DO dev No.
#10
#53107
DI Hi-Spd
#10
#53108
DO Hi-Spd
#10
#11
Station
No.: 11
#53111
RIO CH No.
#11
#53112
RIO Sta.
No. #11
#53113
DI dev
name #11
#53114
DI dev No.
#11
#53115
DO dev
name #11
#53116
DO dev No.
#11
#53117
DI Hi-Spd
#11
#53118
DO Hi-Spd
#11
#12
Station
No.: 12
#53121
RIO CH No.
#12
#53122
RIO Sta.
No. #12
#53123
DI dev
name #12
#53124

DI dev No.
#12
#53125
DO dev
name #12
#53126
DO dev No.
#12
#53127
DI Hi-Spd
#12
#53128
DO Hi-Spd
#12
#13
Station
No.: 13
#53131
RIO CH No.
#13
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RIO Sta.
No. #13
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DI dev No.
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DO dev
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DO dev No.
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DI Hi-Spd
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DO Hi-Spd
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Station
No.: 14
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RIO Sta.
No. #14
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DI dev No.
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DO dev
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DO dev No.
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DI Hi-Spd
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DO Hi-Spd
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Station
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No. #15
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DI dev No.
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DO dev No.

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#53157
DI Hi-Spd
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#53158
DO Hi-Spd
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Station
No.: 16
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RIO Sta.
No. #16
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#53164
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DO dev
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DO dev No.
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DI Hi-Spd
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DO Hi-Spd
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Station
No.: 17
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RIO Sta.
No. #17
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DI dev No.
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DO dev
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DO dev No.
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DI Hi-Spd
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#53178
DO Hi-Spd
#17

#18
Station
No.: 18
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RIO CH No.
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RIO Sta.
No. #18
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DI dev No.
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DO dev
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DO dev No.
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#53187
DI Hi-Spd

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#53188
DO Hi-Spd
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Station
No.: 19
#53191
RIO CH No.
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#53192
RIO Sta.
No. #19
#53193
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DI dev No.
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DO dev
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DO dev No.
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#53197
DI Hi-Spd
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#53198
DO Hi-Spd
#19
#20
Station
No.: 20
#53201
RIO CH No.
#20
#53202
RIO Sta.
No. #20
#53203
DI dev
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DI dev No.
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DO dev
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DO dev No.
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#53207
DI Hi-Spd
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#53208
DO Hi-Spd
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Station
No.: 21
#53211
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#53212
RIO Sta.
No. #21
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DI dev No.
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DO dev
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DO dev No.
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#53217
DI Hi-Spd
#21
#53218
DO Hi-Spd
#21
#22
Station
No.: 22

#53221
RIO CH No.
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RIO Sta.
No. #22
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DI dev
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DI dev No.
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DO dev
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#53226
DO dev No.
#22
#53227
DI Hi-Spd
#22
#53228
DO Hi-Spd
#22
#23
Station
No.: 23
#53231
RIO CH No.
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RIO Sta.
No. #23
#53233
DI dev
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DI dev No.
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#53235
DO dev
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DO dev No.
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#53237
DI Hi-Spd
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#53238
DO Hi-Spd
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Station
No.: 24
#53241
RIO CH No.
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#53242
RIO Sta.
No. #24
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DI dev
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#53244
DI dev No.
#24
#53245
DO dev
name #24
#53246
DO dev No.
#24
#53247
DI Hi-Spd
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#53248
DO Hi-Spd
#24
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Station
No.: 25
#53251
RIO CH No.
#25
#53252
RIO Sta.
No. #25
#53253

DI dev
name #25
#53254
DI dev No.
#25
#53255
DO dev
name #25
#53256
DO dev No.
#25
#53257
DI Hi-Spd
#25
#53258
DO Hi-Spd
#25
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Station
No.: 26
#53261
RIO CH No.
#26
#53262
RIO Sta.
No. #26
#53263
DI dev
name #26
#53264
DI dev No.
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#53265
DO dev
name #26
#53266
DO dev No.
#26
#53267
DI Hi-Spd
#26
#53268
DO Hi-Spd
#26
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Station
No.: 27
#53271
RIO CH No.
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#53272
RIO Sta.
No. #27
#53273
DI dev
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DI dev No.
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#53275
DO dev
name #27
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DO dev No.
#27
#53277
DI Hi-Spd
#27
#53278
DO Hi-Spd
#27
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Station
No.: 28
#53281
RIO CH No.
#28
#53282
RIO Sta.
No. #28
#53283
DI dev
name #28
#53284
DI dev No.
#28
#53285
DO dev

name #28
#53286
DO dev No.
#28
#53287
DI Hi-Spd
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#53288
DO Hi-Spd
#28
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Station
No.: 29
#53291
RIO CH No.
#29
#53292
RIO Sta.
No. #29
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DI dev
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#53294
DI dev No.
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#53295
DO dev
name #29
#53296
DO dev No.
#29
#53297
DI Hi-Spd
#29
#53298
DO Hi-Spd
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Station
No.: 30
#53301
RIO CH No.
#30
#53302
RIO Sta.
No. #30
#53303
DI dev
name #30
#53304
DI dev No.
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#53305
DO dev
name #30
#53306
DO dev No.
#30
#53307
DI Hi-Spd
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#53308
DO Hi-Spd
#30
#31
Station
No.: 31
#53311
RIO CH No.
#31
#53312
RIO Sta.
No. #31
#53313
DI dev
name #31
#53314
DI dev No.
#31
#53315
DO dev
name #31
#53316
DO dev No.
#31
#53317
DI Hi-Spd
#31

#53318
DO Hi-Spd
#31
#32
Station
No.: 32
#53321
RIO CH No.
#32
#53322
RIO Sta.
No. #32
#53323
DI dev
name #32
#53324
DI dev No.
#32
#53325
DO dev
name #32
#53326
DO dev No.
#32
#53327
DI Hi-Spd
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#53328
DO Hi-Spd
#32
#33
Station
No.: 33
#53331
RIO CH No.
#33
#53332
RIO Sta.
No. #33
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DI dev
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#53334
DI dev No.
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#53335
DO dev
name #33
#53336
DO dev No.
#33
#53337
DI Hi-Spd
#33
#53338
DO Hi-Spd
#33
#34
Station
No.: 34
#53341
RIO CH No.
#34
#53342
RIO Sta.
No. #34
#53343
DI dev
name #34
#53344
DI dev No.
#34
#53345
DO dev
name #34
#53346
DO dev No.
#34
#53347
DI Hi-Spd
#34
#53348
DO Hi-Spd
#34
#35
Station
No.: 35
#53351

RIO CH No.
#35
#53352
RIO Sta.
No. #35
#53353
DI dev
name #35
#53354
DI dev No.
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#53355
DO dev
name #35
#53356
DO dev No.
#35
#53357
DI Hi-Spd
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#53358
DO Hi-Spd
#35
#36
Station
No.: 36
#53361
RIO CH No.
#36
#53362
RIO Sta.
No. #36
#53363
DI dev
name #36
#53364
DI dev No.
#36
#53365
DO dev
name #36
#53366
DO dev No.
#36
#53367
DI Hi-Spd
#36
#53368
DO Hi-Spd
#36
RIO CH No. RIO Sta.
No.
DI dev
name
DI dev No. DO dev
name
DO dev No. DI Hi-Spd DO Hi Spd

#37
Station
No.: 37
#53371
RIO CH No.
#37
#53372
RIO Sta.
No. #37
#53373
DI dev
name #37
#53374
DI dev No.
#37
#53375
DO dev
name #37
#53376
DO dev No.
#37
#53377
DI Hi-Spd
#37
#53378
DO Hi-Spd
#37

#38
Station
No.: 38
#53381
RIO CH No.
#38
#53382
RIO Sta.
No. #38
#53383
DI dev
name #38
#53384
DI dev No.
#38
#53385
DO dev
name #38
#53386
DO dev No.
#38
#53387
DI Hi-Spd
#38
#53388
DO Hi-Spd
#38
#39
Station
No.: 39
#53391
RIO CH No.
#39
#53392
RIO Sta.
No. #39
#53393
DI dev
name #39
#53394
DI dev No.
#39
#53395
DO dev
name #39
#53396
DO dev No.
#39
#53397
DI Hi-Spd
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#53398
DO Hi-Spd
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#40
Station
No.: 40
#53401
RIO CH No.
#40
#53402
RIO Sta.
No. #40
#53403
DI dev
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DI dev No.
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#53405
DO dev
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DO dev No.
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#53407
DI Hi-Spd
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#53408
DO Hi-Spd
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#41
Station
No.: 41
#53411
RIO CH No.
#41
#53412

RIO Sta.
No. #41
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DI dev
name #41
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DI dev No.
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DO dev
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DO dev No.
#41
#53417
DI Hi-Spd
#41
#53418
DO Hi-Spd
#41
#42
Station
No.: 42
#53421
RIO CH No.
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RIO Sta.
No. #42
#53423
DI dev
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DI dev No.
#42
#53425
DO dev
name #42
#53426
DO dev No.
#42
#53427
DI Hi-Spd
#42
#53428
DO Hi-Spd
#42
#43
Station
No.: 43
#53431
RIO CH No.
#43
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RIO Sta.
No. #43
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DI dev
name #43
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DI dev No.
#43
#53435
DO dev
name #43
#53436
DO dev No.
#43
#53437
DI Hi-Spd
#43
#53438
DO Hi-Spd
#43
#44
Station
No.: 44
#53441
RIO CH No.
#44
#53442
RIO Sta.
No. #44
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DI dev
name #44
#53444
DI dev No.

#44
#53445
DO dev
name #44
#53446
DO dev No.
#44
#53447
DI Hi-Spd
#44
#53448
DO Hi-Spd
#44
#45
Station
No.: 45
#53451
RIO CH No.
#45
#53452
RIO Sta.
No. #45
#53453
DI dev
name #45
#53454
DI dev No.
#45
#53455
DO dev
name #45
#53456
DO dev No.
#45
#53457
DI Hi-Spd
#45
#53458
DO Hi-Spd
#45
#46
Station
No.: 46
#53461
RIO CH No.
#46
#53462
RIO Sta.
No. #46
#53463
DI dev
name #46
#53464
DI dev No.
#46
#53465
DO dev
name #46
#53466
DO dev No.
#46
#53467
DI Hi-Spd
#46
#53468
DO Hi-Spd
#46
#47
Station
No.: 47
#53471
RIO CH No.
#47
#53472
RIO Sta.
No. #47
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DI dev
name #47
#53474
DI dev No.
#47
#53475
DO dev
name #47
#53476
DO dev No.
#47

#53477
DI Hi-Spd
#47
#53478
DO Hi-Spd
#47
#48
Station
No.: 48
#53481
RIO CH No.
#48
#53482
RIO Sta.
No. #48
#53483
DI dev
name #48
#53484
DI dev No.
#48
#53485
DO dev
name #48
#53486
DO dev No.
#48
#53487
DI Hi-Spd
#48
#53488
DO Hi-Spd
#48
#49
Station
No.: 49
#53491
RIO CH No.
#49
#53492
RIO Sta.
No. #49
#53493
DI dev
name #49
#53494
DI dev No.
#49
#53495
DO dev
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#53496
DO dev No.
#49
#53497
DI Hi-Spd
#49
#53498
DO Hi-Spd
#49
#50
Station
No.: 50
#53501
RIO CH No.
#50
#53502
RIO Sta.
No. #50
#53503
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name #50
#53504
DI dev No.
#50
#53505
DO dev
name #50
#53506
DO dev No.
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#53507
DI Hi-Spd
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#53508
DO Hi-Spd
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#51

Station
No.: 51
#53511
RIO CH No.
#51
#53512
RIO Sta.
No. #51
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DI dev
name #51
#53514
DI dev No.
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#53515
DO dev
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DO dev No.
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#53517
DI Hi-Spd
#51
#53518
DO Hi-Spd
#51
#52
Station
No.: 52
#53521
RIO CH No.
#52
#53522
RIO Sta.
No. #52
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DI dev
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DI dev No.
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#53525
DO dev
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#53526
DO dev No.
#52
#53527
DI Hi-Spd
#52
#53528
DO Hi-Spd
#52
#53
Station
No.: 53
#53531
RIO CH No.
#53
#53532
RIO Sta.
No. #53
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DI dev
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DI dev No.
#53
#53535
DO dev
name #53
#53536
DO dev No.
#53
#53537
DI Hi-Spd
#53
#53538
DO Hi-Spd
#53
#54
Station
No.: 54
#53541
RIO CH No.
#54
#53542
RIO Sta.

No. #54
#53543
DI dev
name #54
#53544
DI dev No.
#54
#53545
DO dev
name #54
#53546
DO dev No.
#54
#53547
DI Hi-Spd
#54
#53548
DO Hi-Spd
#54
#55
Station
No.: 55
#53551
RIO CH No.
#55
#53552
RIO Sta.
No. #55
#53553
DI dev
name #55
#53554
DI dev No.
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#53555
DO dev
name #55
#53556
DO dev No.
#55
#53557
DI Hi-Spd
#55
#53558
DO Hi-Spd
#55
RIO CH No. RIO Sta.
No.
DI dev
name
DI dev No. DO dev
name
DO dev No. DI Hi-Spd DO Hi Spd

#56
Station
No.: 56
#53561
RIO CH No.
#56
#53562
RIO Sta.
No. #56
#53563
DI dev
name #56
#53564
DI dev No.
#56
#53565
DO dev
name #56
#53566
DO dev No.
#56
#53567
DI Hi-Spd
#56
#53568
DO Hi-Spd
#56
#57
Station
No.: 57
#53571

RIO CH No.
#57
#53572
RIO Sta.
No. #57
#53573
DI dev
name #57
#53574
DI dev No.
#57
#53575
DO dev
name #57
#53576
DO dev No.
#57
#53577
DI Hi-Spd
#57
#53578
DO Hi-Spd
#57
#58
Station
No.: 58
#53581
RIO CH No.
#58
#53582
RIO Sta.
No. #58
#53583
DI dev
name #58
#53584
DI dev No.
#58
#53585
DO dev
name #58
#53586
DO dev No.
#58
#53587
DI Hi-Spd
#58
#53588
DO Hi-Spd
#58
#59
Station
No.: 59
#53591
RIO CH No.
#59
#53592
RIO Sta.
No. #59
#53593
DI dev
name #59
#53594
DI dev No.
#59
#53595
DO dev
name #59
#53596
DO dev No.
#59
#53597
DI Hi-Spd
#59
#53598
DO Hi-Spd
#59
#60
Station
No.: 60
#53601
RIO CH No.
#60
#53602
RIO Sta.
No. #60
#53603
DI dev

name #60
#53604
DI dev No.
#60
#53605
DO dev
name #60
#53606
DO dev No.
#60
#53607
DI Hi-Spd
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#53608
DO Hi-Spd
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Station
No.: 61
#53611
RIO CH No.
#61
#53612
RIO Sta.
No. #61
#53613
DI dev
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DI dev No.
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#53615
DO dev
name #61
#53616
DO dev No.
#61
#53617
DI Hi-Spd
#61
#53618
DO Hi-Spd
#61
#62
Station
No.: 62
#53621
RIO CH No.
#62
#53622
RIO Sta.
No. #62
#53623
DI dev
name #62
#53624
DI dev No.
#62
#53625
DO dev
name #62
#53626
DO dev No.
#62
#53627
DI Hi-Spd
#62
#53628
DO Hi-Spd
#62
#63
Station
No.: 63
#53631
RIO CH No.
#63
#53632
RIO Sta.
No. #63
#53633
DI dev
name #63
#53634
DI dev No.
#63
#53635
DO dev
name #63

#53636
DO dev No.
#63
#53637
DI Hi-Spd
#63
#53638
DO Hi-Spd
#63
#64
Station
No.: 64
#53641
RIO CH No.
#64
#53642
RIO Sta.
No. #64
#53643
DI dev
name #64
#53644
DI dev No.
#64
#53645
DO dev
name #64
#53646
DO dev No.
#64
#53647
DI Hi-Spd
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#53648
DO Hi-Spd
#64
#65
Station
No.: 65
#53651
RIO CH No.
#65
#53652
RIO Sta.
No. #65
#53653
DI dev
name #65
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DI dev No.
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#53655
DO dev
name #65
#53656
DO dev No.
#65
#53657
DI Hi-Spd
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#53658
DO Hi-Spd
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#66
Station
No.: 66
#53661
RIO CH No.
#66
#53662
RIO Sta.
No. #66
#53663
DI dev
name #66
#53664
DI dev No.
#66
#53665
DO dev
name #66
#53666
DO dev No.
#66
#53667
DI Hi-Spd
#66
#53668

DO Hi-Spd
#66
#67
Station
No.: 67
#53671
RIO CH No.
#67
#53672
RIO Sta.
No. #67
#53673
DI dev
name #67
#53674
DI dev No.
#67
#53675
DO dev
name #67
#53676
DO dev No.
#67
#53677
DI Hi-Spd
#67
#53678
DO Hi-Spd
#67
#68
Station
No.: 68
#53681
RIO CH No.
#68
#53682
RIO Sta.
No. #68
#53683
DI dev
name #68
#53684
DI dev No.
#68
#53685
DO dev
name #68
#53686
DO dev No.
#68
#53687
DI Hi-Spd
#68
#53688
DO Hi-Spd
#68
#69
Station
No.: 69
#53691
RIO CH No.
#69
#53692
RIO Sta.
No. #69
#53693
DI dev
name #69
#53694
DI dev No.
#69
#53695
DO dev
name #69
#53696
DO dev No.
#69
#53697
DI Hi-Spd
#69
#53698
DO Hi-Spd
#69
#70
Station
No.: 70
#53701
RIO CH No.

#70
#53702
RIO Sta.
No. #70
#53703
DI dev
name #70
#53704
DI dev No.
#70
#53705
DO dev
name #70
#53706
DO dev No.
#70
#53707
DI Hi-Spd
#70
#53708
DO Hi-Spd
#70
#71
Station
No.: 71
#53711
RIO CH No.
#71
#53712
RIO Sta.
No. #71
#53713
DI dev
name #71
#53714
DI dev No.
#71
#53715
DO dev
name #71
#53716
DO dev No.
#71
#53717
DI Hi-Spd
#71
#53718
DO Hi-Spd
#71
#72
Station
No.: 72
#53721
RIO CH No.
#72
#53722
RIO Sta.
No. #72
#53723
DI dev
name #72
#53724
DI dev No.
#72
#53725
DO dev
name #72
#53726
DO dev No.
#72
#53727
DI Hi-Spd
#72
#53728
DO Hi-Spd
#72
#73
Station
No.: 73
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RIO Sta.
No. #73
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#53734
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DO dev
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DO dev No.
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DI Hi-Spd
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#53738
DO Hi-Spd
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Station
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DO dev No.
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DI Hi-Spd
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#53748
DO Hi-Spd
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RIO CH No. RIO Sta.
No.
DI dev
name
DI dev No. DO dev
name
DO dev No. DI Hi-Spd DO Hi Spd

#75
Station
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#53751
RIO CH No.
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DI Hi-Spd
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DO Hi-Spd
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Station
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#53761
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#76
#53762
RIO Sta.

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DO Hi-Spd
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DO Hi-Spd
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Station
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DO Hi-Spd
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DI Hi-Spd
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DO Hi-Spd
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Station
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DO dev No.
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DO Hi-Spd
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#53851
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RIO Sta.
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DI dev No.
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DO dev No.
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DO Hi-Spd
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Station

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DO dev
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DO dev No.
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DI Hi-Spd
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DO Hi-Spd
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Station
No.: 87
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RIO Sta.
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DO dev
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DO dev No.
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DI Hi-Spd
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#53878
DO Hi-Spd
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Station
No.: 88
#53881
RIO CH No.
#88
#53882
RIO Sta.
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DO dev
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DO dev No.
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DI Hi-Spd
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DO Hi-Spd
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Station
No.: 89
#53891
RIO CH No.
#89
#53892
RIO Sta.
No. #89

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DO dev No.
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#53898
DO Hi-Spd
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Station
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RIO Sta.
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DO dev
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DO dev No.
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#53908
DO Hi-Spd
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RIO Sta.
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DO dev No.
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DO Hi-Spd
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Station
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RIO CH No.
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RIO Sta.
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DI dev No.
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DO dev
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DO dev No.
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#53928
DO Hi-Spd
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RIO Sta.
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DO dev No.
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#53938
DO Hi-Spd
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RIO CH No. RIO Sta.
No.
DI dev
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DI dev No. DO dev
name
DO dev No. DI Hi-Spd DO Hi Spd

#94
Station
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DO dev No.
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DI Hi-Spd
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#53948
DO Hi-Spd
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Station
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RIO Sta.
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DO Hi-Spd
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Station
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DO Hi-Spd
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Station
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DO Hi-Spd
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DO dev No.
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DO Hi-Spd
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DO dev No.
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DO Hi-Spd
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Station
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#54001
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RIO Sta.
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DO dev No.
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DO Hi-Spd
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Station
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#54011
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DO dev No.
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#54018
DO Hi-Spd

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RIO Sta.
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DO dev No.
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DO Hi-Spd
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DO dev No.
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DO Hi-Spd
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Station
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#54051
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#105

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DO Hi-Spd
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Station
No.:106
#54061
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#106
#54062
RIO Sta.
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#54072
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DO dev No.
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DO Hi-Spd
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Station
No.:108
#54081
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#54082
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DO dev No.
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Station
No.: 109
#54091
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DO dev No.
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DO Hi-Spd
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Station
No.: 110
#54101
RIO CH No.
#110
#54102
RIO Sta.
No. #110
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#54105
DO dev
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DO dev No.
#110
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DO Hi-Spd
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Station
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#54111
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#111
#54112
RIO Sta.
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DO dev
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#54116
DO dev No.

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DI Hi-Spd
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DO Hi-Spd
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Station
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#54121
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#112
#54122
RIO Sta.
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#54125
DO dev
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#54126
DO dev No.
#112
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#54128
DO Hi-Spd
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RIO CH No. RIO Sta.
No.
DI dev
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DI dev No. DO dev
name
DO dev No. DI Hi-Spd DO Hi Spd

#113
Station
No.: 113
#54131
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#54132
RIO Sta.
No. #113
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#54135
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DO dev No.
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#54137
DI Hi-Spd
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#54138
DO Hi-Spd
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#114
Station
No.: 114
#54141
RIO CH No.
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#54142
RIO Sta.
No. #114
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DO dev
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DO dev No.
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DO Hi-Spd
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Station
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#54177
DI Hi-Spd

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DO Hi-Spd
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DO dev No.
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DO dev No.
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DO Hi-Spd
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Station
No.: 121

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DO dev No.
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#54217
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#54218
DO Hi-Spd
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#54222
RIO Sta.
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#54228
DO Hi-Spd
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#54235
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DO dev No.
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#54237
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#54238
DO Hi-Spd
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Station
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#124
#54242
RIO Sta.
No. #124
#54243

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#54245
DO dev
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DO dev No.
#124
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#54248
DO Hi-Spd
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Station
No.: 125
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#54252
RIO Sta.
No. #125
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DI dev No.
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#54255
DO dev
name #125
#54256
DO dev No.
#125
#54257
DI Hi-Spd
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#54258
DO Hi-Spd
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Station
No.: 126
#54261
RIO CH No.
#126
#54262
RIO Sta.
No. #126
#54263
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#54265
DO dev
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#54266
DO dev No.
#126
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DI Hi-Spd
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#54268
DO Hi-Spd
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Station
No.: 127
#54271
RIO CH No.
#127
#54272
RIO Sta.
No. #127
#54273
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name #127
#54274
DI dev No.
#127
#54275
DO dev

name #127
#54276
DO dev No.
#127
#54277
DI Hi-Spd
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#54278
DO Hi-Spd
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Station
No.: 128
#54281
RIO CH No.
#128
#54282
RIO Sta.
No. #128
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#54284
DI dev No.
#128
#54285
DO dev
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#54286
DO dev No.
#128
#54287
DI Hi-Spd
#128
#54288
DO Hi-Spd
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Station
No.: 129
#54291
RIO CH No.
#129
#54292
RIO Sta.
No. #129
#54293
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#54294
DI dev No.
#129
#54295
DO dev
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#54296
DO dev No.
#129
#54297
DI Hi-Spd
#129
#54298
DO Hi-Spd
#129
#130
Station
No.: 130
#54301
RIO CH No.
#130
#54302
RIO Sta.
No. #130
#54303
DI dev
name #130
#54304
DI dev No.
#130
#54305
DO dev
name #130
#54306
DO dev No.
#130
#54307
DI Hi-Spd
#130

#54308
DO Hi-Spd
#130
#131
Station
No.: 131
#54311
RIO CH No.
#131
#54312
RIO Sta.
No. #131
#54313
DI dev
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#54314
DI dev No.
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#54315
DO dev
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#54316
DO dev No.
#131
#54317
DI Hi-Spd
#131
#54318
DO Hi-Spd
#131
RIO CH No. RIO Sta.
No.
DI dev
name
DI dev No. DO dev
name
DO dev No. DI Hi-Spd DO Hi Spd

#132
Station
No.: 132
#54321
RIO CH No.
#132
#54322
RIO Sta.
No. #132
#54323
DI dev
name #132
#54324
DI dev No.
#132
#54325
DO dev
name #132
#54326
DO dev No.
#132
#54327
DI Hi-Spd
#132
#54328
DO Hi-Spd
#132
#133
Station
No.: 133
#54331
RIO CH No.
#133
#54332
RIO Sta.
No. #133
#54333
DI dev
name #133
#54334
DI dev No.
#133
#54335
DO dev
name #133
#54336
DO dev No.

#133
#54337
DI Hi-Spd
#133
#54338
DO Hi-Spd
#133
#134
Station
No.: 134
#54341
RIO CH No.
#134
#54342
RIO Sta.
No. #134
#54343
DI dev
name #134
#54344
DI dev No.
#134
#54345
DO dev
name #134
#54346
DO dev No.
#134
#54347
DI Hi-Spd
#134
#54348
DO Hi-Spd
#134
#135
Station
No.: 135
#54351
RIO CH No.
#135
#54352
RIO Sta.
No. #135
#54353
DI dev
name #135
#54354
DI dev No.
#135
#54355
DO dev
name #135
#54356
DO dev No.
#135
#54357
DI Hi-Spd
#135
#54358
DO Hi-Spd
#135
#136
Station
No.: 136
#54361
RIO CH No.
#136
#54362
RIO Sta.
No. #136
#54363
DI dev
name #136
#54364
DI dev No.
#136
#54365
DO dev
name #136
#54366
DO dev No.
#136
#54367
DI Hi-Spd
#136
#54368
DO Hi-Spd
#136

#137
Station
No.: 137
#54371
RIO CH No.
#137
#54372
RIO Sta.
No. #137
#54373
DI dev
name #137
#54374
DI dev No.
#137
#54375
DO dev
name #137
#54376
DO dev No.
#137
#54377
DI Hi-Spd
#137
#54378
DO Hi-Spd
#137
#138
Station
No.: 138
#54381
RIO CH No.
#138
#54382
RIO Sta.
No. #138
#54383
DI dev
name #138
#54384
DI dev No.
#138
#54385
DO dev
name #138
#54386
DO dev No.
#138
#54387
DI Hi-Spd
#138
#54388
DO Hi-Spd
#138
#139
Station
No.: 139
#54391
RIO CH No.
#139
#54392
RIO Sta.
No. #139
#54393
DI dev
name #139
#54394
DI dev No.
#139
#54395
DO dev
name #139
#54396
DO dev No.
#139
#54397
DI Hi-Spd
#139
#54398
DO Hi-Spd
#139
#140
Station
No.: 140
#54401
RIO CH No.
#140
#54402

RIO Sta.
No. #140
#54403
DI dev
name #140
#54404
DI dev No.
#140
#54405
DO dev
name #140
#54406
DO dev No.
#140
#54407
DI Hi-Spd
#140
#54408
DO Hi-Spd
#140
#141
Station
No.: 141
#54411
RIO CH No.
#141
#54412
RIO Sta.
No. #141
#54413
DI dev
name #141
#54414
DI dev No.
#141
#54415
DO dev
name #141
#54416
DO dev No.
#141
#54417
DI Hi-Spd
#141
#54418
DO Hi-Spd
#141
#142
Station
No.: 142
#54421
RIO CH No.
#142
#54422
RIO Sta.
No. #142
#54423
DI dev
name #142
#54424
DI dev No.
#142
#54425
DO dev
name #142
#54426
DO dev No.
#142
#54427
DI Hi-Spd
#142
#54428
DO Hi-Spd
#142
#143
Station
No.: 143
#54431
RIO CH No.
#143
#54432
RIO Sta.
No. #143
#54433
DI dev
name #143
#54434
DI dev No.

#143
#54435
DO dev
name #143
#54436
DO dev No.
#143
#54437
DI Hi-Spd
#143
#54438
DO Hi-Spd
#143
#144
Station
No.: 144
#54441
RIO CH No.
#144
#54442
RIO Sta.
No. #144
#54443
DI dev
name #144
#54444
DI dev No.
#144
#54445
DO dev
name #144
#54446
DO dev No.
#144
#54447
DI Hi-Spd
#144
#54448
DO Hi-Spd
#144
#145
Station
No.: 145
#54451
RIO CH No.
#145
#54452
RIO Sta.
No. #145
#54453
DI dev
name #145
#54454
DI dev No.
#145
#54455
DO dev
name #145
#54456
DO dev No.
#145
#54457
DI Hi-Spd
#145
#54458
DO Hi-Spd
#145
#146
Station
No.: 146
#54461
RIO CH No.
#146
#54462
RIO Sta.
No. #146
#54463
DI dev
name #146
#54464
DI dev No.
#146
#54465
DO dev
name #146
#54466
DO dev No.
#146

#54467
DI Hi-Spd
#146
#54468
DO Hi-Spd
#146
#147
Station
No.: 147
#54471
RIO CH No.
#147
#54472
RIO Sta.
No. #147
#54473
DI dev
name #147
#54474
DI dev No.
#147
#54475
DO dev
name #147
#54476
DO dev No.
#147
#54477
DI Hi-Spd
#147
#54478
DO Hi-Spd
#147
#148
Station
No.: 148
#54481
RIO CH No.
#148
#54482
RIO Sta.
No. #148
#54483
DI dev
name #148
#54484
DI dev No.
#148
#54485
DO dev
name #148
#54486
DO dev No.
#148
#54487
DI Hi-Spd
#148
#54488
DO Hi-Spd
#148
#149
Station
No.: 149
#54491
RIO CH No.
#149
#54492
RIO Sta.
No. #149
#54493
DI dev
name #149
#54494
DI dev No.
#149
#54495
DO dev
name #149
#54496
DO dev No.
#149
#54497
DI Hi-Spd
#149
#54498
DO Hi-Spd
#149
#150

Station
No.: 150
#54501
RIO CH No.
#150
#54502
RIO Sta.
No. #150
#54503
DI dev
name #150
#54504
DI dev No.
#150
#54505
DO dev
name #150
#54506
DO dev No.
#150
#54507
DI Hi-Spd
#150
#54508
DO Hi-Spd
#150
RIO CH No. RIO Sta.
No.
DI dev
name
DI dev No. DO dev
name
DO dev No. DI Hi-Spd DO Hi Spd

#151
Station
No.: 151
#54511
RIO CH No.
#151
#54512
RIO Sta.
No. #151
#54513
DI dev
name #151
#54514
DI dev No.
#151
#54515
DO dev
name #151
#54516
DO dev No.
#151
#54517
DI Hi-Spd
#151
#54518
DO Hi-Spd
#151
#152
Station
No.: 152
#54521
RIO CH No.
#152
#54522
RIO Sta.
No. #152
#54523
DI dev
name #152
#54524
DI dev No.
#152
#54525
DO dev
name #152
#54526
DO dev No.
#152
#54527
DI Hi-Spd
#152

#54528
DO Hi-Spd
#152
#153
Station
No.: 153
#54531
RIO CH No.
#153
#54532
RIO Sta.
No. #153
#54533
DI dev
name #153
#54534
DI dev No.
#153
#54535
DO dev
name #153
#54536
DO dev No.
#153
#54537
DI Hi-Spd
#153
#54538
DO Hi-Spd
#153
#154
Station
No.: 154
#54541
RIO CH No.
#154
#54542
RIO Sta.
No. #154
#54543
DI dev
name #154
#54544
DI dev No.
#154
#54545
DO dev
name #154
#54546
DO dev No.
#154
#54547
DI Hi-Spd
#154
#54548
DO Hi-Spd
#154
#155
Station
No.: 155
#54551
RIO CH No.
#155
#54552
RIO Sta.
No. #155
#54553
DI dev
name #155
#54554
DI dev No.
#155
#54555
DO dev
name #155
#54556
DO dev No.
#155
#54557
DI Hi-Spd
#155
#54558
DO Hi-Spd
#155
#156
Station
No.: 156
#54561

RIO CH No.
#156
#54562
RIO Sta.
No. #156
#54563
DI dev
name #156
#54564
DI dev No.
#156
#54565
DO dev
name #156
#54566
DO dev No.
#156
#54567
DI Hi-Spd
#156
#54568
DO Hi-Spd
#156
#157
Station
No.: 157
#54571
RIO CH No.
#157
#54572
RIO Sta.
No. #157
#54573
DI dev
name #157
#54574
DI dev No.
#157
#54575
DO dev
name #157
#54576
DO dev No.
#157
#54577
DI Hi-Spd
#157
#54578
DO Hi-Spd
#157
#158
Station
No.: 158
#54581
RIO CH No.
#158
#54582
RIO Sta.
No. #158
#54583
DI dev
name #158
#54584
DI dev No.
#158
#54585
DO dev
name #158
#54586
DO dev No.
#158
#54587
DI Hi-Spd
#158
#54588
DO Hi-Spd
#158
#159
Station
No.: 159
#54591
RIO CH No.
#159
#54592
RIO Sta.
No. #159
#54593
DI dev

name #159
#54594
DI dev No.
#159
#54595
DO dev
name #159
#54596
DO dev No.
#159
#54597
DI Hi-Spd
#159
#54598
DO Hi-Spd
#159
#160
Station
No.: 160
#54601
RIO CH No.
#160
#54602
RIO Sta.
No. #160
#54603
DI dev
name #160
#54604
DI dev No.
#160
#54605
DO dev
name #160
#54606
DO dev No.
#160
#54607
DI Hi-Spd
#160
#54608
DO Hi-Spd
#160
#161
Station
No.: 161
#54611
RIO CH No.
#161
#54612
RIO Sta.
No. #161
#54613
DI dev
name #161
#54614
DI dev No.
#161
#54615
DO dev
name #161
#54616
DO dev No.
#161
#54617
DI Hi-Spd
#161
#54618
DO Hi-Spd
#161
#162
Station
No.: 162
#54621
RIO CH No.
#162
#54622
RIO Sta.
No. #162
#54623
DI dev
name #162
#54624
DI dev No.
#162
#54625
DO dev
name #162

#54626
DO dev No.
#162
#54627
DI Hi-Spd
#162
#54628
DO Hi-Spd
#162
#163
Station
No.: 163
#54631
RIO CH No.
#163
#54632
RIO Sta.
No. #163
#54633
DI dev
name #163
#54634
DI dev No.
#163
#54635
DO dev
name #163
#54636
DO dev No.
#163
#54637
DI Hi-Spd
#163
#54638
DO Hi-Spd
#163
#164
Station
No.: 164
#54641
RIO CH No.
#164
#54642
RIO Sta.
No. #164
#54643
DI dev
name #164
#54644
DI dev No.
#164
#54645
DO dev
name #164
#54646
DO dev No.
#164
#54647
DI Hi-Spd
#164
#54648
DO Hi-Spd
#164
#165
Station
No.: 165
#54651
RIO CH No.
#165
#54652
RIO Sta.
No. #165
#54653
DI dev
name #165
#54654
DI dev No.
#165
#54655
DO dev
name #165
#54656
DO dev No.
#165
#54657
DI Hi-Spd
#165
#54658

DO Hi-Spd
#165
#166
Station
No.: 166
#54661
RIO CH No.
#166
#54662
RIO Sta.
No. #166
#54663
DI dev
name #166
#54664
DI dev No.
#166
#54665
DO dev
name #166
#54666
DO dev No.
#166
#54667
DI Hi-Spd
#166
#54668
DO Hi-Spd
#166
#167
Station
No.: 167
#54671
RIO CH No.
#167
#54672
RIO Sta.
No. #167
#54673
DI dev
name #167
#54674
DI dev No.
#167
#54675
DO dev
name #167
#54676
DO dev No.
#167
#54677
DI Hi-Spd
#167
#54678
DO Hi-Spd
#167
#168
Station
No.: 168
#54681
RIO CH No.
#168
#54682
RIO Sta.
No. #168
#54683
DI dev
name #168
#54684
DI dev No.
#168
#54685
DO dev
name #168
#54686
DO dev No.
#168
#54687
DI Hi-Spd
#168
#54688
DO Hi-Spd
#168
#169
Station
No.: 169
#54691
RIO CH No.

#169
#54692
RIO Sta.
No. #169
#54693
DI dev
name #169
#54694
DI dev No.
#169
#54695
DO dev
name #169
#54696
DO dev No.
#169
#54697
DI Hi-Spd
#169
#54698
DO Hi-Spd
#169
RIO CH No. RIO Sta.
No.
DI dev
name
DI dev No. DO dev
name
DO dev No. DI Hi-Spd DO Hi Spd

#170
Station
No.: 170
#54701
RIO CH No.
#170
#54702
RIO Sta.
No. #170
#54703
DI dev
name #170
#54704
DI dev No.
#170
#54705
DO dev
name #170
#54706
DO dev No.
#170
#54707
DI Hi-Spd
#170
#54708
DO Hi-Spd
#170
#171
Station
No.: 171
#54711
RIO CH No.
#171
#54712
RIO Sta.
No. #171
#54713
DI dev
name #171
#54714
DI dev No.
#171
#54715
DO dev
name #171
#54716
DO dev No.
#171
#54717
DI Hi-Spd
#171
#54718
DO Hi-Spd
#171
#172

Station
No.: 172
#54721
RIO CH No.
#172
#54722
RIO Sta.
No. #172
#54723
DI dev
name #172
#54724
DI dev No.
#172
#54725
DO dev
name #172
#54726
DO dev No.
#172
#54727
DI Hi-Spd
#172
#54728
DO Hi-Spd
#172
#173
Station
No.: 173
#54731
RIO CH No.
#173
#54732
RIO Sta.
No. #173
#54733
DI dev
name #173
#54734
DI dev No.
#173
#54735
DO dev
name #173
#54736
DO dev No.
#173
#54737
DI Hi-Spd
#173
#54738
DO Hi-Spd
#173
#174
Station
No.: 174
#54741
RIO CH No.
#174
#54742
RIO Sta.
No. #174
#54743
DI dev
name #174
#54744
DI dev No.
#174
#54745
DO dev
name #174
#54746
DO dev No.
#174
#54747
DI Hi-Spd
#174
#54748
DO Hi-Spd
#174
#175
Station
No.: 175
#54751
RIO CH No.
#175
#54752
RIO Sta.

No. #175
#54753
DI dev
name #175
#54754
DI dev No.
#175
#54755
DO dev
name #175
#54756
DO dev No.
#175
#54757
DI Hi-Spd
#175
#54758
DO Hi-Spd
#175
#176
Station
No.: 176
#54761
RIO CH No.
#176
#54762
RIO Sta.
No. #176
#54763
DI dev
name #176
#54764
DI dev No.
#176
#54765
DO dev
name #176
#54766
DO dev No.
#176
#54767
DI Hi-Spd
#176
#54768
DO Hi-Spd
#176
#177
Station
No.: 177
#54771
RIO CH No.
#177
#54772
RIO Sta.
No. #177
#54773
DI dev
name #177
#54774
DI dev No.
#177
#54775
DO dev
name #177
#54776
DO dev No.
#177
#54777
DI Hi-Spd
#177
#54778
DO Hi-Spd
#177
#178
Station
No.: 178
#54781
RIO CH No.
#178
#54782
RIO Sta.
No. #178
#54783
DI dev
name #178
#54784
DI dev No.
#178

#54785
DO dev
name #178
#54786
DO dev No.
#178
#54787
DI Hi-Spd
#178
#54788
DO Hi-Spd
#178
#179
Station
No.: 179
#54791
RIO CH No.
#179
#54792
RIO Sta.
No. #179
#54793
DI dev
name #179
#54794
DI dev No.
#179
#54795
DO dev
name #179
#54796
DO dev No.
#179
#54797
DI Hi-Spd
#179
#54798
DO Hi-Spd
#179
#180
Station
No.: 180
#54801
RIO CH No.
#180
#54802
RIO Sta.
No. #180
#54803
DI dev
name #180
#54804
DI dev No.
#180
#54805
DO dev
name #180
#54806
DO dev No.
#180
#54807
DI Hi-Spd
#180
#54808
DO Hi-Spd
#180
#181
Station
No.: 181
#54811
RIO CH No.
#181
#54812
RIO Sta.
No. #181
#54813
DI dev
name #181
#54814
DI dev No.
#181
#54815
DO dev
name #181
#54816
DO dev No.
#181
#54817

DI Hi-Spd
#181
#54818
DO Hi-Spd
#181
#182
Station
No.: 182
#54821
RIO CH No.
#182
#54822
RIO Sta.
No. #182
#54823
DI dev
name #182
#54824
DI dev No.
#182
#54825
DO dev
name #182
#54826
DO dev No.
#182
#54827
DI Hi-Spd
#182
#54828
DO Hi-Spd
#182
#183
Station
No.: 183
#54831
RIO CH No.
#183
#54832
RIO Sta.
No. #183
#54833
DI dev
name #183
#54834
DI dev No.
#183
#54835
DO dev
name #183
#54836
DO dev No.
#183
#54837
DI Hi-Spd
#183
#54838
DO Hi-Spd
#183
#184
Station
No.: 184
#54841
RIO CH No.
#184
#54842
RIO Sta.
No. #184
#54843
DI dev
name #184
#54844
DI dev No.
#184
#54845
DO dev
name #184
#54846
DO dev No.
#184
#54847
DI Hi-Spd
#184
#54848
DO Hi-Spd
#184
#185
Station

No.: 185
#54851
RIO CH No.
#185
#54852
RIO Sta.
No. #185
#54853
DI dev
name #185
#54854
DI dev No.
#185
#54855
DO dev
name #185
#54856
DO dev No.
#185
#54857
DI Hi-Spd
#185
#54858
DO Hi-Spd
#185
#186
Station
No.: 186
#54861
RIO CH No.
#186
#54862
RIO Sta.
No. #186
#54863
DI dev
name #186
#54864
DI dev No.
#186
#54865
DO dev
name #186
#54866
DO dev No.
#186
#54867
DI Hi-Spd
#186
#54868
DO Hi-Spd
#186
RIO CH No. RIO Sta.
No.
DI dev
name
DI dev No. DO dev
name
DO dev No. DI Hi-Spd DO Hi Spd

Set LONG data.
#29001 to #29896 are used as parameter range where C language modules can be used arbitrarily.
Set DOUBLE data.
#29901 to #29996 are used as parameter range where C language modules can be used arbitrarily.
#29001-
29896
Open param 1
#29901-
29996
Open param 2

<Data typ>
Set the data format (BYTE, WORD, DWORD, WORD(BIT)) of the assignment area.
0: WORD
1: DWORD
2: BYTE
3: WORD(BIT)
<Data no>
Set the number of data in the assignment area. The number to be designated varies depending on the unit designated by the data format.

0 to 3000
(Depends on the device assignment and data format.)
<Disp typ>
Designate the status of data display format, display restrictions and input protection.
bit0: Cancellation of protection for input
Select whether to check the input protection for the data protection key 2 on the group details screen.
(Note) The name of data protection key differs between machine tool builders. Refer to manuals issued by each machine tool builder for details.
0: Check
1: Not check
bit1: Cancellation of restriction on display
Select whether to display the group details screen even when a machine tool builder password is not entered.
0: Not display
1: Display
bit4: BCD format
Display the data of the group details screen in BCD format.
0: Disabled
1: Enabled
bit5: BIT format
Display the data of the group details screen in BIT format.
0: Disabled
1: Enabled
bit6: HEX format (Hexadecimal format)
Display the data of the group details screen in HEX format.
0: Disabled
1: Enabled
bit7: Sign (Decimal format only)
Select whether to display the data of the group details screen in a decimal format with/without a sign.
0: With sign
1: Without sign
#40001-
40100
Device Open Parameters
M800V/M80V Series Alarm/Parameter Manual
15 Machine Parameters
15.23 SRAM Open Parameters
IB-1501623-F 672
15.23 SRAM Open Parameters
<Data typ>
Set the data type (CHAR, SHORT, LONG, DOUBLE) of the assignment area.
1: CHAR
2: SHORT
3: LONG
4: DOUBLE
<Data no>
Set the number of data in the assignment area. The number to be designated varies depending on the unit and free area designated by the data format.
0 to 9999999 (Depends on the data format and free area)
<Disp typ>
Designate the status of data display format, display restrictions and input protection.
bit0: Cancellation of protection for input
Select whether to check the input protection for the data protection key 2 on the group details screen.
(Note) The name of data protection key differs between machine tool builders. Refer to manuals issued by each machine tool builder for details.
0: Check
1: Not check
bit1: Cancellation of restriction on display
Select whether to display the group details screen even when a machine tool builder password is not entered.
0: Not display
1: Display
bit4: BCD format
Display the data of the group details screen in BCD format.
0: Disable
1: Enable
bit5: BIT format
Display the data of the group details screen in BIT format.
0: Disable
1: Enable
bit6: HEX format (Hexadecimal format)
Display the data of the group details screen in HEX format.
0: Disable
1: Enable
bit7: Sign (Decimal format only)
Select whether to display the data of the group details screen in a decimal format with/without a sign.
0: With sign
1: Without sign
#41001-
41100
SRAM Open Parameters
M800V/M80V Series Alarm/Parameter Manual
15 Machine Parameters
15.24 CC-Link Parameters
673 IB-1501623-F
15.24 CC-Link Parameters
Set the station No. of the CC-Link I/F unit.
"n" represents the expansion slot No. (n=1 to 3)
-1: Invalid
0: Master station

1 to 64: Device station
---Master station---
Set a value within the setting range.
---Local/standby master station---
Set a value within the setting range.
---Setting range---
-1 to 64
Select the transmission rate and operation mode of the CC-Link I/F unit.
"n" represents the expansion slot No. (n=1 to 3)
<Online mode>
0: 156Kbps
1: 625Kbps
2: 2.5Mbps
3: 5Mbps
4: 10Mbps
<Circuit test mode>
5: 156Kbps
6: 625Kbps
7: 2.5Mbps
8: 5Mbps
9: 10Mbps
<Hardware test mode>
10: 156Kbps
11: 625Kbps
12: 2.5Mbps
13: 5Mbps
14: 10Mbps
(Note) Perform hardware test after removing the CC-Link cable.
---Master station---
Set a value within the setting range.
---Local/standby master station---
Set a value within the setting range.
---Setting range---
0 to 14
(PR) #24001+40(n-1) SLn station No. CC-Link station No.
(PR) #24002+40(n-1) SLn line-spd&Mode CC-Link transmission rate and mode

Select whether to clear or hold the data input from the data link faulty station.
"n" represents the expansion slot No. (n=1 to 3)
0: Clear
1: Hold
(Note) Refer to "CC-Link System Master/Local Module User's Manual (SH-080394E)" for the details of the functions.
---Master station---
Set to "0" or "1".
---Local/standby master station---
Set to "0" or "1".
Set whether to refresh or compulsorily clear the device stations at PLC STOP.
"n" represents the expansion slot No. (n=1 to 3)
0: Refresh
1: Compulsorily clear
(Note) Refer to "CC-Link System Master/Local Module User's Manual (SH-080394E)" for the details of the functions.
---Master station---
Set to "0" or "1".
---Local/standby master station---
Set to "0" or "1".
Set the number of occupied local and standby master stations.
"n" represents the expansion slot No. (n=1 to 3)
---Master station---
Set to "0".
---Local/standby master station---
Set to either of "1" to "4".
---Setting range---
0 to 4
Set the magnification for the extended cyclic operation of the local station whose type corresponds to Ver.2.
"n" represents the expansion slot No. (n=1 to 3)
Set "1" for the local station whose type corresponds to Ver.1.
This function is out of specifications when the protocol version is Ver.1. The setting for the local station is fixed to "1".
---Master station---
Set to "0".
---Local/standby master station---
Set to either of "1", "2", "4" or "8".
---Setting range---
0, 1, 2, 4, 8 (times)
(PR) #24003+40(n-1) SLn set fault sta Setting of data link faulty station
#24004+40(n-1) SLn PLC stop set Setting at PLC STOP
(PR) #24005+40(n-1) SLn occ stations Number of occupied stations
(PR) #24006+40(n-1) SLn extended cyc Extended cyclic setting

Set the total number of remote stations, local stations, intelligent device stations, standby master station and

reserved stations connected to the master station.
"n" represents the expansion slot No. (n=1 to 3)
---Master station---
Set to either of "1" to "64".
---Local/standby master station---
Set to "0".
---Setting range---
0 to 64 (modules)
Set the number of retries for when a communication error occurs.
"n" represents the expansion slot No. (n=1 to 3)
---Master station---
Set to either of "1" to "7".
---Local/standby master station---
Set to "0".
---Setting range---
0 to 7 (times)
Set the total number of remote stations, local stations, intelligent device stations and standby master station that can be returned to system operation by a single link scan.
"n" represents the expansion slot No. (n=1 to 3)
(Note) Refer to "CC-Link System Master/Local Module User's Manual (SH-080394E)" for the details of the functions.
---Master station---
Set to either of "1" to "10".
---Local/standby master station---
Set to "0".
---Setting range---
0 to 10 (modules)
Set the station No. of the standby master station.
"n" represents the expansion slot No. (n=1 to 3)
Set "0" when no standby master station is provided.
---Master station---
Set a value within the setting range.
---Local/standby master station---
Set "0" (fixed) for the local station.
Set "1" (fixed) for the standby station.
---Setting range---
0 to 64
#24007+40(n-1) SLn conn modules Number of connected modules
#24008+40(n-1) SLn num of retries Number of retries
#24009+40(n-1) SLn auto ret mdls Number of automatic return modules
(PR) #24010+40(n-1) SLn STBY master st Standby master station

Set the data link status for when the master station failure occurs.
"n" represents the expansion slot No. (n=1 to 3)
0: Fixed to stop
(Note) Refer to "CC-Link System Master/Local Module User's Manual (SH-080394E)" for the details of the functions.
---Master station---
Set to "0" (fixed).
---Local/standby master station---
Set to "0".
Select whether to synchronize the link scan with one ladder scan.
"n" represents the expansion slot No. (n=1 to 3)
0: Fixed to synchronize
---Master station---
Set to "0" (fixed).
---Local/standby master station---
Set to "0".
Set the delay time.
"n" represents the expansion slot No. (n=1 to 3)
0: (Fixed value)
---Master station---
Set to "0" (fixed).
---Local/standby master station---
Set to "0".
Set the refresh device name of the remote input (RX) to be automatically refreshed.
(Example) X
"n" represents the expansion slot No. (n=1 to 3)
Set "0" when no setting is required.
---Master station---
Set a value within the setting range.
---Local/standby master station---
Set a value within the setting range.
---Setting range---
0, X, M, L, B, D, W, R
#24011+40(n-1) SLn ope at NC down Operation at NC down
#24012+40(n-1) SLn scan mode Scan mode
#24013+40(n-1) SLn delay time Delay time
#24014+40(n-1) SLn RX dev name Remote input (RX) refresh device name

Set the refresh device No. of the remote input (RX) to be automatically refreshed.
"n" represents the expansion slot No. (n=1 to 3)

(Note 1) When setting parameters in ALL.PRM with using the parameter input/output function, input the de vice No. of decimal digit.
(Example) When setting "X400" for the remote input (RX) refresh device No., input as follows;
#24014+40(n-1): "X"
#24015+40(n-1): "1024"
(Note 2) When the refresh device name has been set, the refresh device No. will be "0".
Confirm the refresh device No. after changing the refresh device name.
If you specify bit devices, set them in increments of 16 points.
The operation will not be guaranteed unless the address is set in increments of 16 points.
(Example) 1000
---Master station---
Set a value within the setting range.
---Local/standby master station---
Set a value within the setting range.
---Setting range---
X: 0 to 5FF
M: 0 to 10239
L: 0 to 511
B: 0 to 1FFF
D: 0 to 2047
W: 0 to 1FFF
R: 8300 to 9799, 9800 to 9899
Set the refresh device name of the remote output (RY) to be automatically refreshed.
(Example) Y
"n" represents the expansion slot No. (n=1 to 3)
Set "0" when no setting is required.
---Master station---
Set a value within the setting range.
---Local/standby master station---
Set a value within the setting range.
---Setting range---
0, Y, M, L, B, D, W, R
#24015+40(n-1) SLn RX dev No. Remote input (RX) refresh device No.
#24016+40(n-1) SLn RY dev name Remote output (RY) refresh device name

Set the refresh device No. of the remote output (RY) to be automatically refreshed.
"n" represents the expansion slot No. (n=1 to 3)
(Note 1) When setting parameters in ALL.PRM with using the parameter input/output function, input the de vice No. of decimal digit.
(Example) When setting "X400" for the remote input (RX) refresh device No., input as follows;
#24014+40(n-1): "X"
#24015+40(n-1): "1024"
(Note 2) When the refresh device name has been set, the refresh device No. will be "0".
Confirm the refresh device No. after changing the refresh device name.
If you specify bit devices, set them in increments of 16 points.
The operation will not be guaranteed unless the address is set in increments of 16 points.
(Example) 1000
---Master station---
Set a value within the setting range.
---Local/standby master station---
Set a value within the setting range.
---Setting range---
Y: 0 to 5FF
M: 0 to 10239
L: 0 to 511
B: 0 to 1FFF
D: 0 to 2047
W: 0 to 1FFF
R: 8300 to 9799, 9800 to 9899
Set the refresh device name of the remote register (RWr) to be automatically refreshed.
(Example) W
"n" represents the expansion slot No. (n=1 to 3)
Set "0" when no setting is required.
---Master station---
Set a value within the setting range.
---Local/standby master station---
Set a value within the setting range.
---Setting range---
0, M, L, B, D, W, R
#24017+40(n-1) SLn RY dev No. Remote output (RY) refresh device No.
#24018+40(n-1) SLn RWr dev name Remote register (RWr) refresh device name

Set the refresh device No. of the remote register (RWr) to be automatically refreshed.
"n" represents the expansion slot No. (n=1 to 3)
(Note 1) When setting parameters in ALL.PRM with using the parameter input/output function, input the de vice No. of decimal digit.
(Example) When setting "X400" for the remote input (RX) refresh device No., input as follows;
#24014+40(n-1): "X"
#24015+40(n-1): "1024"
(Note 2) When the refresh device name has been set, the refresh device No. will be "0".
Confirm the refresh device No. after changing the refresh device name.
If you specify bit devices, set them in increments of 16 points.
The operation will not be guaranteed unless the address is set in increments of 16 points.
(Example) 1FF0
---Master station---

Set a value within the setting range.
---Local/standby master station---
Set a value within the setting range.
---Setting range---
M: 0 to 10239
L: 0 to 511
B: 0 to 1FFF
D: 0 to 2047
W: 0 to 1FFF
R: 8300 to 9799, 9800 to 9899
Set the refresh device name of the remote register (RWw) to be automatically refreshed.
(Example) W
"n" represents the expansion slot No. (n=1 to 3)
Set "0" when no setting is required.
---Master station---
Set a value within the setting range.
---Local/standby master station---
Set a value within the setting range.
---Setting range---
0, M, L, B, D, W, R
#24019+40(n-1) SLn RWr dev No. Remote register (RWr) refresh device No.
#24020+40(n-1) SLn RWw dev name Remote register (RWw) refresh device name

Set the refresh device No. of the remote register (RWw) to be automatically refreshed.
"n" represents the expansion slot No. (n=1 to 3)
(Note 1) When setting parameters in ALL.PRM with using the parameter input/output function, input the de vice No. of decimal digit.
(Example) When setting "X400" for the remote input (RX) refresh device No., input as follows;
#24014+40(n-1): "X"
#24015+40(n-1): "1024"
(Note 2) When the refresh device name has been set, the refresh device No. will be "0".
Confirm the refresh device No. after changing the refresh device name.
If you specify bit devices, set them in increments of 16 points.
The operation will not be guaranteed unless the address is set in increments of 16 points.
(Example) 1FF0
---Master station---
Set a value within the setting range.
---Local/standby master station---
Set a value within the setting range.
---Setting range---
M: 0 to 10239
L: 0 to 511
B: 0 to 1FFF
D: 0 to 2047
W: 0 to 1FFF
R: 8300 to 9799, 9800 to 9899
Set the refresh device name of the special relay (SB) to be automatically refreshed.
(Example) SB
"n" represents the expansion slot No. (n=1 to 3)
Set "0" when no setting is required.
---Master station---
Set a value within the setting range.
---Local/standby master station---
Set a value within the setting range.
---Setting range---
0, M, L, B, D, W, R, SB
#24021+40(n-1) SLn RWw dev No. Remote register (RWw) refresh device No.
#24022+40(n-1) SLn SB dev name Special relay (SB) refresh device name

Set the refresh device No. of the special relay (SB) to be automatically refreshed.
"n" represents the expansion slot No. (n=1 to 3)
(Note 1) When setting parameters in ALL.PRM with using the parameter input/output function, input the de vice No. of decimal digit.
(Example) When setting "X400" for the remote input (RX) refresh device No., input as follows;
#24014+40(n-1): "X"
#24015+40(n-1): "1024"
(Note 2) When the refresh device name has been set, the refresh device No. will be "0".
Confirm the refresh device No. after changing the refresh device name.
If you specify bit devices, set them in increments of 16 points.
The operation will not be guaranteed unless the address is set in increments of 16 points.
(Example) 1F0
---Master station---
Set a value within the setting range.
---Local/standby master station---
Set a value within the setting range.
---Setting range---
M: 0 to 10239
L: 0 to 511
B: 0 to 1FFF
D: 0 to 2047
W: 0 to 1FFF
SB: 0 to 1FF
R: 8300 to 9799, 9800 to 9899
Set the refresh device name of the special relay (SW) to be automatically refreshed.

"n" represents the expansion slot No. (n=1 to 3)
(Example) SW
Set "0" when no setting is required.
---Master station---
Set a value within the setting range.
---Local/standby master station---
Set a value within the setting range.
---Setting range---
0, M, L, B, D, W, R, SW
#24023+40(n-1) SLn SB dev No. Special relay (SB) refresh device No.
#24024+40(n-1) SLn SW dev name Special relay (SW) refresh device name

Set the refresh device No. of the special relay (SW) to be automatically refreshed.
"n" represents the expansion slot No. (n=1 to 3)
(Note 1) When setting parameters in ALL.PRM with using the parameter input/output function, input the de vice No. of decimal digit.
(Example) When setting "X400" for the remote input (RX) refresh device No., input as follows;
#24014+40(n-1): "X"
#24015+40(n-1): "1024"
(Note 2) When the refresh device name has been set, the refresh device No. will be "0".
Confirm the refresh device No. after changing the refresh device name.
If you specify bit devices, set them in increments of 16 points.
(Example) 1F0
---Master station---
Set a value within the setting range.
---Local/standby master station---
Set a value within the setting range.
---Setting range---
M: 0 to 10239
L: 0 to 511
B: 0 to 1FFF
D: 0 to 2047
W: 0 to 1FFF
SW: 0 to 1FF
R: 8300 to 9799, 9800 to 9899
Select the CC-Link version mode that has been set to the slide switch SW1-2 on the CC-Link unit (HN566/
HN567).
"n" represents the expansion slot No. (n=1 to 3)
0: Ver.2
1: Ver.1
Ver.2 mode has been set to SW1-2 as default.
---Master station---
Set to "0" or "1".
---Local/standby master station---
Set to "0" or "1".
Set the type of the connected remote station, local station, intelligent device station and standby master sta tion.
0: No setting
1: Ver.1 remote I/O station
2: Ver.1 remote device station
3: Ver.1 intelligent device station
4: Ver.2 remote device station
5: Ver.2 intelligent device station
"m" means the m-th connected station in ascending order of station No. (m=1 to 64)
---Master station---
Set to either of "0" to "5".
---Local/standby master station---
Set to "0".
#24025+40(n-1) SLn SW dev No. Special relay (SW) refresh device No.
(PR) #24026+40(n-1) SLn Protocol Ver Protocol version
#24121+15(m-1) CNm station type Station type

Select the magnification for the extended cycling operation of the connected remote, local and intelligent sta tions.
Set "1" when the protocol version is Ver.1.
Set "0" when no setting is required.
"m" means the m-th connected station in ascending order of station No. (m=1 to 64)
---Master station---
Set a value within the setting range.
---Local/standby master station---
Set to "0".
---Setting range---
0, 1, 2, 4, 8 (times)
Set the number of the occupied stations by the connected remote, local and intelligent stations.
Set 1 for 8 points I/O and 16 points I/O.
Set "0" when no setting is required.
"m" means the m-th connected station in ascending order of station No. (m=1 to 64)
---Master station---
Set a value within the setting range.
---Local/standby master station---
Set to "0".
---Setting range---
0 to 4 (stations occupied)
Set the station No. of the connected remote, local and intelligent stations.
Set "0" when no setting is required.

"m" means the m-th connected station in ascending order of station No. (m=1 to 64)
---Master station---
Set a value within the setting range.
---Local/standby master station---
Set to "0".
---Setting range---
0 to 64
#24122+15(m-1) CNm extended cyc Extended cyclic setting
#24123+15(m-1) CNm occ stations Number of occupied stations
#24124+15(m-1) CNm station No. Station No.

Select the number of points of the connected remote station.
"m" means the m-th connected station in ascending order of station No. (m=1 to 64)
The details of setting values differ with each protocol version and station type.
Protocol: Ver.2 (station type: Ver.1, remote I/O station)
0: 0 point (reserved station)
1: 8 points
2: 8 points + 8 points reserved
3: 16 points
4: 32 points
Setting "0" is valid only for the reserved station. When "0" is set for the other stations, the number of points will be 32.
Set the value so that the total number of points of remote I/O stations connected in series will be multiple of 16.
(Example 1) 2 units of 8 points I/O: Set "1" for each
(Example 2) 3 units of 8 points I/O: Set "1" for the first and the second I/O, "2" for the third.
Protocol: Ver.2 (station type: Ver.1 except remote I/O station)
0: 0 point (reserved station)
1 to 4: Automatically calculated
Setting "0" is valid only for the reserved station. When "0" is set for the other stations, the number of points will be automatically calculated.
Unless 0 is set, the number of points will be automatically calculated with the number of occupied stations and the setting value of the extended cycling.
Protocol: Ver.1 (for all station types)
0 to 4: Automatically calculated
"0" cannot be set even for the reserved station.
Automatically calculated with the setting value of the number of occupied stations.
---Master station---
Set a value corresponding to the protocol version and the station type.
---Local/standby master station---
Set to "0".
Set the reserved/error invalid station.
"m" means the m-th connected station in ascending order of station No. (m=1 to 64)
0: No setting
1: Reserved station
2: Error invalid station
(Note) Refer to "CC-Link System Master/Local Module User's Manual (SH-080394E)" for the details of the functions.
---Master station---
Set either of "0" to "2".
---Local/standby master station---
Set to "0".
#24125+15(m-1) CNm remote sta pt Remote station points
#24126+15(m-1) CNm set rsvd sta Reserved station

Set the allocation of the buffer memory size to the local station, standby master station and intelligent device station when in transient transmission.
"m" means the m-th connected station in ascending order of station No. (m=1 to 64)
Set "0" when no setting is required.
(Note) The total size of the send/receive buffers must be 4096 (words) or less.
---Master station---
Set a value within the setting range.
---Local/standby master station---
Set to "0".
---Setting range---
0, 64 to 4096 (words)
Set the allocation of the buffer memory size to the local station, standby master station and intelligent device station when in transient transmission.
"m" means the m-th connected station in ascending order of station No. (m=1 to 64)
Set "0" when no setting is required.
(Note) The total size of the send/receive buffers must be 4096 (words) or less.
---Master station---
Set a value within the setting range.
---Local/standby master station---
Set to "0".
---Setting range---
0, 64 to 4096 (words)
Set the allocation of the buffer memory size to the local station, standby master station and intelligent device station when in transient transmission.
"m" means the m-th connected station in ascending order of station No. (m=1 to 64)
Set "0" when no setting is required.
---Master station---
Set a value within the setting range.

---Local/standby master station---
Set to "0".
---Setting range---
0, 128 to 4096 (words)
#24131+15(m-1) CNm send size Send buffer size
#24132+15(m-1) CNm receive size Receive buffer size
#24133+15(m-1) CNm auto bfr size Automatic update buffer size

15.25 PLC Axis Indexing Parameters
Set the axis No. to be controlled as auxiliary axis using auxiliary axis interface.
When "0" is set, the axis will not operate as auxiliary axis.
---Setting range---
0 to 8: (M800VW/M800VS Series)
0 to 4: (M80V Series)
Set the number of stations.
For linear axis, this value is expressed by: number of divisions = number of stations -1.
Setting "0" or "1" sets the number of stations to 2.
---Setting range---
0 to 360
The bits that are not explained here must be set to "0".
bit3:
0: Automatic reach signal isn't interlocked with the start signal.
1: Automatic reach signal is interlocked with the start signal.
bit4:
0: Automatic reach signal is turned ON again.
1: Automatic reach signal isn't turned ON again.
bit5:
0: Station No. Output within fixed position.
1: Station No. Constantly output.
bit9:
0: Rotation direction determined by operation control signal (DIR)
1: Rotation direction in the shortcut direction
bitE:
0: Rotation direction in operation control signal (DIR) or in the shortcut direction
1: Rotation direction in the arbitrary position command sign direction
bitF:
0: Stopper direction is in the positioning direction.
1: Stopper direction is in the sign direction of the stopper amount.
The bits that are not explained here must be set to "0".
bit4:
0: Uniform assignment
1: Arbitrary coordinate assignment
Set the movement stroke length for linear axes.
(Note 1) Setting "0.000" causes an MCP alarm at the power ON.
(Note 2) This parameter is meaningless at the non-uniform index or random position command.
---Setting range---
0.000 to 99999.999 (mm)
Set the distance (offset) from the reference position to station 1.
---Setting range---
-99999.999 to 99999.999 (or mm)
(PR) #12800 chgauxno Auxiliary axis number
(PR) #12801 aux_station Number of indexing stations
(PR) #12802 aux_Cont1 Control parameter 1
(PR) #12803 aux_Cont2 Control parameter 2
(PR) #12804 aux_tleng Linear axis stroke length
#12805 aux_ST.offset Station offset

Set the feedrate during automatic operation when "operation parameter group n" is selected.
"#12810 aux_Aspeed1" is regarded as the clamp value for the automatic operation speeds and manual op eration speeds of all operation groups.
A speed exceeding "aux_Aspeed1" cannot be commanded, even if it is set in a parameter.
(Note) Setting "0" causes an operation error at the "Operation start" signal's ON.
---Setting range---
0 to 100000 (/min or mm/min)
Set the feedrate during manual operation or JOG operation when "operation parameter group n" is selected.
(Note) Setting "0" causes an operation error at the "Operation start" signal's ON.
---Setting range---
0 to 100000 (/min or mm/min)
Set the linear acceleration/deceleration time for "Operation parameter group 1 automatic operation speed"
(clamp speed) when "operation parameter group n" is selected.
When "#12818+10(n-1) aux_smgstn" is "F", S-shape acceleration/deceleration is carried out.
When operating at a speed less than the clamp speed, if "#1361 aux_acc" is set to "0", the axis will accel erate/decelerate with the time constant set in this parameter. If "#1361 aux_acc" is set to "1", the axis will accelerate/decelerate at the constant inclination determined by this parameter and "aux_Aspeed1".
Setting "0" cancels acceleration/deceleration: The axis will move with the time constant "0".
---Setting range---
0 to 4000 (ms)
Set the total time of the non-linear parts in the S-pattern acceleration/deceleration.
In the handle feed operation mode, this setting value is regarded as time constant for the linear acceleration/
deceleration.
(Note) If this parameter is set to "0" while "#12818 aux_smgst1"is set to "F", an MCP alarm will occur.
---Setting range---
0 to 4000 (ms)
Set the motor output torque limit value when "operation parameter group n" is selected.

When setting 500%, the torque is limited at the maximum torque of the motor specifications. Set 500%, when
torque is not particularly needed to be limited.
In the stopper positioning operation mode, this will be regarded as torque limit value when positioning to the
stopper starting coordinates.
---Setting range---
0 to 500 (%)
Set the excessive error detection width when "operation parameter group n" is selected.
The excessive error alarm (S03 0052) will be detected when the position droop becomes larger than this set ting value.
In the stopper positioning operation mode, this will be regarded as excessive error detection width when po sitioning to the stopper starting coordinates.
---Setting range---
0 to 32767(or mm)
#12810+10(n-1) aux_Aspeedn Operation parameter group n Automatic operation
speed
#12811+10(n-1) aux_Mspeedn Operation parameter group n Manual operation speed
#12812+10(n-1) aux_timen.1 Operation parameter group n Acceleration/deceleration
time constant 1
#12813+10(n-1) aux_timen.2 Operation parameter group n Acceleration/deceleration
time constant 2
#12814+10(n-1) aux_TLn Operation parameter group n Torque limit value
#12815+10(n-1) aux_ODn Operation parameter group n Excessive error detection
width

Set the tolerable value at which "set position reached" (JST) or "automatic set position reached" (JSTA) sig nal is output when "operation parameter group n" is selected.
"Set position reached" (JST) indicates that the machine position is at any station.
During automatic operation, "automatic set position reached" (JSTA) is also output under the same condition.
These signals will turn OFF when the machine position moves away from the station over this value.
---Setting range---
0.000 to 99999.999 (or mm)
Set the tolerable value at which "near set position" (NEAR) signal is output when "operation parameter group
n" is selected.
"Near set position" (NEAR) indicates that the machine position is near any station position. This value is gen erally set wider than the set position output width.
During operations, this is related to the special commands when the station selection is set to "0".
---Setting range---
0.000 to 99999.999 (or mm)
Select the acceleration/deceleration type when "operation parameter group n" is selected.
0, 1: Linear acceleration/deceleration
F: S-pattern acceleration/deceleration
Set the station 2 coordinate value when arbitrary coordinate assignment is selected.
The station 1 coordinate value is fixed at "0.000" (machine coordinate zero point).
---Setting range---
-99999.999 to 99999.999 (or mm)
Set the station 3 coordinate value when arbitrary coordinate assignment is selected.
The station 1 coordinate value is fixed at "0.000" (machine coordinate zero point).
---Setting range---
-99999.999 to 99999.999 (or mm)
Set the station 4 coordinate value when arbitrary coordinate assignment is selected.
The station 1 coordinate value is fixed at "0.000" (machine coordinate zero point).
---Setting range---
-99999.999 to 99999.999 (or mm)
Set the station 5 coordinate value when arbitrary coordinate assignment is selected.
The station 1 coordinate value is fixed at "0.000" (machine coordinate zero point).
---Setting range---
-99999.999 to 99999.999 (or mm)
Set the station 6 coordinate value when arbitrary coordinate assignment is selected.
The station 1 coordinate value is fixed at "0.000" (machine coordinate zero point).
---Setting range---
-99999.999 to 99999.999 (or mm)
#12816+10(n-1) aux_justn Operation parameter group n Set position output width
#12817+10(n-1) aux_nearn Operation parameter group n Near set position output
width
(PR) #12818+10(n-1) aux_smgstn Operation parameter group n Acceleration/Deceleration
type
#12850 aux_stpos2 Station 2 coordinate
#12851 aux_stpos3 Station 3 coordinate
#12852 aux_stpos4 Station 4 coordinate
#12853 aux_stpos5 Station 5 coordinate
#12854 aux_stpos6 Station 6 coordinate

Set the station 7 coordinate value when arbitrary coordinate assignment is selected.
The station 1 coordinate value is fixed at "0.000" (machine coordinate zero point).
---Setting range---
-99999.999 to 99999.999 (or mm)
Set the station 8 coordinate value when arbitrary coordinate assignment is selected.
The station 1 coordinate value is fixed at "0.000" (machine coordinate zero point).
---Setting range---
-99999.999 to 99999.999 (or mm)
Set the station 9 coordinate value when arbitrary coordinate assignment is selected.
The station 1 coordinate value is fixed at "0.000" (machine coordinate zero point).
---Setting range---
-99999.999 to 99999.999 (or mm)
Set the station 10 coordinate value when arbitrary coordinate assignment is selected.
The station 1 coordinate value is fixed at "0.000" (machine coordinate zero point).

---Setting range---
-99999.999 to 99999.999 (or mm)
Set the station 11 coordinate value when arbitrary coordinate assignment is selected.
The station 1 coordinate value is fixed at "0.000" (machine coordinate zero point).
---Setting range---
-99999.999 to 99999.999 (or mm)
Set the station 12 coordinate value when arbitrary coordinate assignment is selected.
The station 1 coordinate value is fixed at "0.000" (machine coordinate zero point).
---Setting range---
-99999.999 to 99999.999 (or mm)
Set the station 13 coordinate value when arbitrary coordinate assignment is selected.
The station 1 coordinate value is fixed at "0.000" (machine coordinate zero point).
---Setting range---
-99999.999 to 99999.999 (or mm)
Set the station 14 coordinate value when arbitrary coordinate assignment is selected.
The station 1 coordinate value is fixed at "0.000" (machine coordinate zero point).
---Setting range---
-99999.999 to 99999.999 (or mm)
Set the station 15 coordinate value when arbitrary coordinate assignment is selected.
The station 1 coordinate value is fixed at "0.000" (machine coordinate zero point).
---Setting range---
-99999.999 to 99999.999 (or mm)
#12855 aux_stpos7 Station 7 coordinate
#12856 aux_stpos8 Station 8 coordinate
#12857 aux_stpos9 Station 9 coordinate
#12858 aux_stpos10 Station 10 coordinate
#12859 aux_stpos11 Station 11 coordinate
#12860 aux_stpos12 Station 12 coordinate
#12861 aux_stpos13 Station 13 coordinate
#12862 aux_stpos14 Station 14 coordinate
#12863 aux_stpos15 Station 15 coordinate

Set the station 16 coordinate value when arbitrary coordinate assignment is selected.
The station 1 coordinate value is fixed at "0.000" (machine coordinate zero point).
---Setting range---
-99999.999 to 99999.999 (or mm)
Set the station 17 coordinate value when arbitrary coordinate assignment is selected.
The station 1 coordinate value is fixed at "0.000" (machine coordinate zero point).
---Setting range---
-99999.999 to 99999.999 (or mm)
Set the station 18 coordinate value when arbitrary coordinate assignment is selected.
The station 1 coordinate value is fixed at "0.000" (machine coordinate zero point).
---Setting range---
-99999.999 to 99999.999 (or mm)
Set the station 19 coordinate value when arbitrary coordinate assignment is selected.
The station 1 coordinate value is fixed at "0.000" (machine coordinate zero point).
---Setting range---
-99999.999 to 99999.999 (or mm)
Set the station 20 coordinate value when arbitrary coordinate assignment is selected.
The station 1 coordinate value is fixed at "0.000" (machine coordinate zero point).
---Setting range---
-99999.999 to 99999.999 (or mm)
Select the criterion for the output of position switches 1 to 15.
bit0 to E correspond to position switches 1 to 15.
0: Judged by the machine position of the command system.
1: Judged by the machine FB position (actual position).
(Note) The bits that are not explained here must be set to "0".
Set "PSW1 area setting" 1 and 2 to specify the area where the position switch 1 will turn ON when the ma chine is positioned.
Whether the value of setting 1 is larger than setting 2 (or vice versa) does not affect the position switch op eration.
For rotary axes, the output turns ON in the area excluding 0.000 degree.
---Setting range---
-99999.999 to 99999.999 (or mm)
Set "PSW1 area setting" 1 and 2 to specify the area where the position switch 1 will turn ON when the ma chine is positioned.
Whether the value of setting 1 is larger than setting 2 (or vice versa) does not affect the position switch op eration.
For rotary axes, the output turns ON in the area excluding 0.000 degree.
---Setting range---
-99999.999 to 99999.999 (or mm)
#12864 aux_stpos16 Station 16 coordinate
#12865 aux_stpos17 Station 17 coordinate
#12866 aux_stpos18 Station 18 coordinate
#12867 aux_stpos19 Station 19 coordinate
#12868 aux_stpos20 Station 20 coordinate
#12870 aux_PSWcheck PSW detection method
#12871 aux_PSW1dog1 PSW1 area setting 1
#12872 aux_PSW1dog2 PSW1 area setting 2

Set "PSW2 area setting" 1 and 2 to specify the area where the position switch 2 will turn ON when the ma chine is positioned.
Whether the value of setting 1 is larger than setting 2 (or vice versa) does not affect the position switch op eration.
For rotary axes, the output turns ON in the area excluding 0.000 degree.
---Setting range---
-99999.999 to 99999.999 (or mm)
Set "PSW2 area setting" 1 and 2 to specify the area where the position switch 2 will turn ON when the ma chine is positioned.

Whether the value of setting 1 is larger than setting 2 (or vice versa) does not affect the position switch op eration.
For rotary axes, the output turns ON in the area excluding 0.000 degree.
---Setting range---
-99999.999 to 99999.999 (or mm)
Set "PSW3 area setting" 1 and 2 to specify the area where the position switch 3 will turn ON when the ma chine is positioned.
Whether the value of setting 1 is larger than setting 2 (or vice versa) does not affect the position switch op eration.
For rotary axes, the output turns ON in the area excluding 0.000 degree.
---Setting range---
-99999.999 to 99999.999 (or mm)
Set "PSW3 area setting" 1 and 2 to specify the area where the position switch 3 will turn ON when the ma chine is positioned.
Whether the value of setting 1 is larger than setting 2 (or vice versa) does not affect the position switch op eration.
For rotary axes, the output turns ON in the area excluding 0.000 degree.
---Setting range---
-99999.999 to 99999.999 (or mm)
Set "PSW4 area setting" 1 and 2 to specify the area where the position switch 4 will turn ON when the ma chine is positioned.
Whether the value of setting 1 is larger than setting 2 (or vice versa) does not affect the position switch op eration.
For rotary axes, the output turns ON in the area excluding 0.000 degree.
---Setting range---
-99999.999 to 99999.999 (or mm)
Set "PSW4 area setting" 1 and 2 to specify the area where the position switch 4 will turn ON when the ma chine is positioned.
Whether the value of setting 1 is larger than setting 2 (or vice versa) does not affect the position switch op eration.
For rotary axes, the output turns ON in the area excluding 0.000 degree.
---Setting range---
-99999.999 to 99999.999 (or mm)
#12873 aux_PSW2dog1 PSW2 area setting 1
#12874 aux_PSW2dog2 PSW2 area setting 2
#12875 aux_PSW3dog1 PSW3 area setting 1
#12876 aux_PSW3dog2 PSW3 area setting 2
#12877 aux_PSW4dog1 PSW4 area setting 1
#12878 aux_PSW4dog2 PSW4 area setting 2

Set "PSW5 area setting" 1 and 2 to specify the area where the position switch 5 will turn ON when the ma chine is positioned.
Whether the value of setting 1 is larger than setting 2 (or vice versa) does not affect the position switch op eration.
For rotary axes, the output turns ON in the area excluding 0.000 degree.
---Setting range---
-99999.999 to 99999.999 (or mm)
Set "PSW5 area setting" 1 and 2 to specify the area where the position switch 5 will turn ON when the ma chine is positioned.
Whether the value of setting 1 is larger than setting 2 (or vice versa) does not affect the position switch op eration.
For rotary axes, the output turns ON in the area excluding 0.000 degree.
---Setting range---
-99999.999 to 99999.999 (or mm)
Set "PSW6 area setting" 1 and 2 to specify the area where the position switch 6 will turn ON when the ma chine is positioned.
Whether the value of setting 1 is larger than setting 2 (or vice versa) does not affect the position switch op eration.
For rotary axes, the output turns ON in the area excluding 0.000 degree.
---Setting range---
-99999.999 to 99999.999 (or mm)
Set "PSW6 area setting" 1 and 2 to specify the area where the position switch 6 will turn ON when the ma chine is positioned.
Whether the value of setting 1 is larger than setting 2 (or vice versa) does not affect the position switch op eration.
For rotary axes, the output turns ON in the area excluding 0.000 degree.
---Setting range---
-99999.999 to 99999.999 (or mm)
Set "PSW7 area setting" 1 and 2 to specify the area where the position switch 7 will turn ON when the ma chine is positioned.
Whether the value of setting 1 is larger than setting 2 (or vice versa) does not affect the position switch op eration.
For rotary axes, the output turns ON in the area excluding 0.000 degree.
---Setting range---
-99999.999 to 99999.999 (or mm)
Set "PSW7 area setting" 1 and 2 to specify the area where the position switch 7 will turn ON when the ma chine is positioned.
Whether the value of setting 1 is larger than setting 2 (or vice versa) does not affect the position switch op eration.
For rotary axes, the output turns ON in the area excluding 0.000 degree.
---Setting range---
-99999.999 to 99999.999 (or mm)
#12879 aux_PSW5dog1 PSW5 area setting 1
#12880 aux_PSW5dog2 PSW5 area setting 2
#12881 aux_PSW6dog1 PSW6 area setting 1
#12882 aux_PSW6dog2 PSW6 area setting 2
#12883 aux_PSW7dog1 PSW7 area setting 1
#12884 aux_PSW7dog2 PSW7 area setting 2

Set "PSW8 area setting" 1 and 2 to specify the area where the position switch 8 will turn ON when the ma chine is positioned.
Whether the value of setting 1 is larger than setting 2 (or vice versa) does not affect the position switch op eration.
For rotary axes, the output turns ON in the area excluding 0.000 degree.
---Setting range---
-99999.999 to 99999.999 (or mm)
Set "PSW8 area setting" 1 and 2 to specify the area where the position switch 8 will turn ON when the ma chine is positioned.
Whether the value of setting 1 is larger than setting 2 (or vice versa) does not affect the position switch op eration.
For rotary axes, the output turns ON in the area excluding 0.000 degree.
---Setting range---
-99999.999 to 99999.999 (or mm)
Set "PSW9 area setting" 1 and 2 to specify the area where the position switch 9 will turn ON when the ma chine is positioned.
Whether the value of setting 1 is larger than setting 2 (or vice versa) does not affect the position switch op eration.
For rotary axes, the output turns ON in the area excluding 0.000 degree.
---Setting range---

-99999.999 to 99999.999 (or mm)
Set "PSW9 area setting" 1 and 2 to specify the area where the position switch 9 will turn ON when the ma chine is positioned.
Whether the value of setting 1 is larger than setting 2 (or vice versa) does not affect the position switch op eration.
For rotary axes, the output turns ON in the area excluding 0.000 degree.
---Setting range---
-99999.999 to 99999.999 (or mm)
Set "PSW10 area setting" 1 and 2 to specify the area where the position switch 10 will turn ON when the
machine is positioned.
Whether the value of setting 1 is larger than setting 2 (or vice versa) does not affect the position switch op eration.
For rotary axes, the output turns ON in the area excluding 0.000 degree.
---Setting range---
-99999.999 to 99999.999 (or mm)
Set "PSW10 area setting" 1 and 2 to specify the area where the position switch 10 will turn ON when the
machine is positioned.
Whether the value of setting 1 is larger than setting 2 (or vice versa) does not affect the position switch op eration.
For rotary axes, the output turns ON in the area excluding 0.000 degree.
---Setting range---
-99999.999 to 99999.999 (or mm)
#12885 aux_PSW8dog1 PSW8 area setting 1
#12886 aux_PSW8dog2 PSW8 area setting 2
#12887 aux_PSW9dog1 PSW9 area setting 1
#12888 aux_PSW9dog2 PSW9 area setting 2
#12889 aux_PSW10dog1 PSW10 area setting 1
#12890 aux_PSW10dog2 PSW10 area setting 2

Set "PSW11 area setting" 1 and 2 to specify the area where the position switch 11 will turn ON when the
machine is positioned.
Whether the value of setting 1 is larger than setting 2 (or vice versa) does not affect the position switch op eration.
For rotary axes, the output turns ON in the area excluding 0.000 degree.
---Setting range---
-99999.999 to 99999.999 (or mm)
Set "PSW11 area setting" 1 and 2 to specify the area where the position switch 11 will turn ON when the
machine is positioned.
Whether the value of setting 1 is larger than setting 2 (or vice versa) does not affect the position switch op eration.
For rotary axes, the output turns ON in the area excluding 0.000 degree.
---Setting range---
-99999.999 to 99999.999 (or mm)
Set "PSW12 area setting" 1 and 2 to specify the area where the position switch 12 will turn ON when the
machine is positioned.
Whether the value of setting 1 is larger than setting 2 (or vice versa) does not affect the position switch op eration.
For rotary axes, the output turns ON in the area excluding 0.000 degree.
---Setting range---
-99999.999 to 99999.999 (or mm)
Set "PSW12 area setting" 1 and 2 to specify the area where the position switch 12 will turn ON when the
machine is positioned.
Whether the value of setting 1 is larger than setting 2 (or vice versa) does not affect the position switch op eration.
For rotary axes, the output turns ON in the area excluding 0.000 degree.
---Setting range---
-99999.999 to 99999.999 (or mm)
Set "PSW13 area setting" 1 and 2 to specify the area where the position switch 13 will turn ON when the
machine is positioned.
Whether the value of setting 1 is larger than setting 2 (or vice versa) does not affect the position switch op eration.
For rotary axes, the output turns ON in the area excluding 0.000 degree.
---Setting range---
-99999.999 to 99999.999 (or mm)
Set "PSW13 area setting" 1 and 2 to specify the area where the position switch 13 will turn ON when the
machine is positioned.
Whether the value of setting 1 is larger than setting 2 (or vice versa) does not affect the position switch op eration.
For rotary axes, the output turns ON in the area excluding 0.000 degree.
---Setting range---
-99999.999 to 99999.999 (or mm)
#12891 aux_PSW11dog1 PSW11 area setting 1
#12892 aux_PSW11dog2 PSW11 area setting 2
#12893 aux_PSW12dog1 PSW12 area setting 1
#12894 aux_PSW12dog2 PSW12 area setting 2
#12895 aux_PSW13dog1 PSW13 area setting 1
#12896 aux_PSW13dog2 PSW13 area setting 2

Set "PSW14 area setting" 1 and 2 to specify the area where the position switch 14 will turn ON when the
machine is positioned.
Whether the value of setting 1 is larger than setting 2 (or vice versa) does not affect the position switch op eration.
For rotary axes, the output turns ON in the area excluding 0.000 degree.
---Setting range---
-99999.999 to 99999.999 (or mm)
Set "PSW14 area setting" 1 and 2 to specify the area where the position switch 14 will turn ON when the
machine is positioned.
Whether the value of setting 1 is larger than setting 2 (or vice versa) does not affect the position switch op eration.
For rotary axes, the output turns ON in the area excluding 0.000 degree.
---Setting range---
-99999.999 to 99999.999 (or mm)
Set "PSW15 area setting" 1 and 2 to specify the area where the position switch 15 will turn ON when the
machine is positioned.

Whether the value of setting 1 is larger than setting 2 (or vice versa) does not affect the position switch op eration.
For rotary axes, the output turns ON in the area excluding 0.000 degree.
---Setting range---
-99999.999 to 99999.999 (or mm)
Set "PSW15 area setting" 1 and 2 to specify the area where the position switch 15 will turn ON when the
machine is positioned.
Whether the value of setting 1 is larger than setting 2 (or vice versa) does not affect the position switch op eration.
For rotary axes, the output turns ON in the area excluding 0.000 degree.
---Setting range---
-99999.999 to 99999.999 (or mm)
Set the command stroke of the stopper operation in the stopper positioning.
---Setting range---
0.000 to 359.999(or mm)
Set the standby time from the stopper starting coordinate positioning to the stopper operation start in the
stopper positioning.
---Setting range---
0 to 9999 (ms)
Set the time from the completion of the stopper operation to the changeover of the stopper torque in the stop per positioning.
---Setting range---
0 to 9999(ms)
Set the time from the completion of the stopper operation to the output of the "automatic set position reached"
(JSTA), "set position reached" (JST) or "near set position" (NEAR) signal in the stopper positioning.
---Setting range---
0 to 9999(ms)
#12897 aux_PSW14dog1 PSW14 area setting 1
#12898 aux_PSW14dog2 PSW14 area setting 2
#12899 aux_PSW15dog1 PSW15 area setting 1
#12900 aux_PSW15dog2 PSW15 area setting 2
#12910 aux_push Stopper amount
#12911 aux_pusht1 Stopper standby time
#12912 aux_pusht2 Stopper torque release time
#12913 aux_pusht3 Set position signal output delay time

Select the type of lathe: horizontal or vertical.
0: Horizontal-type lathe
1: Vertical-type lathe
Select the linear axis direction to move the turret along for each part system.
Horizontal-type lathe (right-handed)
1: Front upper position
2: Front lower position
3: Rear upper position
4: Rear lower position
Horizontal-type lathe (left-handed)
11: Front upper position
12: Front lower position
13: Rear upper position
14: Rear lower position
Vertical-type lathe (right-handed)
21: Front left position
22: Front right position
Vertical-type lathe (left-handed)
31: Front left position
32: Front right position
(Note) Upper/lower position of horizontal-type lathe and right/left position of vertical-type lathe are the names
indicating the turret position with general machine configuration.
Select a number corresponding to the actual machine configuration and the axis direction to this param eter.
Axis configuration follows the base axis I, J, K (parameters #1026 to #1028).
Select which of the following parameters to use as tool rotation axis-related parameters: Rotary axis config uration parameters or 3D check parameters.
0: Rotary axis configuration parameters
1: 3D check parameters
Specify the name of tool rotation axis using the 2nd axis name.
---Setting range---
Two alphanumeric characters (A to Z and 1 to 9)
Select about which axis the tool rotation axis rotates.
(Note) When "#12624 tool rot ax name" (Tool rotation axis name) is not set, this parameter is disabled.
If "0: Disable" is selected when "#12624 tool rot ax name" is set, this parameter is treated as "2: J axis".
0: Disable
1: I axis
2: J axis
3: K axis
(PR) #12621 machine type Select machine type (For L system only)
(PR) #12622 turret move dir Select turret move direction (For L system only)
(PR) #12623 tool rot ax para Select tool rotation axis parameters (For L system only)
(PR) #12624 tool rot ax name Tool rotation axis name (For L system only)
(PR) #12625 tool rot ax type Select tool rotation axis (For L system only)

Select the tool rotation axis direction.
(Note) When "#12624 tool rot ax name" is not set, this parameter is disabled.
0: Right-handed system
1: Left-handed system
Specify the spindle No. of the front side work spindle.

When this parameter is set to 0, the spindle No.is treated as 1.
---Setting range---
0 to the number of spindles
Specify the spindle No. of the rear side work spindle.
If there is no rear-side work spindle, set this parameter to 0.
---Setting range---
0 to the number of spindles
Specify the rotation direction of the front side work spindle.
0: Right-handed system
1: Left-handed system
Specify the rotation direction of the rear side work spindle.
0: Right-handed system
1: Left-handed system
Specify the M code allocated to the front chuck closing.
---Setting range---
0 to 99999999
Specify the M code allocated to the back chuck closing.
---Setting range---
0 to 99999999
Specify the position from the machine zero point in the X axis direction of front chuck.
---Setting range---
-99999.999 to 99999.999 (mm)
Specify the position from the machine zero point in the Y axis direction of front chuck.
---Setting range---
-99999.999 to 99999.999 (mm)
Specify the position from the machine zero point in the Z axis direction of front chuck.
---Setting range---
-99999.999 to 99999.999 (mm)
Specify the position from the machine zero point in the X axis direction of back chuck.
---Setting range---
-99999.999 to 99999.999 (mm)
(PR) #12626 tool rot dir Tool rotation axis direction (For L system only)
(PR) #12627 main sp no Front spindle No. (For L system only)
(PR) #12628 sub sp no Rear spindle No. (For L system only)
(PR) #12629 main sp rot dir Front spindle rotation direction (For L system only)
(PR) #12630 sub sp rot dir Rear spindle rotation direction (For L system only)
(PR) #12631 main chuck close M Front chuck close M code (For L system only)
(PR) #12632 sub chuck close M Back chuck close M code(For L system only)
(PR) #12633 main chuck pos X Front chuck position X (For L system only)
(PR) #12634 main chuck pos Y Front chuck position Y (For L system only)
(PR) #12635 main chuck pos Z Front chuck position Z (For L system only)
(PR) #12636 sub chuck pos X Back chuck position X (For L system only)

Specify the position from the machine zero point in the Y axis direction of back chuck.
---Setting range---
-99999.999 to 99999.999 (mm)
Specify the position from the machine zero point in the Z axis direction of back chuck.
---Setting range---
-99999.999 to 99999.999 (mm)
Specify the name of the axis to move the front chuck with 2nd axis name.
---Setting range---
Two digits between A to Z and 1 to 9
Specify the name of the axis to move the back chuck with 2nd axis name.
---Setting range---
Two digits between A to Z and 1 to 9
Set the center position of the table in the horizontal axis direction using the machine position.
---Setting range---
-99999.999 to 99999.999 (mm)
Set the center position of the table in the vertical axis direction using the machine position.
---Setting range---
-99999.999 to 99999.999 (mm)
Set the center position of the table in the height axis direction using the machine position.
---Setting range---
-99999.999 to 99999.999 (mm)
(PR) #12637 sub chuck pos Y Back chuck position Y (For L system only)
(PR) #12638 sub chuck pos Z Back chuck position Z (For L system only)
(PR) #12639 main chuck ax name Front chuck moving axis name (For L system only)
(PR) #12640 sub chuck ax name Back chuck moving axis name (For L system only)
(PR) #12650 table center posH Horizontal axis table center position (For M system on ly)
(PR) #12651 table center posV Vertical axis table center position (For M system only)
(PR) #12652 table center posT Height axis table center position (For M system only)

Specify the M code for calculating the machining time. (n=1 to 50)
---Setting range---
0 to 99999999
Specify the execution time of the M code. (n=1 to 50)
---Setting range---
0 to 60000 (ms)
Specify the M code for calculating the machining time.
Set the M code that takes different time for each part system. (n=1 to 10)
---Setting range---

0 to 99999999
Specify the execution time of the M code.
Different values can be set for each part system. (n=1 to 10)
---Setting range---
0 to 60000 (ms)
Specify the 2nd miscellaneous function code for calculating the machining time. (n=1 to 10)
---Setting range---
0 to 99999999
Specify the execution time of the 2nd miscellaneous function code. (n=1 to 10)
---Setting range---
0 to 60000 (ms)
Specify the execution time of the T code for each part system.
---Setting range---
0 to 60000 (ms)
Specify the average execution time of the M code for which individual setting is not performed.
---Setting range---
0 to 60000 (ms)
Specify the average execution time of the 2nd miscellaneous function code for which individual setting is not performed.
---Setting range---
0 to 60000 (ms)
#42801+2(n-1) M[n] Code M code for calculating machining time
#42802+2(n-1) M[n] ExeTime Execution time of M code for calculating machining time
#42901+2(n-1) M[50+n] Code M code for calculating machining time (for each part system)
#42902+2(n-1) M[50+n] ExeTime Execution time of M code for calculating machine time (for each part system)
#42931+2(n-1) M2[n] Code 2nd miscellaneous function code for calculating ma chining time
#42932+2(n-1) M2[n] ExeTime Execution time of 2nd m. function code for calculating machining time
#42951 T Code ExeTime Execution time of T code for calculating machining time
#42952 M Code StdExeTime Standard execution time of M code for calculating ma chining time
#42953 M2 Code StdExeTime Standard execution time of 2nd m. function code for cal culating machine time

Specify the S code execution time of the 1st spindle.
---Setting range---
0 to 60000 (ms)
Specify the S code execution time of the 2nd spindle.
---Setting range---
0 to 60000 (ms)
Specify the S code execution time of the 3rd spindle.
---Setting range---
0 to 60000 (ms)
Specify the S code execution time of the 4th spindle.
---Setting range---
0 to 60000 (ms)
Specify the S code execution time of the 5th spindle.
---Setting range---
0 to 60000 (ms)
Specify the S code execution time of the 6th spindle.
---Setting range---
0 to 60000 (ms)
Specify the S code execution time of the 7th spindle.
---Setting range---
0 to 60000 (ms)
Specify the S code execution time of the 8th spindle.
---Setting range---
0 to 60000 (ms)
#42961 S Code ExeTime 1 S code execution time for machining time calculation (1st spindle)
#42962 S Code ExeTime 2 S code execution time for machining time calculation (2nd spindle)
#42963 S Code ExeTime 3 S code execution time for machining time calculation (3rd spindle)
#42964 S Code ExeTime 4 S code execution time for machining time calculation (4th spindle)
#42965 S Code ExeTime 5 S code execution time for machining time calculation (5th spindle)
#42966 S Code ExeTime 6 S code execution time for machining time calculation (6th spindle)
#42967 S Code ExeTime 7 S code execution time for machining time calculation (7th spindle)
#42968 S Code ExeTime 8 S code execution time for machining time calculation (8th spindle)

Select whether to enable the safety related I/O observation.
0: Disable
1: Enable
Select whether to enable the safely limited speed observation.
0: Disable

1: Enable
Select whether to enable the safely limited position observation.
0: Disable
1: Enable
Select whether to enable the safe speed monitor.
0: Disable
1: Enable
Select whether to enable the safe cam.
0: Disable
1: Enable
Select whether to enable the safe operating stop.
0: Disable
1: Enable
(*) When SS2 is executed, SOS is activated irrespective of this parameter.
Select whether to enable the safe stop 1.
0: Disable
1: Enable
(*) Irrespective of this parameter, when a smart safety observation error is detected, SS1 may be activated depending on the setting of "#51102 SF_Stoptype".
Select whether to enable the safe stop 2.
0: Disable
1: Enable
Select whether to enable the safe torque off.
0: Disable
1: Enable
(*) Irrespective of this parameter, when a smart safety observation error is detected, STO may be activated depending on the setting of "#51102 SF_Stoptype".
Select whether to enable the safe brake control.
0: Disable
1: Enable
(PR) #51001 SIO_Enable Enable safety related I/O observation
(PR) #51002 SLS_Enable Enable SLS observation
(PR) #51003 SLP_Enable Enable SLP observation
(PR) #51004 SSM_Enable Enable Safe speed monitor
(PR) #51005 SCA_Enable Enable safe cam
(PR) #51006 SOS_Enable Enable Safe operating stop
(PR) #51007 SS1_Enable Enable Safe stop 1
(PR) #51008 SS2_Enable Enable Safe stop 2
(PR) #51009 STO_Enable Enable Safe torque off
(PR) #51010 SBC_Enable Safe brake control enabled

Set the time that elapses before the next SBT incomplete signal (SBTNFEXm / SBTNFMOm) turns ON after completing the brake test.
When set "0", the interval will be 8 hours.
---Setting range---
0 to 255 hours
Set the tolerable time for inconsistency between CPUs status. (When the status is inconsistent for more than tolerable time, the alarm occurs and the motor power shuts OFF.)
When set "0", the inconsistency tolerable time is 100 ms.
---Setting range---
0 to 5000 (ms)
Set the safety password.
Setting: 7 or 8 uppercase alphanumeric characters
If no password is set, turn ON the machine parameter setup mode to set the safety parameters.
---Setting range---
7 or 8 uppercase alphanumeric characters
Select whether to enable the simple test mode in which the drive safety function operation can be checked without connecting any smart safety observation-capable drive unit.
0: Disable the drive safety function simple test mode
1: Enable the drive safety function simple test mode
Specify the maximum number of storable steps for safety sequence.
The maximum number of executable steps will be double the maximum number of storable steps.
0: 6144 steps
1 to 32: (Setting value) K steps
---Setting range---
0 (default)
1 to 32 (K steps)
(PR) #51011 SBT_INT SBT interval
(PR) #51012 CRSCHK_TOL Cross-check status inconsistency tolerable time
#51013 SF_PSWD Safe password
(PR) #51015 safe_drv_test Drive safety function easy test mode
(PR) #51017 SLAD_Step Maximum number of steps in safety ladder

Exclude the axis from the smart safety observation target.
0: Enable smart safety observation
1: Disable smart safety observation
(Note) The settings of "#51101 SF_Disable" and "#51301 SF_SDisable" must be the same within a multi hybrid drive unit.
Select which of the safe stop methods to use when an error is detected in the smart safety observation.
0: STO
1: SS1
Specify the upper limits of machine-end speed determined as safe for each of SLS speed tolerances 1 to 4.

If the SLS detection delay time has elapsed with the command/FB speed exceeding the safely-limited speed while SLS is ON, a safe stop (SS1 or STO) is executed. The safely-limited speed to be applied to SLS is calculated using the following equation.
Safely-limited speed = SLS speed tolerance x SLS speed override / 100
---Setting range---
0 to 999999 (mm/min or /min)
Specify the speed overrides 1 to 16 with respect to SLS speed tolerances 1 to 4. For details refer to SLS speed tolerances 1 to 4.
---Setting range---
0 to 100 (%)
Specify the speed clamp ratio that is applied while SLS is ON. Set the ratio to about 80 to 90%. While SLS is ON, the command speed is clamped at the following speed:
Clamp speed = Safely-limited speed x SLS speed clamp ratio / 100
(Safely-limited speed = SLS speed tolerance x SLS speed override / 100)
---Setting range---
0 to 100 (%)
Specify a period of time to detect a speed error while SLS is ON. A safe stop (SS1 or STO) is executed if the period of time set in this parameter has elapsed with the command/FB speed exceeding the safely-limited speed.
---Setting range---
0 to 9999 (ms)
Specify a period of time to detect a deceleration error that is caused due to change of the safely-limited speed at the start of or during SLS. If you have changed the safely-limited speed at the start of or during SLS, and the time set in this parameter has elapsed with the command/FB speed exceeding the safely-limited speed, a safe stop (SS1 or STO) is executed. When set to "0", the detection time is treated as 200(ms).
---Setting range---
0 to 99999 (ms)
(PR) #51101 SF_Disable Disable smart safety observation
(PR) #51102 SF_Stoptype Stop method at error
(PR) #51103-
51106
SLS_Speed1-4 SLS speed tolerance 1-4
(PR) #51107-
51122
SLS_Override1-16 SLS speed override 1-16
(PR) #51123 SLS_Clamp SLS speed clamp ratio
#51124 SLS_T1 SLS detection delay time
#51125 SLS_T2 SLS deceleration observation time

"n" represents the SLP position tolerance No. (n=1 to 4)
Specify the upper and lower limits of machine position, which is determined as safe, for each of SLP position tolerances 1(+) to 4(+). If the SLP detection delay time has elapsed while SLP is ON with the command/FB position outside the SLP position tolerance range, a safe stop (SS1 or STO) is executed.
*SLP is not available for a rotation-type rotary axis.
---Setting range---
-99999.999 to +99999.999 (mm)
"n" represents the SLP position tolerance No. (n=1 to 4)
Specify the upper and lower limits of machine position, which is determined as safe, for each of SLP position tolerances 1(-) to 4(-). If the SLP detection delay time has elapsed while SLP is ON with the command/FB position outside the SLP position tolerance range, a safe stop (SS1 or STO) is executed.
*SLP is not available for a rotation-type rotary axis.
---Setting range---
-99999.999 to +99999.999 (mm)
Specify a period of time to detect a machine position error while SLP is ON. If the time set in this parameter has elapsed with the command/FB position outside the SLP position tolerance range, a safe stop (SS1 or STO) is executed.
---Setting range---
0 to 9999 (ms)
Specify the upper limits of machine-end speed determined as safe for each of SSM speeds 1 to 4. If the com mand/FB speed is at the safe speed or lower while SSM is ON, the Under SSM safe speed signal turns ON. If the command/FB speed exceeds the safe speed, the Under SSM safe speed signal turns OFF. The safe speed to be applied to SSM is calculated using the following equation.
(When the Under SSM safe speed signal is ON)
Safe speed = SSM speed
(When the Under SSM safe speed signal is OFF)
Safe speed = SSM speed - SSM hysteresis width
---Setting range---
0 to 999999 (mm/min or /min)
Specify the hysteresis widths that correspond to SSM speeds 1 to 4. For details refer to SSM speeds 1 to 4.
---Setting range---
0 to 999999 (mm/min or /min)
"n" represents the SCA position No. (n=1 to 16)
Specify the upper and lower limits of machine position determined as safe for each of SCA positions 1(+) to 16(+). If the command/FB position is in the SCA safe position or smaller while SCA is ON, the Safe cam po sition signal turns OFF. If the position has exceeded the SCA safe position, the Safe cam position signal turns ON. The SCA safe position is calculated using the following equation.
(When the Safe cam position signal is ON)
SCA safe position = SCA position (+) SCA hysteresis width
(When the Safe cam position signal is OFF)
SCA safe position = SCA position (+)
---Setting range---
-99999.999 to +99999.999 (mm)
(PR) #51126+2(n-1) SLP_PositionPn SLP position tolerance n (+)
(PR) #51127+2(n-1) SLP_PositionMn SLP position tolerance n (-)
#51134 SLP_T1 SLP detection delay time
(PR) #51135-
51138

SSM_Speed1-4 SSM speed 1-4
#51139-
51142
SSM_Hysteresis1-4 SSM hysteresis width 1-4
(PR) #51143+2(n-1) SCA_PositionPn SCA position n (+)

"n" represents the SCA position No. (n=1 to 16)
Specify the upper and lower limits of machine position determined as safe for each of SCA positions 1(-) to
16(-). If the command/FB position is in the SCA safe position or smaller while SCA is ON, the Safe cam po sition signal turns OFF. If the position has exceeded the SCA safe position, the Safe cam position signal turns
ON. The SCA safe position is calculated using the following equation.
(When the Safe cam position signal is ON)
SCA safe position = SCA position (-) SCA hysteresis width
(When the Safe cam position signal is OFF)
SCA safe position = SCA position (-)
---Setting range---
-99999.999 to +99999.999 (mm)
Specify the hysteresis widths that correspond to SCA positions 1 to 16. For details refer to SCA positions
1(+/-) to 16(+/-).
---Setting range---
0 to 99999.999 (mm)
Specify the upper limit of machine-end speed determined as a safe operating stop.
If the SOS_V detection delay time has elapsed with the command/FB speed exceeding the speed of this
parameter while SOS is ON, a safe stop (SS1 or STO) is executed.
The point of time at which the command/FB speed drops to that of this parameter or lower while SS1/SS2
is ON is treated as a standstill.
*When this parameter is set to 0, "SOS speed error" may occur even though the axis is at a standstill.
---Setting range---
0 to 9999 (mm/min or /min)
Specify a period of time to detect a speed error while SOS is ON. If the period of time set in this parameter
has elapsed with the command/FB speed exceeding the SOS stop speed while SOS is ON, a safe stop (SS1
or STO) is executed.
---Setting range---
0 to 9999 (ms)
Specify the upper limit of machine-end position deviation determined as a safe operating stop. If the SOS_PD
detection delay time has elapsed with the position deviation (difference between the command and FB posi tions) exceeding that of this parameter while SOS is ON, a safe stop (SS1 or STO) is executed.
*When this parameter is set to 0, "SOS position deviation error" may occur even though the axis is at a stand still.
---Setting range---
0 to 9999.999 (mm or)
Specify a period of time to detect a position deviation error while SOS is ON. If a period of time set in this
parameter has elapsed with the position deviation (difference between the command and FB positions) ex ceeding the SOS position deviation tolerance while SOS is ON, a safe stop (SS1 or STO) is executed.
---Setting range---
0 to 9999 (ms)
Specify the upper limit of machine-end travel distance (minus side) determined as a safe operating stop. If
the SOS_P detection delay time has elapsed with the command/FB travel distance in the minus direction ex ceeding that of this parameter while SOS is ON, a safe stop (SS1 or STO) is executed.
*When this parameter is set to 0, "SOS travel distance error" may occur even though the axis is at a standstill.
---Setting range---
0 to 9999.999 (mm or)
(PR) #51144+2(n-1) SCA_PositionMn SCA position n (-)
#51175 SCA_Hysteresis SCA hysteresis width
(PR) #51176 SOS_Speed SOS stop speed
#51177 SOS_T1 SOS_V detection delay time
(PR) #51178 SOS_Droop SOS position deviation tolerance
#51179 SOS_T2 SOS_PD detection delay time
(PR) #51180 SOS_PositionM SOS travel distance tolerance (-)

Specify the upper limit of machine-end travel distance (plus side) determined as a safe operating stop. If the
SOS_P detection delay time has elapsed with the command/FB travel distance in the plus direction exceed ing that of this parameter while SOS is ON, a safe stop (SS1 or STO) is executed.
*When this parameter is set to 0, "SOS travel distance error" may occur even though the axis is at a standstill.
---Setting range---
0 to 9999.999 (mm or)
Specify a period of time to detect a travel distance error while SOS is ON. If the period of time set in this
parameter has elapsed with the command/FB travel distance exceeding the SOS travel distance tolerance
(+/-) while SOS is ON, a safe stop (SS1 or STO) is executed.
---Setting range---
0 to 9999 (ms)
Specify a period of time to detect a deceleration error while SS1 is ON. If the time set in this parameter has
elapsed with the command/FB speed exceeding the SOS stop speed, STO is activated.
---Setting range---
0 to 99999 (ms)
Specify a period of time to detect a deceleration error while SS2 is ON. If the time set in this parameter has
elapsed with the command/FB speed exceeding the SOS stop speed, STO is activated.
---Setting range---
0 to 99999 (ms)
Specify a period of time to wait from when the drive unit receives an STO request from the NC until when
STO is actually executed. Set this time so that the brake is activated within this period of time. When set to
"0", the STO execution standby time is treated as 200 ms.
---Setting range---
0 to 20000 (ms)
0: Disable
1: Enable
0: Disable
1: Enable

Set the current limit value in the brake test in proportion to the stall current. When set to "0", the alarm occurs
at the start of the brake test. (The test does not start.)
---Setting range---
0 to 100 (%)
Set the wait time of output of movement command for brake test from NC since receiving SBT starting signal
(SBTSTEXm / SBTSTMOm). When set to "0", the commanded wait time is 400 ms.
---Setting range---
0 to 30000 (ms)
Set the movement amount to command to the test target axis at the time of brake test. When set to "0", the
alarm occurs at the start of the brake test. (The test does not start.)
---Setting range---
-99999.999 to 99999.999 (mm or)
(PR) #51181 SOS_PositionP SOS travel distance tolerance (+)
#51182 SOS_T3 SOS_P detection delay time
#51183 SS1_T1 SS1 deceleration observation time
#51184 SS2_T1 SS2 deceleration observation time
(PR) #51185 STO_EXEWT Waiting time before STO execution
(PR) #51186 SBTEX_Enable External brake SBT enabled
(PR) #51187 SBTMO_Enable Motor brake SBT enabled
#51191 SBT_ILIM SBT current limit value
(PR) #51192 SBT_CMDWT SBT command wait time
(PR) #51193 SBT_FD SBT command movement amount

Set the command speed to command to the test target axis at the time of brake test. When set to "0", the
alarm occurs at the start of the brake test. (The test does not start.)
---Setting range---
0 to 1000000 (mm/min or /min)
Set the time to continue the observation of axis movement amount after the output of movement command
for test at the time of brake test. When set to "0", the observation time is 1000 ms.
---Setting range---
0 to 30000 (ms)
Set the tolerable movement amount of the test target axis at the time of brake test. (The alarm occurs if the
movement amount during the test exceeds this parameter value.) When set "0", the tolerable movement
amount is 100 mm (or).
---Setting range---
0 to 99999.999 (mm or)
Sets the tolerable value of the difference (error amount) between [saved position at power shut OFF] and
[restored position at power ON] in SLP/SCA encoder diagnosis during power OFF. When this above differ ence exceeds the tolerable value, the system starts in STO status. When set "0", the tolerable value is as in
below formula.
Tolerable movement amount = SV018(PIT) * 0.9
---Setting range---
0 to 99999.999 (mm)
Enables the encoder diagnosis during power OFF to use SLP/SCA for the axes connected with Multi revolu tion safety encoder.
0: Disable the encoder diagnosis during power OFF to use SLP/SCA for the axes connected with Multi rev olution safety encoder
1: Enable the encoder diagnosis during power OFF to use SLP/SCA for the axes connected with Multi rev olution safety encoder
* As for the axes not connected with Multi revolution safety encoder, the above diagnosis will be enabled
regardless of the setting value of this parameter.
* The above diagnosis will not be executed when SLP/SCA are disabled. (Both SLP_Enable and SCA_En able are 0.)
Sets the tolerable value of the position deviation (the difference between the commanded position generated
inside NC and the feedback position received from drive unit) in the position deviation diagnosis. When the
position deviation exceeds the tolerable value, the Safe stop (SS1/STO) will be carried out. When "0" is set,
the tolerable value is as in below formula.
Tolerable value = SV018(PIT) * 2.0
---Setting range---
0 to 32767 (mm or)
(PR) #51194 SBT_FDRATE SBT command speed
(PR) #51195 SBT_OBTIM SBT observation time
(PR) #51196 SBT_TOL SBT tolerable movement amount
(PR) #51197 SLP/SCA_FDTOL SLP/SCA tolerable movement amount during power
OFF
(PR) #51198 MlRtAbsSEnc_FDChk SLP/SCA encoder diagnosis during power OFF applica tion for Multi revolution safety encoder
#51199 SF_PDCHK_TOL Servo axis position deviation diagnosis tolerable value

Specify the Safety axiss specification by turning ON the corresponding bit. Input the hexadecimal value for
this parameter.
bit0-2: Not used
bit3: Motor brake connection status
0: Motor brake connected
1: Motor brake not connected
bit4-F: Not used
* If the settings of encoder type (bit0, bit1) are different from the actually connected ones, the servo alarm 4D
is output.
---Setting range---
0x0000 to 0xFFFF
For a safety encoder-connected axis, set the safety encoder type. When the Multi revolution part is connect ed to the safety encoder that is outside the certification of safety standards, and in SLP/SCA enabled, SLP/
SCA encorder diagnosis during power OFF will be carried out regardless of the setting value of #51198 Ml RtAbsSEnc_FDChk.
0: Safety encoder that is outside the safety certification for Multi revolution
1: Safety encoder that is certified with safety standards for Multi revolution
Specify a length of time it takes to complete deceleration stop when safety external emergency stop is im plemented.
When not executing deceleration stop, set the parameter to "0".
When executing deceleration stop, subtract "#51185 STO_EXEWT" from "#2256 SV056" and set the differ ence in the parameter.
---Setting range---

0 to 20000 (ms)
(PR) #51200 SFSPEC1 Safety specification 1
(PR) #51201 SENCTYP Safety encoder type
(PR) #51202 SEMG_STO_WT STO delay time for safety external emergency stop

Exclude the axis from the smart safety observation target.
0: Enable smart safety observation
1: Disable smart safety observation
(Note) The settings of "#51101 SF_Disable" and "#51301 SF_SDisable" must be the same within a multi hybrid drive unit.
Select which of the safe stop methods to use when an error is detected in the smart safety observation.
0: STO
1: SS1
Specify the upper limits of machine-end speed determined as safe for each of SLS speed tolerances 1 to 4.
If the SLS detection delay time has elapsed with the command/FB speed exceeding the safely-limited speed while SLS is ON, a safe stop (SS1 or STO) is executed. The safely-limited speed to be applied to SLS is calculated using the following equation.
Safely-limited speed = SLS speed tolerance x SLS speed override / 100
---Setting range---
0 to 999999.9 (r/min)
Specify the speed overrides 1 to 16 with respect to SLS speed tolerances 1 to 4. For details refer to SLS speed tolerances 1 to 4.
---Setting range---
0 to 100 (%)
Specify the speed clamp ratio that is applied while SLS is ON. Set the ratio to about 80 to 90%. While SLS is ON, the command speed is clamped at the following speed:
Clamp speed = Safely-limited speed x SLS speed clamp ratio / 100
(Safely-limited speed = SLS speed tolerance x SLS speed override / 100)
---Setting range---
0 to 100 (%)
Specify a period of time to detect a speed error while SLS is ON. A safe stop (SS1 or STO) is executed if the period of time set in this parameter has elapsed with the command/FB speed exceeding the safely-limited speed.
---Setting range---
0 to 9999 (ms)
Specify a period of time to detect a deceleration error that is caused due to change of the safely-limited speed at the start of or during SLS. If you have changed the safely-limited speed at the start of or during SLS, and the time set in this parameter has elapsed with the command/FB speed exceeding the safely-limited speed, a safe stop (SS1 or STO) is executed. When set to "0", the detection time is treated as 200(ms).
---Setting range---
0 to 99999 (ms)
(PR) #51301 SF_SDisable Disable smart safety observation
(PR) #51302 SF_SStoptype Stop method at error
(PR) #51303-
51306
SLS_SSpeed1-4 SLS speed tolerance 1-4
(PR) #51307-
51322
SLS_SOverride1-16 SLS speed override 1-16
(PR) #51323 SLS_Sclamp SLS speed clamp ratio
#51324 SLS_ST1 SLS detection delay time
#51325 SLS_ST2 SLS deceleration observation time

Specify the upper limits of machine-end speed determined as safe for each of SSM speeds 1 to 4. If the com mand/FB speed is at the safe speed or lower while SSM is ON, the Under SSM safe speed signal turns ON.
If the command/FB speed exceeds the safe speed, the Under SSM safe speed signal turns OFF. The safe speed to be applied to SSM is calculated using the following equation.
(When the Under SSM safe speed signal is ON)
Safe speed = SSM speed
(When the Under SSM safe speed signal is OFF)
Safe speed = SSM speed - SSM hysteresis width
---Setting range---
0 to 999999.9 (r/min)
Specify the hysteresis widths that correspond to SSM speeds 1 to 4. For details refer to SSM speeds 1 to 4.
---Setting range---
0 to 999999.9 (r/min)
Specify the upper limit of machine-end speed determined as a safe operating stop.
If the SOS_V detection delay time has elapsed with the command/FB speed exceeding that of this param eter while SOS is ON, a safe stop (SS1 or STO) is executed.
The point of time at which the command/FB speed drops to that of this parameter or lower while SS1/SS2 is ON is treated as a standstill.
*When this parameter is set to 0, "SOS speed error" may occur even though the spindle is at a standstill.
---Setting range---
0 to 9999.9 (r/min)
Specify a period of time to detect a speed error while SOS is ON. If the period of time set in this parameter has elapsed with the command/FB speed exceeding the SOS stop speed while SOS is ON, a safe stop (SS1 or STO) is executed.
---Setting range---
0 to 9999 (ms)
Specify the upper limit of machine-end position deviation determined as a safe operating stop. If the SOS_PD detection delay time has elapsed with the position deviation (difference between the command and FB posi tions) exceeding that of this parameter while SOS is ON, a safe stop (SS1 or STO) is executed.
*When this parameter is set to 0, "SOS position deviation error" may occur even though the spindle is at a standstill.
---Setting range---

0 to 9999 ()
Specify a period of time to detect a position deviation error while SOS is ON. If a period of time set in this
parameter has elapsed with the position deviation (difference between the command and FB positions) ex ceeding the SOS position deviation tolerance while SOS is ON, a safe stop (SS1 or STO) is executed.
---Setting range---
0 to 9999 (ms)
Specify the upper limit of machine-end travel distance (minus side) determined as a safe operating stop. If
the SOS_P detection delay time has elapsed with the command/FB travel distance in the minus direction ex ceeding that of this parameter while SOS is ON, a safe stop (SS1 or STO) is executed.
*When this parameter is set to 0, "SOS travel distance error" may occur even though the spindle is at a stand still.
---Setting range---
0 to 9999 ()
(PR) #51326-
51329
SSM_SSpeed1-4 SSM speed 1-4
#51330-
51333
SSM_SHysteresis1-4 SSM hysteresis width 1-4
(PR) #51334 SOS_SSpeed SOS stop speed
#51335 SOS_ST1 SOS_V detection delay time
(PR) #51336 SOS_SDroop SOS position deviation tolerance
#51337 SOS_ST2 SOS_PD detection delay time
(PR) #51338 SOS_SPositionM SOS travel distance tolerance (-)

Specify the upper limit of machine-end travel distance (plus side) determined as a safe operating stop. If the
SOS_P detection delay time has elapsed with the command/FB travel distance in the plus direction exceed ing that of this parameter while SOS is ON, a safe stop (SS1 or STO) is executed.
*When this parameter is set to 0, "SOS travel distance error" may occur even though the spindle is at a stand still.
---Setting range---
0 to 9999 ()
Specify a period of time to detect a travel distance error while SOS is ON. If the period of time set in this
parameter has elapsed with the command/FB travel distance exceeding the SOS travel distance tolerance
(+/-) while SOS is ON, a safe stop (SS1 or STO) is executed.
---Setting range---
0 to 9999 (ms)
Specify a period of time to detect a deceleration error while SS1 is ON. If the time set in this parameter has
elapsed with the command/FB speed exceeding the SOS stop speed, STO is activated.
---Setting range---
0 to 99999 (ms)
Specify a period of time to detect a deceleration error while SS2 is ON. If the time set in this parameter has
elapsed with the command/FB speed exceeding the SOS stop speed, STO is activated.
---Setting range---
0 to 99999 (ms)
Specify a period of time to wait from when the drive unit receives an STO request from the NC until when
STO is actually executed. Set this time so that the brake is activated within this period of time. When set to
"0", the STO execution standby time is treated as 200 ms.
---Setting range---
0 to 20000 (ms)
Set the waiting time for starting the position deviation diagnosis at Spindle non-interpolation mode. The di agnosis of the position deviation at Spindle non-interpolation mode starts after the commanded speed be comes consistent and after the time set by this parameter passes. It stops while the command speed is
changing. When set to "0", the Spindle position deviation diagnosis waiting time is 20000 ms.
---Setting range---
0 to 30000 (ms)
Sets the tolerable value of the position deviation (the difference between the commanded position generated
inside NC and the feedback position received from drive unit) in the position deviation diagnosis. When the
position deviation exceeds the tolerable value, the Safe stop (SS1/STO) will be carried out. When set to "0",
the tolerable value is 1080.
---Setting range---
0 to 32767 ()
Specify a length of time it takes to complete deceleration stop when safety external emergency stop is im plemented.
When not executing deceleration stop, set the parameter to "0".
When executing deceleration stop, subtract "#51343 STO_SEXEWT" from "#13056 SP056" and set the dif ference in the parameter.
---Setting range---
0 to 29900 (ms)
(PR) #51339 SOS_SPositionP SOS travel distance tolerance (+)
#51340 SOS_ST3 SOS_P detection delay time
#51341 SS1_ST1 SS1 deceleration observation time
#51342 SS2_ST1 SS2 deceleration observation time
(PR) #51343 STO_SEXEWT Waiting time before STO execution
#51344 SF_PDCHK_ST1 Spindle position deviation diagnosis waiting time
#51345 SF_PDCHK_STOL Spindle position deviation diagnosis tolerable value
(PR) #51347 SEMG_STO_SWT STO delay time for safety external emergency stop

15.31 Safety I/O Assignment Parameters
Specify the channel No. to which the nth safety I/O unit is connected. (n = 1 to 8)
(*) When set to "0", the RIO assignment parameters of the nth station are all disabled.
---Setting range---
0 to 4
Specify the station No. of the nth safety I/O unit. (n=1 to 8)
* Set this parameter to the same value as of the rotary switch on the safety I/O unit to which the device is
assigned.
---Setting range---
0 to 63
Specify the name of the DI assignment devices of the nth safety I/O unit. (n=1 to 8)
* When set to "0", the name is left blank.

---Setting range---
0, X, ZR
Specify the head device No. of DI assignment devices of the nth safety I/O unit. (n=1 to 8)
Device X: hexadecimal and on a 32-point basis (a multiple of 32)
Device ZR: decimal and on a 2-point basis (an even number)
* This parameter changes to "0" if you change the device name "DI dev name #n".
* Specify "DI dev name #n" ahead of this parameter.
---Setting range---
X: 0 to 1E0 (hexadecimal)
ZR: 0 to 62 (decimal)
Specify the name of the DO assignment devices of the nth safety I/O unit. (n=1 to 8)
* When set to "0", the name is left blank.
---Setting range---
0, Y, ZR
Specify the head device No. of the DO assignment devices of the nth safety I/O unit. (n=1 to 8)
Device Y: hexadecimal and on a 32-point basis (a multiple of 32)
Device ZR: decimal and on a 2-point basis (an even number)
* The setting of this parameter changes to "0" if you change the device name of "DO dev name #n".
* Specify "DO dev name #n" ahead of this parameter.
---Setting range---
Y: 0 to 1E0 (hexadecimal)
ZR: 64 to 126 (decimal)
Specify the No. of I/O channel to connect the safety I/O unit that receives the emergency stop signal. When
set to "0", the designation of emergency stop signal device by EMG_Dev1 is disabled, irrespective of the set tings of EMG_Dev1_stn and EMG_Dev1_bit.
---Setting range---
0 to 4
(PR) #51501+10(n-1) RIO CH No. #n Target channel number #n
(PR) #51502+10(n-1) RIO Station No. #n Target station number #n
(PR) #51503+10(n-1) DI dev name #n DI device name #n
(PR) #51504+10(n-1) DI dev No. #n DI device number #n
(PR) #51505+10(n-1) DO dev name #n DO device name #n
(PR) #51506+10(n-1) DO dev No. #n DO device number #n
(PR) #51582 EMG_Dev1_ch Emergency stop signal 1 channel No.

Specify the No. of station to connect the safety I/O unit that receives the emergency stop signal.
---Setting range---
0 to 63
Specify the bit No. of the safety I/O unit that receives the emergency stop signal.
---Setting range---
0 to 7
Specify the No. of I/O channel to connect the safety I/O unit that receives the emergency stop signal. When
set to "0", the designation of emergency stop signal device by EMG_Dev2 is disabled, irrespective of the set tings of EMG_Dev2_stn and EMG_Dev2_bit.
---Setting range---
0 to 4
Specify the No. of station to connect the safety I/O unit that receives the emergency stop signal.
---Setting range---
0 to 63
Specify the bit No. of the safety I/O unit that receives the emergency stop signal.
---Setting range---
0 to 7
Specify the allowed time of inconsistency between the PLC1 and PLC2 side input signals. Specify this in in crements of 10 (ms). When set to "0", the allowed safety signal compare time is 300 (ms).
---Setting range---
0 to 500 (10 ms)
Specify the allowed time of inconsistency between the PLC1 and PLC2 side output signals. Specify this in
increments of 10 (ms). When set to "0", the allowed safety signal compare time is 300 (ms).
---Setting range---
0 to 50 (10 ms)
Select the DO control method and PLC status of when a safety signal observation error occurs.
0: PLC is set in RUN state and DO is controlled through user safety sequence
1: PLC is set in STOP state and all DOs are OFF.
Specify the allowed time of inconsistency between the PLC1 and PLC2 side output signals. Specify this in
increments of 10 (ms). When set to "0", the allowed safety signal compare time is 300 (ms).
Set tolerable time more than 300 (ms), when an output signal is controlled with 100 (ms) timer.
---Setting range---
0 to 500 (10 ms)
(PR) #51583 EMG_Dev1_stn Emergency stop signal 1 station No.
(PR) #51584 EMG_Dev1_bit Emergency stop signal 1 bit No.
(PR) #51585 EMG_Dev2_ch Emergency stop signal 2 channel No.
(PR) #51586 EMG_Dev2_stn Emergency stop signal 2 station No.
(PR) #51587 EMG_Dev2_bit Emergency stop signal 2 bit No.
(PR) #51591 SIO_DIDelay Allowed input signal compare time
(PR) #51592 SIO_DODelay Allowed output signal compare time
(PR) #51593 SIO_DOErrtype DO control method at diagnostic error
(PR) #51594 SIO_DODelay2 Allowed output signal compare time 2

15.32 EtherNet/IP Parameters
15.32.1 EtherNet/IP Parameters Scanner 1
(Note) Numeric portion of "N001" included in each parameter name varies depending on the parameter No.
Specify the No. of the device that is assigned to node. (n=1 to 64)
---Setting range---
1 to 128
Specify the position No. that is assigned to node. (n=1 to 64)

---Setting range---
0 to 63
Specify the PLC project No. that is assigned to node. (n=1 to 64)
This number is set as the project No. of PLC device to which the node input/output/connection status is as signed.
---Setting range---
1 to 6
Specify the name of PLC device to which Implicit Message input data is transferred. (n=1 to 64)
Example) X
---Setting range---
X, M, L, SB, B, SW, D, R, W
Specify the top No. of PLC device to which Implicit Message input data is transferred. (n=1 to 64)
If you specify bit devices, set them in increments of 16 points.
Example) 100
---Setting range---
X: 0 to 5F0
M: 0 to 61424
L: 0 to 32752
SB: 0 to 7FF0
B: 0 to EFF0
SW: 0 to 7FFF
D: 0 to 32767
W: 0 to 7FFF
R: 8300 to 9799, 9800 to 9899, 18300 to 19799, 19800 to 19899, 28300 to 29799, 29800 to 29899
Specify the size (bytes) of Implicit Message input data that is transferred to PLC device. (n=1 to 64)
Example) 1
---Setting range---
0 to 509 (bytes)
* Up to 5000 bytes in total for all nodes
#80000+20(n-1) N001 Device Number Scanner function Implicit Message: device No.
#80001+20(n-1) N001 Position No. Scanner function Implicit Message: position No.
#80002+20(n-1) N001 Project No. Scanner function Implicit Message: PLC project No.
#80003+20(n-1) N001 in dev name Scanner function Implicit Message: PLC device name
(IN (T->O))
#80004+20(n-1) N001 in dev No. Scanner function Implicit Message: PLC device top No.
(IN (T->O))
#80005+20(n-1) N001 in dev size Scanner function Implicit Message: PLC device size (IN
(T->O))

Specify the name of PLC device to which Implicit Message output data is transferred. (n=1 to 64)
Example) Y
---Setting range---
Y, M, L, SB, B, SW, D, R, W
Specify the top No. of PLC device to which Implicit Message output data is transferred. (n=1 to 64)
If you specify bit devices, set them in increments of 16 points.
Example) 100
---Setting range---
Y: 0 to 5F0
M: 0 to 61424
L: 0 to 32752
SB: 0 to 7FF0
B: 0 to EFF0
SW: 0 to 7FFF
D: 0 to 32767
W: 0 to 7FFF
R: 8300 to 9799, 9800 to 9899, 18300 to 19799, 19800 to 19899, 28300 to 29799, 29800 to 29899
Specify the size (bytes) of Implicit Message output data that is transferred to PLC device. (n=1 to 64)
Example) 1
---Setting range---
0 to 505 (bytes)
* Up to 5000 bytes in total for all nodes
Specify the name of PLC device to which connection status of the device assigned to node is transferred.
(n=1 to 64)
Example) M
---Setting range---
M, L, SB, B, SW, D, R, W
Specify the top No. of PLC device to which connection status of the device assigned to node is transferred.
(n=1 to 64)
6 bytes of data starting from the specified device No. are occupied.
Example) 1024
---Setting range---
M: 0 to 61424
L: 0 to 32752
SB: 0 to 7FF0
B: 0 to EFF0
SW: 0 to 7FFF
D: 0 to 32767
W: 0 to 7FFF
R: 8300 to 9799, 9800 to 9899, 18300 to 19799, 19800 to 19899, 28300 to 29799, 29800 to 29899
#80006+20(n-1) N001 out dev name Scanner function Implicit Message: PLC device name
(OUT (O->T))
#80007+20(n-1) N001 out dev No. Scanner function Implicit Message: PLC device top No.
(OUT (O->T))
#80008+20(n-1) N001 out dev size Scanner function Implicit Message: PLC device size
(OUT (O->T))
#80009+20(n-1) N001 sts dev name Scanner function Implicit Message: connection status

assign PLC device name
#80010+20(n-1) N001 sts dev No. Scanner function Implicit Message: connection status
assign PLC device No.

This parameter specifies the high-speed refresh input area size for the node. (n = 1 to 64)
When the setting is greater than that of PLC device size (IN (T->O)) of the same node, an alarm will be is sued.
When the total size of the high-speed refresh input areas for all the nodes and all the areas is greater than 8 (bytes), an alarm will be issued.
---Setting range---
0 to 8
(*) Up to 8 (bytes) in total for all nodes
This parameter specifies the high-speed refresh output area size for the node. (n = 1 to 64)
When the setting is greater than that of PLC device size (OUT (O->T)) of the same node, an alarm will be issued.
When the total size of the high-speed refresh output areas for all the nodes and all the areas is greater than 8 (bytes), an alarm will be issued.
---Setting range---
0 to 8
(*) Up to 8 (bytes) in total for all nodes
Select which data is sent to the hardware connected when the NC enters the PLC STOP mode, the set PLC device value or the cleared data (the data cleared to "0").
0: Send the PLC device value
1: Send the data cleared to "0"
#80011+20(n-1) N001 High in size High-speed refresh area size (IN (T->O))
#80012+20(n-1) N001 High out size High-speed refresh area size (OUT (O->T))
#81565 PLC Stop Output Setting of output at PLC STOP

15.32.2 EtherNet/IP Parameters Scanner 2
(Note) Numeric portion of "CH01" included in each parameter name varies depending on the parameter No.
Specify the PLC project No. that is assigned to node. (c=1 to 16)
This number is set as the project No. of PLC device to which the node input/output/control structure is as signed.
---Setting range---
1 to 6
Specify the name of PLC device to which "Explicit Message control structure" is assigned. (c=1 to 16)
Example) M
---Setting range---
M, L, SB, B, SW, D, R, W
Specify the top No. of PLC device to which "Explicit Message control structure" is assigned. (c=1 to 16)
If you specify bit devices, set them in increments of 16 points.
Example) 2048
---Setting range---
M: 0 to 61424
L: 0 to 32752
SB: 0 to 7FF0
B: 0 to EFF0
SW: 0 to 7FFF
D: 0 to 32767
W: 0 to 7FFF
R: 8300 to 9799, 9800 to 9899, 18300 to 19799, 19800 to 19899, 28300 to 29799, 29800 to 29899
#81280+10(c-1) CH01 Project No. Scanner function Explicit Message: PLC project No.
#81281+10(c-1) CH01 ctrl dev name Scanner function Explicit Message: control structure
assign PLC device name
#81282+10(c-1) CH01 ctrl dev No. Scanner function Explicit Message: ctrl structure as sign PLC device top No.

15.32.3 EtherNet/IP Parameters Adapter 1
(Note) Numeric portion of "A1" included in each parameter name varies depending on the parameter No.
Specify the PLC project No. that is assigned to Adapter Implicit (IN/OUT) area. (a=1 to 6)
This number is set as the project No. of PLC device for input/output to/from Adapter Implicit (IN/OUT) area.
---Setting range---
1 to 6
Specify the offset (bytes) from the head of Adapter Implicit (IN) area. (a=1 to 6)
The data starting from the specified offset is sent from Adapter Implicit (IN) area to PLC device.
Example) 100
---Setting range---
0 to 499 (bytes)
Specify the name of PLC device to which Adapter Implicit (IN) area data is transferred. (a=1 to 6)
Example) X
---Setting range---
X, M, L, SB, B, SW, D, R, W
Specify the top No. of PLC device to which Adapter Implicit (IN) area data is transferred. (a=1 to 6)
If you specify bit devices, set them in increments of 16 points.
Example) 200
---Setting range---
X: 0 to 5F0
M: 0 to 61424
L: 0 to 32752
SB: 0 to 7FF0
B: 0 to EFF0
SW: 0 to 7FFF

D: 0 to 32767
W: 0 to 7FFF
R: 8300 to 9799, 9800 to 9899, 18300 to 19799, 19800 to 19899, 28300 to 29799, 29800 to 29899
Specify the size (bytes) of Adapter Implicit (IN) area data that is transferred to PLC device. (a=1 to 6)
Example) 1
---Setting range---
0 to 500 (bytes)
* Up to 500 bytes in total for all areas
Specify the offset (bytes) from the head of Adapter Implicit (OUT) area. (a=1 to 6)
The PLC device data starting from the specified offset is sent to Adapter Implicit (OUT) area.
Example) 100
---Setting range---
0 to 499 (bytes)
#81440+20(a-1) Imp A1 Proj No. Adapter function Implicit Message: PLC project No.
#81441+20(a-1) Imp A1in offset Adapter function Implicit Message: IN area top offset
#81442+20(a-1) Imp A1in dev name Adapter function Implicit Message: PLC device name
(IN)
#81443+20(a-1) Imp A1in dev No. Adapter function Implicit Message: PLC device top No.
(IN)
#81444+20(a-1) Imp A1in dev size Adapter function Implicit Message: PLC device size (IN)
#81445+20(a-1) Imp A1out offset Adapter function Implicit Message: OUT area top offset

Specify the name of PLC device that is sent to Adapter Implicit (OUT) area. (a=1 to 6)
Example) Y
---Setting range---
Y, M, L, SB, B, SW, D, R, W
Specify the top No. of PLC device that is sent to Adapter Implicit (OUT) area. (a=1 to 6)
If you specify bit devices, set them in increments of 16 points.
Example) 200
---Setting range---
Y: 0 to 5F0
M: 0 to 61424
L: 0 to 32752
SB: 0 to 7FF0
B: 0 to EFF0
SW: 0 to 7FFF
D: 0 to 32767
W: 0 to 7FFF
R: 8300 to 9799, 9800 to 9899, 18300 to 19799, 19800 to 19899, 28300 to 29799, 29800 to 29899
Specify the size (bytes) of PLC device that is sent to Adapter Implicit (OUT) area. (a=1 to 6)
Example) 1
---Setting range---
0 to 500 (bytes)
* Up to 500 bytes in total for all areas
This parameter specifies the size of the high-speed refresh area in the I/O (IN) area. (a = 1 to 6)
When the setting is greater than that of PLC device size (IN) of the same area, an alarm will be issued.
When the total size of the high-speed refresh input areas for all the nodes and all the areas is greater than 8
(bytes), an alarm will be issued.
---Setting range---
0 to 8
(*) Up to 8 (bytes) in total for all areas
This parameter specifies the size of the high-speed refresh area in the I/O (OUT) area. (a = 1 to 6)
When the setting is greater than that of PLC device size (OUT) of the same area, an alarm will be issued.
When the total size of the high-speed refresh output areas for all the nodes and all the areas is greater than
8 (bytes), an alarm will be issued.
---Setting range---
0 to 8
(*) Up to 8 (bytes) in total for all areas
Specify the No. of PLC project to which connection status is transferred.
---Setting range---
1 to 6
#81446+20(a-1) Imp A1out dev name Adapter function Implicit Message: PLC device name
(OUT)
#81447+20(a-1) Imp A1out dev No. Adapter function Implicit Message: PLC device top No.
(OUT)
#81448+20(a-1) Imp A1out dev size Adapter function Implicit Message: PLC device size
(OUT)
#81449+20(a-1) Imp A1High in size High-speed refresh area size (IN)
#81450+20(a-1) Imp A1High outsize High-speed refresh area size (OUT)
#81560 Imp sts Proj No. Connection status assigned PLC project No.

Specify the name of PLC device to which connection status is transferred.
Example) M
---Setting range---
M, L, SB, B, SW, D, R, W
Specify the top No. of PLC device to which connection status is transferred.
6 bytes of data starting from the specified device No. are occupied.
---Setting range---
M: 0 to 61424
L: 0 to 32752
SB: 0 to 7FF0
B: 0 to EFF0

SW: 0 to 7FFF
D: 0 to 32767
W: 0 to 7FFF
R: 8300 to 9799, 9800 to 9899, 18300 to 19799, 19800 to 19899, 28300 to 29799, 29800 to 29899
#81561 Impsts dev name Connection status assigned PLC device name
#81562 Imp sts dev No. Connection status assigned PLC device top No.

15.32.4 EtherNet/IP Parameters Adapter 2
(Note) Numeric portion of "A1" included in each parameter name varies depending on the parameter No.
Specify the PLC project No. that is assigned to Adapter Explicit (IN/OUT) area. (a=1 to 6)
This number is set as the project No. of PLC device for input/output to/from Adapter Explicit (IN/OUT) area.
---Setting range---
1 to 6
Specify the offset (bytes) from the head of Adapter Explicit (IN) area. (a=1 to 6)
The data starting from the specified offset is sent from Adapter Explicit (IN) area to PLC device.
Example) 100
---Setting range---
0 to 1388
Specify the name of PLC device to which Adapter Explicit (IN) area data is transferred. (a=1 to 6)
Example) M
---Setting range---
M, L, SB, B, SW, D, R, W
Specify the top No. of PLC device to which Adapter Explicit (IN) area data is transferred. (a=1 to 6)
If you specify bit devices, set them in increments of 16 points.
Example) 512
---Setting range---
M: 0 to 61424
L: 0 to 32752
SB: 0 to 7FF0
B: 0 to EFF0
SW: 0 to 7FFF
D: 0 to 32767
W: 0 to 7FFF
R: 8300 to 9799, 9800 to 9899, 18300 to 19799, 19800 to 19899, 28300 to 29799, 29800 to 29899
Specify the size (bytes) of Adapter Explicit (IN) area data that is transferred to PLC device. (a=1 to 6)
Example) 1
---Setting range---
0 to 1389 (bytes)
* Up to 1389 bytes in total for all areas
Specify the offset (bytes) from the head of Adapter Explicit (OUT) area. (a=1 to 6)
The PLC device data starting from the specified offset is sent to Adapter Explicit (OUT) area.
Example) 100
---Setting range---
0 to 1388
#81570+20(a-1) Exp A1 Proj No. Adapter function Explicit Message: PLC project No.
#81571+20(a-1) Exp A1in offset Adapter function Explicit Message: IN area top offset
#81572+20(a-1) Exp A1in dev name Adapter function Explicit Message: PLC device name
(IN)
#81573+20(a-1) Exp A1in dev No. Adapter function Explicit Message: PLC device top No.
(IN)
#81574+20(a-1) Exp A1in dev size Adapter function Explicit Message: PLC device size (IN)
#81575+20(a-1) Exp A1out offset Adapter function Explicit Message: OUT area top offset

Specify the name of PLC device that is sent to Adapter Explicit (OUT) area. (a=1 to 6)
Example) B
---Setting range---
M, L, SB, B, SW, D, R, W
Specify the top No. of PLC device that is sent to Adapter Explicit (OUT) area. (a=1 to 6)
Example) 200
---Setting range---
M: 0 to 61424
L: 0 to 32752
SB: 0 to 7FF0
B: 0 to EFF0
SW: 0 to 7FFF
D: 0 to 32767
W: 0 to 7FFF
R: 8300 to 9799, 9800 to 9899, 18300 to 19799, 19800 to 19899, 28300 to 29799, 29800 to 29899
Specify the size (bytes) of PLC device that is sent to Adapter Explicit (OUT) area. (a=1 to 6)
Example) 1
---Setting range---
0 to 1389 (bytes)
* Up to 1389 bytes in total for all areas
#81576+20(a-1) Exp A1out dev name Adapter function Explicit Message: PLC device name
(OUT)
#81577+20(a-1) Exp A1out dev No. Adapter function Explicit Message: PLC device top No.
(OUT)
#81578+20(a-1) Exp A1out dev size Adapter function Explicit Message: PLC device size
(OUT)

15.33.1 CC-Link IE Field Network 1
(Note) Numeric portion of "N01" included in each parameter name varies depending on the parameter No.
Example: #82060+10(k-1) "#1 N01 Link-d name" (k = 1 to 64)
Select the slot of the CC-Link IE field network expansion unit to which you apply the CCIEF common param eters #82000 to #82695.
(Note) If you select the same slot as of "#82700 #2 Slot No.", the parameters #82000 to #82695 are applied
to the slot with higher priority.
---Setting range---
0: No setting (Disable)
1: EXT3
2: EXT4
(*) For M80V/M800VS
1: EXT1
2: EXT2
Specify the station type of the CC-Link IE field network expansion unit.
0: Master station
1: Local station
Specify the network No. of the CC-Link IE field network expansion unit.
---Setting range---
0 to 239
0: No setting
Specify the number of stations other than master stations.
If the NC acts as a local station, set "0" in the parameter.
If you set a reserved station, include it in the count.
If you set a submaster station, include it in the count.
---Setting range---
0 to 64
0: No setting
Specify the station No. of the CC-Link IE field network expansion unit.
For a master station, the station No. is 0, irrespective of the parameter.
* If the NC acts as a master station, the maximum value of the station No. which can be set to the slave station
is "64". If the NC acts as a master station and also the NC is connected as a local station, set "64" or less
to the station No.
---Setting range---
0 to 120
Specify the communication mode.
0: Online mode
1: Offline mode
2: H/W test mode
(PR) #82000 #1 Slot No. Selection of parameter application slot
(PR) #82001 #1 Network Type Network type
(PR) #82002 #1 Network No. Network No.
#82003 #1 Total Stations Total number of device stations
(PR) #82004 #1 Station No. Station No. (local station)
(PR) #82005 #1 Mode Communication mode

Select whether to hold or clear the input data from the device station where a data link error occurred.
0: Clear
1: Hold
Select whether to hold or clear the cyclic data output when the PLC is put in STOP status.
0: Output
1: Clear
Select whether or not to use the loopback function.
When ring topology is selected as the method of connecting with other stations, select "1" (Use).
For the other connection methods, select "0" (Not use).
If the NC acts as a local station, set "0" in the parameter.
If the NC acts as a local station, it operates according to the loopback function setting of master station.
0: Not use
1: Use
Select whether or not to assure data integrity on a station basis in link refresh of the CC-Link IE field network
expansion unit.
If the NC acts as a local station, set "0" in the parameter.
If the NC acts as a local station, it operates according to the station-based block assurance setting of master
station.
0: Not assure
1: Assure
Set this parameter for a submaster station.
This parameter allows you to select parameters to be applied to a device station for the number and alloca tion of link devices.
Select either the parameters of master station or those of local station.
0: Apply the parameters of master station
1: Apply the parameters of local station
Specify the number of SB link devices for link refresh.
Set the number in increments of 16.
---Setting range---
0 to 512
Specify the start device No. of SB link devices that perform link refresh.
Set the number in increments of 16.
---Setting range---
0 to 1F0 (hexadecimal)
Specify the project No. of PLC devices that perform link refresh with the SB link devices.
---Setting range---
0 to 6
0: No setting
#82006 #1 DLink Fault St. Data link error station setting

#82007 #1 PLC Stop Output Output setting at PLC STOP
#82008 #1 Loopback Func Loopback function setting
#82009 #1 Assure Blk Data Block data assurance per station
(PR) #82011 #1 SubM sel para Selection of submaster station's parameters
#82040 #1 SB Link-d size Number of SB link devices
#82041 #1 SB Link-d DNo. Start device No. of SB link devices
#82042 #1 Refr-d PNo.(SB) Refresh device project No. for SB link device

Specify the name of PLC devices that perform link refresh with the SB link devices.
---Setting range---
0, M, L, B, D, W, R, SB
0: No setting
Specify the start device No. of PLC devices that perform link refresh with the SB link devices.
If you specify bit devices, set them in increments of 16 points.
---Setting range---
M: 0 to 61424
L: 0 to 32752
B: 0 to EFF0
D: 0 to 32767
W: 0 to 7FFF
SB: 0 to 7FF0
R: 8300 to 9799, 9800 to 9899, 18300 to 19799, 19800 to 19899, 28300 to 29799, 29800 to 29899
Specify the number of SW link devices for link refresh.
Set the number in increments of 4.
---Setting range---
0 to 512
Specify the start device No. of SW link devices that perform link refresh.
Set the number in increments of 4.
---Setting range---
0 to 1FC (hexadecimal)
Specify the project No. of PLC devices that perform link refresh with the SW link devices.
---Setting range---
0 to 6
0: No setting
Specify the name of PLC devices that perform link refresh with the SW link devices.
---Setting range---
0, M, L, B, D, W, R, SW
0: No setting
Specify the start device No. of PLC devices that perform link refresh with the SW link devices.
If you specify bit devices, set them in increments of 16 points.
---Setting range---
M: 0 to 61424
L: 0 to 32752
B: 0 to EFF0
D: 0 to 32767
W: 0 to 7FFF
SW: 0 to 7FF0
R: 8300 to 9799, 9800 to 9899, 18300 to 19799, 19800 to 19899, 28300 to 29799, 29800 to 29899
#82043 #1 Refr-d name(SB) Refresh device name for SB link device
#82044 #1 Refr-d DNo.(SB) Refresh device start device No. for SB link device
#82050 #1 SW Link-d size Number of SW link devices
#82051 #1 SW Link-d DNo. Start device No. of SW link devices
#82052 #1 Refr-d PNo.(SW) Refresh device project No. for SW link device
#82053 #1 Refr-d name(SW) Refresh device name for SW link device
#82054 #1 Refr-d DNo.(SW) Refresh device start device No. for SW link device

Specify the link device name. (k=1 to 64)
---Setting range---
0, RX, RY, RWr, RWw
0: No setting
Specify the number of link devices. (k=1 to 64)
If you designate RX/RY, set the number in increments of 16.
If you designate RWr/RWw, set the number in increments of 4.
---Setting range---
RX, RY: 0 to 16384
RWr, RWw: 0 to 8192
Specify the start device number of the link devices. (k=1 to 64)
If you designate RX/RY, set the number in increments of 16.
If you designate RWr/RWw, set the number in increments of 4.
---Setting range---
RX, RY: 0 to 3FF0
RWr, RWw: 0 to 1FFC (hexadecimal)
Specify the project No. of PLC devices that perform link refresh with the link devices. (k=1 to 64)
---Setting range---
0 to 6
0: No setting
Specify the name of PLC devices that perform link refresh with the link devices. (k=1 to 64)
---Setting range---
RX: 0, X, M, L, B, D, W, R
RY: 0, Y, M, L, B, D, W, R
RWr, RWw: 0, M, L, B, D, W, R
0: No setting

Specify the start device No. of PLC devices that perform link refresh with the link devices. (k=1 to 64)
If you specify bit devices, set them in increments of 16 points.
---Setting range---
X: 0 to 5F0
Y: 0 to 5F0
M: 0 to 61424
L: 0 to 32752
B: 0 to EFF0
D: 0 to 32767
W: 0 to 7FFF
R: 8300 to 9799, 9800 to 9899, 18300 to 19799, 19800 to 19899, 28300 to 29799, 29800 to 29899
#82060+10(k-1) #1 N01 Link-d name Link device name
#82061+10(k-1) #1 N01 Link-d size Number of link devices
#82062+10(k-1) #1 N01 Link-d DNo. Link device start device No.
#82063+10(k-1) #1 N01 Refr-d PNo. Refresh device project No.
#82064+10(k-1) #1 N01 Refr-d name Refresh device name
#82065+10(k-1) #1 N01 Refr-d DNo. Refresh device start device No.

15.33.2 CC-Link IE Field Network 2
(Note) Numeric portion of "N01" included in each parameter name varies depending on the parameter No.
Example: #82760+10(k-1) "#2 N01 Link-d name" (k = 1 to 64)
Select the slot of the CC-Link IE field network expansion unit to which you apply the CCIEF common param eters #82700 to #83395.
(Note) If you select the same slot as of "#82000 #1 Slot No.", the parameters #82000 to #82695 are applied
to the slot with higher priority.
---Setting range---
0: No setting (Disable)
1: EXT3
2: EXT4
(*) For M80V/M800VS
1: EXT1
2: EXT2
Specify the station type of the CC-Link IE field network expansion unit.
---Setting range---
0: Master station
1: Local station
Specify the network No. of the CC-Link IE field network expansion unit.
---Setting range---
0 to 239
0: No setting
Specify the number of stations other than master stations.
If the NC acts as a local station, set "0" in the parameter.
If you set a reserved station, include it in the count.
If you set a submaster station, include it in the count.
---Setting range---
0 to 64
0: No setting
Specify the station No. of the CC-Link IE field network expansion unit.
For a master station, the station No. is 0, irrespective of the parameter.
* If the NC acts as a master station, the maximum value of the station No. which can be set to the slave station
is "64". If the NC acts as a master station and also the NC is connected as a local station, set "64" or less
to the station No.
---Setting range---
0 to 120
Specify the communication mode.
0: Online mode
1: Offline mode
2: H/W test mode
(PR) #82700 #2 Slot No. Selection of parameter application slot
(PR) #82701 #2 Network Type Network type
(PR) #82702 #2 Network No. Network No.
#82703 #2 Total Stations Total number of device stations
(PR) #82704 #2 Station No. Station No. (local station)
(PR) #82705 #2 Mode Communication mode

Select whether to hold or clear the input data from the device station where a data link error occurred.
0: Clear
1: Hold
Select whether to hold or clear the cyclic data output when the PLC is put in STOP status.
0: Clear
1: Hold
Select whether or not to use the loopback function.
When ring topology is selected as the method of connecting with other stations, select "1" (Use).
For the other connection methods, select "0" (Not use).
If the NC acts as a local station, set "0" in the parameter.
If the NC acts as a local station, it operates according to the loopback function setting of master station.
0: Not use
1: Use
Select whether or not to assure data integrity on a station basis in link refresh of the CC-Link IE field network
expansion unit.
If the NC acts as a local station, set "0" in the parameter.
If the NC acts as a local station, it operates according to the station-based block assurance setting of master
station.

0: Not assure
1: Assure
Set this parameter for a submaster station.
This parameter allows you to select parameters to be applied to a device station for the number and alloca tion of link devices.
Select either the parameters of master station or those of local station.
0: Apply the parameters of master station
1: Apply the parameters of local station
Specify the number of SB link devices for link refresh.
Set the number in increments of 16.
---Setting range---
0 to 512
Specify the start device No. of SB link devices that perform link refresh.
Set the number in increments of 16.
---Setting range---
0 to 1F0 (hexadecimal)
Specify the project No. of PLC devices that perform link refresh with the SB link devices.
---Setting range---
0 to 6
0: No setting
#82706 #2 DLink Fault St. Data link error station setting
#82707 #2 PLC Stop Output Output setting at PLC STOP
#82708 #2 Loopback Func Loopback function setting
#82709 #2 Assure Blk Data Block data assurance per station
(PR) #82711 #2 SubM sel para Selection of submaster station's parameters
#82740 #2 SB Link-d size Number of SB link devices
#82741 #2 SB Link-d DNo. Start device No. of SB link devices
#82742 #2 Refr-d PNo.(SB) Refresh device project No. for SB link device

Specify the name of PLC devices that perform link refresh with the SB link devices.
---Setting range---
0, M, L, B, D, W, R, SB
0: No setting
Specify the start device No. of PLC devices that perform link refresh with the SB link devices.
If you specify bit devices, set them in increments of 16 points.
---Setting range---
M: 0 to 61424
L: 0 to 32752
B: 0 to EFF0
D: 0 to 32767
W: 0 to 7FFF
SB: 0 to 7FF0
R: 8300 to 9799, 9800 to 9899, 18300 to 19799, 19800 to 19899, 28300 to 29799, 29800 to 29899
Specify the number of SW link devices for link refresh.
Set the number in increments of 4.
---Setting range---
0 to 512
Specify the start device No. of SW link devices that perform link refresh.
Set the number in increments of 4.
---Setting range---
0 to 1FC (hexadecimal)
Specify the project No. of PLC devices that perform link refresh with the SW link devices.
---Setting range---
0 to 6
0: No setting
Specify the name of PLC devices that perform link refresh with the SW link devices.
---Setting range---
0, M, L, B, D, W, R, SW
0: No setting
Specify the start device No. of PLC devices that perform link refresh with the SW link devices.
If you specify bit devices, set them in increments of 16 points.
---Setting range---
M: 0 to 61424
L: 0 to 32752
B: 0 to EFF0
D: 0 to 32767
W: 0 to 7FFF
SW: 0 to 7FF0
R: 8300 to 9799, 9800 to 9899, 18300 to 19799, 19800 to 19899, 28300 to 29799, 29800 to 29899
#82743 #2 Refr-d name(SB) Refresh device name for SB link device
#82744 #2 Refr-d DNo.(SB) Refresh device start device No. for SB link device
#82750 #2 SW Link-d size Number of SW link devices
#82751 #2 SW Link-d DNo. Start device No. of SW link devices
#82752 #2 Refr-d PNo.(SW) Refresh device project No. for SW link device
#82753 #2 Refr-d name(SW) Refresh device name for SW link device
#82754 #2 Refr-d DNo.(SW) Refresh device start device No. for SW link device

Specify the link device name. (k=1 to 64)
---Setting range---
0, RX, RY, RWr, RWw
0: No setting
Specify the number of link devices. (k=1 to 64)
If you designate RX/RY, set the number in increments of 16.

If you designate RWr/RWw, set the number in increments of 4.
---Setting range---
RX, RY: 0 to 16384
RWr, RWw: 0 to 8192
Specify the start device number of the link devices. (k=1 to 64)
If you designate RX/RY, set the number in increments of 16.
If you designate RWr/RWw, set the number in increments of 4.
---Setting range---
RX, RY: 0 to 3FF0
RWr, RWw: 0 to 1FFC (hexadecimal)
Specify the project No. of PLC devices that perform link refresh with the link devices. (k=1 to 64)
---Setting range---
0 to 6
0: No setting
Specify the name of PLC devices that perform link refresh with the link devices. (k=1 to 64)
---Setting range---
RX: 0, X, M, L, B, D, W, R
RY: 0, Y, M, L, B, D, W, R
RWr, RWw: 0, M, L, B, D, W, R
0: No setting
Specify the start device No. of PLC devices that perform link refresh with the link devices. (k=1 to 64)
If you specify bit devices, set them in increments of 16 points.
---Setting range---
X: 0 to 5F0
Y: 0 to 5F0
M: 0 to 61424
L: 0 to 32752
B: 0 to EFF0
D: 0 to 32767
W: 0 to 7FFF
R: 8300 to 9799, 9800 to 9899, 18300 to 19799, 19800 to 19899, 28300 to 29799, 29800 to 29899
#82760+10(k-1) #2 N01 Link-d name Link device name
#82761+10(k-1) #2 N01 Link-d size Number of link devices
#82762+10(k-1) #2 N01 Link-d DNo. Link device start device No.
#82763+10(k-1) #2 N01 Refr-d PNo. Refresh device project No.
#82764+10(k-1) #2 N01 Refr-d name Refresh device name
#82765+10(k-1) #2 N01 Refr-d DNo. Refresh device start device No.

15.33.3 CC-Link IE Field Master Parameters
(Note) Numeric portion of "CN01" included in each parameter name varies depending on the parameter No.
Example: #83400+10(n-1) "CN01 Station No." (n = 1 to 64)
Specify the station No. of device or submaster station connected to the network. (n = 1 to 64)
There is no need to number the stations sequentially. (duplication is not acceptable)
---Setting range---
0 to 64
0: No setting
Specify the station type for device stations. (n=1 to 64)
Set the same station type as that of the units that are actually connected to the network.
---Setting range---
0: No setting
1: Remote I/O station
2: Remote device station
3: Intelligent device station
4: Local station
5: Submaster station
Specify the number of RX/RY link devices that perform link refresh with device stations. (n=1 to 64)
Set the number in increments of 16.
---Setting range---
Local, intelligent device or submaster station: 0 to 2048
Remote device station: 0 to 128
Remote I/O station: 0 to 64
Specify the start device No. of RX/RY link devices that perform link refresh with device stations. (n=1 to 64)
Set the number in increments of 16.
---Setting range---
0 to 3FF0 (hexadecimal)
Specify the number of RWr/RWw link devices that perform link refresh with device stations. (n=1 to 64)
Set the number in increments of 4.
---Setting range---
Local, intelligent device or submaster station: 0 to 1024
Remote device station: 0 to 64
Remote I/O station: Setting is disabled (fixed to 0)
Specify the start device No. of RWr/RWw link devices that perform link refresh with device stations. (n=1 to 64)
Set the number in increments of 4.
---Setting range---
0 to 1FFC (hexadecimal)
#83400+10(n-1) CN01 Station No. Station No. (device station)
#83401+10(n-1) CN01 Station Type Station type (device station)
#83402+10(n-1) CN01 RX/RY size Number of RX/RY link devices
#83403+10(n-1) CN01 RX/RY DNo. Start device No. of RX/RY link devices
#83404+10(n-1) CN01 RWr/RWw size Number of RWr/RWw link devices
#83405+10(n-1) CN01 RWr/RWw DNo. Start device No. of RWr/RWw link devices

Designate the station as reserved station or error invalid station. (n=1 to 64)
---Setting range---
0: No setting
1: Reserved station
2: Error invalid station
#83406+10(n-1) CN01 Set rsvd sts Reserved/Error invalid station setting

15.33.4 CC-Link IE Field Network Basic
(Note) Numeric portion of "N01" included in each parameter name varies depending on the parameter No.
Example: #85020+20(n-1) "N01 Occupied St." (n = 1 to 4)
Select whether to enable the CC-Link IE Field Network Basic communication.
0: Disabled
1: Enabled
Select whether the local station acts as a master or a remote.
When operating it as a master station, set the parameters #85010 to #85092.
When operating it as a remote, set the parameters #85180 to #85189.
0: Master station
1: Remote station
Select whether to execute emergency stop or indicate a warning when an error occurs in the CC-Link IE Field Network Basic communication.
0: Emergency stop
1: Warning indication
Select whether to clear the input data (RX for master, RY for remote) or retain the last value when a data link error occurs.
0: Clear
1: Hold
Select whether to retain or clear the output data (RY for master, RX for remote) when the PLC is put in STOP status.
0: Output
1: Clear
Specify the number of remote devices that are connected to the CC-Link IE Field Network Basic communi cation (master).
---Setting range---
0 to 4 (0: No setting)
Specify the length of timeout for cyclic communication in milliseconds.
---Setting range---
0 or 20 to 65535 (0: 100ms)
Specify the number of timeouts for cyclic communication.
If the number of consecutive timeouts exceeds the setting, the remote is disconnected.
---Setting range---
0, 3, 5, 10 (0: 3 times)
(PR) #85000 Enable CCIEF Basic Enable the CC-Link IE Field Network Basic communica tion.
(PR) #85001 Station Type CC-Link IE Field Network Basic communication: Station type
(PR) #85002 Err Switch Select the behavior when an error occurs in the CC-Link IE Field Network Basic communication.
#85003 DLink Fault St. CC-Link IE Field Network Basic communication: Data link error station
#85004 PLC Stop Output CC-Link IE Field Network Basic communication: Output at PLC STOP
#85010 Total Remotes CC-Link IE Field Network Basic comm. (master): Num ber of connected devices
#85012 Timeout Value Timeout for the CC-Link IE Field Network Basic commu nication (master)
#85013 Timeout Count CC-Link IE Field Network Basic communication (mas ter): Timeout count

Specify the number of stations occupied by the remote device. (n = 1 to 4)
Up to 4 stations can be occupied by one remote device.
Example: When the 1st device occupies four stations, stations occupied by the 2nd device start from the 5th station.
1st device occupying four stations (1st to 4th stations)
2nd device occupying one station (5th station)
---Setting range---
0 to 4 (0: No setting)
Select whether to set the remote device as reserved station. (n = 1 to 4)
When set as reserved station, communication with the remote device is not performed.
This enables you to reserve the stations that are to be used in the future.
Example: When the 1st device occupies four reserved stations, stations occupied by the 2nd device start from the 5th station. Communication is not performed for the 1st to 4th stations.
1st device (reserved station) occupying four stations (1st to 4th stations) (Communication is not performed)
2nd device occupying one station (5th station)
---Setting range---
0: No setting
1: Reserved station
Specify the IP address of the remote device. (n = 1 to 4)
Set the remote's IP address in the same network as the parameter "#1926 Global IP address". It is not pos sible to communication with a device on a different network.
---Setting range---
0.0.0.0,0.0.0.1 to 223.255.255.254 (0.0.0.0: No setting)
Specify the project No. of PLC devices for which link refresh is performed with the link devices of the remote device. (n = 1 to 4)
---Setting range---
0 to 6 (0: No setting)
Specify the name of PLC devices for which link refresh is performed with the link devices "RX" of the remote device. (n = 1 to 4)

Link refresh-enabled devices
X, M, L, B, D, W and R
---Setting range---
0, X, M, L, B, D, W or R (0: No setting)
Specify the starting device No. of PLC devices for which link refresh is performed with the link devices "RX"
of the remote device. (n = 1 to 4)
If you specify bit devices, set them in increments of 16 points.
---Setting range---
X: 0 to 5F0
M: 0 to 61424
L: 0 to 32752
B: 0 to EFF0
D: 0 to 32767
W: 0 to 7FFF
R: 8300 to 9799, 9800 to 9899, 18300 to 19799, 19800 to 19899, 28300 to 29799, 29800 to 29899
#85020+20(n-1) N01 Occupied St. Number of occupied stations
#85022+20(n-1) N01 Set rsvd St. Reserved station setting
#85023+20(n-1) N01 IP Address IP address
#85024+20(n-1) N01 Refr-d PNo. Refresh device project No.
#85025+20(n-1) N01 Refr-d to RX Refresh device name (RX)
#85026+20(n-1) N01 Refr-No to RX Starting refresh device No. (RX)

Specify the name of PLC devices for which link refresh is performed with the link devices "RY" of the remote
device. (n = 1 to 4)
Link refresh-enabled devices
Y, M, L, B, D, W and R
---Setting range---
0, Y, M, L, B, D, W or R (0: No setting)
Specify the starting device No. of PLC devices for which link refresh is performed with the link devices "RY"
of the remote device. (n = 1 to 4)
If you specify bit devices, set them in increments of 16 points.
---Setting range---
Y: 0 to 5F0
M: 0 to 61424
L: 0 to 32752
B: 0 to EFF0
D: 0 to 32767
W: 0 to 7FFF
R: 8300 to 9799, 9800 to 9899, 18300 to 19799, 19800 to 19899, 28300 to 29799, 29800 to 29899
Specify the name of PLC devices for which link refresh is performed with the link devices "RWr" of the remote
device. (n = 1 to 4)
Link refresh-enabled devices
M, L, B, D, W and R
---Setting range---
0, M, L, B, D, W or R (0: No setting)
Specify the starting device No. of PLC devices for which link refresh is performed with the link devices "RWr"
of the remote device. (n = 1 to 4)
If you specify bit devices, set them in increments of 16 points.
---Setting range---
M: 0 to 61424
L: 0 to 32752
B: 0 to EFF0
D: 0 to 32767
W: 0 to 7FFF
R: 8300 to 9799, 9800 to 9899, 18300 to 19799, 19800 to 19899, 28300 to 29799, 29800 to 29899
Specify the name of PLC devices for which link refresh is performed with the link devices "RWw" of the re mote device. (n = 1 to 4)
Link refresh-enabled devices
M, L, B, D, W and R
---Setting range---
0, M, L, B, D, W or R (0: No setting)
#85027+20(n-1) N01 Refr-d to RY Refresh device name (RY)
#85028+20(n-1) N01 Refr-No to RY Starting refresh device No. (RY)
#85029+20(n-1) N01 Refr-d to RWr Refresh device name (RWr)
#85030+20(n-1) N01 Refr-No to RWr Starting refresh device No. (RWr)
#85031+20(n-1) N01 Refr-d to RWw Refresh device name (RWw)

Specify the starting device No. of PLC devices for which link refresh is performed with the link devices "RWw"
of the remote device. (n = 1 to 4)
If you specify bit devices, set them in increments of 16 points.
---Setting range---
M: 0 to 61424
L: 0 to 32752
B: 0 to EFF0
D: 0 to 32767
W: 0 to 7FFF
R: 8300 to 9799, 9800 to 9899, 18300 to 19799, 19800 to 19899, 28300 to 29799, 29800 to 29899
Specify the number of stations occupied for the CC-Link IE Field Network Basic communication (remote).
Up to 4 stations can be occupied.
---Setting range---
0 to 4 (0: No setting)
Specify the project No. of PLC devices for which link refresh is performed with the link devices of CC-Link IE
Field Network Basic communication (remote).

---Setting range---
0 to 6 (0: No setting)
Specify the name of PLC devices for which link refresh is performed with the link devices "RX" of CC-Link IE Field Network Basic communication (remote).
Link refresh-enabled devices
Y, M, L, B, D, W and R
---Setting range---
0, Y, M, L, B, D, W or R (0: No setting)
Specify the starting device No. of PLC devices for which link refresh is performed with the link devices "RX" of CC-Link IE Field Network Basic communication (remote).
If you specify bit devices, set them in increments of 16 points.
---Setting range---
Y: 0 to 5F0
M: 0 to 61424
L: 0 to 32752
B: 0 to EFF0
D: 0 to 32767
W: 0 to 7FFF
R: 8300 to 9799, 9800 to 9899, 18300 to 19799, 19800 to 19899, 28300 to 29799, 29800 to 29899
Specify the name of PLC devices for which link refresh is performed with the link devices "RY" of CC-Link IE Field Network Basic communication (remote).
Link refresh-enabled devices
X, M, L, B, D, W and R
---Setting range---
0, X, M, L, B, D, W or R (0: No setting)
#85032+20(n-1) N01 Refr-No to RWw Starting refresh device No. (RWw)
#85180 R Occupied St. CC-Link IE Field Network Basic comm. (remote): Num ber of occupied stations
#85181 R Refr-d PNo. Remote function: Refresh device project No.
#85182 R Refr-d to RX Remote function: Refresh device name (RX)
#85183 R Refr-No to RX Remote function: Starting refresh device No. (RX)
#85184 R Refr-d to RY Remote function: Refresh device name (RY)

Specify the starting device No. of PLC devices for which link refresh is performed with the link devices "RY" of CC-Link IE Field Network Basic communication (remote).
If you specify bit devices, set them in increments of 16 points.
---Setting range---
X: 0 to 5F0
M: 0 to 61424
L: 0 to 32752
B: 0 to EFF0
D: 0 to 32767
W: 0 to 7FFF
R: 8300 to 9799, 9800 to 9899, 18300 to 19799, 19800 to 19899, 28300 to 29799, 29800 to 29899
Specify the name of PLC devices for which link refresh is performed with the link devices "RWr" of CC-Link IE Field Network Basic communication (remote).
Link refresh-enabled devices
M, L, B, D, W and R
---Setting range---
0, M, L, B, D, W or R (0: No setting)
Specify the starting device No. of PLC devices for which link refresh is performed with the link devices "RWr" of CC-Link IE Field Network Basic communication (remote).
If you specify bit devices, set them in increments of 16 points.
---Setting range---
M: 0 to 61424
L: 0 to 32752
B: 0 to EFF0
D: 0 to 32767
W: 0 to 7FFF
R: 8300 to 9799, 9800 to 9899, 18300 to 19799, 19800 to 19899, 28300 to 29799, 29800 to 29899
Specify the name of PLC devices for which link refresh is performed with the link devices "RWw" of CC-Link IE Field Network Basic communication (remote).
Link refresh-enabled devices
M, L, B, D, W and R
---Setting range---
0, M, L, B, D, W or R (0: No setting)
Specify the starting device No. of PLC devices for which link refresh is performed with the link devices "RWw" of CC-Link IE Field Network Basic communication (remote).
If you specify bit devices, set them in increments of 16 points.
---Setting range---
M: 0 to 61424
L: 0 to 32752
B: 0 to EFF0
D: 0 to 32767
W: 0 to 7FFF
R: 8300 to 9799, 9800 to 9899, 18300 to 19799, 19800 to 19899, 28300 to 29799, 29800 to 29899
#85185 R Refr-No to RY Remote function: Starting refresh device No. (RY)
#85186 R Refr-d to RWr Remote function: Refresh device name (RWr)
#85187 R Refr-No to RWr Remote function: Starting refresh device No. (RWr)
#85188 R Refr-d to RWw Remote function: Refresh device name (RWw)
#85189 R Refr-No to RWw Remote function: Starting refresh device No. (RWw)

Select whether to hold or clear the cyclic data input of the CC-Link IE TSN remote module received from the master station when the data link of the CC-Link IE TSN remote module becomes abnormal.
0: Clear
1: Hold
Select whether to hold or clear the cyclic data output sent from CC-Link IE TSN remote module when the PLC is put in STOP state.
0: Hold
1: Clear
Specify the link speed of the CC-Link IE TSN Remote module.
For CC-Link IE TSN remote module, the link speed is not fixed. The link is established after the autonegoti ation.
0: 1 Gbps Full Duplex
1: 100 Mbps Full Duplex
Specify the number of SB link devices for link refresh.
Specify this parameter with the number in increments of 16 points.
This parameter is only valid for CC-Link IE TSN remote modules.
---Setting range---
0 to 512
Specify the start device No. of SB link devices that perform link refresh.
Enter this parameter in hexadecimal with the number in increments of 16 points.
This parameter is only valid for CC-Link IE TSN remote modules.
---Setting range---
0 to 1F0 (HEX)
Specify the project No. of PLC devices that perform link refresh with the SB link devices.
Enter a value that fits within the [Maximum Project No.] of the multi-project parameter.
Enter "1" when the multi-project is disabled.
Set "0" when SB link devices do not perform link refresh.
This parameter is only valid for CC-Link IE TSN remote modules.
---Setting range---
0 to 6
0: No setting
Specify the name of PLC devices that perform link refresh with the SB link devices.
Set "0" when SB link devices do not perform link refresh.
This parameter is only valid for CC-Link IE TSN remote modules.
---Setting range---
0, M, L, B, D, W, R, SB
0: No setting
#88300 DLink Fault Data link setting at error
#88301 PLC Stop Output Output setting at PLC STOP
(PR) #88302 Link speed Link speed
#88310 SB Link-d size Number of SB link devices
#88311 SB Link-d DNo. Start device No. of SB link device
#88312 Refr-d PNo.(SB) Refresh device project No. of SB link device
#88313 Refr-d name(SB) Refresh device name of SB link device

Specify the start device No. of PLC devices that perform link refresh with the SB link devices.
If you specify bit devices, set this parameter in increments of 16 points.
This parameter is only valid for CC-Link IE TSN remote modules.
---Setting range---
M: 0 to 61424
L: 0 to 32752
B: 0 to EFF0
D: 0 to 32767
W: 0 to 7FFF
SB: 0 to 7FF0
R: 8300 to 9799, 9800 to 9899, 18300 to 19799, 19800 to 19899, 28300 to 29799, 29800 to 29899
Specify the number of SW link devices for link refresh.
Specify this parameter with the number in increments of 4 points.
This parameter is only valid for CC-Link IE TSN remote modules.
---Setting range---
0 to 512
Specify the start device No. of SW link devices that perform link refresh.
Enter this parameter in hexadecimal with the number in increments of 4 points.
This parameter is only valid for CC-Link IE TSN remote modules.
---Setting range---
0 to 1FC (HEX)
Specify the project No. of PLC devices that perform link refresh with the SW link devices.
Enter a value that fits within the [Maximum Project No.] of the multi-project parameter.
Enter "1" when the multi-project is disabled.
Set "0" when SW link devices do not perform link refresh.
This parameter is only valid for CC-Link IE TSN remote modules.
---Setting range---
0 to 6
0: No setting
Specify the name of PLC devices that perform link refresh with the SW link devices.
Set "0" when SW link devices do not perform link refresh.
This parameter is only valid for CC-Link IE TSN remote modules.
---Setting range---
0, M, L, B, D, W, R, SW
0: No setting
#88314 Refr-d DNo.(SB) Refresh device start device No. of SB link device
#88320 SW Link-d size Number of SW link devices
#88321 SW Link-d DNo. Start device No. of SW link device
#88322 Refr-d PNo.(SW) Refresh device project No. of SW link device
#88323 Refr-d name(SW) Refresh device name of SW link device

Specify the start device No. of PLC devices that perform link refresh with the SW link devices.
If you specify bit devices, set this parameter in increments of 16 points.
This parameter is only valid for CC-Link IE TSN remote modules.
---Setting range---
M: 0 to 61424
L: 0 to 32752
B: 0 to EFF0
D: 0 to 32767
W: 0 to 7FFF
SW: 0 to 7FFF
R: 8300 to 9799, 9800 to 9899, 18300 to 19799, 19800 to 19899, 28300 to 29799, 29800 to 29899
Specify the number of RX link devices for link refresh.
Specify this parameter with the number in increments of 16 points.
This parameter is only valid for CC-Link IE TSN remote modules.
---Setting range---
0 to 2048
Specify the project No. of PLC devices that perform link refresh with the RX link devices.
Enter a value that fits within the [Maximum Project No.] of the multi-project parameter.
Enter "1" when the multi-project is disabled.
Set "0" when RX link devices do not perform link refresh.
This parameter is only valid for CC-Link IE TSN remote modules.
---Setting range---
0 to 6
0: No setting
Specify the name of PLC devices that perform link refresh with the RX link devices.
Set "0" when RX link devices do not perform link refresh.
This parameter is only valid for CC-Link IE TSN remote modules.
---Setting range---
0, Y, M, L, B, D, W, R
0: No setting
Specify the start device No. of PLC devices that perform link refresh with the RX link devices.
If you specify bit devices, set this parameter in increments of 16 points.
This parameter is only valid for CC-Link IE TSN remote modules.
---Setting range---
Y: 0 to 5F0
M: 0 to 61424
L: 0 to 32752
B: 0 to EFF0
D: 0 to 32767
W: 0 to 7FFF
R: 8300 to 9799, 9800 to 9899, 18300 to 19799, 19800 to 19899, 28300 to 29799, 29800 to 29899
#88324 Refr-d DNo.(SW) Refresh device start device No. of SW link device
#88330 RX Link-d size Number of RX link devices
#88331 Refr-d PNo.(RX) Refresh device project No. of RX link device
#88332 Refr-d name(RX) Refresh device name of RX link device
#88333 Refr-d DNo.(RX) Refresh device start device No. of RX link device

Specify the number of RY link devices for link refresh.
Specify this parameter with the number in increments of 16 points.
This parameter is only valid for CC-Link IE TSN remote modules.
---Setting range---
0 to 2048
Specify the project No. of PLC devices that perform link refresh with the RY link devices.
Enter a value that fits within the [Maximum Project No.] of the multi-project parameter.
Enter "1" when the multi-project is disabled.
Set "0" when RY link devices do not perform link refresh.
This parameter is only valid for CC-Link IE TSN remote modules.
---Setting range---
0 to 6
0: No setting
Specify the name of PLC devices that perform link refresh with the RY link devices.
Set "0" when RY link devices do not perform link refresh.
This parameter is only valid for CC-Link IE TSN remote modules.
---Setting range---
0, X, M, L, B, D, W, R
0: No setting
Specify the start device No. of PLC devices that perform link refresh with the RY link devices.
If you specify bit devices, set this parameter in increments of 16 points.
This parameter is only valid for CC-Link IE TSN remote modules.
---Setting range---
X: 0 to 5F0
M: 0 to 61424
L: 0 to 32752
B: 0 to EFF0
D: 0 to 32767
W: 0 to 7FFF
R: 8300 to 9799, 9800 to 9899, 18300 to 19799, 19800 to 19899, 28300 to 29799, 29800 to 29899
Specify the number of RWr link devices for link refresh.
Specify this parameter with the number in increments of 4 points.
This parameter is only valid for CC-Link IE TSN remote modules.
---Setting range---
0 to 512

Specify the project No. of PLC devices that perform link refresh with the RWr link devices.
Enter a value that fits within the [Maximum Project No.] of the multi-project parameter.
Enter "1" when the multi-project is disabled.
Set "0" when RWr link devices do not perform link refresh.
This parameter is only valid for CC-Link IE TSN remote modules.
---Setting range---
0 to 6
0: No setting
#88340 RY Link-d size Number of RY link devices
#88341 Refr-d PNo.(RY) Refresh device project No. of RY link device
#88342 Refr-d name(RY) Refresh device name of RY link device
#88343 Refr-d DNo.(RY) Refresh device start device No. of RY link device
#88350 RWr Link-d size Number of RWr link devices
#88351 Refr-d PNo.(RWr) Refresh device project No. of RWr link device

Specify the name of PLC devices that perform link refresh with the RWr link devices.
Set "0" when RWr link devices do not perform link refresh.
This parameter is only valid for CC-Link IE TSN remote modules.
---Setting range---
0, M, L, B, D, W, R
0: No setting
Specify the start device No. of PLC devices that perform link refresh with the RWr link devices.
If you specify bit devices, set this parameter in increments of 16 points.
This parameter is only valid for CC-Link IE TSN remote modules.
---Setting range---
M: 0 to 61424
L: 0 to 32752
B: 0 to EFF0
D: 0 to 32767
W: 0 to 7FFF
R: 8300 to 9799, 9800 to 9899, 18300 to 19799, 19800 to 19899, 28300 to 29799, 29800 to 29899
Specify the number of RWw link devices for link refresh.
Specify this parameter with the number in increments of 4 points.
This parameter is only valid for CC-Link IE TSN remote modules.
---Setting range---
0 to 512
Specify the project No. of PLC devices that perform link refresh with the RWw link devices.
Enter a value that fits within the [Maximum Project No.] of the multi-project parameter.
Enter "1" when the multi-project is disabled.
Set "0" when RWw link devices do not perform link refresh.
This parameter is only valid for CC-Link IE TSN remote modules.
---Setting range---
0 to 6
0: No setting
Specify the name of PLC devices that perform link refresh with the RWw link devices.
Set "0" when RWw link devices do not perform link refresh.
This parameter is only valid for CC-Link IE TSN remote modules.
---Setting range---
0, M, L, B, D, W, R
0: No setting
#88352 Refr-d name(RWr) Refresh device name of RWr link device
#88353 Refr-d DNo.(RWr) Refresh device start device No. of RWr link device
#88360 RWw Link-d size Number of link devices of RWw link device
#88361 Refr-d PNo.(RWw) Refresh device project No. of RWw link device
#88362 Refr-d name(RWw) Refresh device name of RWw link device

Specify the start device No. of PLC devices that perform link refresh with the RWw link devices.
If you specify bit devices, set this parameter in increments of 16 points.
This parameter is only valid for CC-Link IE TSN remote modules.
---Setting range---
M: 0 to 61424
L: 0 to 32752
B: 0 to EFF0
D: 0 to 32767
W: 0 to 7FFF
R: 8300 to 9799, 9800 to 9899, 18300 to 19799, 19800 to 19899, 28300 to 29799, 29800 to 29899
#88363 Refr-d DNo.(RWw) Refresh device start device No. of RWw link device

15.35 PROFIBUS-DP Parameters
Select whether to allocate the devices to PX or PY of PROFIBUS-DP. (n=1 to 64)
(Note) If 0 is set, the PROFIBUS allocation parameters of the n-th set are all disabled.
0: Disable
1: PX
2: PY
Select the section of PROFIBUS-DP I/O data (PX/PY) to which the devices are allocated. (n=1 to 64)
---Setting range---
0 to 31
Select the device that is allocated to the section of PROFIBUS-DP I/O data(PX/PY). (n=1 to 64)
(Note) The setting range varies according to the value of "#n I/O reg".

---Setting range---
X, Y, M, L, B, D, R or W
When "#n I/O reg" is "1", "Y" is out of the setting range.
When "#n I/O reg" is "2", "X" is out of the setting range.
Select the 32 bytes of devices to which PROFIBUS-DP I/O data is allocated. Specify the starting device num ber. (n=1 to 64)
* If the set value is out of the following ranges, an alarm occurs at the start of NC.
Hexadecimal setting:
X: 0 to 1C0, 300 to 500
Y: 0 to 1C0, 300 to 500
B: 0 to DF00
W: 0 to 2FF0
Decimal setting:
M: 0 to 61184
L: 0 to 768
D: 0 to 4080
R: 8300 to 9884, 18300 to 19884, 28300 to 29884
(Note) Due to the multi-project function, if the number of the first project points is smaller than the default value, the range becomes narrower corresponding to the number of the first project points.
---Setting range---
The setting range varies according to the value of "#n dev name".
X, Y, B, W: 0 to FFFF
M, L, D, R: 0 to 65535
When the PLC of the NC unit is in the STOP state or error state, select the value to send to the slave device, either the value of the PLC device allocated by NC parameters or the value cleared to "0".
0: Send the PLC device value
1: Send the data cleared to "0"
(PR) #57000+4(n-1) #n I/O reg PROFIBUS I/O area
(PR) #57001+4(n-1) #n sect No. PROFIBUS section number
(PR) #57002+4(n-1) #n dev name PROFIBUS device name
(PR) #57003+4(n-1) #n dev No. PROFIBUS device number
#57300 PLC Stop Output Setting of output at PLC STOP

15.36 FL-net Parameters
Specify the node name for the NC to be used in FL-net communication.
This parameter is used for response of message transmission.
The communication is possible even when the node name is unspecified.
---Setting range---
Up to 10 characters in length, containing alphanumeric characters and symbols
0: No setting
Specify the length of token watchdog time.
Set the value in increments of 1 ms.
This parameter has the following 2 uses.
(1) Monitoring local node
When a token cannot be issued within the token watchdog time set by this parameter and a time-out oc curs, "token watchdog time error flag" in "local node management information" is turned to "1" (ON).
When the time-out is counted for 3 consecutive times, the node is released from the network and the sys tem alarm (Z103) occurs. When a time-out occurs, set the larger value than current value to this param eter.
(2) Monitoring other node
Check the release of the other nodes based on token watchdog time for each node, and the token is to be re-issued.
Calculate the token watchdog time with the following formula.
[Calculation method]
Token watchdog time =
(Total number of cyclic frames for local nodes + 2) 2.0 ms
+ (Total number of cyclic frames for local nodes + 2) the allowable minimum frame interval time
(*) The maximum data size for 1 packet is 1024 bytes.
---Setting range---
1 to 255 (ms)
Specify the allowable minimum frame interval time.
The minimum frame interval time is ensured the time from the end of a frame to the subsequent frame to be sent.
This parameter has the following 2 uses.
(1) Time until any frame is sending from local node after the local node address token was received
(2) Transmission interval for cyclic frames or message frames
Note that this does not apply between the token frame and the preceding cyclic frame.
The largest value of the allowable minimum frame interval time within the network is used for all devices.
When any restriction is needed for the configuration of devices or communication path, set "1" or larger value to this parameter. Set "0" when no restriction is needed.
---Setting range---
0: No setting
1 to 9: 1 (ms)
10 to 19: 2 (ms)
20 to 29: 3 (ms)
30 to 39: 4 (ms)
40 to 49: 5 (ms)
50: 6 (ms)
#88000 Node name Node name
#88001 Token Wdog Time Token watchdog time
#88002 Min. Frame Time Minimum permissible frame interval

Select which data is sent to the hardware connected when the NC enters the PLC STOP mode, the set PLC device value or the cleared data (the data cleared to "0").
0: Send the PLC device value
1: Send the data cleared to "0"

Specify the start address (word) in the local node area of the common memory area 1.
The sum of the start address and its size cannot exceed 200 (HEX).
---Setting range---
0 to 1FF (word) (hexadecimal)
Specify the size (word) of the local node area of the common memory area 1.
When "0" is set, the data will not be transmitted.
The sum of the start address and its size cannot exceed 200 (HEX).
---Setting range---
0 to 512 (words)
Specify the project number of PLC device to be assigned to the local node area of the common memory area 1.
---Setting range---
1 to 6
0: No setting
Specify the PLC device name to be assigned to the local node area of the common memory area 1.
(Example) Y
When the setting of this parameter is changed, the value of "#88014 CyC1 My dev No." is cleared to "0".
---Setting range---
Y, M, L, SB, B, SW, D, R, W
0: No setting
Specify the start number of PLC device to be assigned to the local node area of the common memory area 1.
If you specify bit devices, set them with numbers divisible by 16 (in increments of 16 points).
(Example) 100
---Setting range---
Y: 0 to 5F0
M: 0 to 61424
L: 0 to 32752
SB: 0 to 7FF0
B: 0 to EFF0
SW: 0 to 7FFF
D: 0 to 32767
W: 0 to 7FFF
R: 8300 to 9799, 9800 to 9899, 18300 to 19799, 19800 to 19899, 28300 to 29799, 29800 to 29899
#88003 PLC Stop Output Setting of output at PLC STOP
#88010 CyC1 My Addr Start address in local node area of common memory
area 1
#88011 CyC1 My Size Size of local node area in common memory area 1
#88012 CyC1 My Proj. No. PLC project number for local node area in common
memory area 1
#88013 CyC1 My dev name PLC device name for local node area in common mem ory area 1
#88014 CyC1 My dev No. Start number of PLC device for local node area in com mon memory area 1

Specify the start address (word) in the other node area 1 of the common memory area 1.
The sum of the start address and its size cannot exceed 200 (HEX).
---Setting range---
0 to 1FF (word) (hexadecimal)
Specify the size (word) of the other node area 1 of the common memory area 1.
When "0" is set, the data will not be transmitted.
The sum of the start address and its size cannot exceed 200 (HEX).
---Setting range---
0 to 512 (words)
Specify the project number of PLC device to be assigned to the other node area 1 of the common memory area 1.
---Setting range---
1 to 6
0: No setting
Specify the PLC device name to be assigned to the other node area 1 of the common memory area 1.
(Example) X
When the setting of this parameter is changed, the value of "#88024 CyC1 A1 dev No." is cleared to "0".
---Setting range---
X, M, L, SB, B, SW, D, R, W
0: No setting
Specify the start number of PLC device to be assigned to the other node area 1 of the common memory area 1.
If you specify bit devices, set them with numbers divisible by 16 (in increments of 16 points).
(Example) 100
---Setting range---
X: 0 to 5F0
M: 0 to 61424
L: 0 to 32752
SB: 0 to 7FF0
B: 0 to EFF0
SW: 0 to 7FFF
D: 0 to 32767
W: 0 to 7FFF
R: 8300 to 9799, 9800 to 9899, 18300 to 19799, 19800 to 19899, 28300 to 29799, 29800 to 29899
Specify the start address (word) in the other node area 2 of the common memory area 1.
The sum of the start address and its size cannot exceed 200 (HEX).
---Setting range---
0 to 1FF (word) (hexadecimal)
#88020 CyC1 A1 Addr Start address in other node area 1 of common memory
area 1
#88021 CyC1 A1 Size Size of other node area 1 in common memory area 1
#88022 CyC1 A1 Proj. No. PLC project number for other node area 1 in common
memory area 1

#88023 CyC1 A1 dev name PLC device name for other node area 1 in common memory area 1
#88024 CyC1 A1 dev No. Start number of PLC device for other node area 1 in common memory area 1
#88030 CyC1 A2 Addr Start address in other node area 2 of common memory area 1

Specify the size (word) of the other node area 2 of the common memory area 1.
When "0" is set, the data will not be transmitted.
The sum of the start address and its size cannot exceed 200 (HEX).
---Setting range---
0 to 512 (words)
Specify the project number of PLC device to be assigned to the other node area 2 of the common memory area 1.
---Setting range---
1 to 6
0: No setting
Specify the PLC device name to be assigned to the other node area 2 of the common memory area 1.
(Example) X
When the setting of this parameter is changed, the value of "#88034 CyC1 A2 dev No." is cleared to "0".
---Setting range---
X, M, L, SB, B, SW, D, R, W
0: No setting
Specify the start number of PLC device to be assigned to the other node area 2 of the common memory area 1.
If you specify bit devices, set them with numbers divisible by 16 (in increments of 16 points).
(Example) 100
---Setting range---
X: 0 to 5F0
M: 0 to 61424
L: 0 to 32752
SB: 0 to 7FF0
B: 0 to EFF0
SW: 0 to 7FFF
D: 0 to 32767
W: 0 to 7FFF
R: 8300 to 9799, 9800 to 9899, 18300 to 19799, 19800 to 19899, 28300 to 29799, 29800 to 29899
Specify the start address (word) in the local node area of the common memory area 2.
The sum of the start address and its size cannot exceed 2000 (HEX).
---Setting range---
0 to 1FFF (word) (hexadecimal)
Specify the size (word) of the local node area of the common memory area 2.
When "0" is set, the data will not be transmitted.
The sum of the start address and its size cannot exceed 2000 (HEX).
---Setting range---
0 to 8192 (words)
#88031 CyC1 A2 Size Size of other node area 2 in common memory area 1
#88032 CyC1 A2 Proj. No. PLC project number for other node area 2 in common memory area 1
#88033 CyC1 A2 dev name PLC device name for other node area 2 in common memory area 1
#88034 CyC1 A2 dev No. Start number of PLC device for other node area 2 in common memory area 1
#88040 CyC2 My Addr Start address in local node area of common memory area 2
#88041 CyC2 My Size Size of local node area in common memory area 2

Specify the project number of PLC device to be assigned to the local node area of the common memory area 2.
---Setting range---
1 to 6
0: No setting
Specify the PLC device name to be assigned to the local node area of the common memory area 2.
(Example) Y
When the setting of this parameter is changed, the value of "#88044 CyC2 My dev No." is cleared to "0".
---Setting range---
Y, M, L, SB, B, SW, D, R, W
0: No setting
Specify the start number of PLC device to be assigned to the local node area of the common memory area 2.
If you specify bit devices, set them with numbers divisible by 16 (in increments of 16 points).
(Example) 100
---Setting range---
Y: 0 to 5F0
M: 0 to 61424
L: 0 to 32752
SB: 0 to 7FF0
B: 0 to EFF0
SW: 0 to 7FFF
D: 0 to 32767
W: 0 to 7FFF
R: 8300 to 9799, 9800 to 9899, 18300 to 19799, 19800 to 19899, 28300 to 29799, 29800 to 29899
Specify the start address (word) in the other node area 1 of the common memory area 2.

The sum of the start address and its size cannot exceed 2000 (HEX).
---Setting range---
0 to 1FFF (word) (hexadecimal)
Specify the size (word) of the other node area 1 of the common memory area 2.
When "0" is set, the data will not be transmitted.
The sum of the start address and its size cannot exceed 2000 (HEX).
---Setting range---
0 to 8192 (words)
Specify the project number of PLC device to be assigned to the other node area 1 of the common memory area 2.
---Setting range---
1 to 6
0: No setting
#88042 CyC2 My Proj. No. PLC project number for local node area in common memory area 2
#88043 CyC2 My dev name PLC device name for local node area in common mem ory area 2
#88044 CyC2 My dev No. Start number of PLC device for local node area in com mon memory area 2
#88050 CyC2 A1 Addr Start address in other node area 1 of common memory area 2
#88051 CyC2 A1 Size Size of other node area 1 in common memory area 2
#88052 CyC2 A1 Proj. No. PLC project number for other node area 1 in common memory area 2

Specify the PLC device name to be assigned to the other node area 1 of the common memory area 2.
(Example) X
When the setting of this parameter is changed, the value of "#88054 CyC2 A1 dev No." is cleared to "0".
---Setting range---
X, M, L, SB, B, SW, D, R, W
0: No setting
Specify the start number of PLC device to be assigned to the other node area 1 of the common memory area 2.
If you specify bit devices, set them with numbers divisible by 16 (in increments of 16 points).
(Example) 100
---Setting range---
X: 0 to 5F0
M: 0 to 61424
L: 0 to 32752
SB: 0 to 7FF0
B: 0 to EFF0
SW: 0 to 7FFF
D: 0 to 32767
W: 0 to 7FFF
R: 8300 to 9799, 9800 to 9899, 18300 to 19799, 19800 to 19899, 28300 to 29799, 29800 to 29899
Specify the start address (word) in the other node area 2 of the common memory area 2.
The sum of the start address and its size cannot exceed 2000 (HEX).
---Setting range---
0 to 1FFF (word) (hexadecimal)
Specify the size (word) of the other node area 2 of the common memory area 2.
When "0" is set, the data will not be transmitted.
The sum of the start address and its size cannot exceed 2000 (HEX).
---Setting range---
0 to 8192 (words)
Specify the project number of PLC device to be assigned to the other node area 2 of the common memory area 2.
---Setting range---
1 to 6
0: No setting
Specify the PLC device name to be assigned to the other node area 2 of the common memory area 2.
(Example) X
When the setting of this parameter is changed, the value of "#88064 CyC2 A2 dev No." is cleared to "0".
---Setting range---
X, M, L, SB, B, SW, D, R, W
0: No setting
#88053 CyC2 A1 dev name PLC device name for other node area 1 in common memory area 2
#88054 CyC2 A1 dev No. Start number of PLC device for other node area 1 in common memory area 2
#88060 CyC2 A2 Addr Start address in other node area 2 of common memory area 2
#88061 CyC2 A2 Size Size of other node area 2 in common memory area 2
#88062 CyC2 A2 Proj. No. PLC project number for other node area 2 in common memory area 2
#88063 CyC2 A2 dev name PLC device name for other node area 2 in common memory area 2

Specify the start number of PLC device to be assigned to the other node area 2 of the common memory area 2.
If you specify bit devices, set them with numbers divisible by 16 (in increments of 16 points).
(Example) 100
---Setting range---
X: 0 to 5F0
M: 0 to 61424

L: 0 to 32752
SB: 0 to 7FF0
B: 0 to EFF0
SW: 0 to 7FFF
D: 0 to 32767
W: 0 to 7FFF
R: 8300 to 9799, 9800 to 9899, 18300 to 19799, 19800 to 19899, 28300 to 29799, 29800 to 29899
Specify the project number of the PLC device that stores the local node management information.
---Setting range---
1 to 6
0: No setting
Specify the name of the PLC device that stores the Local node management information.
(Example) M
When the setting of this parameter is changed, the value of "#88072 My sts dev No." is cleared to "0".
---Setting range---
M, L, SB, B, SW, D, R, W
0: No setting
Specify the number of the PLC device that stores the Local node management information.
If you specify bit devices, set them with numbers divisible by 16 (in increments of 16 points).
The eight bytes of area starting from the specified device are occupied.
(Example) 1024
---Setting range---
M: 0 to 61424
L: 0 to 32752
SB: 0 to 7FF0
B: 0 to EFF0
SW: 0 to 7FFF
D: 0 to 32767
W: 0 to 7FFF
R: 8300 to 9799, 9800 to 9899, 18300 to 19799, 19800 to 19899, 28300 to 29799, 29800 to 29899
Specify the project number of the PLC device that stores the list of participating nodes.
---Setting range---
1 to 6
0: No setting
#88064 CyC2 A2 dev No. Start number of PLC device for other node area 2 in
common memory area 2
#88070 My sts Proj. No. PLC project number for Local node management infor mation
#88071 My sts dev name PLC device name for Local node management informa tion
#88072 My sts dev No. PLC device number for Local node management infor mation
#88080 N List Proj. No. PLC project number for List of participating nodes

Specify the name of the PLC device that stores the List of participating nodes.
(Example) M
When the setting of this parameter is changed, the value of "#88082 N List dev No." is cleared to "0".
---Setting range---
M, L, SB, B, SW, D, R, W
0: No setting
Specify the number of the PLC device that stores the List of participating nodes.
If you specify bit devices, set them with numbers divisible by 16 (in increments of 16 points).
The 32 bytes of area starting from the specified device are occupied.
(Example) 1024
---Setting range---
M: 0 to 61424
L: 0 to 32752
SB: 0 to 7FF0
B: 0 to EFF0
SW: 0 to 7FFF
D: 0 to 32767
W: 0 to 7FFF
R: 8300 to 9799, 9800 to 9899, 18300 to 19799, 19800 to 19899, 28300 to 29799, 29800 to 29899
Specify the project number of the PLC device that stores the WARNING information.
---Setting range---
1 to 6
0: No setting
Specify the name of the PLC device that stores the WARNING information.
(Example) M
When the setting of this parameter is changed, the value of "#88092 Warning dev No." is cleared to "0".
---Setting range---
M, L, SB, B, SW, D, R, W
0: No setting
Specify the number of the PLC device that stores the WARNING information.
If you specify bit devices, set them with numbers divisible by 16 (in increments of 16 points).
The 32 bytes of area starting from the specified device are occupied.
(Example) 1024
---Setting range---
M: 0 to 61424
L: 0 to 32752
SB: 0 to 7FF0
B: 0 to EFF0
SW: 0 to 7FFF
D: 0 to 32767
W: 0 to 7FFF
R: 8300 to 9799, 9800 to 9899, 18300 to 19799, 19800 to 19899, 28300 to 29799, 29800 to 29899
#88081 N List dev name PLC device name for List of participating nodes
#88082 N List dev No. PLC device number for List of participating nodes

#88090 Warnig Proj. No. PLC project number for WARNING information
#88091 Warnig dev name PLC device name for WARNING information
#88092 Warnig dev No. PLC device number for WARNING information

Specify the project number of the PLC device that stores the ALARM information.
---Setting range---
1 to 6
0: No setting
Specify the name of the PLC device that stores the ALARM information.
(Example) M
When the setting of this parameter is changed, the value of "#88102 Alarm dev No." is cleared to "0".
---Setting range---
M, L, SB, B, SW, D, R, W
0: No setting
Specify the number of the PLC device that stores the ALARM information.
If you specify bit devices, set them with numbers divisible by 16 (in increments of 16 points).
The 32 bytes of area starting from the specified device are occupied.
(Example) 1024
---Setting range---
M: 0 to 61424
L: 0 to 32752
SB: 0 to 7FF0
B: 0 to EFF0
SW: 0 to 7FFF
D: 0 to 32767
W: 0 to 7FFF
R: 8300 to 9799, 9800 to 9899, 18300 to 19799, 19800 to 19899, 28300 to 29799, 29800 to 29899
Specify the project number of the PLC device that stores the RUN/STOP information.
---Setting range---
1 to 6
0: No setting
Specify the name of the PLC device that stores the RUN/STOP information.
(Example) M
When the setting of this parameter is changed, the value of "#88112 Run Stop dev No." is cleared to "0".
---Setting range---
M, L, SB, B, SW, D, R, W
0: No setting
#88100 Alarm Proj. No. PLC project number for ALARM information
#88101 Alarm dev name PLC device name for ALARM information
#88102 Alarm dev No. PLC device number for ALARM information
#88110 Run Stop Proj. No. PLC project number for RUN/STOP information
#88111 Run Stop dev name PLC device name for RUN/STOP information

Specify the number of the PLC device that stores the RUN/STOP information.
If you specify bit devices, set them with numbers divisible by 16 (in increments of 16 points).
The 32 bytes of area starting from the specified device are occupied.
(Example) 1024
---Setting range---
M: 0 to 61424
L: 0 to 32752
SB: 0 to 7FF0
B: 0 to EFF0
SW: 0 to 7FFF
D: 0 to 32767
W: 0 to 7FFF
R: 8300 to 9799, 9800 to 9899, 18300 to 19799, 19800 to 19899, 28300 to 29799, 29800 to 29899
Specify the project number of the PLC device that stores the information of completion of common memory setting.
---Setting range---
1 to 6
0: No setting
Specify the name of the PLC device that stores the information of Completion of common memory setting.
(Example) M
When the setting of this parameter is changed, the value of "#88122 CM Comp. dev No." is cleared to "0".
---Setting range---
M, L, SB, B, SW, D, R, W
0: No setting
Specify the number of the PLC device that stores the information of completion of common memory setting.
If you specify bit devices, set them with numbers divisible by 16 (in increments of 16 points).
The eight bytes of area starting from the specified device are occupied.
(Example) 1024
---Setting range---
M: 0 to 61424
L: 0 to 32752
SB: 0 to 7FF0
B: 0 to EFF0
SW: 0 to 7FFF
D: 0 to 32767
W: 0 to 7FFF
R: 8300 to 9799, 9800 to 9899, 18300 to 19799, 19800 to 19899, 28300 to 29799, 29800 to 29899
Specify the project number of the PLC device that stores the information of common memory data valid.
---Setting range---

1 to 6
0: No setting
#88112 Run Stop dev No. PLC device number for RUN/STOP information
#88120 CM Comp. Proj. No. PLC project number for info. of Completion of common
memory setting
#88121 CM Comp. dev name PLC device name for information of Completion of com mon memory setting
#88122 CM Comp. dev No. PLC device number for information of Completion of
common memory setting
#88130 CM Valid Proj. No. PLC project number for information of Common memo ry data valid

Specify the name of the PLC device that stores the information of Common memory data valid.
(Example) M
When the setting of this parameter is changed, the value of "#88132 CM Valid dev No." is cleared to "0".
---Setting range---
M, L, SB, B, SW, D, R, W
0: No setting
Specify the number of the PLC device that stores the information of common memory data valid.
If you specify bit devices, set them with numbers divisible by 16 (in increments of 16 points).
The 32 bytes of area starting from the specified device are occupied.
(Example) 1024
---Setting range---
M: 0 to 61424
L: 0 to 32752
SB: 0 to 7FF0
B: 0 to EFF0
SW: 0 to 7FFF
D: 0 to 32767
W: 0 to 7FFF
R: 8300 to 9799, 9800 to 9899, 18300 to 19799, 19800 to 19899, 28300 to 29799, 29800 to 29899
Specify the project number of the PLC device that stores the network management information.
---Setting range---
1 to 6
0: No setting
Specify the name of the PLC device that stores the Network management information.
(Example) M
When the setting of this parameter is changed, the value of "#88142 Net sts dev No." is cleared to "0".
---Setting range---
M, L, SB, B, SW, D, R, W
0: No setting
Specify the number of the PLC device that stores the Network management information.
If you specify bit devices, set them with numbers divisible by 16 (in increments of 16 points).
The four bytes of area starting from the specified device are occupied.
(Example) 1024
---Setting range---
M: 0 to 61424
L: 0 to 32752
SB: 0 to 7FF0
B: 0 to EFF0
SW: 0 to 7FFF
D: 0 to 32767
W: 0 to 7FFF
R: 8300 to 9799, 9800 to 9899, 18300 to 19799, 19800 to 19899, 28300 to 29799, 29800 to 29899
#88131 CM Valid dev name PLC device name for information of Common memory
data valid
#88132 CM Valid dev No. PLC device number for information of Common memo ry data valid
#88140 Net sts Proj. No. PLC project number for Network management informa tion
#88141 Net sts dev name PLC device name for Network management information
#88142 Net sts dev No. PLC device number for Network management informa tion

15.37 Laser Parameters
Specify the type of laser oscillator to be connected.
0: No laser I/F unit connected
1: Type1
2: Type2
Specify "1" when writing the firmware for the laser oscillator specified using #90001 to the laser I/F unit.
The firmware is written to the laser I/F unit at NC power on, and #90002 is set to "0" when writing has com pleted.
---Setting range---
0/1
Specify the number of the R register to be used in digital input 1 to the laser oscillator.
The output from the laser oscillator is stored in that R register number + 1.
When not using this parameter, set to "0".
If a number not within the user area is specified, a setting error is output.
User area: 8300 to 9898, 18300 to 19898, 28300 to 29898
---Setting range---
0, 8300 to 9898, 18300 to 19898, 28300 to 29898
Specify the number of the R register to be used in digital input 2 to the laser oscillator.
The output from the laser oscillator is stored in that R register number + 1.
When not using this parameter, set to "0".
If a number not within the user area is specified, a setting error is output.
User area: 8300 to 9898, 18300 to 19898, 28300 to 29898
---Setting range---
0, 8300 to 9898, 18300 to 19898, 28300 to 29898

Specify the time period during which the axis can be stopped while laser beam is ON without raising safety problems.
If set to zero, 20 (s) applies.
---Setting range---
0 to 20 (s)
Set the rated power of the laser oscillator.
When "0" is set, laser is not output.
---Setting range---
0 to 50000 (W)
Set the rated voltage of the laser oscillator.
When "0" is set, laser is not output.
---Setting range---
0.000 to 10.000 (V)
Set the gain adjustment value for laser power feedback.
When "0" is set, the laser power feedback value is displayed without gain adjustment.
---Setting range---
0.00 to 200.00 (%)
(PR) #90001 lsr_unit_type Laser oscillator type
(PR) #90002 lsr_unit_write Laser I/F unit firmware write
(PR) #90003 lsr_dio_dev1 Laser digital I/O 1
(PR) #90004 lsr_dio_dev2 Laser digital I/O 2
#90005 lsr_max_stop_t Maximum stop time with beam ON
(PR) #90006 lsr_rated_output Rated power
(PR) #90007 lsr_rated_AbsV Rated voltage
#90008 lsr_fb_gain Gain adjustment value for laser power feedback

Set the offset adjustment value for laser power feedback.
When "0" is set, the laser power feedback value is displayed without offset.
---Setting range---
-32768 to 32767 (W)
Set the rated power of the laser oscillator for feedback.
When "0" is set, the value of parameter "#90006 lsr_rated_output" is used.
---Setting range---
0 to 50000 (W)
Set the rated voltage of the laser oscillator for feedback.
When "0" is set, the value of parameter "#90007 lsr_rated_AbsV" is used.
---Setting range---
0.000 to 10.000 (V)
Specify the maximum power to the laser oscillator.
---Setting range---
0 to 50000 (W)
Specify the maximum frequency to the laser oscillator.
---Setting range---
0 to 9999 (Hz)
Specify the M code number used to turn on laser beam.
When set to zero, no M code can be used to turn on laser beam.
---Setting range---
0, 200 to 99999999
Specify the M code number used to turn off laser beam.
When set to zero, no M code can be used to turn off laser beam.
---Setting range---
0, 200 to 99999999
Specify the time constant used as a time lag between the time that a command for changing the processing condition is issued and the time that the change takes effect.
Adjust this parameter when axis movement and change in beam status do not coincide.
---Setting range---
0 to 100 (ms)
Specify the time constant for changing the processing condition when the processing condition (laser output, frequency, duty) is set to a value greater than the current one.
---Setting range---
0 to 100 (ms)
Specify the time constant for changing the processing condition when the processing condition (laser output, frequency, duty) is set to a value smaller than the current one.
---Setting range---
0 to 100 (ms)
#90009 lsr_fb_ofs Offset adjustment value for laser power feedback
(PR) #90010 lsr_fb_rated_o_p FB rated power
(PR) #90011 lsr_fb_rated_AbsV FB rated voltage
#90021 lsr_PWR_limit Maximum laser power
#90022 lsr_FRQ_limit Maximum frequency
#90023 lsr_M_beam_on Beam ON M code
#90024 lsr_M_beam_off Beam OFF M code
#90025 lsr_f_laser_syn Time constant for laser command synchronization
#90026 lsr_tr1 Time constant for laser command rising
#90027 lsr_tr2 Time constant for laser command falling

Specify the M code number used to select preset laser processing conditions.
A processing condition is selected according to the specified number as follows when this M code is execut ed.
Set value + 0: Processing condition 1
Set value + 1: Processing condition 2
Set value + 2: Processing condition 3
Set value + 3: Processing condition 4

:
Set value + 29: Processing condition 30
When set to zero, no M code can be used to select processing conditions.
---Setting range---
0, 200 to 99999000
Specify the number of M codes used to select laser processing conditions.
When set to zero, 30 applies.
---Setting range---
0 to 30
Specify the R register number to which to output beam focus, nozzle height, gas pressure, and gas type in the laser processing condition.
The processing condition values are output as follows according to the specified number.
Set value + 0: Beam focus (L)
Set value + 1: Beam focus (H)
Set value + 2: Nozzle height (L)
Set value + 3: Nozzle height (H)
Set value + 4: Gas pressure (L)
Set value + 5: Gas pressure (H)
Set value + 6: Gas type
When not using this parameter, set to "0".
Be sure to specify an even number.
If one of the following is specified, this parameter cannot be set.
Odd number
A device that conflicts with parameter "#90003 lsr_dio_dev1" (Laser digital I/O 1) or "#90004 lsr_dio_dev2" (Laser digital I/O 2)
A number not within the user area
---Setting range---
0, 8300 to 9892, 18300 to 19892, 28300 to 29892
Specify whether to enable the DR control function.
0: Disable
1: Enable
Specify the laser power at which DR control is started.
---Setting range---
0 to 50000 (W)
Specify the frequency at which DR control is started.
---Setting range---
0 to 9999 (Hz)
(PR) #90041 lsr_cond_M M code for laser processing condition selection
(PR) #90042 lsr_cond_M_num Number of M codes for laser processing condition se lection
(PR) #90043 lsr_cond_out_Rreg R register number for laser processing condition output
#90061 lsr_DR_varid DR control ON
#90062 lsr_PWR_DR_start Laser power to start DR control
#90063 lsr_FRQ_DR_start Frequency to start DR control

Specify the duty at which DR control is started.
---Setting range---
0.0 to 100.0 (%)
Specify the minimum laser power during DR control.
---Setting range---
0 to 50000 (W)
Specify the minimum frequency during DR control.
---Setting range---
0 to 9999 (Hz)
Specify the minimum duty during DR control.
---Setting range---
0.0 to 100.0 (%)
Specify the time constant used as a time lag between the time that the specified speed is changed and the time that the processing condition changes when DR control is enabled.
Adjust this parameter when axis movement and change in beam status do not coincide.
---Setting range---
0 to 100 (ms)
Specify the time constant for changing the processing condition when the processing condition (laser output, frequency, duty) for DR control is changed to a value greater than the current one.
---Setting range---
0 to 100 (ms)
Specify the time constant for changing the processing condition when the processing condition (laser output, frequency, duty) for DR control is changed to a value smaller than the current one.
---Setting range---
0 to 100 (ms)
Specify the M code number used to turn on F-CUT.
When set to zero, no M code can be used to turn on F-CUT.
---Setting range---
0, 200 to 99999999
Specify the M code number used to turn off F-CUT.
When set to zero, no M code can be used to turn off F-CUT.
---Setting range---
0, 200 to 99999999
Specify the correction time for the timing to turn on laser beam while F-CUT is active.
---Setting range---
0 to 10000 (s)
#90064 lsr_DUTY_DR_start Duty to start DR control
#90065 lsr_PWR_DR_lowlmt Minimum laser power in DR control
#90066 lsr_FRQ_DR_lowlmt Minimum frequency in DR control
#90067 lsr_DUTY_DR_lowlmt Minimum duty in DR control
#90068 lsr_f_laser_DR_syn Time constant for laser command synchronization in

DR control
#90069 lsr_DR_tr1 Time constant for laser command rising in DR control
#90070 lsr_DR_tr2 Time constant for laser command falling in DR control
#90091 lsr_M_fcut_on F-CUT ON M code
#90092 lsr_M_fcut_off F-CUT OFF M code
#90093 lsr_fcut_on_tr1 F-CUT beam ON correction time 1

Specify the correction time for the timing to turn off laser beam while F-CUT is active.
---Setting range---
0 to 10000 (s)
Set the cutting feed rate at which to switch the correction time for the timing to turn on/off laser beam while F-CUT is active.
When the cutting feed rate is higher than the set value or when the set value is "0", "#90093 lsr_fcut_on_tr1" (F-CUT beam ON correction time 1) and "#90094 lsr_fcut_off_tr1" (F-CUT beam OFF correction time 1) are used as the correction time for the timing to turn on/off laser beam.
When the cutting feed rate is equal to or lower than the set value, "#90096 lsr_fcut_on_tr2" (F-CUT beam ON correction time 2) and "#90097 lsr_fcut_off_tr2" (F-CUT beam OFF correction time 2) are used as the correction time for the timing to turn on/off laser beam.
---Setting range---
0 to 1000000 (mm/min)
Specify the correction time for the timing to turn on laser beam while F-CUT is active.
---Setting range---
0 to 10000 (s)
Specify the correction time for the timing to turn off laser beam while F-CUT is active.
---Setting range---
0 to 10000 (s)
Specify whether to enable the height control function.
0: Disable
1: Enable
When using DIO to enable and disable height control, set this parameter to "0".
Specify the axis to which height control is applied using an axis number in the part system.
The axis number is an NC axis number excluding spindles and PLC axes.
When "0" is set, height control is not applied.
---Setting range---
0 to the number of control axes
Set the position of the sensor relative to the tip of the nozzle.
Enter a positive value when the sensor measurement position is farther away from the workpiece than the tip of the nozzle.
Enter a negative value when the sensor measurement position is closer to the workpiece than the tip of the nozzle.
---Setting range---
-99.9 to 99.9 (mm)
Set the sensor signal that inputs the detected interference by the laser head during height control.
The sensor signal is shared with the skip signal.
When "0" is set, the detection of interference by the laser head during height control is disabled.
---Setting range---
0 to 8
#90094 lsr_fcut_off_tr1 F-CUT beam OFF correction time 1
#90095 lsr_fuct_cmp_spd1 Speed to switch correction for beam ON/OFF in F-CUT 1
#90096 lsr_fcut_on_tr2 F-CUT beam ON correction time 2
#90097 lsr_fcut_off_tr2 F-CUT beam OFF correction time 2
#90101 lsr_hight_ctrl Height control
(PR) #90102 lsr_hight_ax Height control axis
#90103 lsr_hight_sen_ofs Height control Sensor offset
(PR) #90104 lsr_hight_itf_sen Height control_Head interference sensor signal

Set the M code number for enabling the fast retraction control for height control.
If "0" is set, M code will be unavailable.
---Setting range---
0, 200 to 99999999
Set the M code number for disabling the fast retraction control for height control.
If "0" is set, M code will be unavailable.
---Setting range---
0, 200 to 99999999
Set the upper limit of lift to be applied during fast retraction control in height control.
If "0" is set, the position where approach is started will be the upper limit of lift.
---Setting range---
0 to 999999.999 (mm)
Enable laser power calibration.
0: Disable laser power calibration
1: Enable laser power calibration
Set the laser power command value for laser power calibration. (n = 1 to 30)
Do not specify the same value more than once for "#90121 lsr_calib_cmd_01" through "#90179 lsr_cal ib_cmd_30".
Do not specify "0" for the parameters that come between "#90121 lsr_calib_cmd_01" and "#90179 lsr_-calib_cmd_30".
Set the values of "#90121 lsr_calib_cmd_01" to "#90179 lsr_calib_cmd_30" in ascending order.
Set a value smaller than or equal to "#90006 lsr_rated_output" (Rated power) for "#90121 lsr_calib_c md_01" through "#90179 lsr_calib_cmd_30".
---Setting range---
0 to 50000 (W)
Set the result of laser power measurement for laser power command value. (n = 1 to 30)
---Setting range---
0 to 50000 (W)

#90105 lsr_M_HEvac_on Height control_Fast retraction control ON M code
#90106 lsr_M_HEvac_off Height control_Fast retraction control OFF M code
#90107 lsr_HEvac_rise_lim Height control_Fast retraction control lift upper limit
#90111 lsr_op_calibrate Power calibration
#90121+2(n-1) lsr_calib_cmd_01-30 Laser power command value
#90122+2(n-1) lsr_calib_meas_01-30 Laser power measured value

15.38 NC Axis Switch Parameters
The description and setting range for these parameters are the same as Servo parameters "#2201 SV001" to "#2456 SV256". Refer to "15.7 Servo Parameters" for details.
Specify by two characters the name of the axis to be changed in NC axis switchover.
The first character must be a letter because it is used as a command address. The second character must be a number.
---Setting range---
2-character string consisting of A to Z followed by 1 to 9
(When "0" is set, change is not reflected.)
#71001-
71256
SV001-SV256 NC axis switch parameters
#71257 Hotaxname NC axis name change

15.39 Spindle Switch Parameters
The description and setting range for these parameters are the same as Spindle parameters "#13001 SP001" to "#13240 SP240". Refer to "15.9 Spindle Parameters" for details.
#71501-
71740
SP001-SP240 Spindle switch parameters

Revision History
Date of
revision
Manual No. Revision details
Jul. 2021 IB(NA)1501623-A First edition created.
Mar. 2022 IB(NA)1501623-B The descriptions were revised corresponding to S/W version A3 of Mitsubishi Electric CNC M800V/M80V series.
The following chapter was added.
- 16.36 Laser Parameters
The following chapters were revised.
- 1 Operation Errors (M)
- 4 MCP Alarms (Y)
- 5 System Alarms (Z)
- 6 Absolute Position Detection System Alarms (Z7*)
- 12 Program Errors (P)
- 15 User Parameters
- 16 Machine Parameters
Other mistakes were corrected.
Mar. 2023 IB(NA)1501623-C The descriptions were revised corresponding to S/W version A7 of Mitsubishi Electric CNC M800V/M80V series.
The following chapters were revised.
- 1 Operation Errors (M)
- 5 System Alarms (Z)
- 10 User PLC Alarms (U)
- 12 Program Errors (P)
- 14 User Parameters
- 15 Machine Parameters
Other mistakes were corrected.
Jul. 2023 IB(NA)1501623-D The descriptions were revised corresponding to S/W version A8 of Mitsubishi Electric CNC M800V/M80V series.
The following chapters were added.
- 15.37 NC Axis Switch Parameters
- 15.38 Spindle Switch Parameters
The following chapters were revised.
- 1 Operation Errors (M)
- 5 System Alarms (Z)
- 14 User Parameters
- 15 Machine Parameters
Other mistakes were corrected.
Date of
revision
Manual No. Revision details
Nov. 2023 IB(NA)1501623-E The descriptions were revised corresponding to S/W version A9 of Mitsubishi Electric CNC M800V/M80V series.
The following chapter was added.
- 15.34 CC-Link IE TSN (Remote station) Parameters
The following chapters were revised.
- 1 Operation Errors (M)
- 4 MCP Alarms (Y)
- 5 System Alarms (Z)
- 12 Program Errors (P)

- 14 User Parameters
- 15 Machine Parameters

Other mistakes were corrected.

Apr. 2024 IB(NA)1501623-F The descriptions were revised corresponding to S/W version AA of Mitsubishi Electric
CNC M800V/M80V series.

The following chapters were revised.

- 1 Operation Errors (M)
- 2 Stop Codes (T)
- 4 MCP Alarms (Y)
- 5 System Alarms (Z)
- 9 Computer Link Errors (L)
- 10 User PLC Alarms (U)
- 12 Program Errors (P)
- 14 User Parameters
- 15 Machine Parameters

Other mistakes were corrected.

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TEL: +33-1-41-02-83-13 / FAX: +33-1-49-01-07-25
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Charleston, SC Service Satellite TEL: +33-1-41-02-83-13 / FAX: +33-1-49-01-07-25
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Dallas, TX Service Satellite VIA ENERGY PARK 14, VIMERCATE 20871 (MB) ITALY
Houston, TX Service Satellite TEL: +39-039-6053-342 / FAX: +39-039-6053-206
Hartford, CT Service Satellite
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Nashville, TN Service Satellite VIA G. SAVELLI, 24 - 35129 PADOVA, ITALY
Huntsville, AL Satellite TEL: +39-039-6053-342 / FAX: +39-039-6053-206
Pittsburg, PA Service Satellite
Tampa, FL Service Satellite U.K. Service Center
Miami, FL Satelite TRAVELLERS LANE, HATFIELD, HERTFORDSHIRE, AL10 8XB, U.K.
Lafayette, LA Service Satellite TEL: +44-1707-288-780 / FAX: +44-1707-278-695
Allentown, PA Satelite
Spain Service Center
CTRA. RUBI, 76-80 8174 SAINT CUGAT DEL VALLES, BARCELONA, SPAIN
Western Region Service Center (California) TEL: +34-935-65-2236 / FAX: +34-935-89-1579
5900-B KATELLA AVE. - 5900-A KATELLA AVE. CYPRESS, CALIFORNIA 90630, U.S.A.
TEL: +1-714-699-2625 / FAX: +1-847-478-2650 Poland Service Center
San Francisco, CA Satelite UL.KRAKOWSKA 50, 32-083 BALICE, POLAND
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MITSUBISHI ELECTRIC TURKEY ELEKTRK RNLER A.
Mexico Region Service Center (Queretaro) SERIFALI MAHALLESI KALE SOKAK. NO.41 34775
Parque Tecnolgico Innovacin Quertaro, Lateral Carretera Estatal 431, Km 2+200, Lote 91 Modulos 1 y 2 UMRANIYE, ISTANBUL, TURKEY
ocixM ,oratreuQ ,suqraM lE ,64267 PC ,arrohcaM al adneicaH 74-44-166-612-09+ :XAF / 0052-969-612-09+ :LET
TEL: +52-442-153-6050
Monterrey, NL Service Satellite Czech Republic Service Center
Mexico City, DF Service Satellite MITSUBISHI ELECTRIC EUROPE B.V. PRAGUE OFFICE
Pekask 621/7, 155 00 PRAHA 5, CZECH REPUBLIC
TEL: +420-734-402-587
BRAZIL
Sweden Service Center
MITSUBISHI ELECTRIC DO BRASIL COMRCIO E SERVIOS LTDA. HAMMARBACKEN 14, P.O.BOX 750 SE-19127, SOLLENTUNA, SWEDEN
Votorantim Office TEL: +46-8-6251200 / FAX: +46-8-6251014
AV. GISELE CONSTANTINO,1578, PARQUE BELA VISTA, VOTORANTIM-SP, BRAZIL CEP:18.110-650
TEL: +55-15-3023-9000 Bulgaria Service Center
Blumenau, Santa Catarina Office AKHNATON Ltd. (Service Partner)
4 ANDREJ LJAPCHEV BLVD. POB 21, BG-1756 SOFIA, BULGARIA
TEL: +359-2-8176009 / FAX: +359-2-9744061
Ukraine Service Center (Kiev)
CSC Automation Ltd. (Service Partner)
4 B, YEVHENA SVERSTYUKA STR., 02002 KIEV, UKRAINE
TEL: +380-44-494-3344 / FAX: +380-44-494-3366
South Africa Service Center
Adroit Technologies (Service Partner)
20 WATERFORD OFFICE PARK, WATERFORD DRIVE, CNR OF WITKOPPEN ROAD,
FOURWAYS JOHANNESBURG SOUTH AFRICA

TEL: +27-11-658-8100 / FAX: +27-11-658-8101
ASEAN CHINA
)RETNEC AF NAESA(.DTL .ETP AISA CIRTCELE IHSIBUSTIM)RETNEC AF ANIHC(.DTL)ANIHC(NOITAMOTUA CIRTCELE IHSIBUSTIM
Singapore Service Center CNC Call Center
349951 EROPAGNIS GNIDLIUB CIRTCELE IHSIBUSTIM DAOR ARDNAXELA 703 0315-129-004-68+ :LET
TEL: +65-6473-2308 / FAX: +65-6476-7439
Shanghai Service Center
NO.1386 HONG QIAO ROAD, CHANG NING QU, SHANGHAI 200336, CHINA
PHILIPPINES TEL: +86-21-2322-3030 / FAX: +86-21-2322-3000*8422
Qingdao Service Center
MELCO FACTORY AUTOMATION PHILIPPINES INC. Suzhou Service Center
Head Office Wuhan Service Center
128 LOPEZ RIZAL STREET, BRGY., HIGHWAY HILLS, MANDALUYONG CITY , MM PHILIPPINES 1550 Ningbo Service Center
TEL: +63-2-8256-8042 / FAX: +632-8637-2294 Hefei Service Center
Beijing Service Center
Philippines Service Center Tianjin Service Center
KM.23 WEST SERVICE ROAD SSH, CUPANG ,MUNTINLUPA CITY, PHILIPPINES Xian Service Center
TEL: +63-2-8807-0420 / FAX: +63-2-8842-5202 Dalian Service Center
Chengdu Service Center
VIETNAM Shenzhen Service Center
LEVEL8, GALAXY WORLD TOWER B, 1 YABAO ROAD, LONGGANG DISTRICT,
MITSUBISHI ELECTRIC VIETNAM CO., LTD. SHENZHEN 518129, CHINA
Vietnam Ho Chi Minh Service Center TEL: +86-755-2399-8272 / FAX: +86-755-8229-3686
11TH & 12TH FLOOR, VIETTEL TOWER B, 285 CACH MANG THANG 8 STREET, WARD 12, DISTRICT 10, Dongguan Service Center
HO CHI MINH CITY, VIETNAM Xiamen Service Center
TEL: +84-28-3910-5945 / FAX: +84-28-3910-5947
Vietnam Hanoi Service Center KOREA
14TH FLOOR, CAPITAL TOWER, 109 TRAN HUNG DAO STREET, CUA NAM WARD,
HOAN KIEM DISTRICT, HA NOI CITY, VIETNAM MITSUBISHI ELECTRIC AUTOMATION KOREA CO., LTD. (KOREA FA CENTER)
TEL: +84-24-3937-8075 / FAX: +84-24-3937-8076 Korea Seoul Service Center
8F GANGSEO HANGANG XI-TOWER A, 401 YANGCHEON-RO, GANGSEO-GU,
SEOUL 07528 KOREA
INDONESIA TEL: +82-2-3660-9631 / FAX: +82-2-3664-8668
PT. MITSUBISHI ELECTRIC INDONESIA Korea Daegu Service Center
Indonesia Service Center (Cikarang) 2F KT BLDG. 8, HOGUK-RO, BUK-GU, DAEGU 41518, KOREA
JL. KENARI RAYA BLOK G2-07A, DELTA SILICON 5, LIPPO CIKARANG - BEKASI 17550, INDONESIA TEL: +82-53-382-7401 / FAX: +82-53-382-7412
TEL: +62-21-2961-7797 / FAX: +62-21-2961-7794
Korea Changwon Technical Center
#205, 888, CHANGWON-DAERO, SEONGSAN-GU, CHANGWON-SI,
MALAYSIA GYEONGSANGNAM-DO, 51532, KOREA
TEL: +82-55-261-5559 / FAX: +82-55-261-5558
MITSUBISHI ELECTRIC SALES MALAYSIA SDN. BHD.
Malaysia Service Center (Kuala Lumpur Service Center)
LOT 11, JALAN 219, P.O BOX 1036, 46860 PETALING JAYA, SELANGOR DARUL EHSAN, MALAYSIA TAIWAN
TEL: +60-3-7626-5032
MITSUBISHI ELECTRIC TAIWAN CO., LTD. (TAIWAN FA CENTER)
Johor Bahru Service Center Taiwan Taichung Service Center
.rohoJ 00118 ,nnO otaD radnaB ,6/4 nanarijreP nalaJ ,9 WIAT , 86704 YTIC GNUHCIAT ,.TSID NUTIX ,.DR HT61 UQEYGNOG ,1-8 .ON AN
TEL: 07-3642250 / 2256 TEL: +886-4-2359-0688 / FAX: +886-4-2359-0689
Pulau Pinang Service Center Taiwan Taipei Service Center
25-G, Pusat Perniagaan Perdana Jaya, Jalan Permatang Rawa, 14000 Bukit Mertajam, Pulau Pinang 11F, NO.88, SEC.6, ZHONGSHAN N. RD., SHILIN DIST., TAIPEI CITY 11155, TAIWAN
5381-015-4-06+ :xaF / 8381-015-4-06+ :LET 3345-3382-2-688+ :XAF / 0345-3382-2-688+ :LET
Taiwan Tainan Service Center
THAILAND 11F-1, NO.30, ZHONGZHENG S. RD., YONGKANG DIST., TAINAN CITY 71067, TAIWAN
TEL: +886-6-252-5030 / FAX: +886-6-252-5031
MITSUBISHI ELECTRIC FACTORY AUTOMATION (THAILAND) CO., LTD.
Thailand Service Center (Bangkok)
101, TRUE DIGITAL PARK OFFICE, 5TH FLOOR, SUKHUMVIT ROAD, BANGCHAK, PHRA KHANONG, OCEANIA
BANGKOK, 10260 THAILAND
TEL: +66-2-092-8600 / FAX: +66-2-043-1231-33 MITSUBISHI ELECTRIC AUSTRALIA PTY. LTD.
Oceania Service Center
348 VICTORIA ROAD, RYDALMERE, N.S.W. 2116 AUSTRALIA
INDIA TEL: +61-2-9684-7269/ FAX: +61-2-9684-7245
MITSUBISHI ELECTRIC INDIA PVT., LTD.
Service Head office and South India Service Center (Bangalore)
CNC eXPerience Park, PLOT NO. 57/A, PEENYA PHASE 3,
PEENYA INDUSTRIAL AREA, BANGALORE 560058, KARNATAKA, INDIA
TEL : +91-80-4655-2121
Chennai Service Satellite
Coimbatore Service Satellite
Hyderabad Service Satellite
North India Service Center (Gurgaon)
PLOT 517, GROUND FLOOR, UDYOG VIHAR PHASE-III, GURUGRAM 122008, HARYANA, INDIA
TEL : +91-124-463-0300
Ludhiana Service Satellite
Panthnagar Service Satellite
Delhi Service Satellite
Jamshedpur Service Satellite
Manesar Service Satellite
West India Service Center (Pune)
ICC-Devi GAURAV TECHNOLOGY PARK, UNIT NO.402, FOURTH FLOOR, NORTH WING,
SURVEY NUMBER 191-192 (P), NEXT to INDIAN CARD CLOTHING COMPANY Ltd,
OPP. VALLABH NAGAR, PIMPRI, PUNE- 411 018, MAHARASHTRA, INDIA
TEL : +91-20-6819-2274
Kolhapur Service Satellite
Aurangabad Service Satellite
Mumbai Service Satellite
West India Service Center (Ahmedabad)

204-209, 2ND FLOOR, 31FIVE, CORPORATE ROAD PRAHLADNAGAR,
AHMEDABAD -380015, GUJARAT, INDIA
TEL : + 91-79-6777-7888
Rajkot Service Satellite

Notice

Every effort has been made to keep up with software and hardware revisions in the contents described in this manual. However, please understand that in some unavoidable cases simultaneous revision is not possible.

Please contact your Mitsubishi Electric dealer with any questions or comments regarding the use of this product.

Duplication Prohibited

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Introduction

This manual describes the specifications of Mitsubishi Electric CNC.

Read this manual thoroughly and understand the product's functions and performance before use.

Supported models of this manual are as follows:

Abbreviations for model names used in this manual are as follows:

To safely use this CNC unit, thoroughly study the "Precautions for Safety" before use.

Be sure to keep this manual on hand so that users can refer to it at any time.

Also refer to the manuals on "Manual List" as necessary.

Notes on reading this manual

(1) The characteristic values and numerical values without tolerances mentioned in this manual are representative values.

Details described in this manual

In this manual, the following abbreviations might be used.

L system: Lathe system

M system: Machining center system

Supported models Abbreviations in this manual

M800VW Series M850VW, M830VW

M800VS Series M850VS, M830VS

M80VW Series M80VW

M80V Series M80V TypeA, M80V TypeB

Abbreviations Supported models

M800V, M800V Series M800VW Series/M800VS Series

M80V, M80V Series M80VW Series/M80V Series

M800V/M80V, M800V/M80V Series M800VW Series/M800VS Series/M80VW Series/M80V Series

M8V, M8V Series M800VW Series/M800VS Series/M80VW Series/M80V Series

Manual List

Manuals related to M800V/M80V Series are listed as follows.

These manuals are written on the assumption that all optional functions are added to the targeted model.

Some functions or screens may not be available depending on the machine or specifications set by MTB. (Confirm the specifications before use.)

The manuals issued by MTB take precedence over these manuals.

Manual IB No. Purpose and Contents

M800V/M80V Series

Instruction Manual IB-1501618 Operation guide for NC

Explanation for screen operation, etc.

M800V/M80V Series

Programming Manual

(Lathe System) (1/2)

IB-1501619 G code programming for lathe system

Basic functions, etc.

M800V/M80V Series

Programming Manual

(Lathe System) (2/2)

IB-1501620 G code programming for lathe system

Functions for multi-part system, high-accuracy function, etc.

M800V/M80V Series

Programming Manual

(Machining Center System) (1/2)

IB-1501621 G code programming for machining center system

Basic functions, etc.

M800V/M80V Series

Programming Manual

(Machining Center System) (2/2)

IB-1501622 G code programming for machining center system

Functions for multi-part system, high-accuracy function, etc.

M800V/M80V Series

Alarm/Parameter Manual IB-1501623 Alarms

Parameters

Manuals for MTBs (NC)

Manuals for MTBs (drive section)

Manual IB No. Purpose and Contents

M800V/M80V Series

Specifications Manual (Function) IB-1501610 Model selection

Outline of various functions

M800V/M80V Series

Specifications Manual (Hardware) IB-1501611 Model selection

Specifications of hardware unit

M800VW/M80VW Series

Connection and Setup Manual IB-1501612 Detailed specifications of hardware unit

Installation, connection, wiring, setup (startup/adjustment)

M800VS/M80V Series

Connection and Setup Manual IB-1501613 Detailed specifications of hardware unit

Installation, connection, wiring, setup (startup/adjustment)

M800V/M80V Series

PLC Development Manual IB-1501614

Electrical design
I/O relation (assignment, setting, connection), field network
Development environment (PLC on-board, peripheral
development environment), etc.
M800V/M80V Series
PLC Programming Manual (1/2) IB-1501667
Electrical design
Sequence programming
Explanation for instructions, functions, and parameters
M800V/M80V Series
PLC Programming Manual (2/2) IB-1501668
Electrical design
Sequence programming
Usage examples of instructions
M800V/M80V Series
PLC Interface Manual IB-1501616 Electrical design
Interface signals between NC and PLC
M800V/M80V Series
Maintenance Manual IB-1501617 Cleaning and replacement for each unit
Other items related to maintenance
High Speed Processing Unit User's
Manual IB-1501714 Specifications for high speed processing unit (HPU)
Manual IB No. Contents
MDS-E/EH Series
Specifications Manual IB-1501226 Specifications for power supply regeneration type
MDS-E/EH Series
Instruction Manual IB-1501229 Instruction for power supply regeneration type
MDS-EJ/EJH Series
Specifications Manual IB-1501232 Specifications for regenerative resistor type
MDS-EJ/EJH Series
Instruction Manual IB-1501235 Instruction for regenerative resistor type
MDS-EM/EMH Series
Specifications Manual IB-1501238 Specifications for multi-hybrid, power supply regeneration
type
MDS-EM/EMH Series
Instruction Manual IB-1501241 Instruction for multi-hybrid, power supply regeneration type
DATA BOOK IB-1501252 Specifications of servo drive unit, spindle drive unit, motor, etc.
MDS-EX-CVP Series
Specifications and Instruction
Manual
IB-1501587 Specifications and instruction for the power supply unit with
large capacity
Manuals for MTBs (Others)
Manual No. Purpose and Contents
GOT2000 Series Users Manual
(Hardware) SH-081194ENG Outline of hardware such as part names, external dimensions,
installation, wiring, maintenance, etc. of GOTs
GOT2000 Series Users Manual
(Utility) SH-081195ENG Outline of utilities such as screen display setting, operation
method, etc. of GOTs
GOT2000 Series Users Manual
(Monitor) SH-081196ENG Outline of each monitor function of GOTs
GOT2000 Series Connection Manual
(Mitsubishi Electric Products) SH-081197ENG Outline of connection types and connection method between
GOT and Mitsubishi Electric connection devices
GOT2000 Series Connection Manual
(Non-Mitsubishi Electric Products 1) SH-081198ENG Explanation for connection types and connection method
GOT2000 Series Connection Manual between GOT and other company's devices
(Non-Mitsubishi Electric Products 2) SH-081199ENG
GOT2000 Series Connection Manual
(Microcomputers, MODBUS/Fieldbus
Products, Peripherals)
SH-081200ENG
Explanation for connection types and connection method
between GOT and microcomputers, MODBUS/fieldbus
products, peripherals
GT SoftGOT2000 Version1 Operating
Manual SH-081201ENG
Explanation for system configuration, screen configuration
and operation method of monitoring software GT
SoftGOT2000
GT Designer3 (GOT2000) Screen
Design Manual SH-081220ENG Outline of screen design method using screen creation
software GT Designer3
GOT2000/GOT1000 Series CC-Link
Communication Unit User's Manual IB-0800351 Explanation for handling CC-Link communication unit (for
GOT2000 series/GOT1000 series)
GX Developer Version 8 Operating
Manual (Startup) SH-080372E Explanation for system configuration, installation, etc. of PLC
development tool GX Developer
GX Developer Version 8 Operating
Manual SH-080373E Explanation for operations using PLC development tool GX
Developer
GX Converter Version 1 Operating
Manual IB-0800004 Explanation for operations using data conversion tool GX
Converter
GX Works2 Installation Instructions BCN-P5999-0944 Explanation for the operating environment and installation
method of GX Works2

GX Works2 Version 1 Operating
Manual (Common) SH-080779ENG
Explanation for the system configuration of GX Works2 and
the functions common to Simple project and Structured project
such as parameter setting, operation method for the online
function
GX Works2 Version 1 Operating
Manual (Simple Project) SH-080780ENG Explanation for methods for such as creating and monitoring
programs in Simple project of GX Works2
GX Works2 Version 1 Operating
Manual (Simple Project, Function
Block)
SH-080984ENG
Explanation for methods for such as creating function blocks,
pasting function blocks to sequence programs, and operating
FB library in Simple project of GX Works2
GX Works2 Version 1 Operating
Manual (Structured Project) SH-080781ENG Explanation for methods for such as creating and monitoring
programs in Structured project of GX Works2
GX Works3 Installation Instructions BCN-P5999-0391 Explanation for the operating environment and installation
method of GX Works3
MELSEC-Q/L/F Structured
Programming Manual (Fundamentals) SH-080782ENG Explanation for programming methods, types of programming
languages, etc. required to create structured programs
MELSEC-Q/L Structured
Programming Manual (Application
Functions)
SH-080784ENG
Explanation for specifications and functions related to
application functions which can be used in structured
programs
MELSEC-Q CC-Link System Master/
Local Module Users Manual SH-080394E Explanation for system configuration, installation, wiring, etc.
of master/local modules for CC-Link system
MELSEC iQ-R Programming Manual
(CPU Module Instructions, Standard
Functions/Function Blocks)
SH-081266ENG
Explanation for instructions, general-purpose functions, and
general-purpose function blocks required for programming the
sequencer MELSEC iQ-R series
Reference Manual for MTBs
Manual No. Purpose and Contents
M800/M80 Series Smart safety
observation Specification manual BNP-C3072-022 Explanation for smart safety observation function
M800/M80 Series Interactive cycle
insertion (Customization)
Specification manual
BNP-C3072-121-
0003 Explanation for interactive cycle insertion
M800/M80 Series Synchronous
Control Specifications manual BNP-C3072-074 Explanation for synchronous control
M800/M80 Series Multiple-Axis
Synchronization Control
Specifications manual
BNP-C3072-339 Explanation for multiple-axis synchronization control
M800/M80 Series GOT Connection
Specifications manual BNP-C3072-314 Explanation for GOT connection
M800/M80 Series PROFIBUS-DP
Specification manual BNP-C3072-118 Explanation for PROFIBUS-DP communication function
M800/M80 Series EtherNet/IP
Specifications manual BNP-C3072-263 Explanation for EtherNet/IP
M800/M80 Series FL-net
Specifications manual BNP-C3072-368 Explanation for FL-net
M800/M80 Series CC-Link (Master/
Local) Specification manual BNP-C3072-089 Explanation for CC-Link
M800/M80 Series CC-Link IE Field
(Master/local) Specifications manual BNP-C3072-283 Explanation for CC-Link IE Field
M800/M80 Series CC-Link IE Field
Basic Specifications manual BNP-C3072-337 Explanation for CC-Link IE Field Basic
Precautions for Safety
Always read this manual, related manuals and attached documents before installation, operation, programming, maintenance
or inspection to ensure correct use. Understand all the conditions described in this manual before using the unit.
We rank the safety precautions into "DANGER", "WARNING" and "CAUTION" for the manuals issued by Mitsubishi Electric,
including this manual.
Note that even items ranked as " CAUTION", may lead to serious consequences depending on the situation. All the items
are important and must always be observed.
The following signs indicate prohibition and compulsory.
The meaning of each pictorial sign is as follows.
Mitsubishi Electric CNC is designed and manufactured solely for applications to machine tools to be used for industrial
purposes.
Do not use this product in any applications other than those specified above, especially those which are substantially
influential on the public interest or which are expected to have significant influence on human lives or properties.
DANGER
When the user may be subject to imminent fatalities or major injuries if handling is mistaken.
WARNING
When the user may be subject to fatalities or major injuries if handling is mistaken.
CAUTION

When the user may be subject to medium or minor injuries or when only property damage may occur, if handling is mistaken.
This sign indicates prohibited behavior (must not do).
For example, indicates "Keep fire away".
This sign indicated a thing that is pompously (must do).
For example, indicates "it must be grounded".
CAUTION CAUTION rotated ob ject CAUTION HOT Danger Electric shock risk Danger explosive
Prohibited Disassembly is pro hibited KEEP FIRE AWAY General instruction Earth ground
For Safe Use
Not applicable in this manual.
Not applicable in this manual.
Items related to product and manual
The items that are not described in this manual must be interpreted as "not possible".
This manual is written on the assumption that all the applicable functions are included. Some of them, however, may not be available for your NC system. Refer to the specifications issued by the machine tool builder before use.
Some screens and functions may differ depending on each NC system (or version), and some functions may not be possible. Please confirm the specifications before starting to use.
To protect the availability, integrity and confidentiality of the NC system against cyber-attacks including unauthorized access, denial-of-service (Dos) (*1) attack, and computer virus from external sources via a network, take security measures such as firewall, VPN, and anti-virus software.
Mitsubishi Electric assumes no responsibility for any problems caused to the NC system by any type of cyber-attacks including DoS attack, unauthorized access and computer virus.
(*1) Denial-of-service (Dos) refers to a type of cyber-attack that disrupts services by overloading the system or by exploit ing a vulnerability of the system.
Items related to start up and maintenance
Follow the power specifications (input voltage range, frequency range, momentary power failure time range) described in this manual.
Follow the environment conditions (ambient temperature, humidity, vibration, atmosphere) described in this manual.
Follow the remote type machine contact input/output interface described in this manual. (Connect a diode in parallel with the inductive load or connect a protective resistor in serial with the capacitive load, etc.)
If the temperature rise detection function is invalidated with the parameters, the control could be disabled when the temperature is excessive. This could result in machine damage or personal injuries due to runaway axis, and could damage the device. Enable the detection function for normal use. The parameter for the temperature rise detection function will be validated forcibly when the NC unit is turned ON.
DANGER
WARNING
CAUTION
Treatment of waste
The following two laws will apply when disposing of this product. Considerations must be made to each law. The following laws are in effect in Japan. Thus, when using this product overseas, the local laws will have a priority. If necessary, indicate or notify these laws to the final user of the product.
(1) Requirements for "Law for Promotion of Effective Utilization of Resources"
(a) Recycle as much of this product as possible when finished with use.
(b) When recycling, often parts are sorted into steel scraps and electric parts, etc., and sold to scrap contractors. Mitsubishi Electric recommends sorting the product and selling the members to appropriate contractors.
(2) Requirements for "Law for Treatment of Waste and Cleaning"
(a) Mitsubishi Electric recommends recycling and selling the product when no longer needed according to item (1) above. The user should make an effort to reduce waste in this manner.
(b) When disposing a product that cannot be resold, it shall be treated as a waste product.
(c) The treatment of industrial waste must be commissioned to a licensed industrial waste treatment contractor, and appropriate measures, including a manifest control, must be taken.
(d) Batteries correspond to "primary batteries", and must be disposed of according to local disposal laws.
Disposal
(Note) This symbol mark is for EU countries only.
This symbol mark is according to the directive 2006/66/EC Article 20 Information for end-users and Annex II.
Your MITSUBISHI ELECTRIC product is designed and manufactured with high quality materials and components which can be recycled and/or reused.
This symbol means that batteries and accumulators, at their end-of-life, should be disposed of separately from your household waste.
If a chemical symbol is printed beneath the symbol shown above, this chemical symbol means that the battery or accumulator contains a heavy metal at a certain concentration. This will be indicated as follows:
Hg: mercury (0.0005%), Cd: cadmium (0.002%), Pb: lead (0.004%)
In the European Union there are separate collection systems for used batteries and accumulators.
Please, dispose of batteries and accumulators correctly at your local community waste collection/recycling centre.
Please, help us to conserve the environment we live in!
Trademarks
MELDAS, MELSEC, EZSocket, EZMotion, iQ Platform, MELSEC iQ-R, MELSOFT, GOT, CC-Link, CC-Link/LT, CC-Link IE, CC-Link IE/field, CC-Link IE TSN, EcoMonitorLight and SLMP are either trademarks or registered trademarks of Mitsubishi Electric Corporation in Japan and/or other countries.
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MODBUS is either a trademark or a registered trademark of Schneider Electric USA, Inc. or the affiliated companies in Japan and/or other countries.
EtherNet/IP is a trademark of Open DeviceNet Vendor Association,Inc.
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QR Code is a registered trademark of DENSO WAVE INCORPORATED.
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Wi-Fi is either a trademark or a registered trademark of Wi-Fi Alliance.
BiSS is a registered trademark of iC-Haus GmbH.
SPRINT is a trademark of Renishaw plc.
Other company and product names that appear in this manual are trademarks or registered trademarks of the respective companies.

(/Japanese)
(A)

Handling of our product
(English)
This is a class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

(/Korean)
(A)
.
WARRANTY
Please confirm the following product warranty details before using Mitsubishi Electric CNC.
1. Warranty Period and Coverage
Should any fault or defect (hereafter called "failure") for which we are liable occur in this product during the warranty period, repair services shall be provided at no cost through the distributor from which the product was purchased or through a Mitsubishi Electric service provider. Note, however, that this does not apply if the customer was informed prior to purchasing the product that the product is not covered under warranty. Also note that we are not responsible for any on-site readjustment and/or trial run that may be required after a defective unit is replaced.
[Warranty Term]
The term of warranty for this product shall be twenty-four (24) months from the date of delivery of the product to the end user, provided the product purchased from Mitsubishi Electric or a distributor in Japan is installed in Japan (but in no event longer than thirty (30) months, including distribution time after shipment from Mitsubishi Electric or a distributor).
Note that, in the case where the product purchased from Mitsubishi Electric or a distributor in or outside Japan is exported and installed in any country other than where it was purchased, please refer to "2. Service in Overseas Countries" below.
[Limitations]
(1) The machine tool builder is requested to conduct an initial failure diagnosis, as a general rule. The diagnosis may also be carried out by Mitsubishi Electric or our service provider for a fee at the machine tool builder's request.
(2) This warranty applies only when the conditions, method, environment, etc., of use are in compliance with the terms, conditions and instructions that are set forth in the instruction manual, users manual, and the caution label affixed to the product, etc.
(3) Even during the term of warranty, repair costs will be charged to the customer in the following cases:
(a) a failure caused by improper storage or handling, carelessness or negligence, etc., or a failure caused by a problem with the customer's hardware or software
(b) a failure caused by any alteration, etc., to the product made by the customer without Mitsubishi Electrics approval
(c) a failure which may be regarded as avoidable, if the customers equipment in which this product is incorporated is equipped with a safety device required by applicable laws or has any function or structure considered to be indispensable in the light of common sense in the industry
(d) a failure which could have been avoided if consumable parts designated in the instruction manual, etc. had been duly maintained and replaced
(e) any replacement of consumable parts (including the battery, relay and fuse)
(f) a failure caused by external factors such as inevitable accidents, including without limitation fire and abnormal fluctuation of voltage, and acts of God, including without limitation earthquakes, lightning, and natural disasters
(g) a failure which could not have been foreseen under technologies available at the time of shipment of this product from Mitsubishi Electric
(h) any other failures which are not attributable to Mitsubishi Electric or which the customer acknowledges are not attributable to Mitsubishi Electric
2. Service in Overseas Countries
If the customer installs a product purchased from Mitsubishi Electric in a machine or equipment and exports it to any country other than where it was purchased, the customer may sign a paid warranty contract with our local FA center.
This applies in the case where the product purchased from us in or outside Japan is exported and installed in any country other than where it was purchased.
For details please contact the distributor from which the product was purchased.
3. Exclusion of Responsibility for Compensation against Loss of Opportunity, Secondary Loss, etc.
Regardless of the gratis warranty term, Mitsubishi Electric shall not be liable for compensation for:
(1) Damage arising from any cause found not to be the responsibility of Mitsubishi Electric.
(2) Lost opportunity or lost profit incurred by the user due to a failure of a Mitsubishi Electric product.
(3) Special damage or secondary damage, whether foreseeable or not, compensation for accidents, and compensation for damages to products other than Mitsubishi Electric products.
(4) Replacement by the user, maintenance of on-site equipment, start-up test run and other tasks.
4. Changes in Product Specifications
Specifications shown in our catalogs, manuals or technical documents are subject to change without notice.
5. Product Application
(1) For use of this product, applications should be those that will not result in a serious damage even if a failure or malfunction occurs in the product, and a backup or failsafe function should operate on an external system when any failure or malfunction occurs to the product.
(2) Mitsubishi Electric CNC is designed and manufactured solely for applications to machine tools for industrial purposes.
Do not use this product in applications other than those specified above, especially those which have substantial influence on public interest or which are expected to have significant influence on human lives or properties.
Contents
M800VW/M80VW Series Hardware..... 1
1 System Basic Configuration (M800VW/M80VW Series) 3
1.1 System Basic Configuration Drawing..... 4
2 General Connection Diagram (M800VW/M80VW Series)..... 5
2.1 M800VW Series, Windows-based Display Unit 7
2.2 M80VW Series, Windows-based Display Unit 8
2.3 19-type Display Unit..... 9
2.4 Connecting a Laser I/F Unit 10

3 List of Configuration (M800VW/M80VW Series)..... 11
3.1 Control Unit [M800VW] 12
3.2 Control Unit [M80VW] 12
3.3 Display Unit [M800VW] 13
3.4 Display Unit [M80VW] 13
3.5 Personal Computer Unit..... 13
3.6 Keyboard Unit 13
3.7 Operation Panel I/O Unit..... 14
3.8 Remote I/O Unit 15
3.9 Laser I/F Unit..... 15
3.10 Function Expansion Unit 16
3.11 Side Memory I/F Unit 16
3.12 Manual Pulse Generator 16
3.13 Synchronous Feed Encoder..... 16
3.14 Machine Operation Panel..... 17
3.15 Handy Terminal..... 17
3.16 Cable Connector Sets..... 18
3.17 Thermistor Set..... 18
3.18 Genuine Memory Card..... 18
3.19 Durable Parts 18
3.20 Replacements 18
3.21 List of Cables 19
3.22 System Type 20
4 General Specifications (M800VW/M80VW Series)..... 21
4.1 Environment Conditions [M800VW] 22
4.1.1 Environment Conditions Inside the Operation Panel..... 22
4.1.2 Environment Conditions Inside the Control Panel..... 24
4.1.3 24 VDC Stabilized Power Supply Selecting Conditions 27
4.2 Environment Conditions [M80VW] 28
4.2.1 Environment Conditions Inside the Operation Panel..... 28
4.2.2 Environment Conditions Inside the Control Panel..... 30
4.2.3 24 VDC Stabilized Power Supply Selecting Conditions 33
4.3 Control Unit [M800VW] 34
4.3.1 M830VW(FCU8-MU052)/M850VW(FCU8-MA051)..... 34
4.4 Control Unit [M80VW] 36
4.4.1 FCU8-MU054 36
4.5 Display Unit [M800VW] 38
4.5.1 15-type (FCU8-DU182-34) 38
4.5.2 19-type (FCU8-DU193-75) 40
4.5.3 19-type (FCU8-DU194-75) 42
4.6 Display Unit [M80VW] 44
4.6.1 15-type (FCU8-DU182-36) 44
4.6.2 19-type (FCU8-DU193-77) 46
4.6.3 19-type (FCU8-DU194-77) 48
4.7 Personal Computer Unit..... 50
4.7.1 Personal Computer Unit (FCU8-PC232) 50
4.7.2 Built-in Disk of the Display Unit (FCU8-CF060G-1)..... 51
4.8 Keyboard Unit 52
4.8.1 Keyboard for 15-type Display Unit (FCU8-KB083)..... 52
4.9 Operation Panel I/O Unit..... 53
4.9.1 List of Units 53
4.9.2 FCU8-DX830/FCU8-DX834/FCU8-DX837 54
4.10 Remote I/O Unit 57
4.10.1 List of Units 57
4.10.2 FCU8-DX220/FCU8-DX230/FCU8-DX231/FCU8-DX202/FCU8-DX213/
FCU8-DX213-1/FCU8-DX654/FCU8-DX654-1/FCU8-DX651/FCU8-DX408/FCU8-DX409 58
4.11 Laser I/F Unit 65
4.11.1 FCU8-DX522-001 65
4.12 Function Expansion Unit..... 66
4.12.1 Measuring Instrument I/F Expansion Unit (FCU8-EX543) 66
4.12.2 Encoder (Manual Pulse Generator) I/F Expansion (FCU8-EX544)..... 67
4.12.3 CC-Link (FCU8-EX561) 68
4.12.4 PROFIBUS-DP (FCU8-EX563)..... 69
4.12.5 CC-Link IE Field (FCU8-EX564) 70
4.12.6 EtherNet/IP (FCU8-EX565)..... 71
4.12.7 FL-net (FCU8-EX568)..... 72
4.12.8 CC-Link IE TSN Remote Unit (FCU8-EX569)..... 73
4.12.9 Vibration Cutting Expansion Unit (FCU8-EX744)..... 74
4.13 Side Memory I/F Unit 75
4.13.1 FCU8-EP201-2..... 75
4.14 Manual Pulse Generator..... 77
4.14.1 5 V Manual Pulse Generator (UFO-01-2Z9) 77
4.14.2 12 V Manual Pulse Generator (HD60C)..... 78
4.15 Synchronous Feed Encoder 79
4.15.1 Synchronous Feed Encoder (OSE-1024-3-15-68)..... 79
4.16 Machine Operation Panel 81
4.16.1 Main Panels A/B
(FCU8-KB921/FCU8-KB922/FCU8-KB925, FCU8-KB923/FCU8-KB924/FCU8-KB926) 81
4.16.2 Sub Panel A (FCU8-KB931/FCU8-KB941)..... 85
4.17 Handy Terminal 86
4.18 Thermistor..... 88
4.18.1 Thermistor(PT3C-51F-M2)..... 88
4.19 Exclusive SD Cards 89
4.20 Specifications and Precautions of USB/SD/LAN Interface 90
4.20.1 USB Interface (Personal Computer Unit, Side Memory I/F Unit) 90
4.20.2 SD Interface (Control Unit, Side Memory I/F Unit)..... 91
4.20.3 LAN Interface (Control Unit, Personal Computer Unit) 91
M800VS/M80V Series Hardware 93

1 System Basic Configuration (M800VS/M80V Series)..... 95
1.1 System Basic Configuration Drawing..... 96
2 General Connection Diagram (M800VS/M80V Series) 97
2.1 M800VS Series 99
2.2 M80V Series..... 100
2.3 19-type Display Unit..... 101
2.4 Connecting an Operation Panel I/O Unit (FCU8-DX834)..... 102
2.5 Connecting a Pulse-controlled Inverter (M80V Series)..... 103
2.6 Connecting a BiSS Encoder..... 104
2.7 Connecting an Image Input Expansion Unit..... 105
2.8 Connecting a Laser I/F Unit 106
2.9 Connecting an EcoMonitorLight..... 106
3 List of Configuration (M800VS/M80V Series) 107
3.1 Control Unit [M800VS] 108
3.2 Control Unit [M80V]..... 108
3.3 Display Unit [M800VS] 108
3.4 Display Unit [M80V]..... 109
3.5 Keyboard Unit [M800VS]..... 110
3.6 Keyboard Unit [M80V]..... 110
3.7 Operation Panel I/O Unit..... 111
3.8 Remote I/O Unit 112
3.9 Laser I/F Unit..... 112
3.10 Functional Safety Expansion Unit [M80V]..... 113
3.11 Function Expansion Unit 113
3.12 Manual Pulse Generator 113
3.13 Synchronous feed encoder 113
3.14 Machine Operation Panel..... 114
3.15 Handy Terminal..... 114
3.16 Cable Connector Sets..... 115
3.17 Thermistor Set..... 115
3.18 Genuine Memory Card..... 115
3.19 Durable Parts 115
3.20 Replacements 115
3.21 List of Cables 116
3.22 System Type 118
4 General Specifications (M800VS/M80V Series)..... 119
4.1 Environment Conditions [M800VS] 120
4.1.1 Installation Environment Conditions 120
4.1.2 24 VDC Stabilized Power Supply Selecting Conditions 124
4.2 Environment Conditions [M80V]..... 125
4.2.1 Installation Environment Conditions 125
4.2.2 24 VDC Stabilized Power Supply Selecting Conditions 129
4.3 Control Unit [M800VS] 130
4.3.1 FCU8-MU551 / FCU8-MA551 130
4.4 Control Unit [M80V]..... 131
4.4.1 FCU8-MU521 / FCU8-MU522 131
4.5 Display Unit [M800VS] 132
4.5.1 10.4-type (FCU8-DU142-31) 132
4.5.2 15-type (FCU8-DU182-31) 133
4.5.3 19-type (FCU8-DU194-31) 135
4.6 Display Unit [M80V]..... 137
4.6.1 8.4-type (FCU8-DU122-12) 137
4.6.2 10.4-type (FCU8-DU142-32) 138
4.6.3 15-type (FCU8-DU182-32) 139
4.6.4 19-type (FCU8-DU194-32) 141
4.7 Keyboard Unit 143
4.7.1 Keyboard for 8.4-type Display Unit (FCU8-KB026)..... 144
4.7.2 Keyboard for 8.4-type Display Unit (FCU8-KB028)..... 145
4.7.3 Keyboard for 8.4-type Display Unit (FCU8-KB029)..... 146
4.7.4 Keyboard for 10.4-type Display Unit (FCU8-KB041)..... 147
4.7.5 Keyboard for 10.4-type Display Unit (FCU8-KB046)..... 148
4.7.6 Keyboard for 10.4-type Display Unit (FCU8-KB047)..... 149
4.7.7 Keyboard for 10.4-type Display Unit (FCU8-KB048)..... 150
4.7.8 Keyboard for 15-type Display Unit (FCU8-KB083)..... 151
4.7.9 Keyboard for 19-type Display Unit (FCU8-KB091)..... 152
4.8 Operation Panel I/O Unit..... 153
4.8.1 List of Units 153
4.8.2 FCU8-DX731/FCU8-DX750/FCU8-DX760/FCU8-DX761/FCU8-DX834 154
4.9 Remote I/O Unit 158
4.9.1 List of Units 158
4.9.2 FCU8-DX220/FCU8-DX230/FCU8-DX231/FCU8-DX202/FCU8-DX213/
FCU8-DX213-1/FCU8-DX654/FCU8-DX654-1/FCU8-DX651/FCU8-DX408/FCU8-DX409 159
4.10 Laser I/F Unit 166
4.10.1 FCU8-DX522-001 166
4.11 Functional Safety Expansion Unit..... 167
4.11.1 Functional Safety Expansion Unit (FCU8-EX134) 167
4.12 Function Expansion Unit..... 168
4.12.1 CC-Link (FCU8-EX561) 168
4.12.2 PROFIBUS-DP (FCU8-EX563)..... 169
4.12.3 CC-Link IE Field (FCU8-EX564) 170
4.12.4 EtherNet/IP (FCU8-EX565)..... 171
4.12.5 FL-net (FCU8-EX568)..... 172
4.12.6 CC-Link IE TSN Remote Unit (FCU8-EX569)..... 173
4.12.7 Vibration Cutting Expansion Unit (FCU8-EX744)..... 174
4.12.8 Image Input Expansion Unit (FCU8-EX752) 175
4.12.9 Option Relay Unit (FCU8-EX704) 176
4.12.10 Option Relay Unit (FCU8-EX705) 177
4.13 Manual Pulse Generator..... 178

4.13.1 5 V Manual Pulse Generator (UFO-01-2Z9) 178
4.13.2 12 V Manual Pulse Generator (HD60C)..... 179
4.14 Synchronous Feed Encoder 180
4.14.1 Synchronous Feed Encoder (OSE-1024-3-15-68)..... 180
4.15 Machine Operation Panel 182
4.15.1 Main Panels A/B
(FCU8-KB921/FCU8-KB922/FCU8-KB925, FCU8-KB923/FCU8-KB924/FCU8-KB926) 182
4.15.2 Sub Panel A (FCU8-KB931/FCU8-KB941)..... 186
4.16 Handy Terminal 187
4.17 Thermistor..... 189
4.17.1 Thermistor(PT3C-51F-M2)..... 189
4.18 Exclusive SD Cards 190
4.19 Specifications and Precautions of USB/SD/LAN/Wireless LAN/HDMI Interface 191
4.19.1 USB Interface (Memory I/F card) 191
4.19.2 USB Interface (Image Input Expansion Unit) 191
4.19.3 SD Interface (Memory I/F card)..... 192
4.19.4 LAN Interface (Control Unit)..... 192
4.19.5 Wireless LAN Interface (Control Unit)..... 193
4.19.6 HDMI Interface (Image Input Expansion Unit) 193

1
System Basic Configuration
(M800VW/M80VW Series)

1 System Basic Configuration (M800VW/M80VW Series)
1.1 System Basic Configuration Drawing

1.1 System Basic Configuration Drawing
(1) For the drive unit configuration, refer to the instruction manual of the drive unit you use.
M800VW M80VW
Motor group
Servo/Spindle
drive unit
Manual pulse generator
Manual pulse penerator
Remote I/O unit
Remote I/O unit
Display unit
Operation panel
I/O unit
Keyboard unit
Synchronous
feed encoder
Personal
computer unit
Control unit
Note

2
General Connection Diagram
(M800VW/M80VW Series)

2 General Connection Diagram (M800VW/M80VW Series)

Typical general connection diagrams for respective models are described.
Refer to the following chapters for parts where the connection differs depending on the unit configuration.
2.3 19-type Display Unit
2.4 Connecting a Laser I/F Unit

2 General Connection Diagram (M800VW/M80VW Series)
2.1 M800VW Series, Windows-based Display Unit

2.1 M800VW Series, Windows-based Display Unit
(*1) For information on how to connect the drive unit, refer to the drive unit's manual.
(*2) When using a keyboard unit, install the operation panel I/O unit on the back of the keyboard unit.
1ch : J030
2ch : J031 2ch
J070/J071
Max. 8 points
J100
SD
J120
SIO
SKIP
DCIN
OPTH1
OPTH2
RIO2
RIO1
SD
RIO3
GDI
EXT1

EXT3
EMG
Edge PC
LAN1
LAN3 Network J303
EcoMonitorLight
RS232C
FCU8-EX56x/EX744
(*1)
J070/J071 DI:CJ31/33
DO:CJ32/34
RIO1
DCIN
RIO2
J350/J351
J350/J351
J070/J071 DI:CJ31/33
DO:CJ32/34
RIO1
DCIN
RIO2
J350/J351
J350/J351
(R2-TM)
FCU8-DX2xx/DX6xx/DX4xx
J210
(R2-TM)
G430
FG
5VJ023/J024/J025
12VJ020/J021/J022
L1 L2 L3
(NFB)
DCOUT
FG
ACIN
CP
MC
ON OFF
MC
MC
J350/J351
J350/J351
J350/J351
J350/J351
J210
J303
J395/J396
J395/J396
Emergency
stop switch
device
Control unit
Skip signal input
SD
memory
card
24VDC
Function expansion unit
Remote I/O unit
24VDC
Machine
control
relay/contact
Remote I/O unit To the next remote I/O or
terminator connector
24VDC
Machine
control
relay/contact
Max. 32 units for each port
To the next remote I/O or
terminator connector
Handy terminal
24VDC
Manual pulse
generator (5V/12V)
Machine operation panel made by the machine tool builder
Dotted lines indicate the sections prepared by the machine tool builder.
<> Angle brackets indicates attached cable of unit.
No-fuse breaker
24VDC stabilized
power supply
24VDC
Drive units
Function expansion unit
FCU8-EX54x
FCU8-EX54x

EXT2
EXT4
RIO5
RIO6
RIO7
RIO8
AIO J220
J026/J027
FCU8-EX56x/EX744
FCU8-MU052/MA051
Function expansion unit
Function expansion unit
Analog input : 4 points
Analog output : 2 points
Manual pulse
generator
RIO4 J210
J070/J071 DI:CJ31/33
DO:CJ32/34
DCIN
RIO1 RIO2
J350/J351
J350/J351
(R2-TM)
Machine
control
relay/contact
To the next remote I/O or
terminator connector
24VDC
Remote I/O unit
J120
ON/OFF
CFast CFAST
LVDS1
USB2-2
USB2-3
USB2-1
FCU8-PC232
LAN J303
MENUKEY
RIO3EXT
ON
OFF
G170
MPG
INV
RS232C
USB-RS232C
GDI
KEYUSB
RIO3
J303
NCKB KEYUSB
J210
J291
J210
LVDS2 SD
DCIN J070/J071
EMG
USB
USB3-2
USB3-1
USB2-4
USB2-6
USB2-5
FCU8-DX2xx/DX6xx/DX4xx
CJ71
FCU8-CF060G-1
DCIN J070/J071
Network
CG31
CG32
FCU8-DX830/834/837
CG33
CG34
SDI Max. 8 points
DI:CJ31/33
DO:CJ32/34
RIO1
DCIN
RIO2
J350/J351
J350/J351
(R2-TM)
J210
FCU8-KB92x FCU8-KB941/KB931
G460

DX834:
DX837:
OPKB J460/461
<J491>
<J292>
<J190>
<J290> <J423> USB
SD
LCD
FCU8-KB04x/KB083
<G402>
(*2)
24VDC
Machine operation panel manufactured by Mitsubishi Electric
Emergency
stop switch
Personal computer unit
device
conversion
USB memory
24VDC
Remote I/O unit
24VDC
Operation panel I/O unit
Safety signal input
Stored in
personal computer unit
CFast unit
(Safety signal input is
DX837 only.)
To the next remote I/O
or terminator connector
Added onto back of
display unit
SD
memory
card
24VDC Machine
control
relay/contact
Backlight
I/F PCB
With scan input/output
With safety signal input
Scan input /
Scan output
(Scan input/output is
DX834 only.)
with touch panel
Keyboard unit
Menu key
(15-type)
Display unit
FCU8-DU182-34
M800V/M80V Series Specifications Manual (Hardware)
2 General Connection Diagram (M800VW/M80VW Series)
2.2 M80VW Series, Windows-based Display Unit
IB-1501611-G 8
2.2 M80VW Series, Windows-based Display Unit
(*1) For information on how to connect the drive unit, refer to the drive unit's manual.
(*2) When using a keyboard unit, install the operation panel I/O unit on the back of the keyboard unit.
(*3) Remote I/O unit can be connected to RIO4/M.
(1) When the handle of handy terminal is used, connect ENC connector of G430 cable to MPG connector of the operation panel I/O unit.
Because the pin assignment of ENC connector of G430 is different from that of MPG connector of the operation panel I/O unit, conversion is required. The conversion cable needs to be prepared by the MTB.
1ch : J030
2ch : J031 2ch
J070/J071
Max. 8 points
J100
SD
J120
SIO
SKIP
DCIN
OPTH1
OPTH2
RIO2
RIO1
SD
RIO3
GDI
EXT1
EXT3
EMG
Edge PC
LAN1

LAN3 Network J303
EcoMonitorLight
RS232C
FCU8-EX56x/EX744
(*1)
J070/J071 DI:CJ31/33
DO:CJ32/34
RIO1
DCIN
RIO2
J350/J351
J350/J351
J070/J071 DI:CJ31/33
DO:CJ32/34
RIO1
DCIN
RIO2
J350/J351
J350/J351
(R2-TM)
FCU8-DX2xx/DX6xx/DX4xx
J210
(R2-TM)
G430
FG
5VJ023/J024/J025
12VJ020/J021/J022
L1 L2 L3
(NFB)
DCOUT
FG
ACIN
CP
MC
ON OFF
MC
MC
J350/J351
J350/J351
J350/J351
J350/J351
J210
J303
J395/J396
J395/J396
Emergency
stop switch
device
Control unit
Skip signal input
SD
memory
card
24VDC
Function expansion unit
Remote I/O unit
24VDC
Machine
control
relay/contact
Remote I/O unit To the next remote I/O or
terminator connector
24VDC
Machine
control
relay/contact
Max. 32 units for each port
To the next remote I/O or
terminator connector
Handy terminal
24VDC
Manual pulse
generator (5V/12V)
Machine operation panel made by the machine tool builder
Dotted lines indicate the sections prepared by the machine tool builder.
<> Angle brackets indicates attached cable of unit.
No-fuse breaker
24VDC stabilized
power supply
24VDC
Drive units
Function expansion unit
FCU8-EX54x
BTBOX
FCU8-MU054
RIO4/M
(*3)
J120

ON/OFF
CFast CFAST
LVDS1
USB2-2
USB2-3
USB2-1
FCU8-PC232
LAN J303
MENUKEY
RIO3EXT
ON
OFF
G170
MPG
INV
RS232C
USB-RS232C
GDI
KEYUSB
RIO3
J303
NCKB KEYUSB
J210
J291
J210
LVDS2 SD
DCIN J070/J071
EMG
USB
USB3-2
USB3-1
USB2-4
USB2-6
USB2-5
FCU8-DX2xx/DX6xx/DX4xx
CJ71
FCU8-CF060G-1
DCIN J070/J071
Network
CG31
CG32
FCU8-DX830/834/837
CG33
CG34
SDI Max. 8 points
DI:CJ31/33
DO:CJ32/34
RIO1
DCIN
RIO2
J350/J351
J350/J351
(R2-TM)
J210
FCU8-KB92x FCU8-KB941/KB931
G460
DX834:
DX837:
OPKB J460/461
<J491>
<J292>
<J190>
<J290> <J423> USB
SD
LCD
FCU8-KB04x/KB083
<G402>
(*2)
24VDC
Machine operation panel manufactured by Mitsubishi Electric
Emergency
stop switch
Personal computer unit
device
conversion
USB memory
24VDC
Remote I/O unit
24VDC
Operation panel I/O unit
Safety signal input
Stored in
personal computer unit
CFast unit
(Safety signal input is
DX837 only.)
To the next remote I/O
or terminator connector

Added onto back of
display unit
SD
memory
card
24VDC Machine
control
relay/contact
Backlight
I/F PCB
With scan input/output
With safety signal input
Scan input /
Scan output
(Scan input/output is
DX834 only.)
with touch panel
Keyboard unit
Menu key
(15-type)
Display unit
FCU8-DU182-36
Note
M800V/M80V Series Specifications Manual (Hardware)
2 General Connection Diagram (M800VW/M80VW Series)
2.3 19-type Display Unit
9 IB-1501611-G
2.3 19-type Display Unit
Dotted lines indicate the sections which is different from the 15-type display unit in the 19-type display unit.
The personal computer unit is installed on the back of the display unit.
The personal computer unit is installed on the back of the display unit.
The operation board I/O unit is installed on the back of the keyboard unit.
19-type display unit
Display unit for M800VW Series Display unit for M80VW Series
FCU8-DU193-75
FCU8-DU194-75
FCU8-DU193-77
FCU8-DU194-77
15-type display unit
Display unit for M800VW Series Display unit for M80VW Series
FCU8-DU182-34 FCU8-DU182-36
LVDS1
FCU8-PC232
MENUKEY
INV
NCKB
LVDS2 SD
USB
FCU8-DX830/834/837
<J190>
<J290> <J423> USB
SD
LCD
Personal computer unit
USB memory
Operation panel I/O unit
SD
memory
card
Backlight
I/F PCB
Display unit
with touch panel <J471>
FCU8-EP201-2
<J292> PCUSB
USB2-2
USB2-1
<J494/
J993>
Side memory I/F unit
LVDS1
FCU8-PC232
MENUKEY
INV
NCKB
LVDS2 SD
USB
FCU8-DX830/834/837
<J190>
<J290> <J423> USB
SD
LCD
Personal computer unit
USB memory
Operation panel I/O unit
SD
memory
card

Backlight
I/F PCB
Display unit
with touch panel
FCU8-KB04x/KB083
<G402>
<J491>
<J292>
USB2-2
USB2-1
Keyboard unit
Menu key

2.4 Connecting a Laser I/F Unit
Connect the laser I/F unit to any of RIO1, RIO2 and RIO4 of the control unit.
The following figure shows an example of connecting the laser I/F unit to RIO2.
(1) The laser I/F unit occupies all one channel; therefore, a remote I/O unit cannot be connected before or after the laser I/F unit.
RIO1 RIO2
Control unit
J070/071
J210
J070/071
DI:CJ31/33
DO:CJ32/34
RIO1
DCIN
RIO2
DI:CJ31/33
DO:CJ32/34
RIO1
DCIN
RIO2
J350/351
J350/351
(R2-TM)
J070/071
J210 RIO
IODCIN CONC
J070/071
DCIN
CONA
CONB
FCU8-DX522-001
Remote I/O unit
24VDC
Remote I/O unit
24VDC Machine
control
relay/contact
To the next remote I/O or
terminator connector
Laser I/F unit
24VDC
Laser oscillator
24VDC
J070/071
J210
J070/071
DI:CJ31/33
DO:CJ32/34
RIO1
DCIN
RIO2
DI:CJ31/33
DO:CJ32/34
RIO1
DCIN
RIO2
J350/351
J350/351
(R2-TM)
RIO4
Remote I/O unit
24VDC
Remote I/O unit
24VDC Machine
control
relay/contact
To the next remote I/O or
terminator connector
Note

Classification Type Components Remark
NC function
For M830VW FCU8-MU052
Main CPU card
7SEG card
SDHC: 1ch
Back panel card
Unit lid (Resin molded article) etc.
This unit is not compliant with either the Export
Trade Control Order or Foreign Exchange Order.
G123 cable for EMG is attached.
NC function
For M850VW FCU8-MA051
Main CPU card
7SEG card
SDHC: 1ch
Back panel card
Unit lid (Resin molded article) etc.
This unit is compliant with the Foreign Exchange
Order but not with the Export Trade Control Order.
G123 cable for EMG is attached.
Classification Type Components Remark
NC function
For M80VW FCU8-MU054
Main CPU card
7SEG card
SDHC: 1ch
Back panel card
Unit lid (Resin molded article) etc.
This unit is not compliant with either the Export
Trade Control Order or Foreign Exchange Order.
G123 cable for EMG is attached.

Classification Type Components Remark
15-type color LCD touchscreen
(XGA:1024 x 768)
FCU8-DU182-34 LCD panel
Backlight I/F PCB
Menu keys
Escutcheon
Base metal plate
Cable
Screw cap set
Personal computer unit is prepared at the same time.
Built-in disk of the display unit is prepared at the same time.
Front side memory I/F is normally equipped with the display
unit.
(Windows-based display)
19-type color LCD touchscreen
(SXGA:1024 x 1280)
FCU8-DU193-75 LCD panel
Backlight I/F PCB
Escutcheon
Base metal plate
Cable
Personal computer unit is prepared at the same time.
Built-in disk of the display unit is prepared at the same time.
Side memory I/F unit is separately prepared.
(Windows-based display)
19-type color LCD touchscreen
(SXGA:1280 x 1024)
FCU8-DU194-75 LCD panel
Backlight I/F PCB
Escutcheon
Base metal plate
Cable
Personal computer unit is prepared at the same time.
Built-in disk of the display unit is prepared at the same time.
Side memory I/F unit is separately prepared.
(Windows-based display)
Classification Type Components Remark
15-type color LCD touchscreen
(XGA:1024 x 768)
FCU8-DU182-36 LCD panel
Backlight I/F PCB

Menu keys
Escutcheon
Base metal plate
Cable
Screw cap set
Personal computer unit is prepared at the same time.
Built-in disk of the display unit is prepared at the same time.
Front side memory I/F is normally equipped with the display
unit.
(Windows-based display)
19-type color LCD touchscreen
(SXGA:1024 x 1280)
FCU8-DU193-77 LCD panel
Backlight I/F PCB
Escutcheon
Base metal plate
Cable
Personal computer unit is prepared at the same time.
Built-in disk of the display unit is prepared at the same time.
Side memory I/F unit is separately prepared.
(Windows-based display)
19-type color LCD touchscreen
(SXGA:1280 x 1024)
FCU8-DU194-77 LCD panel
Backlight I/F PCB
Escutcheon
Base metal plate
Cable
Personal computer unit is prepared at the same time.
Built-in disk of the display unit is prepared at the same time.
Side memory I/F unit is separately prepared.
(Windows-based display)
Classification Type Components Remark
Personal computer unit FCU8-PC232
PC board
PC cooling FAN
Unit lid (Resin molded article) etc.
Built-in disk of the display unit FCU8-CF060G-1 Windows OS/data storage Windows10
Classification Type Components Remark
Keyboard for 15-type display unit
Clear key FCU8-KB083
Escutcheon, key switch
G402 cable
Screw cap set
Full keyboard (for M system/L system) (in tandem)
M800V/M80V Series Specifications Manual (Hardware)
3 List of Configuration (M800VW/M80VW Series)
3.7 Operation Panel I/O Unit
IB-1501611-G 14
3.7 Operation Panel I/O Unit
(*1) J291 cable is required for connection with the personal computer unit. (for windows-based display)
DI: Digital input signals, DO: Digital output signals
Classification Type Components Remark
DI 24 V/0 V common input [64 points]
DO Source output [64 points]
FCU8-DX830 Base card
Add-on card
RIO 2.0 terminator connector (R2-TM)
DI: 64-point 24 V/0 V common type
DO: 64-point source type (200 mA/point)
Manual pulse generator input: 3ch
Display unit I/F
Keyboard unit I/F
Emergency stop input
Remote I/O 2.0 I/F
RIO occupied stations (fixed):
1 to 4, 7 to 14, 20 to 22
RIO extensible stations:
5, 6, 15 to 19, 23 to 64
(*1)
DI 24 V/0 V common input [64 points]
DO Source output [64 points]
Scan input [64 points]
Scan output [64 points]
FCU8-DX834 Base card
Add-on card
RIO 2.0 terminator connector (R2-TM)
DI: 64-point 24 V/0 V common type
DO: 64-point source type (200 mA/point)
Scan input: 64 points
Scan output: 64 points
Manual pulse generator input: 3ch
Display unit I/F
Keyboard unit I/F
Emergency stop input
Remote I/O 2.0 I/F
RIO occupied stations (fixed):
1 to 4, 7 to 14, 20 to 22

RIO extensible stations:
5, 6, 15 to 19, 23 to 64
(*1)
DI 24 V/0 V common input [64 points]
DO Source output [64 points]
Safety DI 24 V/0 V common input [8
points]
FCU8-DX837 Base card
Add-on card
RIO 2.0 terminator connector (R2-TM)
DI: 64-point 24 V/0 V common type
DO: 64-point source type (200 mA/point)
Safety DI: 8-point 0 V common type
Manual pulse generator input: 3ch
Display unit I/F
Keyboard unit I/F
Emergency stop input
Remote I/O 2.0 I/F
RIO occupied stations (fixed):
1 to 4, 7 to 14, 20 to 22
RIO extensible stations:
5, 6, 15 to 19, 23 to 64
(*1)

(*1) Safety DI uses 16 points of terminal because of the duplication wiring.
(*2) Safety relay output uses 8 points of terminal because of the duplication wiring.
(*3) Voltage input, current input, thermocouple input and resistance temperature detector input are selected for each chan nel.
DI: Digital input signals, DO: Digital output signals, AI: Analog input signals, AO: Analog output signals
3.9 Laser I/F Unit
Classification Type Components Remark
DI 24 V/0 V common input [32 points]
DO Source output [32 points]
FCU8-DX220 Base card
RIO 2.0 connector set
DI: 32-point 24 V/0 V common type
DO: 32-point source type (200 mA/point)
Number of occupied stations: 1
DI 24 V/0 V common input [64 points]
DO Source output [48 points]
FCU8-DX230 Base card
RIO 2.0 connector set
DI: 64-point 24 V/0 V common type
DO: 48-point source type (200 mA/point)
Number of occupied stations: 2
DI 24 V/0 V common input [64 points]
DO Source output [48 points]
AO analog output [1 point]
FCU8-DX231 Base card
RIO 2.0 connector set
DI: 64-point 24 V/0 V common type
DO: 48-point source type (200 mA/point)
AO: 1 point
Number of occupied stations: 2
AI analog input [4 points]
AO analog output [1 point]
FCU8-DX202 Base card
RIO 2.0 connector set
AI: 4 points
AO: 1 point
Number of occupied stations: 1
DI 0 V common input [16 points]
DO Source output (large capacity) [8 points]
FCU8-DX213 Base card
RIO 2.0 connector set
DI: 16-point 0 V common type (3 mA/point)
DO: 8-point source type (2 A/point)
Number of occupied stations: 1
DI 0 V common input [16 points]
DO Source output (large capacity) [8 points]
FCU8-DX213-1 Base card
RIO 2.0 connector set
DI: 16-point 0 V common type (9 mA/point)
DO: 8-point source type (2 A/point)
Number of occupied stations: 1
Safety DI 0 V common input [8 points]
Safety DO Source output (large capacity) [4
points]
FCU8-DX654 Base card
RIO 2.0 connector set
Safety DI: 8-point 0 V common type (3 mA/point)
Safety DO: 4-point source type (2A/point)
Number of occupied stations: 2
Safety DI 0 V common input [8 points]
Safety DO Source output (large capacity) [4

points]
FCU8-DX654-1 Base card
RIO 2.0 connector set
Safety DI: 8-point 0 V common type (9 mA/point)
Safety DO: 4-point source type (2 A/point)
Number of occupied stations: 2
DI 24 V/0 V common input [32 points]
DO Source output [32 points]
Safety DI 0 V common input [8 points] (*1)
Safety relay output [4 points] (*2)
FCU8-DX651 Base card
Add-on card
RIO 2.0 connector set
DI: 32-point 24 V/0 V common type
DO: 32-point source type (200 mA/point)
Safety DI: 8-point 0 V common type
Safety relay: 4 points (non-voltage contact)
Relay contact welding detection
Number of occupied stations: 3
Thermistor input [12 points] FCU8-DX408 Base card
RIO 2.0 connector set
Thermistor input: 12 points
Number of occupied stations: 3
Multi-analog input [4 points] (*3) FCU8-DX409 Base card
RIO 2.0 connector set
Multi-analog input: 4 points
Number of occupied stations: 4
Classification Type Components Remark
Laser I/F unit FCU8-DX522-
001
Base card
Connector set
DI: 26-point 0 V common type
DO: 22-point source type (200 mA/point)
PWM output: 1 point
Relay: 3 points (non-voltage contact)
AI: 1 point
AO: 1 point
Remote I/O occupies 1 ch.
M800V/M80V Series Specifications Manual (Hardware)
3 List of Configuration (M800VW/M80VW Series)
3.10 Function Expansion Unit
IB-1501611-G 16
3.10 Function Expansion Unit
[Connector: EXT1/EXT2 on the control unit]
(*1) Measuring instrument I/F expansion unit is available on M800VW Series only.
[Connector: EXT3/EXT4 on the control unit]
3.11 Side Memory I/F Unit
3.12 Manual Pulse Generator
3.13 Synchronous Feed Encoder
Classification Type Components Remark
Measuring instrument I/F expansion
unit (*1) FCU8-EX543 Measuring instrument I/F PCB Measuring instrument I/F 1ch + AI: 4-
point, AO: 2-point
Encoder (manual pulse generator) I/
F expansion unit FCU8-EX544 Encoder I/F PCB Encoder input 1ch
5 V manual pulse generator input 2ch
Classification Type Components Remark
CC-Link expansion unit FCU8-EX561 CC-Link I/F PCB CC-Link 1 ch
PROFIBUS-DP master unit FCU8-EX563 PROFIBUS-DP I/F PCB PROFIBUS-DP 1 ch
CC-Link IE Field
Master/local unit FCU8-EX564 Base card
Add-on card CC-Link IE Field 2 ch
EtherNet/IP
scanner/adapter unit FCU8-EX565 Base card
Add-on card
EtherNet/IP 1 ch
(LAN1 only; LAN2 unavailable)
FL-net expansion unit FCU8-EX568 Base card
Add-on card
FL-net 1 ch
(LAN1 only; LAN2 unavailable)
CC-Link IE TSN remote unit FCU8-EX569 Base card
Add-on card
CC-Link IE TSN network 1 ch
(LAN1 only; LAN2 unavailable)
Vibration cutting expansion unit FCU8-EX744 Base card Vibration cutting function
Classification Type Components Remark
Side memory I/F unit FCU8-EP201-2 Side memory I/F PCB
J292 cable
Structural member
SDHC: 1 ch
USB2.0 1 ch
USB communication
(between side memory I/F PCB and per sonal computer)
Unit lid (resin molded article), metal
plate, etc.
Exclusive for 19-type display unit

Classification Type Components Remark
5 V manual pulse generator UFO-01-2Z9 UFO-01-2Z9
(Produced by NIDEC NEMICON)
Input: DC5 V
100 pulse/rev
12V manual pulse generator HD60C HD60C Input: DC12 V
25 pulse/rev
Classification Type name Components Remark
Synchronous feed encoder OSE1024-3-15-68 OSE1024-3-15-68
Input: DC5 V
1024 pulse/rev
6000 rpm, 68-square flange
Synchronous feed encoder OSE1024-3-15-68-8 OSE1024-3-15-68-8
Input: DC5 V
1024 pulse/rev
8000 rpm, 68-square flange
Synchronous feed encoder OSE1024-3-15-160 OSE1024-3-15-160
Input: DC5 V
1024 pulse/rev
6000 rpm, 160-square flange
M800V/M80V Series Specifications Manual (Hardware)
3 List of Configuration (M800VW/M80VW Series)
3.14 Machine Operation Panel
17 IB-1501611-G
3.14 Machine Operation Panel
3.15 Handy Terminal
Classification Type name Components Remark
Main panel A
(For 8.4-type/15-type display unit) FCU8-KB921
Escutcheon, key switch
Control card
G054 cable, screw cap set
Mitsubishi Electric standard key layout
(55 keys) (Standard specification A)
Main panel A
(For 8.4-type/15-type display unit) FCU8-KB922
Escutcheon, key switch
Control card
G054 cable, screw cap set
Custom specification, 55-key layout
(Clear key top cover sold separately)
Main panel B
(For 10.4-type display unit) FCU8-KB923
Escutcheon, key switch
Control card
G054 cable, screw cap set
Mitsubishi Electric standard key layout
(55 keys) (Standard specification A)
Main panel B
(For 10.4-type display unit) FCU8-KB924
Escutcheon, key switch
Control card
G054 cable, screw cap set
Custom specification, 55-key layout
(Clear key top cover sold separately)
Main panel A
(For 8.4-type/15-type display unit) FCU8-KB925
Escutcheon, key switch
Control card
G054 cable, screw cap set
Mitsubishi Electric standard key layout
(55 keys) (Standard specification B)
Main panel B
(For 10.4-type display unit) FCU8-KB926
Escutcheon, key switch
Control card
G054 cable, screw cap set
Mitsubishi Electric standard key layout
(55 keys) (Standard specification B)
Sub panel A
(Common for all display units) FCU8-KB931
Escutcheon
Emergency stop switch, override switch
ON/OFF switch, screw cap set
Mitsubishi Electric standard switch spec ification (Standard specification A)
Sub panel A
(Common for all display units) FCU8-KB941
Escutcheon
Emergency stop switch, override switch
ON/OFF switch, screw cap set
Mitsubishi Electric standard switch spec ification (Standard specification B)
Clear key top set N030C975G51/
N030C975G55
Clear key top cover (20 pieces/60 piec es)
Set of labels for M7 standard key
layout N939A169G51 Labels for M7 standard key layout (1
sheet)
Classification Type name Components Remark

Handy terminal HG1T-SB12UH MK1346-L5
M800V/M80V Series Specifications Manual (Hardware)
3 List of Configuration (M800VW/M80VW Series)
3.16 Cable Connector Sets
IB-1501611-G 18
3.16 Cable Connector Sets
3.17 Thermistor Set
3.18 Genuine Memory Card
3.19 Durable Parts
Contact the Service Center, Sales Office or dealer for repairs or part replacement.
3.20 Replacements
Classification Type name Components Remark
General I/O
(For SKIP, SIO, MPG, AIO)
FCUA-CS000 Connector (10120-3000PE, 2 pcs.)
Shell kit (10320-52F0-008, 2 pcs.)
Emergency stop connector
(For EMG)
005057-9403
0016020103 x 3 pcs.
Connector (50-57-9403),
Contact (0016020103, 3 pcs.)
Connector kit for RIO 2.0 unit RIO2 CON Connector (1-1318119-3, 2 pcs.),
Contact (1318107-1, 8 pcs.),
Connector (2-178288-3),
Contact (1-175218-5, 3 pcs.)
Connector kit for laser I/F RIOL-CON Connector (1-1318119-3, 2 pcs.),
Contact (1318107-1, 8 pcs.),
Connector (2-178288-3, 2 pcs.),
Contact (1-175218-5, 6 pcs.)
24 VDC power supply connector
(For DCIN)
FCUA-CN220 Connector (2-178288-3),
Contact (1-175218-5, 3 pcs.)
DI/DO Connector
(for operation panel I/O unit)
(for remote I/O unit)
7940-6500SC x 4 pieces
3448-7940 x 4 pcs.
Connector (7940-6500SC, 4 pcs.),
Strain relief (3448-7940, 4 pcs.)
ON/OFF switch connector 005057-9404
0016020103 x 4 pcs.
Connector (50-57-9404),
Contact (0016020103, 4 pcs.)
THERMISTOR connector 37104-2165-000FL 10P Connector (37104-2165-000FL, 10 pieces)
Classification Type name Components Remark
Thermistor PT3C-51F-M2 10P Thermistor (PT3C-51F-M2, 10 pieces)
Classification Type name Components Remark
Exclusive SD cards for 1 GB FCU8-SD001G FCU8-SD001G 1 GB capacity
Exclusive SD cards for 4 GB FCU8-SD004G FCU8-SD004G 4 GB capacity
Durable parts Part type
Battery for control unit Q6BAT
Battery for personal computer unit Q6BAT
Cooling fan for personal computer unit 109P0424H3103
Replacements Part type Manufacturer
Protection fuse for operation panel I/O unit LM50 Daito Communication Apparatus Co., Ltd.
Protection fuse for FCU8-DX220/230/231 LM50 Daito Communication Apparatus Co., Ltd.
Protection fuse for FCU8-DX213/654/213-1/654-1 MP63 Daito Communication Apparatus Co., Ltd.
Protection fuse for FCU8-DX522-001 LM50 Daito Communication Apparatus Co., Ltd.
Pair of SD/USB covers for display unit N031C089G51 -
M800V/M80V Series Specifications Manual (Hardware)
3 List of Configuration (M800VW/M80VW Series)
3.21 List of Cables
19 IB-1501611-G
3.21 List of Cables
[Cable relating to NC]
(1) "x" in type columns indicate cable length (unit: m).
(2) Lengths indicated with an asterisk (*) in the max. cable length column indicate the maximum cable length when connect ing via other unit.
Type name Application Available cable length (m) Max. cable
length
FCUA-R050-xM
Wiring between synchronous encoder and control unit (straight, with
connector)
(for FCU8-EX544)
5 30 m
FCUA-R054-xM
Wiring between synchronous encoder and control unit (right angle, with
connector)
(for FCU8-EX544)
3, 5, 10, 15, 20 30 m
G071 LxM 24 VDC relay cable for machine operation panel 0.12, 0.5, 1 1 m
G123 Cable for emergency stop release - -
G170 LxM
ON/OFF switch cable
(for wiring between ON/OFF switch and personal computer unit)
(for windows-based display)
1 to 2, 3 to 5, 10 to 15 15 m

G430 LxM Cable for connection to handy terminal 3, 5, 10 10 m
G460 LxM Cable for machine operation panel
(for wiring between main panel and sub panel) 0.5 0.5 m
J020 LxM Manual pulse generator cable (12 V): 1 ch 1, 2, 3, 5, 7, 10, 15, 20, 30 50 m
J021 LxM Manual pulse generator cable (12 V): 2 ch 1, 2, 3, 5, 7, 10, 15, 20, 30 50 m
J022 LxM Manual pulse generator cable (12 V): 3 ch 1, 2, 3, 5, 7, 10, 15, 20, 30 50 m
J023 LxM Manual pulse generator cable (5 V): 1 ch 1, 2, 3, 5, 7, 10, 15, 20 20 m
J024 LxM Manual pulse generator cable (5 V): 2 ch 1, 2, 3, 5, 7, 10, 15, 20 20 m
J025 LxM Manual pulse generator cable (5 V): 3 ch 1, 2, 3, 5, 7, 10, 15, 20 20 m
J026 LxM Manual pulse generator cable (5 V): 1 ch
(For connection to control unit) 1, 2, 3, 5, 7, 10, 15, 20 20 m (*)
J027 LxM Manual pulse generator cable (5 V): 2 ch
(For connection to control unit) 1, 2, 3, 5, 7, 10, 15, 20 20 m (*)
J030 LxM RS-232C I/F cable: 1 ch 1, 2, 3, 5, 7, 10 15 m (*)
J031 LxM RS-232C I/F cable: 2 ch 1, 2, 3, 5, 7, 10 15 m (*)
J070 LxM 24 VDC power cable 1, 2, 3, 5, 7, 10, 15 15 m
J071 LxM 24 VDC power cable (for long distance) 20 20 m
J100 LxM SKIP input cable 1, 2, 3, 5, 7, 10, 15, 20 20 m
J120 LxM Emergency stop cable 1, 2, 3, 5, 7, 10, 15, 20, 30 30 m
J121 LxM Emergency stop cable for machine operation panel 1, 2, 3, 5, 7, 10, 15, 20, 30 30 m
J210 LxM Remote I/O 2.0 communication cable 0.3, 1, 2, 3, 5, 7, 10, 15, 20, 30 50 m
J220 LxM Analog output cable
(for M800VW) 2, 3, 7 30 m
J221 LxM Analog input/output cable (for remote I/O unit) 2, 3, 7 30 m
J234 LxM Measuring instrument I/F expansion cable 3 3 m
J291 LxM Connection cable between personal computer unit and operation panel
I/O unit 0.15, 0.5, 1 1 m
J303 LxM LAN straight cable 1, 2, 3, 5, 7, 10, 15, 20, 30 50 m
J350 LxM DI/DO cable (connectors at both ends) 1, 2, 3, 5 50m
J351 LxM DI/DO cable (connector at one end) 3 50 m
J460 LxM DI/DO cable (connectors at both ends) 1, 2, 3, 5 50 m
J461 LxM DI/DO cable (connector at one end) 3 50 m
R2-TM Terminator for remote I/O interface - -
Note
M800V/M80V Series Specifications Manual (Hardware)
3 List of Configuration (M800VW/M80VW Series)
3.22 System Type
IB-1501611-G 20
[Cable Relating to Drive Unit]
(1) "x" in type columns indicate cable length (unit: m).
(2) Lengths indicated with an asterisk (*) in the max. cable length column indicate the maximum cable length when connect ing via other unit.
3.22 System Type
Type name Application Available cable length (m) Max. cable
length
CNP2E-1-xM
Motor side PLG cable
Spindle side accuracy encoder
TS5690 cable
2, 3, 4, 5, 7, 10, 15, 20, 25, 30 30 m
CNP3EZ-2P-xM Spindle side detector cable
OSE-1024 cable 2, 3, 4, 5, 7, 10, 15, 20, 25, 30 30 m
CNP3EZ-3P-xM Spindle side detector cable
OSE-1024 cable 2, 3, 4, 5, 7, 10, 15, 20, 25, 30 30 m
CNV2E-8P-xM
For HG/HG-H, HQ-H, HK/HK-H, HG-JR
Motor side encoder cable (for D47/D48/D51/D74/G48)
Ball screw side encoder cable (OSA405ET2AS, OSA676ET2AS)
2, 3, 4, 5, 7, 10, 15, 20, 25, 30 30 m
CNV2E-9P-xM
For HG/HG-H, HQ-H, HK/HK-H, HG-JR
Motor side encoder cable (for D47/D48/D51/D74/G48)
Ball screw side encoder cable (OSA405ET2AS, OSA676ET2AS)
2, 3, 4, 5, 7, 10, 15, 20, 25, 30 30 m
CNV2E-D-xM MDS-B-SD unit cable 2, 3, 4, 5, 7, 10, 15, 20, 25, 30 30 m
CNV2E-HP-xM MDS-EX-HR unit cable 2, 3, 4, 5, 7, 10, 15, 20, 25, 30 30 m
DG30-xM Battery cable
(for wiring between drive unit and battery box, between drive units) 0.3, 0.5, 1, 2, 3, 5, 7, 10 10 m
G380 LxM Optical communication cable
Wiring between drive units (outside panel) 5, 10, 12, 15, 20, 25, 30 30 m
J395 LxM
Optical communication cable
Wiring between drive units (outside panel)
Wiring between NC and-drive unit
3, 5, 7, 10 10 m
J396 LxM Optical communication cable
Wiring between drive units (inside panel) 0.2, 0.3, 0.5, 1, 2, 3, 5 10 m
MR-BKS1CBLxMA1-H
<200V Series>
Brake cable for HG96
load side angle
2, 3, 5, 7, 10 10 m
MR-BKS1CBLxMA2-H
<200V Series>
Brake cable for HG96
reverse load side angle
2, 3, 5, 7, 10 10 m
MR-BT6V2CBL LxM Battery cable (MDS-EJ/EJH)
(for wiring between drive units) 0.3, 1 1 m

MR-D05UDL3M-B STO cable 3 3 m
MR-ENE4CBLxM-H MTH For HG-H1502 Motor side encoder cable (for D48/D51/D74) 5, 10, 20, 30 30 m
MR-PWS1CBLxMA1-H
<200V Series>
Power cable for HG96
load side angle
2, 3, 5, 7, 10 10 m
MR-PWS1CBLxMA2-H
<200V Series>
Power cable for HG96
reverse load side angle
2, 3, 5, 7, 10 10 m
SH21 LxM Power supply communication cable
Backup unit communication cable 0.35, 0.5, 1, 2, 3 30 m
Series Model name System type Control unit
M800VW Series
M850VW FCA850U-V FCU8-MA051-001
M830VW FCA830U-V FCU8-MU052-001
M80VW Series M80VW FCA80U-V FCU8-MU054-001
Note

4 General Specifications (M800VW/M80VW Series)
4.1 Environment Conditions [M800VW]

4.1 Environment Conditions [M800VW]
4.1.1 Environment Conditions Inside the Operation Panel
(*1) "Short term" means within one month.
(*2) The current consumption of the display unit is included in that of the personal computer unit.
(1) For the whole NC system, consider the characteristics of the drive units when the altitude is more than 1000 meters above sea level.
Refer to the manual of drive unit for details.
(2) When the display unit is mounted on an incline, the inclination angle to place the unit should follow below.
15-type display unit: The inclination should be 30 degrees or less from the vertical direction.
19-type display unit: The inclination should be 60 degrees or less from the vertical direction.
Item
Unit name Display unit Personal computer unit
Type
FCU8-DU182-34: (15-type)
FCU8-DU193-75: (19-type)
FCU8-DU194-75: (19-type)
FCU8-PC232
General spec ifications
Ambient
temperature
During op eration
0 C to 58 C
During
storage
-20 C to 60 C
Ambient hu midity
Long term 10% to 75% RH (with no dew condensation)
Short term 10% to 95% RH (with no dew condensation) (*1)
Vibration resistance 4.9 m/s2 [0.5 G] or less
Shock resistance 29.4 m/s2 [3 G] or less
Working atmosphere No corrosive gases, dust or oil mist
Altitude Operation/Storage: 1000 meters or less above sea level, Transportation: 13000 meters or less above sea level
Power supply voltage
FCU8-DU182-34: 12 VDC/5 VDC/3.3 VDC
FCU8-DU193-75: 12 VDC/5 VDC
FCU8-DU194-75: 12 VDC/5 VDC
24 VDC
(Supplied from personal computer unit)
Current consumption - (*2) 2.2 A
Maximum
heating val ue
(W)
FCU8-DU182-34: 20.5
FCU8-DU193-75: 33
FCU8-DU194-75: 33
19
Mass (kg)
FCU8-DU182-34: 3.9
FCU8-DU193-75: 5.2
FCU8-DU194-75: 5.2
1.2
Outline di mensions
W H
or
W H D
(mm)
FCU8-DU182-34: 400 320
FCU8-DU193-75: 365 440
FCU8-DU194-75: 440 365
237 182 53.5

Note
M800V/M80V Series Specifications Manual (Hardware)
4 General Specifications (M800VW/M80VW Series)
4.1 Environment Conditions [M800VW]
23 IB-1501611-G
(*1) "Short term" means within one month.
(*2) The current consumption of the keyboard unit is included in that of the operation panel I/O unit.
(*3) Current consumption for the I/O circuit needs to be separately calculated based on the number of points used and its load.
(*4) For the heating value of the I/O circuit, calculate with the number of points used.
(*5) 24 V power input is not required for FCU8-KB931/KB941.
(1) For the whole NC system, consider the characteristics of the drive units when the altitude is more than 1000 meters above sea level.
Refer to the manual of drive unit for details.
Item
Unit name Keyboard unit Operation panel I/O unit Machine operation panel
Type FCU8-KB083: (15-type/vertical
arrangement) FCU8-DX830/DX834/DX837
FCU8-KB921/KB922/KB925
FCU8-KB923/KB924/KB926
FCU8-KB931/KB941
General spec ifications
Ambient
temperature
During op eration
0 C to 58 C
During
storage
-20 C to 60 C
Ambient hu midity
Long term 10% to 75% RH (with no dew condensation)
Short term 10% to 95% RH (with no dew condensation) (*1)
Vibration resistance 4.9 m/s2 [0.5 G] or less
Shock resistance 29.4 m/s2 [3 G] or less
Working atmosphere No corrosive gases, dust or oil mist
Altitude Operation/Storage: 1000 meters or less above sea level, Transportation: 13000 meters or less above sea level
Power supply voltage
5 VDC 24 VDC 24 VDC (*5)
(Supply from operation panel I/O
unit)
Current consumption - (*2) 0.3 A (*3) 0.3 A (*5)
Maximum
heating val ue
(W)
1 8 (*4) 7.2
Mass (kg)
1.5 0.4 FCU8-KB921/KB922/KB925:
1.1
FCU8-KB923/KB924/KB926:
1.2
FCU8-KB931/KB941:
0.5
Outline di mensions
W H
(mm)
400 140 116 179 FCU8-KB921/KB922/KB925:
260 140
FCU8-KB923/KB924/KB926:
290 140
FCU8-KB931/KB941:
140 140
Note
M800V/M80V Series Specifications Manual (Hardware)
4 General Specifications (M800VW/M80VW Series)
4.1 Environment Conditions [M800VW]
IB-1501611-G 24
4.1.2 Environment Conditions Inside the Control Panel
(*1) "Short term" means within one month.
(1) For the whole NC system, consider the characteristics of the drive units when the altitude is more than 1000 meters above sea level.
Refer to the manual of drive unit for details.
Item
Unit name Control unit
Type FCU8-MU052/MA051
General spec ifications
Ambient
temperature
During op eration
0 C to 55 C
During
storage
-20 C to 60 C
Ambient hu midity
Long term 10% to 75% RH (with no dew condensation)
Short term 10% to 95% RH (with no dew condensation) (*1)
Vibration resistance 4.9 m/s2 [0.5 G] or less
Shock resistance 29.4 m/s2 [3 G] or less

Working atmosphere No corrosive gases, dust or oil mist
Altitude Operation/Storage: 1000 meters or less above sea level, Transportation: 13000 meters or less
above sea level
Power supply voltage 24 VDC
Current consumption 1.5 A
Maximum
heating val ue
(W)
16
Mass (kg) 1.9
Outline di mensions
W H D
(mm)
90 380 180
Note
M800V/M80V Series Specifications Manual (Hardware)
4 General Specifications (M800VW/M80VW Series)
4.1 Environment Conditions [M800VW]
25 IB-1501611-G
(*1) "Short term" means roughly within one month.
(*2) This value includes the maximum value of DO external load current (3.2 A).
(*3) This value does not include DO external load current.
(*4) For the heating value of the I/O circuit, calculate with the number of points used.
(*5) The maximum value including the heating value of analog input circuit.
(1) For the whole NC system, consider the characteristics of the drive units when the altitude is more than 1000 meters
above sea level.
Refer to the manual of drive unit for details.
Item
Unit name Remote I/O unit
Type FCU8-DX220/
DX230/DX231 FCU8-DX202
FCU8-DX213/
DX213-1/
DX654/
DX654-1
FCU8-DX408 FCU8-DX409 FCU8-DX651
General spec ifications
Ambient
temperature
During op eration
0 C to 58 C
During
storage
-20 C to 60 C
Ambient hu midity
Long term 10% to 75% RH (with no dew condensation)
Short term
10% to 95% RH (with no dew condensation) (*1) 10% to 85% RH
(with no dew con densation) (*1)
Vibration resistance 4.9 m/s2 or less
Shock resistance 29.4 m/s2 or less
Working atmosphere No corrosive gases, dust or oil mist
Altitude Operation/Storage: 1000 meters or less above sea level, Transportation: 13000 meters or less
above sea level
Power supply voltage 24 VDC
Current consumption 3.5 A (*2) 0.3 A 0.3 A (*3) 0.1 A 0.2 A 3.7 A (*2)
Maximum
heating val ue
(W)
8 (*4) 3 6 (*5) 8 (*4)
Mass (kg) 0.4 0.2 0.3 0.8
Outline di mensions
W H D
(mm)
40 175 133 40 175 119 40 175 130 40 175 109 40 175 130 104 175 115
Note
M800V/M80V Series Specifications Manual (Hardware)
4 General Specifications (M800VW/M80VW Series)
4.1 Environment Conditions [M800VW]
IB-1501611-G 26
(*1) "Short term" means roughly within one month.
(*2) This value does not include DO external load current.
(*3) For the heating value of the I/O circuit, calculate with the number of points used.
(*4) The maximum value including the heating value of analog input circuit.
(1) For the whole NC system, consider the characteristics of the drive units when the altitude is more than 1000 meters
above sea level.
Refer to the manual of drive unit for details.
Item
Unit name Laser I/F unit
Type FCU8-DX522-001
General spec ifications
Ambient
temperature
During op eration
0 C to 58 C
During
storage
-20 C to 60 C

Ambient hu midity
Long term 10% to 75% RH (with no dew condensation)
Short term 10% to 95% RH (with no dew condensation) (*1)
Vibration resistance 4.9 m/s2 or less
Shock resistance 29.4 m/s2 or less
Working atmosphere No corrosive gases, dust or oil mist
Altitude Operation/Storage: 1000 meters or less above sea level, Transportation: 13000 meters or less
above sea level
Power supply voltage 24 VDC
Current consumption 0.3 A (*2)
Maximum
heating val ue
(W)
8 (*3)(*4)
Mass (kg) 0.4
Outline di mensions
W H D
(mm)
40 175 133
Note
M800V/M80V Series Specifications Manual (Hardware)
4 General Specifications (M800VW/M80VW Series)
4.1 Environment Conditions [M800VW]
27 IB-1501611-G
4.1.3 24 VDC Stabilized Power Supply Selecting Conditions
Consider the following characteristics for the stabilized power supply, and select the power supply that complies with laws,
regulations, or safety standards of the country where the machine will be installed.
Item Specifications Remarks
Output
Voltage 24 VDC
When the stabilized power supply and 24 VDC input unit are distant, select the stabilized
power supply which is possible to set output voltage 24 VDC or more allowing for the influ ence of voltage down by the cable.
Voltage fluctuation 5%
Current - Calculate the current value as a reference of maximum current consumption for the unit
which uses the power supply.
Ripple noise 0.2 V (P-P)
Output holding
time min 20ms Output holding time is decided by loading ratio; however, the stabilized power supply which
complies with the specification on the left must be selected during maximum loading.
Overcurrent output
shutoff function - Use a power supply having the overcurrent output shutoff function.
CAUTION
Using a stabilized power supply without overcurrent protection may cause the unit's failure due to miswiring of 24 V.
M800V/M80V Series Specifications Manual (Hardware)
4 General Specifications (M800VW/M80VW Series)
4.2 Environment Conditions [M80VW]
IB-1501611-G 28
4.2 Environment Conditions [M80VW]
4.2.1 Environment Conditions Inside the Operation Panel
(*1) "Short term" means within one month.
(*2) The current consumption of the display unit is included in that of the personal computer unit.
(1) For the whole NC system, consider the characteristics of the drive units when the altitude is more than 1000 meters
above sea level.
Refer to the manual of drive unit for details.
(2) When the display unit is mounted on an incline, the inclination angle to place the unit should follow below.
15-type display unit: The inclination should be 30 degrees or less from the vertical direction.
19-type display unit: The inclination should be 60 degrees or less from the vertical direction.
Item
Unit name Display unit Personal computer unit
Type
FCU8-DU182-36: (15-type)
FCU8-DU193-77: (19-type)
FCU8-DU194-77: (19-type)
FCU8-PC232
General spec ifications
Ambient
temperature
During op eration
0 C to 58 C
During
storage
-20 C to 60 C
Ambient hu midity
Long term 10% to 75% RH (with no dew condensation)
Short term 10% to 95% RH (with no dew condensation) (*1)
Vibration resistance 4.9 m/s2 [0.5 G] or less
Shock resistance 29.4 m/s2 [3 G] or less
Working atmosphere No corrosive gases, dust or oil mist
Altitude Operation/Storage: 1000 meters or less above sea level, Transportation: 13000 meters or less
above sea level
Power supply voltage
FCU8-DU182-36: 12 VDC/5 VDC/3.3 VDC
FCU8-DU193-77: 12 VDC/5 VDC
FCU8-DU194-77: 12 VDC/5 VDC
24 VDC
(Supplied from personal computer unit)
Current consumption - (*2) 2.2 A
Maximum

heating val ue
(W)
FCU8-DU182-36: 20.5
FCU8-DU193-77: 33
FCU8-DU194-77: 33
19
Mass (kg)
FCU8-DU182-36: 3.9
FCU8-DU193-77: 5.2
FCU8-DU194-77: 5.2
1.2
Outline di mensions
W H
or
W H D
(mm)
FCU8-DU182-36: 400 320
FCU8-DU193-77: 365 440
FCU8-DU194-77: 440 365
237 182 53.5
Note

(*1) "Short term" means within one month.
(*2) The current consumption of the keyboard unit is included in that of the operation panel I/O unit.
(*3) Current consumption for the I/O circuit needs to be separately calculated based on the number of points used and its load.
(*4) For the heating value of the I/O circuit, calculate with the number of points used.
(*5) 24 V power input is not required for FCU8-KB931/KB941.
(1) For the whole NC system, consider the characteristics of the drive units when the altitude is more than 1000 meters above sea level.
Refer to the manual of drive unit for details.
Item
Unit name Keyboard unit Operation panel I/O unit Machine operation panel
Type FCU8-KB083: (15-type/vertical arrangement) FCU8-DX830/DX834/DX837
FCU8-KB921/KB922/KB925
FCU8-KB923/KB924/KB926
FCU8-KB931/KB941
General spec ifications
Ambient temperature
During op eration
0 C to 58 C
During storage
-20 C to 60 C
Ambient hu midity
Long term 10% to 75% RH (with no dew condensation)
Short term 10% to 95% RH (with no dew condensation) (*1)
Vibration resistance 4.9 m/s2 [0.5 G] or less
Shock resistance 29.4 m/s2 [3 G] or less
Working atmosphere No corrosive gases, dust or oil mist
Altitude Operation/Storage: 1000 meters or less above sea level, Transportation: 13000 meters or less above sea level
Power supply voltage
5 VDC 24 VDC 24 VDC (*5)
(Supply from operation panel I/O unit)
Current consumption - (*2) 0.3 A (*3) 0.3 A (*5)
Maximum heating val ue
(W)
1 8 (*4) 7.2
Mass (kg)
1.5 0.4 FCU8-KB921/KB922/KB925:
1.1
FCU8-KB923/KB924/KB926:
1.2
FCU8-KB931/KB941:
0.5
Outline di mensions
W H
(mm)
400 140 116 179 FCU8-KB921/KB922/KB925:
260 140
FCU8-KB923/KB924/KB926:
290 140
FCU8-KB931/KB941:
140 140
Note

4.2.2 Environment Conditions Inside the Control Panel

(*1) "Short term" means within one month.
(1) For the whole NC system, consider the characteristics of the drive units when the altitude is more than 1000 meters above sea level.
Refer to the manual of drive unit for details.
Item
Unit name Control unit
Type FCU8-MU054
General spec ifications
Ambient
temperature
During op eration
0 C to 55 C
During
storage
-20 C to 60 C
Ambient hu midity
Long term 10% to 75% RH (with no dew condensation)
Short term 10% to 95% RH (with no dew condensation) (*1)
Vibration resistance 4.9 m/s2 [0.5 G] or less
Shock resistance 29.4 m/s2 [3 G] or less
Working atmosphere No corrosive gases, dust or oil mist
Altitude Operation/Storage: 1000 meters or less above sea level, Transportation: 13000 meters or less above sea level
Power supply voltage 24 VDC
Current consumption 1.25 A
Maximum
heating val ue
(W)
16
Mass (kg) 2.0
Outline di mensions
W H D
(mm)
60 380 180
Note
M800V/M80V Series Specifications Manual (Hardware)
4 General Specifications (M800VW/M80VW Series)
4.2 Environment Conditions [M80VW]
31 IB-1501611-G
(*1) "Short term" means roughly within one month.
(*2) This value includes the maximum value of DO external load current (3.2 A).
(*3) This value does not include DO external load current.
(*4) For the heating value of the I/O circuit, calculate with the number of points used.
(*5) The maximum value including the heating value of analog input circuit.
(1) For the whole NC system, consider the characteristics of the drive units when the altitude is more than 1000 meters above sea level.
Refer to the manual of drive unit for details.
Item
Unit name Remote I/O unit
Type FCU8-DX220/
DX230/DX231 FCU8-DX202
FCU8-DX213/
DX213-1/
DX654/
DX654-1
FCU8-DX408 FCU8-DX409 FCU8-DX651
General spec ifications
Ambient
temperature
During op eration
0 C to 58 C
During
storage
-20 C to 60 C
Ambient hu midity
Long term 10% to 75% RH (with no dew condensation)
Short term
10% to 95% RH (with no dew condensation) (*1) 10% to 85% RH
(with no dew con densation) (*1)
Vibration resistance 4.9 m/s2 or less
Shock resistance 29.4 m/s2 or less
Working atmosphere No corrosive gases, dust or oil mist
Altitude Operation/Storage: 1000 meters or less above sea level, Transportation: 13000 meters or less above sea level
Power supply voltage 24 VDC
Current consumption 3.5 A (*2) 0.3 A 0.3 A (*3) 0.1 A 0.2 A 3.7 A (*2)
Maximum
heating val ue
(W)
8 (*4) 3 6 (*5) 8 (*4)
Mass (kg) 0.4 0.2 0.3 0.8
Outline di mensions
W H D
(mm)
40 175 133 40 175 119 40 175 130 40 175 109 40 175 130 104 175 115
Note
M800V/M80V Series Specifications Manual (Hardware)
4 General Specifications (M800VW/M80VW Series)

(*1) "Short term" means roughly within one month.
(*2) This value does not include DO external load current.
(*3) For the heating value of the I/O circuit, calculate with the number of points used.
(*4) The maximum value including the heating value of analog input circuit.
(1) For the whole NC system, consider the characteristics of the drive units when the altitude is more than 1000 meters above sea level.
Refer to the manual of drive unit for details.

Item	Unit name Laser I/F unit
Type	FCU8-DX522-001
General spec ifications	
Ambient temperature During op eration	0 C to 58 C
During storage	-20 C to 60 C
Ambient hu midity	Long term 10% to 75% RH (with no dew condensation) Short term 10% to 95% RH (with no dew condensation) (*1)
Vibration resistance	4.9 m/s2 or less
Shock resistance	29.4 m/s2 or less
Working atmosphere	No corrosive gases, dust or oil mist
Altitude Operation/Storage: 1000 meters or less above sea level, Transportation: 13000 meters or less above sea level	
Power supply voltage	24 VDC
Current consumption	0.3 A (*2)
Maximum heating val ue (W)	8 (*3)(*4)
Mass (kg)	0.4
Outline di mensions W H D (mm)	40 175 133
Note	

4.2.3 24 VDC Stabilized Power Supply Selecting Conditions
Consider the following characteristics for the stabilized power supply, and select the power supply that complies with laws, regulations, or safety standards of the country where the machine will be installed.

Item	Specifications	Remarks
Output Voltage	24 VDC	When the stabilized power supply and 24 VDC input unit are distant, select the stabilized power supply which is possible to set output voltage 24 VDC or more allowing for the influ ence of voltage down by the cable.
Voltage fluctuation	5%	
Current	-	Calculate the current value as a reference of maximum current consumption for the unit which uses the power supply.
Ripple noise	0.2 V (P-P)	
Output holding time min	20ms	Output holding time is decided by loading ratio; however, the stabilized power supply which complies with the specification on the left must be selected during maximum loading.
Overcurrent output shutoff function	-	Use a power supply having the overcurrent output shutoff function.

CAUTION
Using a stabilized power supply without overcurrent protection may cause the unit's failure due to miswiring of 24 V.

4.3 Control Unit [M800VW]
4.3.1 M830VW(FCU8-MU052)/M850VW(FCU8-MA051)
Outline dimensions
80 or more
100 or more 100 or more
Top
Bottom
[mm]
90 180
380

Installation dimensions
45
10 360
[mm] 90 (Unit outline)
380 (Unit outline)
2-M5
Screw

4.4 Control Unit [M80VW]
4.4.1 FCU8-MU054
Outline dimensions
80 or more
100 or more 100 or more
Top
Bottom
[mm]
60 180
380

Installation dimensions
30
10 360
[mm]
40 10
60 (Unit outline)
380 (Unit outline)
3-M5 Screw

4.5 Display Unit [M800VW]
4.5.1 15-type (FCU8-DU182-34)
(1) The figure above shows the state with the personal computer unit mounted.
Outline dimensions
400
320
9.5
[mm]
72
Top
Bottom
Note

Panel cut dimensions
0.5
1930.3
1380.3
3020.3
1530.3
1930.3
193.5
80.2 80.2
20.2
(7) (7)
12 12
[mm]
a
a a a
a
a
a a a a
b
b b
b
b
b
b
b
400
387
307
320
1990.3 1830.3
1530.3
1540.3
18
5
7 7
13
26
7
(7) (7)
70.2
12-C 2
8-M3

(Unit outline)
(Unit outline)
(Square hole dimension)
(Square hole dimension)
10 - 4 holes
screw

4.5.2 19-type (FCU8-DU193-75)
(1) The figure above shows the state with the personal computer unit and the operation panel I/O unit mounted.
Outline dimensions
365
440
24
[mm]
105
(Space required for wiring)
Top
Bottom
Note

Panel cut dimensions
6.5
4160.3
170.50.3
2730.3
1430.3
1480.3
2220.3
3700.3
170.50.3
188.50.3 154.50.3
170.2 170.2
230.2
10.2
164
(12) (12)
(12) (12)
[mm]
a
a
a
a a
a
a
a
a a a a
b
b
b
b
b
b
b
b
b
b
365 (Unit outline)
440 (Unit outline)
328 (Square hole dimension)
403 (Square hole dimension)
10- 5 holes
12- 9 holes

4.5.3 19-type (FCU8-DU194-75)
(1) The figure above shows the state with the personal computer unit and the operation panel I/O unit mounted.
Outline dimensions 365
440 24
[mm]
105
(Space required for wiring)
Top
Bottom
Note

Panel cut dimensions
6.5

4160.3
1710.3
2730.3
187.50.3
170.50.3
153.50.3
230.2
10.2
(12) (12)
(12) (12)
[mm]
4170.3
2450.3
1430.3
10.2
6.5
3930.3
3420.3
3410.3
365 (Unit outline)
440 (Unit outline)
328
(Square hole dimension)
403
(Square hole
dimension)
10- 5 holes
12- 9 holes
Square hole

4.6 Display Unit [M80VW]
4.6.1 15-type (FCU8-DU182-36)
(1) The figure above shows the state with the personal computer unit mounted.
Outline dimensions
400
320
9.5
[mm]
72
(Space required
 for wiring)
Top
Bottom
Note

Panel cut dimensions
0.5
1930.3
1380.3
3020.3
1530.3
1930.3
193.5
80.2 80.2
20.2
(7) (7)
12 12
[mm]
a
a a a
a
a
a a a a
b
b b
b
b
b
b
b
400
387
307
320
1990.3 1830.3
1530.3
1540.3
18
5
7 7
13
26

7
(7) (7)
70.2
12-C 2
8-M3
(Unit outline)
(Unit outline)
(Square hole dimension)
(Square hole dimension)
10 - 4 holes
screw

4.6.2 19-type (FCU8-DU193-77)
(1) The figure above shows the state with the personal computer unit and the operation panel I/O unit mounted.
Outline dimensions
365
440
24
[mm]
105
(Space required for wiring)
Top
Bottom
Note

Panel cut dimensions
6.5
4160.3
170.50.3
2730.3
1430.3
1480.3
2220.3
3700.3
170.50.3
188.50.3 154.50.3
170.2 170.2
230.2
10.2
164
(12) (12)
(12) (12)
[mm]
a
a
a
a a
a
a
a
a a a a
b
b
b
b
b
b
b
b
b
b
365 (Unit outline)
440 (Unit outline)
328 (Square hole dimension)
403 (Square hole dimension)
10- 5 holes
12- 9 holes

4.6.3 19-type (FCU8-DU194-77)
(1) The figure above shows the state with the personal computer unit and the operation panel I/O unit mounted.
Outline dimensions 365
440 24
[mm]
105
(Space required for wiring)
Top
Bottom
Note

Panel cut dimensions
6.5
4160.3
1710.3
2730.3
187.50.3
170.50.3
153.50.3
230.2
10.2
(12) (12)
(12) (12)
[mm]
4170.3
2450.3
1430.3
10.2
6.5
3930.3
3420.3
3410.3
365 (Unit outline)
440 (Unit outline)
328
(Square hole dimension)
403
(Square hole
dimension)
10- 5 holes
12- 9 holes
Square hole

4.7 Personal Computer Unit
4.7.1 Personal Computer Unit (FCU8-PC232)
Outline dimensions
220 35 53.5
2.5
237
182

(Unit mount surface)

4.7.2 Built-in Disk of the Display Unit (FCU8-CF060G-1)
Outline dimensions
42.8 3.3 36.4

4.8 Keyboard Unit
(1) Do not change the setting for the rotary switch mounted on the keyboard unit.
If the setting is changed, the keyboard will not work.
4.8.1 Keyboard for 15-type Display Unit (FCU8-KB083)
(1) The above side view shows the state with the operation panel I/O unit mounted.
Type name The initial value of the rotary switch
FCU8-KB083 A
Outline dimensions
Panel cut dimensions
Note
400
140
9.5
[mm]
110
(Space required for wiring)
Top
Bottom
Note
[mm]
200.50.3
400
387
1930.3
193.5
127
1260.3
1130.3
(7) (7)
(7) (7)

9
13
9
13
(6.5)
3.5 3.5 0.5 (6.5)
6.50.2
6-M3
140
187.50.3
1930.3
1280.3 (6)
6.50.2 6.50.2 (6) 3.5
4
3.5
4
9
18
10.2
(Unit outline)
(Unit outline)
(Square hole dimension)
(Square hole
dimension)
screw
8 - 4 holes

4.9 Operation Panel I/O Unit
4.9.1 List of Units
(*1) The connection method of DO (CG32/CG34) of FCU8-DX834 is different from other operation panel I/O units. Be careful not to connect to a wrong connector. See the descriptions mentioned in the later section for more specific explanation on connections.
(*2) J291 cable is required for connection with the personal computer unit. (for windows-based display)
Classification Type Components Remarks
DI 24 V/0 V common input [64
points]
DO Source output [64 points]
FCU8-DX830 Base card
Add-on card
RIO 2.0 terminator connector (R2-TM)
DI: 64-point 24 V/0 V common type
DO: 64-point source type (200 mA/
point)
Manual pulse generator input: 3ch
Display unit I/F
Keyboard unit I/F
Emergency stop input
Remote I/O 2.0 I/F
RIO occupied stations (fixed):
1 to 4, 7 to 14, 20 to 22
RIO extensible stations:
5, 6, 15 to 19, 23 to 64
(*2)
DI 24 V/0 V common input [64
points]
DO Source output [64 points]
Scan input [64 points]
Scan output [64 points]
FCU8-DX834 (*1) Base card
Add-on card
RIO 2.0 terminator connector (R2-TM)
DI: 64-point 24 V/0 V common type
DO: 64-point source type (200 mA/
point)
Scan input: 64 points
Scan output: 64 points
Manual pulse generator input: 3ch
Display unit I/F
Keyboard unit I/F
Emergency stop input
Remote I/O 2.0 I/F
RIO occupied stations (fixed):
1 to 4, 7 to 14, 20 to 22
RIO extensible stations:
5, 6, 15 to 19, 23 to 64
(*2)
DI 24 V/0 V common input [64
points]
DO Source output [64 points]
Safety DI 24 V/0 V common input [8
points]
FCU8-DX837 Base card
Add-on card
RIO 2.0 terminator connector (R2-TM)
DI: 64-point 24 V/0 V common type

DO: 64-point source type (200 mA/
point)
Safety DI: 8-point 0 V common type
Manual pulse generator input: 3ch
Display unit I/F
Keyboard unit I/F
Emergency stop input
Remote I/O 2.0 I/F
RIO occupied stations (fixed):
1 to 4, 7 to 14, 20 to 22
RIO extensible stations:
5, 6, 15 to 19, 23 to 64
(*2)

4.9.2 FCU8-DX830/FCU8-DX834/FCU8-DX837
Outline dimensions: FCU8-DX830
Outline dimensions: FCU8-DX834
[mm]
116
179
99 (Space required for wiring)
[mm]
116
179
99 (Space required for wiring)

Outline dimensions: FCU8-DX837
[mm]
116
179
99 (Space required for wiring)

The unit thickness of the fixed part with screws is 16.6 mm.
Select the fixing screws having the length suitable for the thickness.
Installation dimensions: FCU8-DX830/FCU8-DX834/FCU8-DX837 1710.3
(5)
(4)
1060.3
(4)
(5)
[mm]
4-M3 screw
116 (Unit outline)
179 (Unit outline)
Note

4.10 Remote I/O Unit
Types of signals described on the list of units can be input/output from the remote I/O unit (FCU8-DXxxx) according to the type and No. of contacts. Remote I/O units are used by being connected to the control unit or the operation panel I/O unit. Multiple remote I/O units can be used as long as the total number of occupied stations is 64 or less.
(1) The maximum connectable number of remote I/O units is 32.
4.10.1 List of Units
(*1) Safety DI uses 16 points of terminal because of the duplication wiring.
(*2) Safety relay output uses 8 points of terminal because of the duplication wiring.
(*3) Voltage input, current input, thermocouple input and resistance temperature detector input are selected for each CH.
Classification Type Components Remarks
DI 24 V/0 V common input [32 points]
DO Source output [32 points] FCU8-DX220 Base card
RIO 2.0 connector set
DI: 32-point 24 V/0 V common type
DO: 32-point source type (200 mA/point)
Number of occupied stations: 1
DI 24 V/0 V common input [64 points]
DO Source output [48 points] FCU8-DX230 Base card
RIO 2.0 connector set
DI: 64-point 24 V/0 V common type
DO: 48-point source type (200 mA/point)
Number of occupied stations: 2
DI 24 V/0 V common input [64 points]
DO Source output [48 points]
AO analog output [1 point]
FCU8-DX231 Base card
RIO 2.0 connector set
DI: 64-point 24 V/0 V common type
DO Source type [48 points] (200 mA/point)
AO: 1 point

Number of occupied stations: 2
AI analog input [4 points]
AO analog output [1 point] FCU8-DX202 Base card
RIO 2.0 connector set
AI: 4 points
AO: 1 point
Number of occupied stations: 1
DI 0 V common input [16 points]
DO Source output (large capacity) [8 points] FCU8-DX213 Base card
RIO 2.0 connector set
DI: 16-point 0 V common type (3 mA/point)
DO: 8-point source type (2 A/point)
Number of occupied stations: 1
DI 0 V common input [16 points]
DO Source output (large capacity) [8 points] FCU8-DX213-1 Base card
RIO 2.0 connector set
DI: 16-point 0 V common type (9 mA/point)
DO: 8-point source type (2 A/point)
Number of occupied stations: 1
Safety DI 0 V common input [8 points]
Safety DO Source output (large capacity) [4
points]
FCU8-DX654 Base card
RIO 2.0 connector set
Safety DI: 8-point 0 V common type (3 mA/point)
Safety DO: 4-point source type (2 A/point)
Number of occupied stations: 2
Safety DI 0 V common input [8 points]
Safety DO Source output (large capacity) [4
points]
FCU8-DX654-1 Base card
RIO 2.0 connector set
Safety DI: 8-point 0 V common type (9 mA/point)
Safety DO: 4-point source type (2 A/point)
Number of occupied stations: 2
DI 24 V/0 V common input [32 points]
DO Source output [32 points]
Safety DI 0V common input [8 points] (*1)
Safety relay output [4 points] (*2)
FCU8-DX651
Base card
Add-on card
RIO 2.0 connector set
DI: 24 V/0 V common type [32 points]
DO: 32-point source type (200 mA/point)
Safety DI: 8-point 0 V common type
Safety relay: 4 points (non-voltage contact)
Relay contact welding detection
Number of occupied stations: 3
Thermistor input (12 points) FCU8-DX408 Base card
RIO 2.0 connector set
Thermistor input: 12 points
Number of occupied stations: 3
Multi-analog input [4 points] (*3) FCU8-DX409 Base card
RIO 2.0 connector set
Multi-analog input: 4 points
Number of occupied stations: 4
Note

4.10.2 FCU8-DX220/FCU8-DX230/FCU8-DX231/FCU8-DX202/FCU8-DX213/
FCU8-DX213-1/FCU8-DX654/FCU8-DX654-1/FCU8-DX651/FCU8-DX408/
FCU8-DX409
Outline dimensions: FCU8-DX220
Outline dimensions: FCU8-DX230
(Space required above the unit) (Space required below the unit)
(Space
required for
wiring)
Top
Bottom
40
168 2.5
45 115
4
[mm] 30 30
(Space required above the unit) (Space required below the unit)
(Space
required for
wiring)
Top
Bottom
40
168 2.5
45 115
4

[mm] 30 30

Outline dimensions: FCU8-DX231
Outline dimensions: FCU8-DX202
(Space required above the unit) (Space required below the unit)
(Space
required for
wiring)
Top
Bottom
40
168 2.5
45 115
4
[mm] 30 30
40
168 2.5
115
4
[mm]
(Space required for
wiring)
Top
Bottom
80

Outline dimensions: FCU8-DX213
Outline dimensions: FCU8-DX213-1
(Space required above the unit) (Space required below the unit)
(Space
required for
wiring)
Top
Bottom
40
168 2.5
45 115
4
[mm] 30 30
(Space required above the unit) (Space required below the unit)
(Space
required for
wiring)
Top
Bottom
40
168 2.5
45 115
4
[mm] 30 30

Outline dimensions: FCU8-DX654
Outline dimensions: FCU8-DX654-1
(Space required above the unit) (Space required below the unit)
(Space
required for
wiring)
Top
Bottom
40
168 2.5
45 115
4
[mm] 30 30
(Space required above the unit) (Space required below the unit)
(Space
required for
wiring)
Top
Bottom
40
168 2.5
45 115
4
[mm] 30 30

Outline dimensions: FCU8-DX651
Outline dimensions: FCU8-DX408
100
168
115
[mm]
45
2.5 4 4
(Space
required for
wiring) Top
Bottom
(Space
required for
Top wiring)
Bottom
40
168 2.5
45 109
4
[mm]

Outline dimensions: FCU8-DX409
(Space
required for
Top wiring)
Bottom
40
168 2.5
45 115
4
[mm]

Installation dimensions: FCU8-DX220/FCU8-DX230/FCU8-DX231/FCU8-DX202/FCU8-DX213/
FCU8-DX213-1/FCU8-DX654/FCU8-DX654-1/FCU8-DX408/FCU8-DX409
Installation dimensions: FCU8-DX651
[mm]
156 0.2
6
6
(Unit outline)
40
168
2-M5 Screw
4
(Unit outline) (Unit outline)
[mm]
156 0.2
4 168
88 0.2
100
6
6
4
3-M5 Screw(Unit outline) (Unit outline)
(Unit outline)

4.11 Laser I/F Unit
4.11.1 FCU8-DX522-001
Outline dimensions
Installation dimensions
[mm]
40 45 115
168
4 2.5
30 30
Top
Bottom
(Space required
above the unit) (Space required below the unit)
(Space
required for
wiring)
[mm]
156 0.2
6
6
(Unit outline)
40

168
2-M5 Screw
4
(Unit outline) (Unit outline)
M800V/M80V Series Specifications Manual (Hardware)
4 General Specifications (M800VW/M80VW Series)
4.12 Function Expansion Unit
IB-1501611-G 66
4.12 Function Expansion Unit
4.12.1 Measuring Instrument I/F Expansion Unit (FCU8-EX543)
Outline dimensions
107.5
124
30
[mm]
80 or more
M800V/M80V Series Specifications Manual (Hardware)
4 General Specifications (M800VW/M80VW Series)
4.12 Function Expansion Unit
67 IB-1501611-G
4.12.2 Encoder (Manual Pulse Generator) I/F Expansion (FCU8-EX544)
Outline dimensions
80 or more
[mm]
107.5 30 124
M800V/M80V Series Specifications Manual (Hardware)
4 General Specifications (M800VW/M80VW Series)
4.12 Function Expansion Unit
IB-1501611-G 68
4.12.3 CC-Link (FCU8-EX561)
Outline dimensions
80 or more
[mm]
94.6 30 124
M800V/M80V Series Specifications Manual (Hardware)
4 General Specifications (M800VW/M80VW Series)
4.12 Function Expansion Unit
69 IB-1501611-G
4.12.4 PROFIBUS-DP (FCU8-EX563)
Outline dimensions
100 or more
[mm]
94.6 30 124
M800V/M80V Series Specifications Manual (Hardware)
4 General Specifications (M800VW/M80VW Series)
4.12 Function Expansion Unit
IB-1501611-G 70
4.12.5 CC-Link IE Field (FCU8-EX564)
Outline dimensions
80 or more
[mm]
94.6 30 124
M800V/M80V Series Specifications Manual (Hardware)
4 General Specifications (M800VW/M80VW Series)
4.12 Function Expansion Unit
71 IB-1501611-G
4.12.6 EtherNet/IP (FCU8-EX565)
Outline dimensions
80 or more
[mm]
94.6 30 124
M800V/M80V Series Specifications Manual (Hardware)
4 General Specifications (M800VW/M80VW Series)
4.12 Function Expansion Unit
IB-1501611-G 72
4.12.7 FL-net (FCU8-EX568)
Outline dimensions
80 or more
[mm]
94.6 30 124
M800V/M80V Series Specifications Manual (Hardware)
4 General Specifications (M800VW/M80VW Series)
4.12 Function Expansion Unit
73 IB-1501611-G
4.12.8 CC-Link IE TSN Remote Unit (FCU8-EX569)
Outline dimensions
80 or more
[mm]
94.6 30 124
M800V/M80V Series Specifications Manual (Hardware)
4 General Specifications (M800VW/M80VW Series)
4.12 Function Expansion Unit
IB-1501611-G 74
4.12.9 Vibration Cutting Expansion Unit (FCU8-EX744)
Outline dimensions
[mm]
94.6 30 124
M800V/M80V Series Specifications Manual (Hardware)

4.13 Side Memory I/F Unit
(1) Side memory I/F unit is only for 19-type display unit.
4.13.1 FCU8-EP201-2
Outline dimensions
Note
38 [mm]
154
134
123
28 8.8
66
1.4
2- 5 holes
(Packing
thickness)
Top
Bottom

Installation dimensions
290.3
40
4-R2.5
B
B
1240.3
1340.3
156
8.8
0.8
(8)
2- 9
B - B
[mm]
Hole
2-M4 screw
(Valid depth of screw: 5.5 or more)

4.14 Manual Pulse Generator
4.14.1 5 V Manual Pulse Generator (UFO-01-2Z9)
100 pulse/rev
Produced by NIDEC NEMICON CORPORATION
Outline dimensions
Panel cut dimensions
3-M4
[mm]
0
10
20
30
40
50
60
70
80
90
0V A B
80.5
60
1 6 6 2 6
R43
77
58
56
8.89 7.6 M3 x 6
5V
Gasket
Above size only
72 at equal pitch
Panel cut diameter
Index stud
Top
Bottom
[mm]
72
62
at equal pitch

4.14.2 12 V Manual Pulse Generator (HD60C)
25 pulse/rev
Outline dimensions
Panel cut dimensions
3.6
16 27 0.5
L10
8.89 7.60
t 2.0 3-M4
77 0.5
80 1
58 0.5
60 0.5
[mm]
24 0.5
56 0.5
Installation of screws
Packing stud bolt
other than M3 x 6
not possible
Top
Bottom
12V 0V BA
40
30
50
60
70
10
20
90
0
80
3 - 4. 8
62
+2
0
72 0. 2
120
[mm]
(Divide equally
by three)

4.15 Synchronous Feed Encoder
4.15.1 Synchronous Feed Encoder (OSE-1024-3-15-68)
Outline dimensions
19. 5
102
135
5 3
33
2
68
28
20
56
68
4 - 5. 4
21mm
14. 3 0
- 0.11
1. 15 +0.14
0 1. 15 +0.14
0
2
26
16
50
15- 0.006
- 0.017
- 0. 009
- 0. 025
2
5 - 0. 012
- 0. 042
3 +0. 1
0
68
56
50
- 0. 009 - 0. 025
[mm]
Caution plate
hole

Enlarged drawing of key
Valid depth of key groove is
Cross section BB

<Connector pin assignment>
Connector
Pin Function Pin Function
A A phase K 0 V
B Z phase L -
C B phase M -
D - N A phase reverse
E Case grounding P Z phase reverse
F - R B phase reverse
G - S -
H +5 V T -
J -
F
J
T
G
L
K
M
H
C
D
E S R
P
N
B
A

4.16 Machine Operation Panel
4.16.1 Main Panels A/B
(FCU8-KB921/FCU8-KB922/FCU8-KB925, FCU8-KB923/FCU8-KB924/FCU8-KB926)
Outline dimensions: FCU8-KB921
Outline dimensions: FCU8-KB922
Outline dimensions: FCU8-KB925
[mm]
260
140
9.5 60
(Space required
for wiring)
Top
Bottom
[mm]
260
140
9.5 60
(Space required
for wiring)
Top
Bottom
[mm]
260
140
9.5 60
(Space required
for wiring)
Top
Bottom

Outline dimensions: FCU8-KB923
Outline dimensions: FCU8-KB924
Outline dimensions: FCU8-KB926
[mm]
290
140
9.5 60
(Space required
for wiring)
Top
Bottom
[mm]
290
140
9.5 60
(Space required

for wiring)
Top
Bottom
[mm]
290
140
9.5 60
(Space required
for wiring)
Top
Bottom

Panel cut dimensions: FCU8-KB921/FCU8-KB922/FCU8-KB925
Panel cut dimensions: FCU8-KB923/FCU8-KB924/FCU8-KB926
[mm]
2480.3
260
247
2460.3
0.5
127
1260.3
1130.3
(7) (7)
(7) (7)
9
13 13
9
(6.5)
3.5 3.5 0.5 (6.5)
6.50.2
10.2
4-M3
140
(6.5)
(6.5)
(Unit outline)
(Unit outline)
(Square hole dimension)
(Square hole
 dimension)
screw
4 - 4 holes
[mm]
2780.3
290
277
2760.3
0.5
127
1260.3
1130.3
(7) (7)
(7) (7)
9
13 13
9
(6.5)
3.5 3.5 0.5 (6.5)
6.50.2
10.2
4-M3
140
(6.5)
(6.5)
(Unit outline)
(Unit outline)
(Square hole dimension)
(Square hole
 dimension)
screw
4 - 4 holes

Letter label dimension: FCU8-KB922/FCU8-KB924
Clear key top
Letter label
(Material: PET or equivalent, t = 0.125 or less)
Example of a letter
12.8 or less
9.8 or less

4.16.2 Sub Panel A (FCU8-KB931/FCU8-KB941)
Outline dimensions: FCU8-KB931
Outline dimensions: FCU8-KB941
Panel cut dimensions: FCU8-KB931/FCU8-KB941
[mm]
140
140
9.5 70
(Space required for
wiring)
Top
Bottom
[mm]
140
140
9.5 70
(Space required for
wiring)
Top
Bottom
[mm]
1280.3
140
127
1260.3
0.5
127
1260.3
1130.3
(7) (7)
(7) (7)
9
13 13
9
(6.5)
3.5 3.5 0.5 (6.5)
6.50.2
10.2
4-M3
140
(Unit outline)
(Unit outline)
(Square hole dimension)
(Square hole
 dimension)
screw
4 - 4 holes

4.17 Handy Terminal
(*1) "Short term" means within one month.
(1) The unit is an IP65F equivalent.
Item
Unit name Handy terminal
Type HG1T-SB12UH-MK1346-L5
General specifica tions
Ambient temperature During operation 0 to 40 C
During storage -20 C to 60 C
Ambient humidity Long term: 10 to 75% RH (with no dew condensation)
Short term: 10 to 95% RH (with no dew condensation) (*1)
Vibration resistance During operation 9.8 m/s2 [1.0 G] or less, 10 to 55 Hz
Shock resistance During storage 98 m/s2 [10.0 G] or less
Working atmosphere No corrosive gases, dust or oil mist
Power specifica tions
Power supply voltage 24 VDC 5% Ripple noise 240 mV (P-P)
Current consumption (max.) 0.2A
Instantaneous stop tolerance time 24 VDC : 4 ms or less
Others Heating value 4 W (max.)
Mass 0.6 kg
Note

(*1) Do not press multiple switches simultaneously: When three or more switches are pressed simultaneously, unpressed switches are also detected as pressed ones.
Dimension and names of parts
No. Name Function/Specification No. Name Function/Specification
(1) LCD Monochrome display with backlight
192 (W) 64 (H) dots (7) HOST Host interface connector
(DDK: 17JE-23250-02(D8A6))
(2) SW1
Emergency stop switch
Contact rating/Contact: 24 VDC, 1A

Contact configuration: 2b contacts
(IDEC Corporation: HA1E-V2S2VR)
(8) - Host interface cable
(5 m)
(3) - Membrane switch (*1) (9) - Simplified hand strap
(IDEC Corporation: HG9Z-PS1)
(4) SW2
Enable switch
Contact rating/Contact: 24 VDC , 50 mA
Contact configuration: 3-position contact 2
(OFF-ON-OFF)
(IDEC Corporation: HE3B-M2)
(10) - Panel mounting bracket
(IDEC Corporation: HG9Z-TK1)
(5) SW4
Manual Pulse Generator
Output: Open collector 4.7 k pull-up resistor is
connected.
(TOKYO SOKUTEIKIZAI CO., LTD:
RE19PH50C16RR)
(11) - Serial number plate
(6) SW6 Selector switch
133
255
90
46.7
38
51
15 11.5
(2)
(5)
(6)
(3)
(1)
(4)
(8)
(7)
(9)
(10) (11)

4.18 Thermistor

4.18 Thermistor
4.18.1 Thermistor(PT3C-51F-M2)
Made by SHIBAURA ELECTRONICS Co., Ltd.
Outline dimensions
Ambient temperature -10 to + 190 C
Insulation resistance 100 M or more at 500 VDC [between case and lead wire]
25010
3
3 12
4.5
[mm]

4.19 Exclusive SD Cards

4.19 Exclusive SD Cards
(*1) SLC stands for Single Level Cell, and it stores one bit data in each memory cell.
This provides longer life span and high product reliability in comparison with MLC (Multi Level Cell) and TLC (Triple
Level Cell), which are commonly applied to SD cards.
(1) Do not touch the terminal part with fingers, etc. when handling the SD cards.
The contamination of the terminal part of SD card causes a contact failure or a trouble.
Item FCU8-SD001G FCU8-SD004G
Capacity 1 GB 4 GB
NAND Flash SLC (*1)
Ambient temperature During operation -25 C to +85 C
During storage -40 C to +85 C
Ambient humidity During operation 5% to 95%RH (with no dew condensation)
During storage 5% to 95%RH (with no dew condensation)
Note

4.20 Specifications and Precautions of USB/SD/LAN Interface

4.20 Specifications and Precautions of USB/SD/LAN Interface
4.20.1 USB Interface (Personal Computer Unit, Side Memory I/F Unit)
(*1) Data transfer speed is the theoretical value on the standard, and the actual speed will be inferior to the value listed
above. The transfer speed may be restrained depending on the specification of the connected device.
(1) Side memory I/F unit is only for 19-type display unit.
Precautions for use of commercially available USB keyboards and mice (Only for the display unit with
the computer.)
Mitsubishi Electric will not provide performance guarantee and maintenance for commercially available USB keyboards and
mice. When any of them is to be used, careful performance check must be required by the machine tool builder.
Commercially available devices may not be compatible with Mitsubishi Electric units or appropriate temperature- or noise wise for the factory automation environment.
Commercially available USB keyboards/mice are susceptible to noise, etc., and may cause a malfunction in the unit that may
lead to an accident. Do not use them while the machine is operated.

Precautions for use of other commercially available USB devices (Only for the display unit with the computer.)

When connecting a commercially available USB device that requires power exceeding the maximum current, select the one of which power can be supplied from an outside source.

Mitsubishi Electric will not provide performance guarantee and maintenance for commercially available USB printer, USB floppy disk, USB memory, USB hub, USB-CD drive, USB-DVD drive, and other USB devices. Commercially available devices may not be compatible with Mitsubishi Electric units or appropriate temperature- or noise-wise for the factory automation environment.

In the case of using one of them, careful performance check must be required by the machine tool builder, and necessary noise countermeasures, such as executing EMI countermeasures or adding the ferrite cores, must be taken.

Precautions for insertion/removal of USB memory

When inserting/removing a USB memory, turn the Mitsubishi Electric device's power OFF. Do not pull out the USB memory or turn OFF the power during access to the USB memory. Failure to observe this could cause the memory contents to be erased.

When inserting/removing a USB memory, be sure to have enough interval to perform that (about 10 seconds or more).

In case of emergency, always perform backups by having your important data duplicate, etc. as Mitsubishi Electric will not guarantee the broken or lost data.

Precaution for operation with front-side USB memory

A USB memory to be used has to be supported USB2.0 Hi-Speed (480 Mbps).

When connecting the USB memory, connect it directly without using the extension cable or USB hub.

Machine vibration may cause the USB memory to fall out depending on environment. Therefore, the operation with the front side USB memory is required to be performed on your own responsibility.

Standards USB3.0 USB2.0

Data transfer speed(*1)

Super Speed (5 Gbps)

High Speed (480 Mbps)

Full Speed (12 Mbps)

Low Speed (1.5 Mbps)

High Speed (480 Mbps)

Full Speed (12 Mbps)

Low Speed (1.5 Mbps)

Power supply to USB de vice

Supply voltage: 5 V 5%

Supply current: Max. 900 mA/port

Supply voltage: 5 V 5%

Supply current: Max. 500 mA/port

(However, max. 200 mA/port for side memory I/F unit)

Number of free ports Personal computer unit 2 Personal computer unit 4, Side memory interface unit 1

Max. cable length 3 m

(For Super Speed. 5 m for up to High Speed)

5 m

Note

Static electricity

Static electricity may cause malfunction of USB memory. Before using the USB memory, make sure to touch a conductive material such as a grounded metal object to discharge static electricity accumulated in human body, etc.

4.20.2 SD Interface (Control Unit, Side Memory I/F Unit)

(*1) SDXC is not supported.

(1) Side memory I/F unit is only for 19-type display unit.

Precautions for use of commercially available SD card

Mitsubishi Electric will not provide performance guarantee and maintenance for commercially available SD card, mini SD card or micro SD card (requires converting adapter). When any of them is to be used, careful performance check must be required by the machine tool builder.

Commercially available devices may not be compatible with Mitsubishi Electric units or suitable FA environment for temperature- or noise-wise.

Precautions for insertion/removal of SD card

When inserting/removing an SD card, turn the Mitsubishi Electric device's power OFF. Do not pull out the card or turn OFF the power during access to the SD card. Failure to observe this could cause the memory contents to be erased.

In case of emergency, always perform backups by having your important data duplicate, etc. as Mitsubishi Electric will not guarantee the broken or lost data.

Static electricity

Static electricity may cause malfunction of SD card. Before using the SD card, make sure to touch a conductive material such as a grounded metal object to discharge static electricity accumulated in human body, etc.

4.20.3 LAN Interface (Control Unit, Personal Computer Unit)

(*1) Data transfer speed is the theoretical value on the standard, and the actual speed will be inferior to the value listed above. The transfer speed may be restrained depending on the specification of the connected device.

(1) When half-duplex communication is made, the response time may become long depending on the connected device. Use full-duplex communication to connect with the opposite device via a switching HUB.

Precautions for selection of LAN cable

Make sure to select the LAN cables which are "category 5e or above" and "shielded". Cable wire material with double shielded, which is appropriate for FA environment, is recommended.

Standards SD/SDHC (*1)

Transfer speed According to the connecting SD card

Maximum capacity 32 GB

Number of free ports Control unit 1, Side memory I/F unit 1

Standards 1000BASE-T/100BASE-TX/10BASE-T 100BASE-TX/10BASE-T

Data transfer speed

(*1)

1000 Mbps/100 Mbps/10 Mbps 100 Mbps/10 Mbps

Number of free ports Control unit (LAN1) 1, Personal computer unit 1 Control unit (LAN3) 1

Max. cable length 100 m 100 m

Note

Note

1 System Basic Configuration (M800VS/M80V Series)

1.1 System Basic Configuration Drawing

1.1 System Basic Configuration Drawing

(1) For the drive unit configuration, refer to the instruction manual of the drive unit you use.

(Control unit is added onto
back of display unit.)
Motor group
Servo/Spindle
drive unit
Manual pulse generator
Manual pulse penerator
Remote I/O unit
Remote I/O unit
Display unit
Operation panel I/O unit
Control unit
(Operation panel I/O unit is added
onto back of keyboard unit.)
Keyboard unit
Synchronous
feed encoder
Note

2 General Connection Diagram (M800VS/M80V Series)

Typical general connection diagrams for respective models are described.
Refer to the following chapters for parts where the connection differs depending on the unit configuration.

2.3 19-type Display Unit
2.4 Connecting an Operation Panel I/O Unit (FCU8-DX834)
2.5 Connecting a Pulse-controlled Inverter (M80V Series)
2.6 Connecting a BiSS Encoder
2.7 Connecting an Image Input Expansion Unit
2.8 Connecting a Laser I/F Unit
2.9 Connecting an EcoMonitorLight

2.1 M800VS Series

2.1 M800VS Series

(*1) For information on how to connect the drive unit, refer to the drive unit's manual.

J395/
J396/
G380
FCUA-R050/054
(1ch)
Field Network
L1 L2 L3
D-AL
MC
DCOUT
FG
ACIN
CP/NFB
MC
ON OFF
MC
MC
CP/NFB
FG
Max.
8 points
EMG J120
J303
J070/071
J303
J100
J030(1ch)
J031(2ch)
EMG
LAN1
SKIP
DCIN
SIO LAN2
FCU8-EX56x

FCU8-EX70x
FRONT
ENC RIO2 CJ71
BL
RIO1
USB_F
SDC_F
USB_B
SDC_B
NCKB
3ch
<G402>
J210
RIO3EXT MPG
5V : J023(1ch)/024(2ch)/025(3ch)
12V : J020(1ch)/021(2ch)/022(3ch)
J350/351
LCD
MENU
KEY
DI:CJ31/33
DO:CJ32/34
RIO1
DCIN
RIO2
J350/351
J350/351
(R2-TM)
G430
J210
FCU8-KB92x FCU8-KB941/KB931
G460
J026(1ch)
J027(2ch)
(*1)
J010 CJ71
FCU8-DX731/DX750/DX760/DX761
DI : CJ37/39
DO : CJ38/40
J460/461
J070/071
J070/071
J210
J210
J070/071
DI:CJ31/33
DO:CJ32/34
RIO1
DCIN
RIO2
DI:CJ31/33
DO:CJ32/34
RIO1
DCIN
RIO2
J350/351
J350/351
J070/071
DI:CJ31/33
DO:CJ32/34
RIO1
DCIN
RIO2
DI:CJ31/33
DO:CJ32/34
RIO1
DCIN
RIO2
J350/351
J350/351
(R2-TM)
(R2-TM)
/
FCU8-EX744 TP
FCU8-KB04x
FCU8-KB083
Wireless
module
Machine operation panel manufactured by Mitsubishi Electric
Drive unit
Control unit
Synchronous feed
encoder
No-fuse breaker (NFB)
AC reactor
Circuit protector (CP)
Ethernet device
Ethernet device

24VDC
RS-232C
device
Function
expansion
unit
Menu key
Display unit
Front memory I/F card Memory mediums
Operation panel I/O unit
Machine
control
relay/contact
Remote I/O unit
24VDC
Keyboard unit
Machine operation panel
made by the machine tool builder Skip signal input
24VDC stabilized
power supply
To the next remote
I/O or terminator
connector
Manual pulse generator
(5V/12V)
Dotted lines indicate the sections prepared by the machine tool builder.
<> Angle brackets indicates attached cable of unit.
Option
relay unit
Handy terminal
24VDC
Manual pulse
generator (5V)
Remote I/O unit
24VDC
Remote I/O unit
24VDC
Remote I/O unit
24VDC
Remote I/O unit
24VDC
To the next remote
I/O or terminator
connector
To the next remote
I/O or terminator
connector
Machine
control
relay/contact
Machine
control
relay/contact
<J50x/J991>
<J473>
<J424>
FCU8-MU551/FCU8-MA551
OPTH1 OPTH2
J395/
J396/
G380 (*1)
FCU8-DX2xx/DX4xx/DX6xx
Add-on
CPU card
Drive unit
10.4-type:FCU8-DU142-31
15-type:FCU8-DU182-31
M800V/M80V Series Specifications Manual (Hardware)
2 General Connection Diagram (M800VS/M80V Series)
2.2 M80V Series
IB-1501611-G 100
2.2 M80V Series
The general connection diagram with smart safety observation function is as below.
Without smart safety observation function, functional safety expansion unit is not installed in the control unit.
(*1) For information on how to connect the drive unit, refer to the drive unit's manual.
(*2) For the 8.4-type display unit, TP connector is not used.
(*3) The safety remote I/O unit is available only when the functional safety expansion unit is mounted.
J395/
J396/
G380
FCUA-R050/054
(1ch)
Field Network
L1 L2 L3
D-AL
MC
DCOUT
FG

ACIN
CP/NFB
MC
ON OFF
MC
MC
CP/NFB
FG
Max.
8 points
EMG J120
J303
J070/071
J303
J100
J030(1ch)
J031(2ch)
EMG
LAN1
SKIP
DCIN
SIO LAN2
FCU8-EX56x
FCU8-EX70x
FRONT
ENC RIO2 CJ71
BL
RIO1
USB_F
SDC_F
USB_B
SDC_B
NCKB
3ch
<G402>
J210
RIO3EXT MPG
5V : J023(1ch)/024(2ch)/025(3ch)
12V : J020(1ch)/021(2ch)/022(3ch)
J350/351
LCD
MENU
KEY
DI:CJ31/33
DO:CJ32/34
RIO1
DCIN
RIO2
J350/351
J350/351
(R2-TM)
G430
J210
FCU8-KB92x FCU8-KB941/KB931
G460
J026(1ch)
J027(2ch)
(*1)
J010 CJ71
FCU8-DX731/DX750/DX760/DX761
DI : CJ37/39
DO : CJ38/40
J460/461
J070/071
J070/071
J210
J210
J070/071
DI:CJ31/33
DO:CJ32/34
RIO1
DCIN
RIO2
DI:CJ31/33
DO:CJ32/34
RIO1
DCIN
RIO2
J350/351
J350/351
J070/071
DI:CJ31/33
DO:CJ32/34
RIO1
DCIN
RIO2
DI:CJ31/33
DO:CJ32/34

RIO1
DCIN
RIO2
J350/351
J350/351
(R2-TM)
(R2-TM)
/
FCU8-EX744 TP
FCU8-KB04x
FCU8-KB083
Wireless
module
Machine operation panel manufactured by Mitsubishi Electric
Drive unit
Control unit
Synchronous feed
encoder
No-fuse breaker (NFB)
AC reactor
Circuit protector (CP)
Ethernet device
Ethernet device
24VDC
RS-232C
device
Function
expansion
unit
Menu key
Display unit
Front memory I/F card Memory mediums
Operation panel I/O unit
Machine
control
relay/contact
Remote I/O unit
24VDC
Keyboard unit
Machine operation panel
made by the machine tool builder Skip signal input
24VDC stabilized
power supply
To the next remote
I/O or terminator
connector
Manual pulse generator
(5V/12V)
Dotted lines indicate the sections prepared by the machine tool builder.
<> Angle brackets indicates attached cable of unit.
Option
relay unit
Handy terminal
24VDC
Manual pulse
generator (5V)
Remote I/O unit
24VDC
Remote I/O unit
24VDC
Remote I/O unit
24VDC
Remote I/O unit
24VDC
To the next remote
I/O or terminator
connector
To the next remote
I/O or terminator
connector
Machine
control
relay/contact
Machine
control
relay/contact
<J493/J50x/J99x>
<J473>
<J424>
FCU8-DX2xx/DX4xx
FCU8-MU521/FCU8-MU522
/DX6xx (*3)
(*2)
FCU8-KB02x
OPTH1
FCU8-EX134
10.4-type:FCU8-DU142-32
15-type:FCU8-DU182-32

Functional
safety
expansion
unit
8.4-type:FCU8-DU122-12

2.3 19-type Display Unit
Dotted lines indicate the sections which is different from the other display units (8.4-type, 10.4-type, and 15-type) in the display unit (19-type).
To connect the 19-type display unit to the CNC, an image input expansion unit is required.
19-type display unit
Other display units (8.4-type, 10.4-type, and 15-type)
BL <J473>
LCD
MENUKEY
TP <J424>
Control unit
Menu key
Display unit
FCU8-EX70x
LCD
FCU8-EX752
Option relay unit
Image input
expansion unit
<J503/J994>
BL <J473>
LCD
MENUKEY
TP <J424>
Control unit
Menu key
Display unit
<J493/J50x/J99x>

2.4 Connecting an Operation Panel I/O Unit (FCU8-DX834)
Dotted lines indicate the sections which is different from the FCU8-DX731/DX750/DX760/DX761 in FCU8-DX834.
FCU8-DX834
FCU8-DX731/DX750/DX760/DX761
CJ71
NCKB
RIO3EXT MPG
J350/351
Control unit
Operation panel I/O unit
Machine operation panel
made by the
machine tool builder
J070/071
J012
RIO3
FCU8-DX834
DI : CG31/33
DO : CG32/34
J350/351
KEYUSB
CJ71
J460/461
DCIN
OPKB
24VDC
CJ71
NCKB
RIO3EXT MPG
J350/351
Control unit
Operation panel I/O unit
Machine operation panel
made by the
machine tool builder
J010
CJ71
FCU8-DX731/DX750/DX760/DX761
DI : CJ37/39
DO : CJ38/40
J460/461

2.5 Connecting a Pulse-controlled Inverter (M80V Series)
Pulse-controlled inverter refers to an inverter capable of controlling spindle operation through pulse train input.

Connect a pulse-controlled inverter to RIO1 and RIO2 of the control unit.
The parts surrounded by the dotted lines in the figures below are different.
(1) When the pulse-controlled inverter is connected, the remote I/O unit cannot be connected to the either of the RIO1 con nector or the RIO2 connector.
Connecting a pulse-controlled inverter
ENC/RIO1/RIO2 when the spindle drive unit is connected
ENC RIO1 RIO2
Control unit
FCUA-R050/054
(1ch)
Synchronous feed
encoder
Spindle motor
Pulse-controlled
inverter
ENC RIO1 RIO2
Control unit
FCUA-R050/054
(1ch)
J070/071
J070/071
J210
J210
J070/071
DI:CJ31/33
DO:CJ32/34
RIO1
DCIN
RIO2
DI:CJ31/33
DO:CJ32/34
RIO1
DCIN
RIO2
J350/351
J350/351
J070/071
DI:CJ31/33
DO:CJ32/34
RIO1
DCIN
RIO2
DI:CJ31/33
DO:CJ32/34
RIO1
DCIN
RIO2
J350/351
J350/351
(R2-TM)
(R2-TM)
Synchronous feed
encoder
Remote I/O unit
24VDC
Remote I/O unit
24VDC
Remote I/O unit
24VDC
Remote I/O unit
24VDC
Machine
control
relay/contact
Machine
control
relay/contact
To the next remote I/O or
terminator connector
To the next remote I/O or
terminator connector
Note
M800V/M80V Series Specifications Manual (Hardware)
2 General Connection Diagram (M800VS/M80V Series)
2.6 Connecting a BiSS Encoder
IB-1501611-G 104
2.6 Connecting a BiSS Encoder
BiSS encoder refers to an encoder compatible with BiSS-C.
Connect the BiSS encoder to the ENC connector and the RIO2 connector of the control unit.
ENC RIO1 RIO2
Control unit
BiSS encoder
M800V/M80V Series Specifications Manual (Hardware)
2 General Connection Diagram (M800VS/M80V Series)
2.7 Connecting an Image Input Expansion Unit
105 IB-1501611-G
2.7 Connecting an Image Input Expansion Unit
Some connections differ depending on the display unit type.
(1) 8.4-type display unit does not support the image input expansion unit.

10.4-type display unit and 15-type display unit
19-type display unit
Connection without the image input expansion unit
BL <J473>
LCD
MENUKEY
TP <J424>
Control unit
Menu key
Display unit
LCD
FCU8-EX752
VIDEOIN VEUSB
HDMI
USB
FCU8-EX70x
<J50x/J991>
Image input
expansion unit
Industrial PC (IPC)
provided by
the machine tool builder
Option relay unit
BL <J473>
LCD
MENUKEY
TP <J424>
Control unit
Menu key
Display unit
LCD
FCU8-EX752
VIDEOIN VEUSB
HDMI
USB
FCU8-EX70x
<J503/J994> Image input
expansion unit
Industrial PC (IPC)
provided by
the machine tool builder
Option relay unit
BL <J473>
LCD
MENUKEY
TP <J424>
<J50x/J991>
Control unit
Menu key
Display unit
Note
M800V/M80V Series Specifications Manual (Hardware)
2 General Connection Diagram (M800VS/M80V Series)
2.8 Connecting a Laser I/F Unit
IB-1501611-G 106
2.8 Connecting a Laser I/F Unit
Connect the laser I/F unit to RIO1 or RIO2 of the control unit.
The following figure shows an example of connecting the laser I/F unit to RIO2.
(1) The laser I/F unit occupies all one channel; therefore, a remote I/O unit cannot be connected before or after the laser I/F unit.
2.9 Connecting an EcoMonitorLight
Connect the EcoMonitorLight to RIO2 of the control unit.
RIO1 RIO2
Control unit
J070/071
J210
J070/071
DI:CJ31/33
DO:CJ32/34
RIO1
DCIN
RIO2
DI:CJ31/33
DO:CJ32/34
RIO1
DCIN
RIO2
J350/351
J350/351
(R2-TM)
J070/071
J210 RIO
IODCIN CONC
J070/071
DCIN
CONA
CONB
FCU8-DX522-001

Remote I/O unit
24VDC
Remote I/O unit
24VDC Machine
control
relay/contact
To the next remote I/O or
terminator connector
Laser I/F unit
24VDC
Laser oscillator
24VDC
Note
RIO2
EcoMonitorLight
Control unit

Classification Type Components Remarks
NC functions and display controller
For M830VS FCU8-MU551
Base control card
Add-on CPU card
Front-side memory I/F card
This unit is not compliant with both Export
Trade Control Order and Foreign Ex change Order.
NC functions and display controller
For M850VS FCU8-MA551
Base control card
Add-on CPU card
Front-side memory I/F card
This unit is not compliant with Export
Trade Control Order, and it is compliant
with Foreign Exchange Order.
Classification Type Components Remarks
NC functions and display controller
For M80V Type B FCU8-MU521 Base control card
Front-side memory I/F card
This unit is not compliant with both Export
Trade Control Order and Foreign Ex change Order.
NC functions and display controller
For M80V Type A FCU8-MU522 Base control card
Front-side memory I/F card
This unit is not compliant with both Export
Trade Control Order and Foreign Ex change Order.
Classification Type Components Remarks
10.4-type color LCD touchscreen
(VGA: 640 x 480)
FCU8-DU142-31 LCD panel
Menu keys
Escutcheon
Base metal plate
Cable
Screw cap set
Front-side memory I/F is normally equipped
with the control unit
15-type color LCD touchscreen
(XGA: 1024 x 768)
FCU8-DU182-31 LCD panel
Menu keys
Escutcheon
Base metal plate
Cable
Screw cap set
Front-side memory I/F is normally equipped
with the control unit
19-type color LCD touchscreen
(SXGA:1280 x 1024)
FCU8-DU194-31 LCD panel
Menu keys
Escutcheon
Base metal plate
Cable
Screw cap set
Front-side memory I/F is normally equipped
with the control unit.

3.4 Display Unit [M80V]
Classification Type Components Remarks
8.4-type color LCD
(VGA: 640 x 480)
FCU8-DU122-12 LCD panel
Menu keys
Escutcheon
Base metal plate
Cable
Screw cap set
Front-side memory I/F is normally equipped
with the control unit
10.4-type color LCD touchscreen
(VGA: 640 x 480)
FCU8-DU142-32 LCD panel
Menu keys
Escutcheon
Base metal plate
Cable
Screw cap set
Front-side memory I/F is normally equipped
with the control unit
15-type color LCD touchscreen
(XGA: 1024 x 768)
FCU8-DU182-32 LCD panel
Menu keys
Escutcheon
Base metal plate
Cable
Screw cap set
Front-side memory I/F is normally equipped
with the control unit
19-type color LCD touchscreen
(SXGA:1280 x 1024)
FCU8-DU194-32 LCD panel
Menu keys
Escutcheon
Base metal plate
Cable
Screw cap set
Front-side memory I/F is normally equipped
with the control unit.
M800V/M80V Series Specifications Manual (Hardware)
3 List of Configuration (M800VS/M80V Series)
3.5 Keyboard Unit [M800VS]
IB-1501611-G 110
3.5 Keyboard Unit [M800VS]
3.6 Keyboard Unit [M80V]
Classification Type Components Remarks
Keyboard for 10.4-type display unit
Clear key
FCU8-KB041 Escutcheon, key switch
G402 cable
Screw cap set
ONG layout (for L system, XZF)
Keyboard for 10.4-type display unit
Clear key
FCU8-KB046 Escutcheon, key switch
G402 cable
Screw cap set
ONG layout (for M system/L system, XYZ)
Keyboard for 10.4-type display unit
Clear key
FCU8-KB047 Escutcheon, key switch
G402 cable
Screw cap set
Full keyboard (for M system/L system) (in tan dem)
Keyboard for 10.4-type display unit
Clear key
FCU8-KB048 Escutcheon, key switch
G402 cable
Screw cap set
ABC layout (for M system/L system)
Keyboard for 15-type display unit
Clear key
FCU8-KB083 Escutcheon, key switch
G402 cable
Screw cap set
Full keyboard (for M system/L system) (in tan dem)
Keyboard for 19-type display unit FCU8-KB091 Escutcheon, key switch
G402 cable
Screw cap set
Full keyboard (QWERTY layout) (in tandem)
Classification Type Components Remarks
Keyboard for 8.4-type display unit
Clear key
FCU8-KB026 Escutcheon, key switch
G402 cable

Screw cap set
ONG layout (for M system/L system, XYZ)
Keyboard for 8.4-type display unit
Clear key
FCU8-KB028 Escutcheon, key switch
G402 cable
Screw cap set
ONG layout (for L system, XZF)
Keyboard for 8.4-type display unit
Clear key
FCU8-KB029 Escutcheon, key switch
G402 cable
Screw cap set
ONG layout (for M system/L system) (in tan dem)
Keyboard for 10.4-type display unit
Clear key
FCU8-KB041 Escutcheon, key switch
G402 cable
Screw cap set
ONG layout (for L system, XZF)
Keyboard for 10.4-type display unit
Clear key
FCU8-KB046 Escutcheon, key switch
G402 cable
Screw cap set
ONG layout (for M system/L system, XYZ)
Keyboard for 10.4-type display unit
Clear key
FCU8-KB047 Escutcheon, key switch
G402 cable
Screw cap set
Full keyboard (for M system/L system) (in tan dem)
Keyboard for 10.4-type display unit
Clear key
FCU8-KB048 Escutcheon, key switch
G402 cable
Screw cap set
ABC layout (for M system/L system)
Keyboard for 15-type display unit
Clear key
FCU8-KB083 Escutcheon, key switch
G402 cable
Screw cap set
Full keyboard (for M system/L system) (in tan dem)
Keyboard for 19-type display unit FCU8-KB091 Escutcheon, key switch
G402 cable
Screw cap set
Full keyboard (QWERTY layout) (in tandem)
M800V/M80V Series Specifications Manual (Hardware)
3 List of Configuration (M800VS/M80V Series)
3.7 Operation Panel I/O Unit
111 IB-1501611-G
3.7 Operation Panel I/O Unit
DI: Digital input signals, DO: Digital output signals
Classification Type Components Remarks
DI 24 V/0 V common input [64 points]
DO Source output [48 points]
AO analog output [1 point]
FCU8-DX731 Base card
RIO 2.0 terminator connector (R2-TM)
DI: 64-point 24 V/0 V common type
DO: 48-point source type (200 mA/point)
AO: 1 point
Manual pulse generator input: 2 ch
Control unit I/F
Keyboard unit I/F
Remote I/O 2.0 I/F
RIO occupied stations (fixed):
1, 3, 7 to 12, 20 to 22
RIO extensible stations:
2, 4 to 6, 13 to 19, 23 to 64
DI 24 V/0 V common input [96 points]
DO Source output [64 points]
FCU8-DX750 Base card
RIO 2.0 terminator connector (R2-TM)
DI: 96-point 24 V/0 V common type
DO: 64-point source type (200 mA/point)
Manual pulse generator input: 3 ch
Control unit I/F
Keyboard unit I/F
Remote I/O 2.0 I/F
RIO occupied stations (fixed):
1 to 3, 7 to 12, 20 to 22
RIO extensible stations:
4 to 6, 13 to 19, 23 to 64
DI 24 V/0 V common input [96 points]
DO Source output [96 points]
FCU8-DX760 Base card

Add-on card
RIO 2.0 terminator connector (R2-TM)
DI: 96-point 24 V/0 V common type
DO: 96-point source type (200 mA/point)
Manual pulse generator input: 3 ch
Control unit I/F
Keyboard unit I/F
Remote I/O 2.0 I/F
RIO occupied stations (fixed):
1 to 4, 7 to 12, 20 to 22
RIO extensible stations:
5, 6, 13 to 19, 23 to 64
DI 24 V/0 V common input [96 points]
DO Source output [64 points]
AI Analog input [1 point]
AO Analog output [1 point]
FCU8-DX761 Base card
Add-on card
RIO 2.0 terminator connector (R2-TM)
DI: 96-point 24 V/0 V common type
DO: 64-point source type (200 mA/point)
AI: 1 point
AO: 1 point
Manual pulse generator input: 3 ch
Control unit I/F
Keyboard unit I/F
Remote I/O 2.0 I/F
RIO occupied stations (fixed):
1 to 5, 7 to 12, 20 to 22
RIO extensible stations:
6, 13 to 19, 23 to 64
DI 24 V/0 V common input [64 points]
DO Source output [64 points]
Scan input [64 points]
Scan output [64 points]
FCU8-DX834 Base card
Add-on card
RIO 2.0 terminator connector (R2-TM)
DI: 64-point 24 V/0 V common type
DO: 64-point source type (200 mA/point)
Scan input: 64 points
Scan output: 64 points
Manual pulse generator input: 3ch
Keyboard unit I/F
Remote I/O 2.0 I/F
RIO occupied stations (fixed):
1 to 4, 7 to 14, 20 to 22
RIO extensible stations:
5, 6, 15 to 19, 23 to 64
M800V/M80V Series Specifications Manual (Hardware)
3 List of Configuration (M800VS/M80V Series)
3.8 Remote I/O Unit
IB-1501611-G 112
3.8 Remote I/O Unit
(*1) Safety DI uses 16 points of terminal because of the duplication wiring.
(*2) Safety relay output uses 8 points of terminal because of the duplication wiring.
(*3) Voltage input, current input, thermocouple input and resistance temperature detector input are selected for each chan nel.
DI: Digital input signals, DO: Digital output signals, AI: Analog input signals, AO: Analog output signals
3.9 Laser I/F Unit
Classification Type Components Remarks
DI 24 V/0 V common input [32 points]
DO Source output [32 points]
FCU8-DX220 Base card
RIO 2.0 connector set
DI: 32-point 24 V/0 V common type
DO: 32-point source type (200 mA/point)
Number of occupied stations: 1
DI 24 V/0 V common input [64 points]
DO Source output [48 points]
FCU8-DX230 Base card
RIO 2.0 connector set
DI: 64-point 24 V/0 V common type
DO: 48-point source type (200 mA/point)
Number of occupied stations: 2
DI 24 V/0 V common input [64 points]
DO Source output [48 points]
AO analog output [1 point]
FCU8-DX231 Base card
RIO 2.0 connector set
DI: 64-point 24 V/0 V common type
DO: 48-point source type (200 mA/point)
AO: 1 point
Number of occupied stations: 2
AI analog input [4 points]
AO analog output [1 point]
FCU8-DX202 Base card
RIO 2.0 connector set
AI: 4 points

AO: 1 point
Number of occupied stations: 1
DI 0 V common input [16 points]
DO Source output (large capacity) [8 points]
FCU8-DX213 Base card
RIO 2.0 connector set
DI: 16-point 0 V common type (3 mA/point)
DO: 8-point source type (2 A/point)
Number of occupied stations: 1
DI 0 V common input [16 points]
DO Source output (large capacity) [8 points]
FCU8-DX213-1 Base card
RIO 2.0 connector set
DI: 16-point 0 V common type (9 mA/point)
DO: 8-point source type (2 A/point)
Number of occupied stations: 1
Safety DI 0 V common input [8 points]
Safety DO Source output (large capacity) [4
points]
FCU8-DX654 Base card
RIO 2.0 connector set
Safety DI: 8-point 0 V common type (3 mA/point)
Safety DO: 4-point source type (2 A/point)
Number of occupied stations: 2
Safety DI 0 V common input [8 points]
Safety DO Source output (large capacity) [4
points]
FCU8-DX654-1 Base card
RIO 2.0 connector set
Safety DI: 8-point 0 V common type (9 mA/point)
Safety DO: 4-point source type (2 A/point)
Number of occupied stations: 2
DI 24 V/0 V common input [32 points]
DO Source output [32 points]
Safety DI 0 V common input [8 points] (*1)
Safety relay output [4 points] (*2)
FCU8-DX651 Base card
Add-on card
RIO 2.0 connector set
DI: 32-point 24 V/0 V common type
DO: 32-point source type (200 mA/point)
Safety DI: 8-point 0 V common type
Safety relay: 4 points (non-voltage contact)
Relay contact welding detection
Number of occupied stations: 3
Thermistor input [12 points] FCU8-DX408 Base card
RIO 2.0 connector set
Thermistor input: 12 points
Number of occupied stations: 3
Multi-analog input [4 points] (*3) FCU8-DX409 Base card
RIO 2.0 connector set
Multi-analog input: 4 points
Number of occupied stations: 4
Classification Type Components Remarks
Laser I/F unit FCU8-DX522-
001
Base card
Connector set
DI: 26-point 0 V common type
DO: 22-point source type (200 mA/point)
PWM: 1 point
Relay: 3 points (1 A/point)
AI: 1 point
AO: 1 point
Remote I/O occupies 1 ch.

3.10 Functional Safety Expansion Unit [M80V]
3.11 Function Expansion Unit
To use the function expansion unit, the option relay unit (FCU8-EX70x) is required.
3.12 Manual Pulse Generator
3.13 Synchronous feed encoder
Classification Type Components Remarks
Functional safety expansion unit FCU8-EX134 Add-on card Smart safety observation
Classification Type Components Remarks
CC-Link expansion unit FCU8-EX561 CC-Link I/F PCB CC-Link 1ch
PROFIBUS-DP master unit FCU8-EX563 PROFIBUS-DP I/F PCB PROFIBUS-DP 1ch
CC-Link IE Field
Master/local unit
FCU8-EX564 Base card
Add-on card
CC-Link IE Field 2 ch
EtherNet/IP
scanner/adapter unit
FCU8-EX565 Base card
Add-on card

EtherNet/IP 1 ch
(LAN1 only; LAN2 unavailable)
FL-net expansion unit FCU8-EX568 Base card
Add-on card
FL-net 1 ch
(LAN1 only; LAN2 unavailable)
CC-Link IE TSN remote unit FCU8-EX569 Base card
Add-on card
CC-Link IE TSN network 1 ch
(LAN1 only; LAN2 unavailable)
Vibration cutting expansion unit FCU8-EX744 Base card Vibration cutting function
Image input expansion unit FCU8-EX752 Base card
Add-on card
Cable holder
19-type display function, Image input
function with IPC (Image input I/F: HD MI)
Classification Type Components Remarks
Option relay unit FCU8-EX704 Relay PCB Function expansion unit for 1 slot
Option relay unit FCU8-EX705 Relay PCB Function expansion unit for 2 slots
Classification Type Components Remarks
5 V manual pulse generator UFO-01-2Z9 UFO-01-2Z9
(Produced by NIDEC NEMICON)
Input: 5 VDC
100 pulse/rev
12 V manual pulse generator HD60C HD60C Input: 12 VDC
25 pulse/rev
Classification Type Components Remarks
Synchronous feed encoder OSE1024-3-15-68 OSE1024-3-15-68
Input: 5 VDC
1024 pulse/rev
6000 rpm, 68-square flange
Synchronous feed encoder OSE1024-3-15-
68-8 OSE1024-3-15-68-8
Input: 5 VDC
1024 pulse/rev
8000 rpm, 68-square flange
Synchronous feed encoder OSE1024-3-15-
160 OSE1024-3-15-160
Input: 5 VDC
1024 pulse/rev
6000 rpm, 160-square flange
M800V/M80V Series Specifications Manual (Hardware)
3 List of Configuration (M800VS/M80V Series)
3.14 Machine Operation Panel
IB-1501611-G 114
3.14 Machine Operation Panel
3.15 Handy Terminal
Classification Type Components Remarks
Main panel A
(For 8.4-type/15-type display unit) FCU8-KB921
Escutcheon, key switch
Control card
G054 cable, screw cap set
Mitsubishi Electric standard key layout
(55 keys) (Standard specification A)
Main panel A
(For 8.4-type/15-type display unit) FCU8-KB922
Escutcheon, key switch
Control card
G054 cable, screw cap set
Custom specification, 55-key layout
(Clear key top cover sold separately)
Main panel B
(For 10.4-type display unit) FCU8-KB923
Escutcheon, key switch
Control card
G054 cable, screw cap set
Mitsubishi Electric standard key layout
(55 keys) (Standard specification A)
Main panel B
(For 10.4-type display unit) FCU8-KB924
Escutcheon, key switch
Control card
G054 cable, screw cap set
Custom specification, 55-key layout
(Clear key top cover sold separately)
Main panel A
(For 8.4-type/15-type display unit) FCU8-KB925
Escutcheon, key switch
Control card
G054 cable, screw cap set
Mitsubishi Electric standard key layout
(55 keys) (Standard specification B)
Main panel B
(For 10.4-type display unit) FCU8-KB926
Escutcheon, key switch
Control card
G054 cable, screw cap set

Mitsubishi Electric standard key layout
(55 keys) (Standard specification B)
Sub panel A
(Common for all display units) FCU8-KB931
Escutcheon
Emergency stop switch, override switch
ON/OFF switch, screw cap set
Mitsubishi Electric standard switch
specification (Standard specification A)
Sub panel A
(Common for all display units) FCU8-KB941
Escutcheon
Emergency stop switch, override switch
ON/OFF switch, screw cap set
Mitsubishi Electric standard switch
specification (Standard specification B)
Clear key top set N030C975G51/
N030C975G55
Clear key top cover (20 pieces/60 piec es)
Set of labels for M7 standard key
layout N939A169G51 Labels for M7 standard key layout (1
sheet)
Classification Type Components Remarks
Handy terminal HG1T-SB12UH MK1346-L5
M800V/M80V Series Specifications Manual (Hardware)
3 List of Configuration (M800VS/M80V Series)
3.16 Cable Connector Sets
115 IB-1501611-G
3.16 Cable Connector Sets
3.17 Thermistor Set
3.18 Genuine Memory Card
3.19 Durable Parts
Contact the Service Center, Sales Office or dealer for repairs or part replacement.
3.20 Replacements
Classification Type Components Remarks
General I/O
(For SKIP, SIO, MPG, AIO)
FCUA-CS000 Connector (10120-3000PE, 2 pcs.)
Shell kit (10320-52F0-008, 2 pcs.)
Emergency stop connector
(For EMG)
005057-9403
0016020103 x 3
pcs.
Connector (50-57-9403),
Contact (0016020103, 3 pcs.)
Connector kit for RIO 2.0 unit RIO2 CON Connector (1-1318119-3, 2 pcs.),
Contact (1318107-1, 8 pcs.),
Connector (2-178288-3),
Contact (1-175218-5, 3 pcs.)
Connector kit for laser I/F RIOL-CON Connector (1-1318119-3, 2 pcs.),
Contact (1318107-1, 8 pcs.),
Connector (2-178288-3, 2 pcs.),
Contact (1-175218-5, 6 pcs.)
24 VDC power supply connector
(For DCIN)
FCUA-CN220 Connector (2-178288-3),
Contact (1-175218-5, 3 pcs.)
DI/DO connector
(For operation panel I/O unit)
(For remote I/O unit)
7940-6500SC x 4
pcs.
3448-7940 x 4
pcs.
Connector (7940-6500SC, 4 pcs.),
Strain relief (3448-7940, 4 pcs.)
FCU8-DX731
DI connector (For operation panel I/
O unit)
7950-6500SC x 2
pcs.
3448-7950 x 2
pcs.
Connector (7950-6500SC, 2 pcs.),
Strain relief (3448-7950, 2 pcs.)
FCU8-DX750/760/761
Connector for CJ71 2-1318119-4
1318107-1 x 8
pcs.
Connector (2-1318119-4),
Contact (1318107-1, 8 pcs.)
THERMISTOR connector 37104-2165-
000FL 10P
Connector (37104-2165-000FL, 10 pcs.)
Classification Type Components Remarks
Thermistor PT3C-51F-M2
10P Thermistor (PT3C-51F-M2, 10 pieces)

Classification Type Components Remarks
Exclusive SD cards for 1 GB FCU8-SD001G FCU8-SD001G 1 GB capacity
Exclusive SD cards for 4 GB FCU8-SD004G FCU8-SD004G 4 GB capacity
Durable parts Part type
Battery for control unit Q6BAT
Replacements Part type Manufacturer
Protection fuse for operation panel I/O unit LM50 Daito Communication Apparatus Co., Ltd.
Protection fuse for FCU8-DX220/230/231/651 LM50 Daito Communication Apparatus Co., Ltd.
Protection fuse for FCU8-DX213/654/213-1/654-1 MP63 Daito Communication Apparatus Co., Ltd.
Protection fuse for FCU8-DX522-001 LM50 Daito Communication Apparatus Co., Ltd.
Pair of SD/USB covers for display unit N031C089G51 -

[Cable relating to NC]
(1) "x" in type columns indicate cable length (unit: m).
(2) Lengths indicated with an asterisk (*) in the "Max. cable length" column indicate the maximum cable length when con necting via other unit.
Type Application Available cable length (m) Max. cable
length
FCUA-R050-xM Wiring between synchronous encoder and control unit (straight, with con nector) 5 30 m
FCUA-R054-xM Wiring between synchronous encoder and control unit (right angle, with
connector) 3, 5, 10, 15, 20 30 m
G071 LxM 24 VDC relay cable for machine operation panel 0.12, 0.5, 1 1 m
G123 Cable for emergency stop release - -
G430 LxM Cable for connection to handy terminal 3, 5, 10 10 m
G460 LxM Cable for machine operation panel
(Cable between main panel and sub panel) 0.5 0.5 m
J010 LxM Operation panel I/O interface cable 0.5, 1 1 m
J012 LxM Operation panel I/O interface cable (for FCU8-DX834) 0.5, 1 1 m
J020 LxM Manual pulse generator cable (12 V): 1 ch 1, 2, 3, 5, 7, 10, 15, 20, 30 50 m
J021 LxM Manual pulse generator cable (12 V): 2 ch 1, 2, 3, 5, 7, 10, 15, 20, 30 50 m
J022 LxM Manual pulse generator cable (12 V): 3 ch 1, 2, 3, 5, 7, 10, 15, 20, 30 50 m
J023 LxM Manual pulse generator cable (5 V): 1 ch 1, 2, 3, 5, 7, 10, 15, 20 20 m
J024 LxM Manual pulse generator cable (5 V): 2 ch 1, 2, 3, 5, 7, 10, 15, 20 20 m
J025 LxM Manual pulse generator cable (5 V): 3 ch 1, 2, 3, 5, 7, 10, 15, 20 20 m
J026 LxM Manual pulse generator cable (5 V): 1 ch
(For connection to control unit) 1, 2, 3, 5, 7, 10, 15, 20 20 m (*)
J027 LxM Manual pulse generator cable (5 V): 2 ch
(For connection to control unit) 1, 2, 3, 5, 7, 10, 15, 20 20 m (*)
J030 LxM RS-232C I/F cable: 1 ch 1, 2, 3, 5, 7, 10 15 m (*)
J031 LxM RS-232C I/F cable: 2 ch 1, 2, 3, 5, 7, 10 15 m (*)
J070 LxM 24 VDC power cable 1, 2, 3, 5, 7, 10, 15 15 m
J071 LxM 24 VDC power cable (for long distance) 20 20 m
J100 LxM SKIP input cable 1, 2, 3, 5, 7, 10, 15, 20 20 m
J120 LxM Emergency stop cable 1, 2, 3, 5, 7, 10, 15, 20, 30 30 m
J121 LxM Emergency stop cable for machine operation panel 1, 2, 3, 5, 7, 10, 15, 20, 30 30 m
J210 LxM Remote I/O 2.0 communication cable 0.3, 1, 2, 3, 5, 7, 10, 15, 20, 30 50 m
J221 LxM Analog input/output cable (for remote I/O unit) 2, 3, 7 30 m
J224 LxM Analog input/output cable (for operation panel I/O unit) 1, 2, 3, 5, 7, 10, 15, 20 30 m
J225 LxM Analog output cable (for operation panel I/O unit) 1, 2, 3, 5, 7, 10, 15, 20 30 m
J303 LxM LAN straight cable 1, 2, 3, 5, 7, 10, 15, 20, 30 50 m
J350 LxM DI/DO cable (connectors at both ends) 1, 2, 3, 5 50 m
J351 LxM DI/DO cable (connector at one end) 3 50 m
J460 LxM DI/DO cable (connectors at both ends) 1, 2, 3, 5 50 m
J461 LxM DI/DO cable (connector at one end) 3 50 m
R2-TM Terminator for remote I/O interface - -
Note

[Cable Relating to Drive Unit]
(1) "x" in type columns indicate cable length (unit: m).
(2) Lengths indicated with an asterisk (*) in the "Max. cable length" column indicate the maximum cable length when con necting via other unit.
Type Application Available cable length (m) Max. cable
length
CNP2E-1-xM
Motor side PLG cable
Spindle side accuracy encoder
TS5690 cable
2, 3, 4, 5, 7, 10, 15, 20, 25, 30 30 m
CNP3EZ-2P-xM Spindle side detector cable
OSE-1024 cable 2, 3, 4, 5, 7, 10, 15, 20, 25, 30 30 m
CNP3EZ-3P-xM Spindle side detector cable
OSE-1024 cable 2, 3, 4, 5, 7, 10, 15, 20, 25, 30 30 m
CNV2E-8P-xM
For HG/HG-H, HQ-H, HK/HK-H, HG-JR
Motor side encoder cable (for D47/D48/D51/D74/G48)
Ball screw side encoder cable (OSA405ET2AS, OSA676ET2AS)
2, 3, 4, 5, 7, 10, 15, 20, 25, 30 30 m
CNV2E-9P-xM
For HG/HG-H, HQ-H, HK/HK-H, HG-JR
Motor side encoder cable (for D47/D48/D51/D74/G48)
Ball screw side encoder cable (OSA405ET2AS, OSA676ET2AS)
2, 3, 4, 5, 7, 10, 15, 20, 25, 30 30 m
CNV2E-D-xM MDS-B-SD unit cable 2, 3, 4, 5, 7, 10, 15, 20, 25, 30 30 m

CNV2E-HP-xM MDS-EX-HR unit cable 2, 3, 4, 5, 7, 10, 15, 20, 25, 30 30 m
DG30-xM Battery cable
(for wiring between drive unit and battery box, between drive units) 0.3, 0.5, 1, 2, 3, 5, 7, 10 10 m
G380 LxM Optical communication cable
Wiring between drive units (outside panel) 5, 10, 12, 15, 20, 25, 30 30 m
J395 LxM
Optical communication cable
Wiring between drive units (outside panel)
Wiring between NC and-drive unit
3, 5, 7, 10 10 m
J396 LxM Optical communication cable
Wiring between drive units (inside panel) 0.2, 0.3, 0.5, 1, 2, 3, 5 10 m
MR-BKS1CBLx MA1-H
<200V Series>
Brake cable for HG96
load side angle
2, 3, 5, 7, 10 10 m
MR-BKS1CBLx MA2-H
<200V Series>
Brake cable for HG96
reverse load side angle
2, 3, 5, 7, 10 10 m
MR-BT6V2CBL
LxM
Battery cable (MDS-EJ/EJH)
(for wiring between drive units) 0.3, 1 1 m
MR-D05UDL3M-B STO cable 3 3 m
MR-ENE4CBLxM H-MTH For HG-H1502 Motor side encoder cable (for D48/D51/D74) 5, 10, 20, 30 30 m
MR-PWS1CBLx MA1-H
<200V Series>
Power cable for HG96
load side angle
2, 3, 5, 7, 10 10 m
MR-PWS1CBLx MA2-H
<200V Series>
Power cable for HG96
reverse load side angle
2, 3, 5, 7, 10 10 m
SH21 LxM Power supply communication cable
Backup unit communication cable 0.35, 0.5, 1, 2, 3 30 m
Note

Series Model name System type Control unit Display unit
M800VS Series M850VS FCA850H-9SV FCU8-MA551-001 FCU8-DU194-31 (19-type color LCD touchscreen)
FCA850H-8SV FCU8-DU182-31 (15-type color LCD touchscreen)
FCA850H-4SV FCU8-DU142-31 (10.4-type color LCD touchscreen)
M830VS FCA830H-9SV FCU8-MU551-001 FCU8-DU194-31 (19-type color LCD touchscreen)
FCA830H-8SV FCU8-DU182-31 (15-type color LCD touchscreen)
FCA830H-4SV FCU8-DU142-31 (10.4-type color LCD touchscreen)
M80V Series M80V TypeA FCA80H-9AV FCU8-MU522-001 FCU8-DU194-32 (19-type color LCD touchscreen)
FCA80H-8AV FCU8-DU182-32 (15-type color LCD touchscreen)
FCA80H-4AV FCU8-DU142-32 (10.4-type color LCD touchscreen)
FCA80P-2AV FCU8-DU122-12 (8.4-type color LCD)
M80V TypeB FCA80H-9BV FCU8-MU521-001 FCU8-DU194-32 (19-type color LCD touchscreen)
FCA80H-8BV FCU8-DU182-32 (15-type color LCD touchscreen)
FCA80H-4BV FCU8-DU142-32 (10.4-type color LCD touchscreen)
FCA80P-2BV FCU8-DU122-12 (8.4-type color LCD)

4
General Specifications (M800VS/M80V Series)

4.1.1 Installation Environment Conditions
(*1) "Short term" means roughly within one month.
(*2) The current consumption of the display unit is included in that of the control unit.
(1) For the whole NC system, consider the characteristics of the drive units when the altitude is more than 1000 meters above sea level.
Refer to the manual of drive unit for details.
(2) When the display unit is mounted on an incline, the inclination angle to place the unit should be 30 degrees or less from the vertical direction.
Item
Unit name Control unit Display unit
Type FCU8-MU551/MA551
FCU8-DU142-31: (10.4-type)
FCU8-DU182-31: (15-type)
FCU8-DU194-31: (19-type)
General
specifica tions
Ambient
tempera ture
During op eration

0 C to 58 C
During
storage
-20 C to 60 C
Ambient
humidity
Long term 10% to 75% RH (with no dew condensation)
Short term 10% to 95% RH (with no dew condensation) (*1)
Vibration resistance 4.9 m/s2 or less
Shock resistance 29.4 m/s2 or less
Working atmosphere No corrosive gases, dust or oil mist
Altitude Operation/Storage: 1000 meters or less above sea level, Transportation: 13000 meters or less
above sea level
Power supply voltage
24 VDC FCU8-DU142-31: 12 VDC/5 VDC/3.3 VDC
FCU8-DU182-31: 12 VDC/5 VDC/3.3 VDC
FCU8-DU194-31: 12 VDC/5 VDC/3.3 VDC
(Supply from control unit)
Current consumption 2.5 A - (*2)
Maximum
heating val ue
(W)
16 FCU8-DU142-31: 10
FCU8-DU182-31: 14
FCU8-DU194-31: 33
Mass (kg)
1.1 FCU8-DU142-31: 1.7
FCU8-DU182-31: 4.1
FCU8-DU194-31: 5.5
Outline di mensions
W H
or
W H D
(mm)
239.1 173.4 75 FCU8-DU142-31: 290 220
FCU8-DU182-31: 400 320
FCU8-DU194-31: 475 400
Note
M800V/M80V Series Specifications Manual (Hardware)
4 General Specifications (M800VS/M80V Series)
4.1 Environment Conditions [M800VS]
121 IB-1501611-G
(*1) "Short term" means roughly within one month.
(*2) The current consumption of the keyboard unit and the operation panel I/O unit (control section) are included in that of the
control unit. Current consumption for the I/O circuit needs to be separately calculated based on the number of points
used and its load.
(*3) For the heating value of the I/O circuit, calculate with the number of points used.
(*4) 24 V power input is not required for FCU8-KB931/KB941.
(*5) Current consumption for the I/O circuit needs to be separately calculated based on the number of points used and its
load.
(1) For the whole NC system, consider the characteristics of the drive units when the altitude is more than 1000 meters
above sea level.
Refer to the manual of drive unit for details.
Item
Unit name Keyboard unit Operation panel I/O unit Machine operation panel
Type
FCU8-KB041/KB046: (10.4-type)
FCU8-KB047: (10.4-type/vertical
arrangement)
FCU8-KB048: (10.4-type)
FCU8-KB083: (15-type/vertical
arrangement)
FCU8-KB091: (19-type/vertical
arrangement)
FCU8-DX731
FCU8-DX750
FCU8-DX760
FCU8-DX761
FCU8-DX834
FCU8-KB921/KB922/
KB925
FCU8-KB923/KB924/
KB926
FCU8-KB931/KB941
General
specifica tions
Ambient
tempera ture
During op eration
0 C to 58 C
During
storage
-20 C to 60 C
Ambient
humidity
Long term 10% to 75% RH (with no dew condensation)
Short term 10% to 95% RH (with no dew condensation) (*1)
Vibration resistance 4.9 m/s2 or less

Shock resistance 29.4 m/s2 or less
Working atmosphere No corrosive gases, dust or oil mist
Altitude Operation/Storage: 1000 meters or less above sea level, Transportation: 13000 meters or less above
sea level
Power supply voltage 5 VDC 5 VDC/3.3 VDC 24 VDC 24 VDC (*4)
(Supply from control unit)
Current consumption - (*2) 0.3 A (*5) 0.3 A (*4)
Maximum
heating val ue
(W)
1 4 (*3) 8 (*3) 7.2
Mass (kg)
FCU8-KB041/KB046: 0.8
FCU8-KB047: 1.3
FCU8-KB048: 1.4
FCU8-KB083: 1.5
FCU8-KB091: 1.6
FCU8-DX731: 0.3
FCU8-DX750: 0.4
FCU8-DX760: 0.5
FCU8-DX761: 0.5
0.4 FCU8-KB921/KB922/
KB925: 1.1
FCU8-KB923/KB924/
KB926: 1.2
FCU8-KB931/KB941: 0.5
Outline di mensions
W H
(mm)
FCU8-KB041/KB046: 140 220
FCU8-KB047: 290 160
FCU8-KB048: 230 220
FCU8-KB083: 400 140
FCU8-KB091: 475 120
116 179 FCU8-KB921/KB922/
KB925: 260 140
FCU8-KB923/KB924/
KB926: 290 140
FCU8-KB931/KB941:
140 140
Note
M800V/M80V Series Specifications Manual (Hardware)
4 General Specifications (M800VS/M80V Series)
4.1 Environment Conditions [M800VS]
IB-1501611-G 122
(*1) "Short term" means roughly within one month.
(*2) This value includes the maximum value of DO external load current (3.2 A).
(*3) This value does not include DO external load current.
(*4) For the heating value of the I/O circuit, calculate with the number of points used.
(*5) The maximum value including the heating value of analog input circuit.
(1) For the whole NC system, consider the characteristics of the drive units when the altitude is more than 1000 meters
above sea level.
Refer to the manual of drive unit for details.
Item
Unit name Remote I/O unit
Type FCU8-DX220/
DX230/DX231 FCU8-DX202
FCU8-DX213/
DX213-1/
DX654/
DX654-1
FCU8-DX408 FCU8-DX409 FCU8-DX651
General spec ifications
Ambient
temperature
During op eration
0 C to 58 C
During
storage
-20 C to 60 C
Ambient hu midity
Long term 10% to 75% RH (with no dew condensation)
Short term
10% to 95% RH (with no dew condensation) (*1) 10% to 85% RH
(with no dew con densation) (*1)
Vibration resistance 4.9 m/s2 or less
Shock resistance 29.4 m/s2 or less
Working atmosphere No corrosive gases, dust or oil mist
Altitude Operation/Storage: 1000 meters or less above sea level, Transportation: 13000 meters or less
above sea level
Power supply voltage 24 VDC
Current consumption 3.5 A (*2) 0.3 A 0.3 A (*3) 0.1 A 0.2 A 3.7 A (*2)
Maximum
heating val ue
(W)
8 (*4) 3 6 (*5) 8 (*4)
Mass (kg) 0.4 0.2 0.3 0.8
Outline di mensions

W H D
(mm)
40 175 133 40 175 119 40 175 130 40 175 109 40 175 130 104 175 115
Note

(*1) "Short term" means roughly within one month.
(*2) This value does not include DO external load current.
(*3) For the heating value of the I/O circuit, calculate with the number of points used.
(*4) The maximum value including the heating value of analog input circuit.
(1) For the whole NC system, consider the characteristics of the drive units when the altitude is more than 1000 meters above sea level.
Refer to the manual of drive unit for details.
Item
Unit name Laser I/F unit
Type FCU8-DX522-001
General spec ifications
Ambient
temperature
During op eration
0 C to 58 C
During
storage
-20 C to 60 C
Ambient hu midity
Long term 10% to 75% RH (with no dew condensation)
Short term 10% to 95% RH (with no dew condensation) (*1)
Vibration resistance 4.9 m/s2 or less
Shock resistance 29.4 m/s2 or less
Working atmosphere No corrosive gases, dust or oil mist
Altitude Operation/Storage: 1000 meters or less above sea level, Transportation: 13000 meters or less above sea level
Power supply voltage 24 VDC
Current consumption 0.3 A (*2)
Maximum
heating val ue
(W)
8 (*3)(*4)
Mass (kg) 0.4
Outline di mensions
W H D
(mm)
40 175 133
Note

4.1.2 24 VDC Stabilized Power Supply Selecting Conditions
Consider the following characteristics for the stabilized power supply, and select the power supply that complies with laws, regulations, or safety standards of the country where the machine will be installed.
Item Specifications Remarks
Output
Voltage 24 VDC
When the stabilized power supply and 24 VDC input unit are distant, select the stabilized power supply which is possible to set output voltage 24 VDC or more allowing for the influ ence of voltage down by the cable.
Voltage fluctuation 5%
Current - Calculate the current value as a reference of maximum current consumption for the unit which uses the power supply.
Ripple noise 0.2 V (P-P)
Output holding
time min 20ms Output holding time is decided by loading ratio; however, the stabilized power supply which complies with the specification on the left must be selected during maximum loading.
Overcurrent output
shutoff function - Use a power supply having the overcurrent output shutoff function.
CAUTION
Using a stabilized power supply without overcurrent protection may cause the unit's failure due to miswiring of 24 V.

4.2 Environment Conditions [M80V]
4.2.1 Installation Environment Conditions
(*1) "Short term" means roughly within one month.
(*2) The current consumption of the display unit is included in that of the control unit.
(1) For the whole NC system, consider the characteristics of the drive units when the altitude is more than 1000 meters above sea level.
Refer to the manual of drive unit for details.
(2) When the display unit is mounted on an incline, the inclination angle to place the unit should be 30 degrees or less from the vertical direction.
Item
Unit name Control unit Display unit
Type FCU8-MU521/MU522
FCU8-DU122-12: (8.4-type)
FCU8-DU142-32: (10.4-type)
FCU8-DU182-32: (15-type)

FCU8-DU194-32: (19-type)
General
specifica tions
Ambient
tempera ture
During op eration
0 C to 58 C
During
storage
-20 C to 60 C
Ambient
humidity
Long term 10% to 75% RH (with no dew condensation)
Short term 10% to 95% RH (with no dew condensation) (*1)
Vibration resistance 4.9 m/s2 or less
Shock resistance 29.4 m/s2 or less
Working atmosphere No corrosive gases, dust or oil mist
Altitude Operation/Storage: 1000 meters or less above sea level, Transportation: 13000 meters or less
above sea level
Power supply voltage
24 VDC FCU8-DU122-12: 12 VDC/3.3 VDC
FCU8-DU142-32: 12 VDC/5 VDC/3.3 VDC
FCU8-DU182-32: 12 VDC/5 VDC/3.3 VDC
FCU8-DU194-32: 12 VDC/5 VDC/3.3 VDC
(Supplied from control unit)
Current consumption 2.5 A - (*2)
Maximum
heating val ue
(W)
12 FCU8-DU122-12: 8
FCU8-DU142-32: 10
FCU8-DU182-32: 14
FCU8-DU194-32: 33
Mass (kg)
1.1 FCU8-DU122-12: 1.2
FCU8-DU142-32: 1.7
FCU8-DU182-32: 4.1
FCU8-DU194-32: 5.5
Outline di mensions
W H
or
W H D
(mm)
239.1 173.4 75 FCU8-DU122-12: 260 200
FCU8-DU142-32: 290 220
FCU8-DU182-32: 400 320
FCU8-DU194-32: 475 400
Note
M800V/M80V Series Specifications Manual (Hardware)
4 General Specifications (M800VS/M80V Series)
4.2 Environment Conditions [M80V]
IB-1501611-G 126
(*1) "Short term" means roughly within one month.
(*2) The current consumption of the keyboard unit and the operation panel I/O unit (control section) are included in that of the
control unit. Current consumption for the I/O circuit needs to be separately calculated based on the number of points
used and its load.
(*3) For the heating value of the I/O circuit, calculate with the number of points used.
(*4) 24 V power input is not required for FCU8-KB931/KB941.
(*5) Current consumption for the I/O circuit needs to be separately calculated based on the number of points used and its
load.
(1) For the whole NC system, consider the characteristics of the drive units when the altitude is more than 1000 meters
above sea level.
Refer to the manual of drive unit for details.
Item
Unit name Keyboard unit Operation panel I/O unit Machine operation panel
Type
FCU8-KB026/KB028: (8.4-type)
FCU8-KB029: (8.4-type/vertical
arrangement)
FCU8-KB041/KB046: (10.4-type)
FCU8-KB047: (10.4-type/verti cal arrangement)
FCU8-KB048: (10.4-type)
FCU8-KB083: (15-type/vertical
arrangement)
FCU8-KB091: (19-type/vertical
arrangement)
FCU8-DX731
FCU8-DX750
FCU8-DX760
FCU8-DX761
FCU8-DX834
FCU8-KB921/KB922/KB925
FCU8-KB923/KB924/KB926
FCU8-KB931/KB941
General
specifica tions
Ambient
tempera ture

During op eration
0 C to 58 C
During
storage
-20 C to 60 C
Ambient
humidity
Long term 10% to 75% RH (with no dew condensation)
Short term 10% to 95% RH (with no dew condensation) (*1)
Vibration resistance 4.9 m/s2 or less
Shock resistance 29.4 m/s2 or less
Working atmosphere No corrosive gases, dust or oil mist
Altitude Operation/Storage: 1000 meters or less above sea level, Transportation: 13000 meters or less above
sea level
Power supply voltage 5 VDC 5 VDC/3.3 VDC 24 VDC 24 VDC (*4)
(Supply from control unit)
Current consumption - (*2) 0.3 A (*5) 0.3 A (*4)
Maximum
heating val ue
(W)
1 4 (*3) 8 (*3) 7.2
Mass (kg)
FCU8-KB026/KB028: 0.75
FCU8-KB029: 1.0
FCU8-KB041/KB046: 0.8
FCU8-KB047: 1.3
FCU8-KB048: 1.4
FCU8-KB083: 1.5
FCU8-KB091: 1.6
FCU8-DX731: 0.3
FCU8-DX750: 0.4
FCU8-DX760: 0.5
FCU8-DX761: 0.5
0.4 FCU8-KB921/KB922/KB925:
1.1
FCU8-KB923/KB924/KB926:
1.2
FCU8-KB931/KB941:
0.5
Outline di mensions
W H
(mm)
FCU8-KB026/KB028: 140 200
FCU8-KB029: 260 140
FCU8-KB041/KB046: 140 220
FCU8-KB047: 290 160
FCU8-KB048: 230 220
FCU8-KB083: 400 140
FCU8-KB091: 475 120
116 179 FCU8-KB921/KB922/KB925:
260 140
FCU8-KB923/KB924/KB926:
290 140
FCU8-KB931/KB941:
140 140
Note
M800V/M80V Series Specifications Manual (Hardware)
4 General Specifications (M800VS/M80V Series)
4.2 Environment Conditions [M80V]
127 IB-1501611-G
(*1) "Short term" means roughly within one month.
(*2) This value includes the maximum value of DO external load current (3.2 A).
(*3) This value does not include DO external load current.
(*4) For the heating value of the I/O circuit, calculate with the number of points used.
(*5) The maximum value including the heating value of analog input circuit.
(1) For the whole NC system, consider the characteristics of the drive units when the altitude is more than 1000 meters
above sea level.
Refer to the manual of drive unit for details.
Item
Unit name Remote I/O unit
Type FCU8-DX220/
DX230/DX231 FCU8-DX202
FCU8-DX213/
DX213-1/
DX654/
DX654-1
FCU8-DX408 FCU8-DX409 FCU8-DX651
General spec ifications
Ambient
temperature
During op eration
0 C to 58 C
During
storage
-20 C to 60 C
Ambient hu midity
Long term 10% to 75% RH (with no dew condensation)
Short term

10% to 95% RH (with no dew condensation) (*1) 10% to 85% RH
(with no dew con densation) (*1)
Vibration resistance 4.9 m/s2 or less
Shock resistance 29.4 m/s2 or less
Working atmosphere No corrosive gases, dust or oil mist
Altitude Operation/Storage: 1000 meters or less above sea level, Transportation: 13000 meters or less
above sea level
Power supply voltage 24 VDC
Current consumption 3.5 A (*2) 0.3 A 0.3 A (*3) 0.1 A 0.2 A 3.7 A (*2)
Maximum
heating val ue
(W)
8 (*4) 3 6 (*5) 8 (*4)
Mass (kg) 0.4 0.2 0.3 0.8
Outline di mensions
W H D
(mm)
40 175 133 40 175 119 40 175 130 40 175 109 40 175 130 104 175 115
Note
M800V/M80V Series Specifications Manual (Hardware)
4 General Specifications (M800VS/M80V Series)
4.2 Environment Conditions [M80V]
IB-1501611-G 128
(*1) "Short term" means roughly within one month.
(*2) This value does not include DO external load current.
(*3) For the heating value of the I/O circuit, calculate with the number of points used.
(*4) The maximum value including the heating value of analog input circuit.
(1) For the whole NC system, consider the characteristics of the drive units when the altitude is more than 1000 meters
above sea level.
Refer to the manual of drive unit for details.
Item
Unit name Laser I/F unit
Type FCU8-DX522-001
General spec ifications
Ambient
temperature
During op eration
0 C to 58 C
During
storage
-20 C to 60 C
Ambient hu midity
Long term 10% to 75% RH (with no dew condensation)
Short term 10% to 95% RH (with no dew condensation) (*1)
Vibration resistance 4.9 m/s2 or less
Shock resistance 29.4 m/s2 or less
Working atmosphere No corrosive gases, dust or oil mist
Altitude Operation/Storage: 1000 meters or less above sea level, Transportation: 13000 meters or less
above sea level
Power supply voltage 24 VDC
Current consumption 0.3 A (*2)
Maximum
heating val ue
(W)
8 (*3)(*4)
Mass (kg) 0.4
Outline di mensions
W H D
(mm)
40 175 133
Note
M800V/M80V Series Specifications Manual (Hardware)
4 General Specifications (M800VS/M80V Series)
4.2 Environment Conditions [M80V]
129 IB-1501611-G
4.2.2 24 VDC Stabilized Power Supply Selecting Conditions
Consider the following characteristics for the stabilized power supply, and select the power supply that complies with laws,
regulations, or safety standards of the country where the machine will be installed.
Item Specifications Remarks
Output
Voltage 24 VDC
When the stabilized power supply and 24 VDC input unit are distant, select the stabilized
power supply which is possible to set output voltage 24 VDC or more allowing for the influ ence of voltage down by the cable.
Voltage fluctuation 5%
Current - Calculate the current value as a reference of maximum current consumption for the unit
which uses the power supply.
Ripple noise 0.2 V (P-P)
Output holding
time min 20ms Output holding time is decided by loading ratio; however, the stabilized power supply which
complies with the specification on the left must be selected during maximum loading.
Overcurrent output
shutoff function - Use a power supply having the overcurrent output shutoff function.
CAUTION
Using a stabilized power supply without overcurrent protection may cause the unit's failure due to miswiring of 24 V.
M800V/M80V Series Specifications Manual (Hardware)
4 General Specifications (M800VS/M80V Series)
4.3 Control Unit [M800VS]
IB-1501611-G 130

4.3 Control Unit [M800VS]
4.3.1 FCU8-MU551 / FCU8-MA551
Outline dimensions
[mm]
47
156
172.4
173.4
90
28
214.5
241.6
208
13.5
6
6
M800V/M80V Series Specifications Manual (Hardware)
4 General Specifications (M800VS/M80V Series)
4.4 Control Unit [M80V]
131 IB-1501611-G
4.4 Control Unit [M80V]
4.4.1 FCU8-MU521 / FCU8-MU522
Outline dimensions
[mm]
47
156
172.4
173.4
90
28
214.5
241.6
208
13.5
6
6
M800V/M80V Series Specifications Manual (Hardware)
4 General Specifications (M800VS/M80V Series)
4.5 Display Unit [M800VS]
IB-1501611-G 132
4.5 Display Unit [M800VS]
4.5.1 10.4-type (FCU8-DU142-31)
(1) The figure above shows the state with the control unit mounted.
Outline dimensions
Option relay unit
not mounted
Option relay unit
FCU8-EX704 mounted
Option relay unit
FCU8-EX705 mounted
A
(Space required for wiring) 110 114
Panel cut dimensions
290
220
9.5
[mm]
A
(Space required for wiring)
Top
Bottom
Note
0.5
2060.3
1920.3
2760.3
20.2
(7) (7) 12 12
[mm]
290
277
207
220
2720.3
7 7
(7) (7)
70.2
4-C 2
4-M3
0.5
(Unit outline)
(Unit outline)
(Square hole dimension)
(Square hole dimension)
screw
4 - 4 holes
M800V/M80V Series Specifications Manual (Hardware)
4 General Specifications (M800VS/M80V Series)

4.5.2 15-type (FCU8-DU182-31)
(1) The figure above shows the state with the control unit mounted.
Outline dimensions
Option relay unit
not mounted
Option relay unit
FCU8-EX704 mounted
Option relay unit
FCU8-EX705 mounted
A
(Space required for wiring) 110 114
400
320
9.5
[mm]
A
(Space required
for wiring)
Top
Bottom
Note

Panel cut dimensions
0.5
1930.3
1380.3
3020.3
1530.3
1930.3
193.5
80.2 80.2
20.2
(7) (7)
12 12
[mm]
a
a a a
a
a
a a a a
b
b b
b
b
b
b
b
400
387
307
320
1990.3 1830.3
1530.3
1540.3
18
5
7 7
13
26
7
(7) (7)
70.2
12-C 2
8-M3
(Unit outline)
(Unit outline)
(Square hole dimension)
(Square hole dimension)
10 - 4 holes
screw

4.5.3 19-type (FCU8-DU194-31)
(1) The figure above shows the state with the control unit mounted.
Outline dimensions
Option relay unit
not mounted
Option relay unit
FCU8-EX704 mounted
Option relay unit
FCU8-EX705 mounted

A
(Space required for wiring) 110 114
475
400
9.5
[mm]
A
(Space required
for wiring)
Top
Bottom
Note

Panel cut dimensions (Unit outline)
screw
10 - 4 holes
(Unit outline)
(Square hole dimension)
(Square hole dimension)
220.50.3
230.50.3
1930.3
3820.3
1940.3
(7)
(7) (7)
[mm]
230.50.3
236.50.3
80.2
1930.3
1780.3
80.2
13
26
7 7
(7)
12
20.2
70.2
12 5
18
0.5
7
231
12-C2
400
387
475
462
8-M3

4.6 Display Unit [M80V]
4.6.1 8.4-type (FCU8-DU122-12)
(1) The 8.4-type display unit is incompatible with the touchscreen.
(2) The figure above shows the state with the control unit mounted.
Outline dimensions
Option relay unit
not mounted
Option relay unit
FCU8-EX704 mounted
Option relay unit
FCU8-EX705 mounted
A
(Space required for wiring) 110 114
Panel cut dimensions
260
200
9.5
[mm]
A
(Space required for wiring)
Top
Bottom
Note
0.5
1860.3
1720.3
2460.3
20.2
(7) (7) 12 12
[mm]

260
247
187
200
2420.3
7 7
(7) (7)
70.2
4-C 2
4-M3
0.5
(Unit outline)
(Unit outline)
(Square hole dimension)
(Square hole dimension)
screw
4 - 4 holes

4.6.2 10.4-type (FCU8-DU142-32)
(1) The figure above shows the state with the control unit mounted.
Outline dimensions
Option relay unit
not mounted
Option relay unit
FCU8-EX704 mounted
Option relay unit
FCU8-EX705 mounted
A
(Space required for wiring) 110 114
Panel cut dimensions
290
220
9.5
[mm]
A
(Space required for wiring)
Top
Bottom
Note
0.5
2060.3
1920.3
2760.3
20.2
(7) (7) 12 12
[mm]
290
277
207
220
2720.3
7 7
(7) (7)
70.2
4-C 2
4-M3
0.5
(Unit outline)
(Unit outline)
(Square hole dimension)
(Square hole dimension)
screw
4 - 4 holes

4.6.3 15-type (FCU8-DU182-32)
(1) The figure above shows the state with the control unit mounted.
Outline dimensions
Option relay unit
not mounted
Option relay unit
FCU8-EX704 mounted
Option relay unit
FCU8-EX705 mounted
A
(Space required for wiring) 110 114
400
320
9.5
[mm]
A
Top
Bottom

(Space required
for wiring)
Note

Panel cut dimensions
0.5
1930.3
1380.3
3020.3
1530.3
1930.3
193.5
80.2 80.2
20.2
(7) (7)
12 12
[mm]
a
a a a
a
a
a a a a
b
b b
b
b
b
b
b
400
387
307
320
1990.3 1830.3
1530.3
1540.3
18
5
7 7
13
26
7
(7) (7)
70.2
12-C 2
8-M3
(Unit outline)
(Unit outline)
(Square hole dimension)
(Square hole dimension)
10 - 4 holes
screw

4.6.4 19-type (FCU8-DU194-32)
(1) The figure above shows the state with the control unit mounted.
Outline dimensions
Option relay unit
not mounted
Option relay unit
FCU8-EX704 mounted
Option relay unit
FCU8-EX705 mounted
A
(Space required for wiring) 110 114
475
400
9.5
[mm]
A
Top
Bottom
(Space required
for wiring)
Note

Panel cut dimensions (Unit outline)
screw
10 - 4 holes
(Unit outline)

(Square hole dimension)
(Square hole dimension)
220.50.3
230.50.3
1930.3
3820.3
1940.3
(7)
(7) (7)
[mm]
230.50.3
236.50.3
80.2
1930.3
1780.3
80.2
13
26
7 7
(7)
12
20.2
70.2
12 5
18
0.5
7
231
12-C2
400
387
475
462
8-M3

4.7 Keyboard Unit
(1) Do not change the setting for the rotary switch mounted on the keyboard unit.
If the setting is changed, the keyboard will not work.
Type name The initial value of the rotary switch
FCU8-KB026 1
FCU8-KB028 3
FCU8-KB029 0
FCU8-KB041 2
FCU8-KB046 0
FCU8-KB047 0
FCU8-KB048 0
FCU8-KB083 A
FCU8-KB091 0
Note

4.7.1 Keyboard for 8.4-type Display Unit (FCU8-KB026)
(1) The above side view shows the state with the operation panel I/O unit mounted.
Outline dimensions
Panel cut dimensions
140
200
9.5
[mm]
110
(Space required for wiring)
Top
Bottom
Note
[mm]
1280.3
140
127
1260.3
0.5
187
1860.3
1730.3
(7) (7)
(7) (7)
9
13
9
13
(6.5)
3.5 3.5 0.5
6.50.2
(6.5)

10.2 4-M3
200
(Unit outline)
(Unit outline)
(Square hole
 dimension)
(Square hole dimension)
screw
4 - 4 holes

4.7.2 Keyboard for 8.4-type Display Unit (FCU8-KB028)
(1) The above side view shows the state with the operation panel I/O unit mounted.
Outline dimensions
Panel cut dimensions
140
200
9.5
[mm]
110
(Space required for wiring)
Top
Bottom
Note
[mm]
1280.3
140
127
1260.3
0.5
187
1860.3
1730.3
(7) (7)
(7) (7)
9
13
9
13
(6.5)
3.5 3.5 0.5
6.50.2
(6.5)
10.2 4-M3
200
(Unit outline)
(Unit outline)
(Square hole
 dimension)
(Square hole dimension)
screw
4 - 4 holes

4.7.3 Keyboard for 8.4-type Display Unit (FCU8-KB029)
(1) The above side view shows the state with the operation panel I/O unit mounted.
Outline dimensions
Panel cut dimensions
[mm]
260
140
9.5 110
(Space required for wiring)
Top
Bottom
Note
[mm]
2480.3
260
247
2460.3
0.5
127
1260.3
1130.3
(7) (7)
(7) (7)
9
13 13
9
(6.5)
3.5 3.5 0.5 (6.5)
6.50.2
10.2

4-M3
140
(Unit outline)
(Unit outline)
(Square hole dimension)
(Square hole
 dimension)
screw
4 - 4 holes

4.7.4 Keyboard for 10.4-type Display Unit (FCU8-KB041)
(1) The above side view shows the state with the operation panel I/O unit mounted.
Outline dimensions
Panel cut dimensions
140
220
9.5
[mm]
110
(Space required for wiring)
Top
Bottom
Note
[mm]
1280.3
140
127
1260.3
0.5
207
2060.3
1930.3
(7) (7)
(7) (7)
9
13
9
13
(6.5)
3.5 3.5 0.5
6.50.2
(6.5)
10.2 4-M3
220
(Unit outline)
(Unit outline)
(Square hole
 dimension)
(Square hole dimension)
screw
4 - 4 holes

4.7.5 Keyboard for 10.4-type Display Unit (FCU8-KB046)
(1) The above side view shows the state with the operation panel I/O unit mounted.
Outline dimensions
Panel cut dimensions
140
220
9.5
[mm]
110
(Space required for wiring)
Top
Bottom
Note
[mm]
1280.3
140
127
1260.3
0.5
207
2060.3
1930.3
(7) (7)
(7) (7)
9
13
9
13
(6.5)
3.5 3.5 0.5

6.50.2
(6.5)
10.2 4-M3
220
(Unit outline)
(Unit outline)
(Square hole
dimension)
(Square hole dimension)
screw
4 - 4 holes

4.7.6 Keyboard for 10.4-type Display Unit (FCU8-KB047)
(1) The above side view shows the state with the operation panel I/O unit mounted.
Outline dimensions
Panel cut dimensions
290
160
9.5
[mm]
110
(Space required for wiring)
Top
Bottom
Note
[mm]
2780.3
290
277
2760.3
0.5
147
1460.3
1330.3
(7) (7)
(7) (7)
9
13
9
13
(6.5)
3.5 3.5 0.5
6.50.2
(6.5)
10.2
4-M3
160
(Unit outline)
(Unit outline)
(Square hole dimension)
(Square hole
dimension)
screw
4 - 4 holes

4.7.7 Keyboard for 10.4-type Display Unit (FCU8-KB048)
(1) The above side view shows the state with the operation panel I/O unit mounted.
Outline dimensions
Panel cut dimensions
[mm]
230
220
9.5 110
(Space required for wiring)
Top
Bottom
Note
[mm]
2180.3
230
217
2160.3
0.5
207
2060.3
1930.3
(7) (7)
(7) (7)
9
13 13
9
(6.5)

3.5 3.5 0.5
6.50.2
(6.5)
10.2
4-M3
220
(Unit outline)
(Unit outline)
(Square hole dimension)
(Square hole
 dimension)
screw
4 - 4 holes

4.7.8 Keyboard for 15-type Display Unit (FCU8-KB083)
(1) The above side view shows the state with the operation panel I/O unit mounted.
Outline dimensions
Panel cut dimensions
400
140
9.5
[mm]
110
(Space required for wiring)
Top
Bottom
Note
[mm]
200.50.3
400
387
1930.3
193.5
127
1260.3
1130.3
(7) (7)
(7) (7)
9
13
9
13
(6.5)
3.5 3.5 0.5 (6.5)
6.50.2
6-M3
140
187.50.3
1930.3
1280.3 (6)
6.50.2 6.50.2 (6) 3.5
4
3.5
4
9
18
10.2
(Unit outline)
(Unit outline)
(Square hole dimension)
(Square hole
 dimension)
screw
8 - 4 holes

4.7.9 Keyboard for 19-type Display Unit (FCU8-KB091)
(1) The above side view shows the state with the operation panel I/O unit mounted.
Outline dimensions
Panel cut dimensions
475
120
9.5
[mm]
18.3
Top
Bottom
Note
[mm]
230.50.3
475
462
2380.3

231
107
930.3
1060.3 (7)
(7) (7)
9
13
9
13
(6.5)
3.5
3.5
0.5
6.50.2
(6.5)
120
230.50.3
2250.3
1080.3 (6)
6.50.2 6.50.2 (6) 3.5
4 4
3.5
9
18
10.2
3.5
6-M3 screw
(Unit outline)
(Unit outline)
(Square hole dimension)
(Square hole
dimension)
8- 4 holes

4.8.1 List of Units

(*1) The form of the CG31/CG32/CG35/CG36 connectors on FCU8-DX731 are the same as that of CJ38/CJ40/CJ42 con nectors on other units. Be careful not to connect to a wrong connector. See the descriptions mentioned in the later sec tion for more specific explanation on connections.

(*2) The connection method of DO (CG32/CG34) of FCU8-DX834 is different from other operation panel I/O units. Be careful not to connect to a wrong connector. See the descriptions mentioned in the later section for more specific explanation on connections.

Classification Type Components Remarks
DI 24 V/0 V common input [64 points]
DO Source output [48 points]
AO analog output [1 point]
FCU8-DX731 (*1) Base card
RIO 2.0 terminator connector (R2-TM)
DI: 64-point 24 V/0 V common type
DO: 48-point source type (200 mA/point)
AO: 1 point
Manual pulse generator input: 2 ch
Control unit I/F
Keyboard unit I/F
Remote I/O 2.0 I/F
RIO occupied stations (fixed):
1, 3, 7 to 12, 20 to 22
RIO extensible stations:
2, 4 to 6, 13 to 19, 23 to 64
DI 24 V/0 V common input [96 points]
DO Source output [64 points]
FCU8-DX750 Base card
RIO 2.0 terminator connector (R2-TM)
DI: 96-point 24 V/0 V common type
DO: 64-point source type (200 mA/point)
Manual pulse generator input: 3 ch
Control unit I/F
Keyboard unit I/F
Remote I/O 2.0 I/F
RIO occupied stations (fixed):
1 to 3, 7 to 12, 20 to 22
RIO extensible stations:
4 to 6, 13 to 19, 23 to 64
DI 24 V/0 V common input [96 points]
DO Source output [96 points]
FCU8-DX760 Base card
Add-on card
RIO 2.0 terminator connector (R2-TM)
DI: 96-point 24 V/0 V common type
DO: 96-point source type (200 mA/point)
Manual pulse generator input: 3 ch
Control unit I/F
Keyboard unit I/F

Remote I/O 2.0 I/F
RIO occupied stations (fixed):
1 to 4, 7 to 12, 20 to 22
RIO extensible stations:
5, 6, 13 to 19, 23 to 64
DI 24 V/0 V common input [96
points]
DO Source output [64 points]
AI Analog input [1 point]
AO Analog output [1 point]
FCU8-DX761 Base card
Add-on card
RIO 2.0 terminator connector (R2-TM)
DI: 96-point 24 V/0 V common type
DO: 64-point source type (200 mA/point)
AI: 1 point
AO: 1 point
Manual pulse generator input: 3 ch
Control unit I/F
Keyboard unit I/F
Remote I/O 2.0 I/F
RIO occupied stations (fixed):
1 to 5, 7 to 12, 20 to 22
RIO extensible stations:
6, 13 to 19, 23 to 64
DI 24 V/0 V common input [64
points]
DO Source output [64 points]
Scan input [64 points]
Scan output [64 points]
FCU8-DX834 (*2) Base card
Add-on card
RIO 2.0 terminator connector (R2-TM)
DI: 64-point 24 V/0 V common type
DO: 64-point source type (200 mA/point)
Scan input: 64 points
Scan output: 64 points
Manual pulse generator input: 3 ch
Keyboard unit I/F
Remote I/O 2.0 I/F
RIO occupied stations (fixed):
1 to 4, 7 to 14, 20 to 22
RIO extensible stations:
5, 6, 15 to 19, 23 to 64

4.8.2 FCU8-DX731/FCU8-DX750/FCU8-DX760/FCU8-DX761/FCU8-DX834
Outline dimensions: FCU8-DX731
Outline dimensions: FCU8-DX750
[mm]
116
179
99 (Space required for wiring)
[mm]
116
179
99 (Space required for wiring)

Outline dimensions: FCU8-DX760
Outline dimensions: FCU8-DX761
[mm]
116
179
99 (Space required for wiring)
[mm]
116
179
99 (Space required for wiring)

Outline dimensions: FCU8-DX834
[mm]
116
179
99 (Space required for wiring)

The unit thickness of the fixed part with screws is 16.6 mm.
Select the fixing screws having the length suitable for the thickness.

Installation dimension: FCU8-DX731/FCU8-DX750/FCU8-DX760/FCU8-DX761/FCU8-DX834 1710.3
(5)
(4)
1060.3
(4)
(5)
[mm]
4-M3 screw
116 (Unit outline)
179 (Unit outline)
Note

4.9 Remote I/O Unit
Types of signals described on the list of units can be input/output from the remote I/O unit (FCU8-DXxxx) according to the type and No. of contacts. Remote I/O units are used by being connected to the control unit or the operation panel I/O unit. Multiple remote I/O units can be used as long as the total number of occupied stations is 64 or less.
(1) The maximum connectable number of remote I/O units is 32.
4.9.1 List of Units
(*1) Safety DI uses 16 points of terminal because of the duplication wiring.
(*2) Safety relay output uses 8 points of terminal because of the duplication wiring.
(*3) Voltage input, current input, thermocouple input and resistance temperature detector input are selected for each CH.
Classification Type Components Remarks
DI 24 V/0 V common input [32 points]
DO Source output [32 points] FCU8-DX220 Base card
RIO 2.0 connector set
DI: 32-point 24 V/0 V common type
DO: 32-point source type (200 mA/point)
Number of occupied stations: 1
DI 24 V/0 V common input [64 points]
DO Source output [48 points] FCU8-DX230 Base card
RIO 2.0 connector set
DI: 64-point 24 V/0 V common type
DO: 48-point source type (200 mA/point)
Number of occupied stations: 2
DI 24 V/0 V common input [64 points]
DO Source output [48 points]
AO analog output [1 point]
FCU8-DX231 Base card
RIO 2.0 connector set
DI: 64-point 24 V/0 V common type
DO Source type [48 points] (200 mA/point)
AO: 1 point
Number of occupied stations: 2
AI analog input [4 points]
AO analog output [1 point] FCU8-DX202 Base card
RIO 2.0 connector set
AI: 4 points
AO: 1 point
Number of occupied stations: 1
DI 0 V common input [16 points]
DO Source output (large capacity) [8 points] FCU8-DX213 Base card
RIO 2.0 connector set
DI: 16-point 0 V common type (3 mA/point)
DO: 8-point source type (2 A/point)
Number of occupied stations: 1
DI 0 V common input [16 points]
DO Source output (large capacity) [8 points] FCU8-DX213-1 Base card
RIO 2.0 connector set
DI: 16-point 0 V common type (9 mA/point)
DO: 8-point source type (2 A/point)
Number of occupied stations: 1
Safety DI 0 V common input [8 points]
Safety DO Source output (large capacity) [4
points]
FCU8-DX654 Base card
RIO 2.0 connector set
Safety DI: 8-point 0 V common type (3 mA/point)
Safety DO: 4-point source type (2 A/point)
Number of occupied stations: 2
Safety DI 0 V common input [8 points]
Safety DO Source output (large capacity) [4
points]
FCU8-DX654-1 Base card
RIO 2.0 connector set
Safety DI: 8-point 0 V common type (9 mA/point)
Safety DO: 4-point source type (2 A/point)
Number of occupied stations: 2
DI 24 V/0 V common input [32 points]
DO Source output [32 points]
Safety DI 0V common input [8 points] (*1)
Safety relay output [4 points] (*2)
FCU8-DX651
Base card
Add-on card
RIO 2.0 connector set

DI: 24 V/0 V common type [32 points]
DO: 32-point source type (200 mA/point)
Safety DI: 8-point 0 V common type
Safety relay: 4 points (non-voltage contact)
Relay contact welding detection
Number of occupied stations: 3
Thermistor input (12 points) FCU8-DX408 Base card
RIO 2.0 connector set
Thermistor input: 12 points
Number of occupied stations: 3
Multi-analog input [4 points] (*3) FCU8-DX409 Base card
RIO 2.0 connector set
Multi-analog input: 4 points
Number of occupied stations: 4
Note

4.9.2 FCU8-DX220/FCU8-DX230/FCU8-DX231/FCU8-DX202/FCU8-DX213/
FCU8-DX213-1/FCU8-DX654/FCU8-DX654-1/FCU8-DX651/FCU8-DX408/
FCU8-DX409
Outline dimensions: FCU8-DX220
Outline dimensions: FCU8-DX230
(Space required above the unit) (Space required below the unit)
(Space
required for
wiring)
Top
Bottom
40
168 2.5
45 115
4
[mm] 30 30
(Space required above the unit) (Space required below the unit)
(Space
required for
wiring)
Top
Bottom
40
168 2.5
45 115
4
[mm] 30 30

Outline dimensions: FCU8-DX231
Outline dimensions: FCU8-DX202
(Space required above the unit) (Space required below the unit)
(Space
required for
wiring)
Top
Bottom
40
168 2.5
45 115
4
[mm] 30 30
40
168 2.5
115
4
[mm]
(Space required for
wiring)
Top
Bottom
80

Outline dimensions: FCU8-DX213
Outline dimensions: FCU8-DX213-1
(Space required above the unit) (Space required below the unit)
(Space
required for
wiring)
Top
Bottom
40
168 2.5
45 115

4
[mm] 30 30
(Space required above the unit) (Space required below the unit)
(Space
required for
wiring)
Top
Bottom
40
168 2.5
45 115
4
[mm] 30 30

Outline dimensions: FCU8-DX654
Outline dimensions: FCU8-DX654-1
(Space required above the unit) (Space required below the unit)
(Space
required for
wiring)
Top
Bottom
40
168 2.5
45 115
4
[mm] 30 30
(Space required above the unit) (Space required below the unit)
(Space
required for
wiring)
Top
Bottom
40
168 2.5
45 115
4
[mm] 30 30

Outline dimensions: FCU8-DX651
Outline dimensions: FCU8-DX408
100
168
115
[mm]
45
2.5 4 4
(Space
required for
wiring) Top
Bottom
(Space
required for
Top wiring)
Bottom
40
168 2.5
45 109
4
[mm]

Outline dimensions: FCU8-DX409
(Space
required for
Top wiring)
Bottom
40
168 2.5
45 115
4
[mm]

Installation dimensions: FCU8-DX220/FCU8-DX230/FCU8-DX231/FCU8-DX202/FCU8-DX213/
FCU8-DX213-1/FCU8-DX654/FCU8-DX654-1/FCU8-DX408/FCU8-DX409
Installation dimensions: FCU8-DX651
[mm]

156 0.2
6
6
(Unit outline)
40
168
2-M5 Screw
4
(Unit outline) (Unit outline)
[mm]
156 0.2
4 168
88 0.2
100
6
6
4
3-M5 Screw(Unit outline) (Unit outline)
(Unit outline)

4.10 Laser I/F Unit
4.10.1 FCU8-DX522-001
Outline dimensions
Installation dimensions
[mm]
40 45 115
168
4 2.5
30 30
Top
Bottom
(Space required
above the unit) (Space required below the unit)
(Space
required for
wiring)
[mm]
156 0.2
6
6
(Unit outline)
40
168
2-M5 Screw
4
(Unit outline) (Unit outline)

4.11 Functional Safety Expansion Unit
4.11.1 Functional Safety Expansion Unit (FCU8-EX134)
Outline dimensions
23.4
[mm]
118.2
129.3

4.12 Function Expansion Unit
4.12.1 CC-Link (FCU8-EX561)
Outline dimensions
94.6 30 124
[mm]

4.12.2 PROFIBUS-DP (FCU8-EX563)
Outline dimensions
94.6 30 124
[mm]

4.12.3 CC-Link IE Field (FCU8-EX564)
Outline dimensions
94.6 30 124
[mm]

4.12.4 EtherNet/IP (FCU8-EX565)
Outline dimensions
94.6 30 124
[mm]

4.12.5 FL-net (FCU8-EX568)
Outline dimensions
94.6 30 124
[mm]

4.12.6 CC-Link IE TSN Remote Unit (FCU8-EX569)
Outline dimensions
94.6 30 124
[mm]

4.12.7 Vibration Cutting Expansion Unit (FCU8-EX744)
Outline dimensions
94.6 30 124
[mm]

4.12.8 Image Input Expansion Unit (FCU8-EX752)
Outline dimensions
94.6 30 124
[mm]

4.12.9 Option Relay Unit (FCU8-EX704)
Outline dimensions
50.2
94.6
134.9
[mm]

4.12.10 Option Relay Unit (FCU8-EX705)
Outline dimensions
78.4
99
134.9
[mm]

4.13 Manual Pulse Generator
4.13.1 5 V Manual Pulse Generator (UFO-01-2Z9)
100 pulse/rev
Produced by NIDEC NEMICON CORPORATION
Outline dimensions
Panel cut dimensions
3-M4
[mm]
0
10
20
30
40
50
60
70
80
90
0V A B
80.5
60
1 6 6 2 6
R43
77
58
56
8.89 7.6 M3 x 6

5V
Gasket
Above size only
72 at equal pitch
Panel cut diameter
Index stud
Top
Bottom
[mm]
72
62
at equal pitch

4.13.2 12 V Manual Pulse Generator (HD60C)
25 pulse/rev
Outline dimensions
Panel cut dimensions
3.6
16 27 0.5
L10
8.89 7.60
t 2.0 3-M4
77 0.5
80 1
58 0.5
60 0.5
[mm]
24 0.5
56 0.5
Installation of screws
Packing stud bolt
other than M3 x 6
not possible
Top
Bottom
12V 0V BA
40
30
50
60
70
10
20
90
0
80
3 - 4. 8
62
+2
0
72 0. 2
120
[mm]
(Divide equally
by three)

4.14 Synchronous Feed Encoder
4.14.1 Synchronous Feed Encoder (OSE-1024-3-15-68)
Outline dimensions
19. 5
102
135
5 3
33
2
68
28
20
56
68
4 - 5. 4
21mm
14. 3 0
- 0.11
1. 15 +0.14
0 1. 15 +0.14
0
2
26
16
50
15- 0.006

- 0.017
- 0. 009
- 0. 025
2
5 - 0. 012
- 0. 042
3 +0. 1
0
68
56
50
- 0. 009 - 0. 025
[mm]
Caution plate
hole
Enlarged drawing of key
Valid depth of key groove is
Cross section BB

<Connector pin assignment>
Connector
Pin Function Pin Function
A A phase K 0 V
B Z phase L -
C B phase M -
D - N A phase reverse
E Case grounding P Z phase reverse
F - R B phase reverse
G - S -
H +5 V T -
J -
F
J
T
G
L
K
M
H
C
D
E S R
P
N
B
A

4.15 Machine Operation Panel
4.15.1 Main Panels A/B
(FCU8-KB921/FCU8-KB922/FCU8-KB925, FCU8-KB923/FCU8-KB924/FCU8-KB926)
Outline dimensions: FCU8-KB921
Outline dimensions: FCU8-KB922
Outline dimensions: FCU8-KB925
[mm]
260
140
9.5 60
(Space required
for wiring)
Top
Bottom
[mm]
260
140
9.5 60
(Space required
for wiring)
Top
Bottom
[mm]
260
140
9.5 60
(Space required
for wiring)
Top
Bottom

Outline dimensions: FCU8-KB923

Outline dimensions: FCU8-KB924
Outline dimensions: FCU8-KB926
[mm]
290
140
9.5 60
(Space required
for wiring)
Top
Bottom
[mm]
290
140
9.5 60
(Space required
for wiring)
Top
Bottom
[mm]
290
140
9.5 60
(Space required
for wiring)
Top
Bottom

Panel cut dimensions: FCU8-KB921/FCU8-KB922/FCU8-KB925
Panel cut dimensions: FCU8-KB923/FCU8-KB924/FCU8-KB926
[mm]
2480.3
260
247
2460.3
0.5
127
1260.3
1130.3
(7) (7)
(7) (7)
9
13 13
9
(6.5)
3.5 3.5 0.5 (6.5)
6.50.2
10.2
4-M3
140
(6.5)
(6.5)
(Unit outline)
(Unit outline)
(Square hole dimension)
(Square hole
dimension)
screw
4 - 4 holes
[mm]
2780.3
290
277
2760.3
0.5
127
1260.3
1130.3
(7) (7)
(7) (7)
9
13 13
9
(6.5)
3.5 3.5 0.5 (6.5)
6.50.2
10.2
4-M3
140
(6.5)
(6.5)
(Unit outline)
(Unit outline)
(Square hole dimension)
(Square hole
dimension)

screw
4 - 4 holes

Letter label dimension: FCU8-KB922/FCU8-KB924
Clear key top
Letter label
(Material: PET or equivalent, t = 0.125 or less)
Example of a letter
12.8 or less
9.8 or less

4.15.2 Sub Panel A (FCU8-KB931/FCU8-KB941)
Outline dimensions: FCU8-KB931
Outline dimensions: FCU8-KB941
Panel cut dimensions: FCU8-KB931/FCU8-KB941
[mm]
140
140
9.5 70
(Space required for
wiring)
Top
Bottom
[mm]
140
140
9.5 70
(Space required for
wiring)
Top
Bottom
[mm]
1280.3
140
127
1260.3
0.5
127
1260.3
1130.3
(7) (7)
(7) (7)
9
13 13
9
(6.5)
3.5 3.5 0.5 (6.5)
6.50.2
10.2
4-M3
140
(Unit outline)
(Unit outline)
(Square hole dimension)
(Square hole
dimension)
screw
4 - 4 holes

4.16 Handy Terminal
(*1) "Short term" means within one month.
(1) The unit is an IP65F equivalent.
Item
Unit name Handy terminal
Type HG1T-SB12UH-MK1346-L5
General specifica tions
Ambient temperature During operation 0 to 40 C
During storage -20 C to 60 C
Ambient humidity Long term: 10 to 75% RH (with no dew condensation)
Short term: 10 to 95% RH (with no dew condensation) (*1)
Vibration resistance During operation 9.8 m/s2 [1.0 G] or less, 10 to 55 Hz
Shock resistance During storage 98 m/s2 [10.0 G] or less
Working atmosphere No corrosive gases, dust or oil mist
Power specifica tions
Power supply voltage 24 VDC 5% Ripple noise 240 mV (P-P)
Current consumption (max.) 0.2A
Instantaneous stop tolerance time 24 VDC : 4 ms or less
Others Heating value 4 W (max.)
Mass 0.6 kg

Note

(*1) Do not press multiple switches simultaneously: When three or more switches are pressed simultaneously, unpressed switches are also detected as pressed ones.
Dimension and names of parts
No. Name Function/Specification No. Name Function/Specification
(1) LCD Monochrome display with backlight
192 (W) 64 (H) dots (7) HOST Host interface connector
(DDK: 17JE-23250-02(D8A6))
(2) SW1
Emergency stop switch
Contact rating/Contact: 24 VDC, 1A
Contact configuration: 2b contacts
(IDEC Corporation: HA1E-V2S2VR)
(8) - Host interface cable
(5 m)
(3) - Membrane switch (*1) (9) - Simplified hand strap
(IDEC Corporation: HG9Z-PS1)
(4) SW2
Enable switch
Contact rating/Contact: 24 VDC , 50 mA
Contact configuration: 3-position contact 2
(OFF-ON-OFF)
(IDEC Corporation: HE3B-M2)
(10) - Panel mounting bracket
(IDEC Corporation: HG9Z-TK1)
(5) SW4
Manual Pulse Generator
Output: Open collector 4.7 k pull-up resistor is
connected.
(TOKYO SOKUTEIKIZAI CO., LTD:
RE19PH50C16RR)
(11) - Serial number plate
(6) SW6 Selector switch
133
255
90
46.7
38
51
15 11.5
(2)
(5)
(6)
(3)
(1)
(4)
(8)
(7)
(9)
(10) (11)

4.17 Thermistor
4.17.1 Thermistor(PT3C-51F-M2)
Made by SHIBAURA ELECTRONICS Co., Ltd.
Outline dimensions
Ambient temperature -10 to + 190 C
Insulation resistance 100 M or more at 500 VDC [between case and lead wire]
25010
3
3 12
4.5
[mm]

4.18 Exclusive SD Cards
(*1) SLC stands for Single Level Cell, and it stores one bit data in each memory cell.
This provides longer life span and high product reliability in comparison with MLC (Multi Level Cell) and TLC (Triple Level Cell), which are commonly applied to SD cards.
(1) Do not touch the terminal part with fingers, etc. when handling the SD cards.
The contamination of the terminal part of SD card causes a contact failure or a trouble.
Item FCU8-SD001G FCU8-SD004G
Capacity 1 GB 4 GB
NAND Flash SLC (*1)
Ambient temperature During operation -25 C to +85 C
During storage -40 C to +85 C
Ambient humidity During operation 5% to 95%RH (with no dew condensation)
During storage 5% to 95%RH (with no dew condensation)
Note

4.19 Specifications and Precautions of USB/SD/LAN/Wireless LAN/HDMI
Interface
4.19.1 USB Interface (Memory I/F card)
(*1) Data transfer speed is the theoretical value on the standard, and the actual speed will be inferior to the value listed above. The transfer speed may be restrained depending on the specification of the connected device.
(1) Do not connect the devices other than the USB memory.
Precautions for insertion/removal of USB memory
When inserting/removing a USB memory, turn the Mitsubishi Electric device's power OFF. Do not pull out the USB memory or turn OFF the power during access to the USB memory. Failure to observe this could cause the memory contents to be erased.
When inserting/removing a USB memory, be sure to have enough interval to perform that (about 10 seconds or more).
In case of emergency, always perform backups by having your important data duplicate, etc. as Mitsubishi Electric will not guarantee the broken or lost data.
Precaution for operation with front-side USB memory
A USB memory to be used has to be supported USB2.0 Hi-Speed (480 Mbps).
When connecting the USB memory, connect it directly without using the extension cable or USB hub.
Machine vibration may cause the USB memory to fall out depending on environment. Therefore, the operation with the front side USB memory is required to be performed on your own responsibility.
Static electricity
Static electricity may cause malfunction of USB memory. Before using the USB memory, make sure to touch a conductive material such as a grounded metal object to discharge static electricity accumulated in human body, etc.
4.19.2 USB Interface (Image Input Expansion Unit)
(*1) Data transfer speed is the theoretical value on the standard, and the actual speed will be inferior to the value listed above. The transfer speed may be restrained depending on the specification of the connected device.
(1) Do not connect any cables or devices other than USB Type A cable.
Precautions for insertion/removal of USB cable
When inserting/removing a USB cable, turn the Mitsubishi Electric device's power OFF. If the cable is inserted/removed while the power is ON, an overvoltage is applied to the IC mounted inside the Mitsubishi Electric device, which may cause a failure.
Standards USB2.0
Data transfer speed (*1)
High Speed (480 Mbps)
Full Speed (12 Mbps)
Low Speed (1.5 Mbps)
Power supply to USB device Supply voltage: 5 V 5%
Supply current: Max. 500 mA/port
Number of free ports Front 1
Maximum cable length 5 m
Standards USB2.0
Data transfer speed (*1)
High Speed (480 Mbps)
Full Speed (12 Mbps)
Low Speed (1.5 Mbps)
Number of free ports Image input expansion unit x 1
Note
Note

4.19.3 SD Interface (Memory I/F card)
(*1) SDXC is not supported.
Precautions for use of commercially available SD card
Mitsubishi Electric will not provide performance guarantee and maintenance for commercially available SD card, mini SD card or micro SD card (requires converting adapter). When any of them is to be used, careful performance check must be required by the machine tool builder.
Commercially available devices may not be compatible with Mitsubishi Electric units or suitable FA environment for temperature- or noise-wise.
Precautions for insertion/removal of SD card
When inserting/removing an SD card, turn the Mitsubishi Electric device's power OFF. Do not pull out the card or turn OFF the power during access to the SD card. Failure to observe this could cause the memory contents to be erased.
In case of emergency, always perform backups by having your important data duplicate, etc. as Mitsubishi Electric will not guarantee the broken or lost data.
Static electricity
Static electricity may cause malfunction of SD card. Before using the SD card, make sure to touch a conductive material such as a grounded metal object to discharge static electricity accumulated in human body, etc.
4.19.4 LAN Interface (Control Unit)
(*1) Data transfer speed is the theoretical value on the standard, and the actual speed will be inferior to the value listed above. The transfer speed may be restrained depending on the specification of the connected device.
(1) When half-duplex communication is made, the response time may become long depending on the connected device.
Use full-duplex communication to connect with the opposite device via a switching HUB.
Precautions for selection of LAN cable
Make sure to select the LAN cables which are "category 5e or above" and "shielded". Cable wire material with double shielded, which is appropriate for FA environment, is recommended.
Standards SD/SDHC (*1)
Transfer speed According to the connecting SD card
Maximum capacity 32 GB
Number of free ports Front 1, Rear 1
Standards 100BASE-TX/10BASE-T
Data transfer speed(*1) 100 Mbps/10 Mbps
Number of free ports Control unit 2
Note

4.19.5 Wireless LAN Interface (Control Unit)

(*1) Data transfer speed is the theoretical value on the standard, and the actual speed will be inferior to the value listed above. The transfer speed may be restrained depending on the specification of the connected device.
(*2) "AP" is the access point or the parent device, and "STA" is the station or the child device.
(*3) The supported channel depends on the setting of the country code.
Name of this function
This product has not received Wi-Fi certification. Use terms such as "wireless LAN", "WLAN", etc.
4.19.6 HDMI Interface (Image Input Expansion Unit)
(*1) The maximum available input resolution of the image signals is Full HD, but the resolution of the display units for Mitsub ishi Electric is 19-type (SXGA), 15-type (VGA) and 10.4-type (VGA).
(1) Do not connect any cables or devices other than HDMI Type A cable.
Precautions for insertion/removal of HDMI cable
When inserting/removing an HDMI cable, turn the Mitsubishi Electric device's power OFF. If the cable is inserted/removed while the power is ON, an overvoltage is applied to the IC mounted inside the Mitsubishi Electric device, which may cause a failure.
Compatible standards IEEE802.11b/IEEE802.11g/IEEE802.11a/IEEE802.11n
Data transfer speed (*1) 11 Mbps/54 Mbps/54 Mbps/150 Mbps
Communication frequency band 2.4/5 GHz band
Operation mode Infrastructure mode (AP/STA) (*2)
Supported channel (*3)
AP mode 1-13 ch, 36-48 ch (W52), 149-165 ch (W58)
STA mode Automatically track the connected AP.
Maximum connectable number in AP mode
5 pieces
Security
WEP
WPA-PSK
WPA2-PSK
Number of antennas 1 (built-in chip antenna)
Standards HDMI Type A
High Speed
Input resolution
Full HD (*1)
HD
SXGA
XGA
VGA
Number of free ports Image input expansion unit x 1
Note

Revision History
Date of revision Manual No. Revision details
Mar. 2021 IB(NA)1501611-A The first edition was created.
Jul. 2021 IB(NA)1501611-B Contents were revised to correspond to Mitsubishi Electric CNC M800VS/M80V Series.
Part "M800VS/M80V Series Hardware" was added.
Other mistakes were corrected.
Mar. 2022 IB(NA)1501611-C Contents were revised to correspond to Mitsubishi Electric CNC M800V/M80V Series software ver sion A3.
"M800VW/M80VW Series Hardware"
The following units were added.
FCU8-DX522-001 (Laser I/F Unit)
The following chapters were added.
2.3 19-type Display Unit
2.4 Connecting a Laser I/F Unit
3.9 Laser I/F Unit
4.11 Laser I/F Unit
The following chapters were changed.
2.1 M800VW Series, Windows-based Display Unit
2.2 M80VW Series, Windows-based Display Unit
3.16 Cable Connector Sets
3.19 Durable Parts
3.20 Replacements
4.1.1 Environment Conditions Inside the Operation Panel
4.1.2 Environment Conditions Inside the Control Panel
4.2.1 Environment Conditions Inside the Operation Panel
4.2.2 Environment Conditions Inside the Control Panel
4.20.1 USB Interface (Personal Computer Unit, Side Memory I/F Unit)
4.20.2 SD Interface (Control Unit, Side Memory I/F Unit)
4.20.3 LAN Interface (Control Unit, Personal Computer Unit)
"M800VS/M80V Series Hardware"
The following units were added.
FCU8-DU194-31 (19-type color LCD touchscreen)
FCU8-DU194-32 (19-type color LCD touchscreen)
FCU8-KB091 (Keyboard for 19-type display unit)
FCU8-DX522-001 (Laser I/F Unit)
FCU8-EX752 (Image input expansion unit)
The following chapters were added.
2.3 19-type Display Unit
2.6 Connecting a BiSS Encoder
2.7 Connecting an Image Input Expansion Unit
2.8 Connecting a Laser I/F Unit
3.9 Laser I/F Unit
4.5.3 19-type (FCU8-DU194-31)
4.6.4 19-type (FCU8-DU194-32)
4.7.10 Keyboard for 19-type Display Unit (FCU8-KB091)
4.10 Laser I/F Unit

4.12.7 Image Input Expansion Unit (FCU8-EX752)
4.19.2 USB Interface (Image Input Expansion Unit)
4.19.5 Wireless LAN Interface (Control Unit)
4.19.6 HDMI Interface (Image Input Expansion Unit)
The following chapters were changed.
2.1 M800VS Series
2.2 M80V Series
2.4 Connecting an Operation Panel I/O Unit (FCU8-DX834)
2.5 Connecting a Pulse-controlled Inverter (M80V Series)
3.3 Display Unit [M800VS]
3.4 Display Unit [M80V]
3.5 Keyboard Unit [M800VS]
3.6 Keyboard Unit [M80V]
(Continue to the next page)
(Continued from the previous page)
3.11 Function Expansion Unit
3.16 Cable Connector Sets
3.20 Replacements
3.22 System Type
4.1.1 Installation Environment Conditions
4.2.1 Installation Environment Conditions
4.3.1 FCU8-MU551 / FCU8-MA551
4.5.2 15-type (FCU8-DU182-31)
4.6.3 15-type (FCU8-DU182-32)
4.7 Keyboard Unit
4.19.1 USB Interface (Memory I/F card)
4.19.3 SD Interface (Memory I/F card)
Other mistakes were corrected.
Mar. 2023 IB(NA)1501611-D Contents were revised to correspond to Mitsubishi Electric CNC M800V/M80V Series software ver sion A7.
"M800VW/M80VW Series Hardware"
The following chapters were changed.
2.1 M800VW Series, Windows-based Display Unit
2.2 M80VW Series, Windows-based Display Unit
2.3 19-type Display Unit
2.4 Connecting a Laser I/F Unit
3.1 Control Unit [M800VW]
3.2 Control Unit [M80VW]
4.1.1 Environment Conditions Inside the Operation Panel
4.2.1 Environment Conditions Inside the Operation Panel
4.3.1 M830VW(FCU8-MU052)/M850VW(FCU8-MA051)
4.4.1 FCU8-MU054
4.10.2 FCU8-DX220/FCU8-DX230/FCU8-DX231/FCU8-DX202/FCU8-DX213/ FCU8-DX213-1/
FCU8-DX654/FCU8-DX654-1/FCU8-DX651/FCU8-DX408/ FCU8-DX409
4.16.1 Main Panels A/B (FCU8-KB921/FCU8-KB922/FCU8-KB925, FCU8-KB923/FCU8-KB924/
FCU8-KB926)
"M800VS/M80V Series Hardware"
The following chapter was added.
2.9 Connecting an EcoMonitorLight
The following chapters were changed.
2.1 M800VS Series
2.2 M80V Series
2.3 19-type Display Unit
4.3.1 FCU8-MU551 / FCU8-MA551
4.9.2 FCU8-DX220/FCU8-DX230/FCU8-DX231/FCU8-DX202/FCU8-DX213/ FCU8-DX213-1/
FCU8-DX654/FCU8-DX654-1/FCU8-DX651/FCU8-DX408/ FCU8-DX409
4.15.1 4.15.1 Main Panels A/B (FCU8-KB921/FCU8-KB922/FCU8-KB925, FCU8-KB923/FCU8-
KB924/FCU8-KB926)
Other mistakes were corrected.
Date of revision Manual No. Revision details
Jul. 2023 IB(NA)1501611-E Contents were revised to correspond to Mitsubishi Electric CNC M800V/M80V Series software ver sion A8.
"M800VW/M80VW Series Hardware"
The following chapter was changed.
3.21 List of Cables
"M800VS/M80V Series Hardware"
The following chapters were changed.
2.3 19-type Display Unit
2.7 Connecting an Image Input Expansion Unit
3.6 Keyboard Unit [M80V]
3.21 List of Cables
4.2.1 Installation Environment Conditions
4.7 Keyboard Unit
The following chapter was deleted.
4.7.1 Keyboard for 8.4-type Display Unit (FCU8-KB025)
Other mistakes were corrected.
Dec. 2023 IB(NA)1501611-F Contents were revised to correspond to Mitsubishi Electric CNC M800V/M80V Series software ver sion A9.
"M800VW/M80VW Series Hardware"
The following chapter was added.
4.12.7 CC-Link IE TSN Remote Unit (FCU8-EX569)
The following chapter was changed.
3.10 Function Expansion Unit
"M800VS/M80V Series Hardware"
The following chapter was added.
4.12.6 CC-Link IE TSN Expansion Unit (FCU8-EX569)
The following chapter was changed.
3.11 Function Expansion Unit
Other mistakes were corrected.
Apr. 2024 IB(NA)1501611-G Contents were revised to correspond to Mitsubishi Electric CNC M800V/M80V Series software ver sion AA.
"M800VW/M80VW Series Hardware"

The following chapter was added.
4.12.1 Measuring Instrument I/F Expansion Unit (FCU8-EX543)
The following chapters were changed.
3.10 Function Expansion Unit
3.21 List of Cables
"M800VS/M80V Series Hardware"
The following chapter was changed.
3.21 List of Cables
Other mistakes were corrected.
Date of revision Manual No. Revision details
Global Service Network
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Minneapolis, MN Service Satellite
Detroit, MI Service Satellite South Germany Service Center (Stuttgart)
Grand Rapids, MI Service Satellite SCHELMENWASENSTRASSE 16-20, 70567 STUTTGART, GERMANY
Cleveland, OH Service Satellite TEL: + 49-711-770598-123 / FAX: +49-711-770598-141
St. Louis, MO Service Satellite
Indianapolis, IN Service Saltellite France Service Center (Paris)
2 RUE DE LUNION, 92565 RUEIL-MALMAISON CEDEX, FRANCE
TEL: +33-1-41-02-83-13 / FAX: +33-1-49-01-07-25
South/East Region Service Center (Georgia)
1845 SATELLITE BOULEVARD STE. 450, DULUTH, GEORGIA 30097, U.S.A. France Service Satellite (Lyon)
9154-852-876-1+ XAF / 9254-852-876-1+ LET ECNARF TSEIRP TNIAS 00896 DONOM SEUQCAJ EELLA ,042
Charleston, SC Service Satellite TEL: +33-1-41-02-83-13 / FAX: +33-1-49-01-07-25
Charlotte, NC Service Satellite
Raleigh, NC Service Satellite Italy Service Center (Milan)
Dallas, TX Service Satellite VIA ENERGY PARK 14, VIMERCATE 20871 (MB) ITALY
Houston, TX Service Satellite TEL: +39-039-6053-342 / FAX: +39-039-6053-206
Hartford, CT Service Satellite
Knoxville, TN Service Satellite Italy Service Satellite (Padova)
Nashville, TN Service Satellite VIA G. SAVELLI, 24 - 35129 PADOVA, ITALY
Huntsville, AL Satellite TEL: +39-039-6053-342 / FAX: +39-039-6053-206
Pittsburg, PA Service Satellite
Tampa, FL Service Satellite U.K. Service Center
Miami, FL Satelite TRAVELLERS LANE, HATFIELD, HERTFORDSHIRE, AL10 8XB, U.K.
Lafayette, LA Service Satellite TEL: +44-1707-288-780 / FAX: +44-1707-278-695
Allentown, PA Satelite
Spain Service Center
CTRA. RUBI, 76-80 8174 SAINT CUGAT DEL VALLES, BARCELONA, SPAIN
Western Region Service Center (California) TEL: +34-935-65-2236 / FAX: +34-935-89-1579
5900-B KATELLA AVE. - 5900-A KATELLA AVE. CYPRESS, CALIFORNIA 90630, U.S.A.
TEL: +1-714-699-2625 / FAX: +1-847-478-2650 Poland Service Center
San Francisco, CA Satelite UL.KRAKOWSKA 50, 32-083 BALICE, POLAND
Seattle, WA Service Satellite TEL: +48-12-347-6500 / FAX: +48-12-630-4701
Denver, CO Service Satellite
Hungary Service Center
Canada Region Service Center (Toronto) MITSUBISHI ELECTRIC EUROPE B.V. HUNGARIAN BRANCH
NO ,MAHKRAM EUNEVA HT41 9924 ADANAC ,2JO R3L OIRAT YRAGNUH ,SRADUB 0402 ,.711 T GSDABAZS ,KRAP ECIFFO SRADUB
5397-574-509-1+ :XAF / 8277-574-509-1+ :LET 3622-334-07-63+ :LET
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Parque Tecnolgico Innovacin Quertaro, Lateral Carretera Estatal 431, Km 2+200, Lote 91 Modulos 1 y 2 UMRANIYE, ISTANBUL, TURKEY
hcaM al adneicaH ocixM ,oratreuQ ,suqraM lE ,64267 PC ,arro 74-44-166-612-09+ :XAF / 0052-969-612-09+ :LET
TEL: +52-442-153-6050
Monterrey, NL Service Satellite Czech Republic Service Center
Mexico City, DF Service Satellite MITSUBISHI ELECTRIC EUROPE B.V. PRAGUE OFFICE
Pekask 621/7, 155 00 PRAHA 5, CZECH REPUBLIC
TEL: +420-734-402-587
BRAZIL
Sweden Service Center
MITSUBISHI ELECTRIC DO BRASIL COMRCIO E SERVIOS LTDA. HAMMARBACKEN 14, P.O.BOX 750 SE-19127, SOLLENTUNA, SWEDEN
Votorantim Office TEL: +46-8-6251200 / FAX: +46-8-6251014
AV. GISELE CONSTANTINO,1578, PARQUE BELA VISTA, VOTORANTIM-SP, BRAZIL CEP:18.110-650
TEL: +55-15-3023-9000 Bulgaria Service Center
Blumenau, Santa Catarina Office AKHNATON Ltd. (Service Partner)
4 ANDREJ LJAPCHEV BLVD. POB 21, BG-1756 SOFIA, BULGARIA
TEL: +359-2-8176009 / FAX: +359-2-9744061
Ukraine Service Center (Kiev)
CSC Automation Ltd. (Service Partner)
4 B, YEVHENA SVERSTYUKA STR., 02002 KIEV, UKRAINE
TEL: +380-44-494-3344 / FAX: +380-44-494-3366
South Africa Service Center
Adroit Technologies (Service Partner)
20 WATERFORD OFFICE PARK, WATERFORD DRIVE, CNR OF WITKOPPEN ROAD,
FOURWAYS JOHANNESBURG SOUTH AFRICA
TEL: +27-11-658-8100 / FAX: +27-11-658-8101
ASEAN CHINA
)RETNEC AF NAESA(.DTL .ETP AISA CIRTCELE IHSIBUSTIM)RETNEC AF ANIHC(.DTL)ANIHC(NOITAMOTUA CIRTCELE IHSIBUSTIM
Singapore Service Center CNC Call Center
349951 EROPAGNIS GNIDLIUB CIRTCELE IHSIBUSTIM DAOR ARDNAXELA 703 0315-129-004-68+ :LET
TEL: +65-6473-2308 / FAX: +65-6476-7439
Shanghai Service Center

NO.1386 HONG QIAO ROAD, CHANG NING QU, SHANGHAI 200336, CHINA
PHILIPPINES TEL: +86-21-2322-3030 / FAX: +86-21-2322-3000*8422
Qingdao Service Center
MELCO FACTORY AUTOMATION PHILIPPINES INC. Suzhou Service Center
Head Office Wuhan Service Center
128 LOPEZ RIZAL STREET, BRGY., HIGHWAY HILLS, MANDALUYONG CITY , MM PHILIPPINES 1550 Ningbo Service Center
TEL: +63-2-8256-8042 / FAX: +632-8637-2294 Hefei Service Center
Beijing Service Center
Philippines Service Center Tianjin Service Center
KM.23 WEST SERVICE ROAD SSH, CUPANG ,MUNTINLUPA CITY, PHILIPPINES Xian Service Center
TEL: +63-2-8807-0420 / FAX: +63-2-8842-5202 Dalian Service Center
Chengdu Service Center
VIETNAM Shenzhen Service Center
LEVEL8, GALAXY WORLD TOWER B, 1 YABAO ROAD, LONGGANG DISTRICT,
MITSUBISHI ELECTRIC VIETNAM CO., LTD. SHENZHEN 518129, CHINA
Vietnam Ho Chi Minh Service Center TEL: +86-755-2399-8272 / FAX: +86-755-8229-3686
11TH & 12TH FLOOR, VIETTEL TOWER B, 285 CACH MANG THANG 8 STREET, WARD 12, DISTRICT 10, Dongguan Service Center
HO CHI MINH CITY, VIETNAM Xiamen Service Center
TEL: +84-28-3910-5945 / FAX: +84-28-3910-5947
Vietnam Hanoi Service Center KOREA
14TH FLOOR, CAPITAL TOWER, 109 TRAN HUNG DAO STREET, CUA NAM WARD,
HOAN KIEM DISTRICT, HA NOI CITY, VIETNAM MITSUBISHI ELECTRIC AUTOMATION KOREA CO., LTD. (KOREA FA CENTER)
TEL: +84-24-3937-8075 / FAX: +84-24-3937-8076 Korea Seoul Service Center
8F GANGSEO HANGANG XI-TOWER A, 401 YANGCHEON-RO, GANGSEO-GU,
SEOUL 07528 KOREA
INDONESIA TEL: +82-2-3660-9631 / FAX: +82-2-3664-8668
PT. MITSUBISHI ELECTRIC INDONESIA Korea Daegu Service Center
Indonesia Service Center (Cikarang) 2F KT BLDG. 8, HOGUK-RO, BUK-GU, DAEGU 41518, KOREA
JL. KENARI RAYA BLOK G2-07A, DELTA SILICON 5, LIPPO CIKARANG - BEKASI 17550, INDONESIA TEL: +82-53-382-7401 / FAX: +82-53-382-7412
TEL: +62-21-2961-7797 / FAX: +62-21-2961-7794
Korea Changwon Technical Center
#205, 888, CHANGWON-DAERO, SEONGSAN-GU, CHANGWON-SI,
MALAYSIA GYEONGSANGNAM-DO, 51532, KOREA
TEL: +82-55-261-5559 / FAX: +82-55-261-5558
MITSUBISHI ELECTRIC SALES MALAYSIA SDN. BHD.
Malaysia Service Center (Kuala Lumpur Service Center)
LOT 11, JALAN 219, P.O BOX 1036, 46860 PETALING JAYA, SELANGOR DARUL EHSAN, MALAYSIA TAIWAN
TEL: +60-3-7626-5032
MITSUBISHI ELECTRIC TAIWAN CO., LTD. (TAIWAN FA CENTER)
Johor Bahru Service Center Taiwan Taichung Service Center
.rohoJ 00118 ,nnO otaD radnaB ,6/4 nanarijreP nalaJ ,9 WIAT , 86704 YTIC GNUHCIAT ,.TSID NUTIX ,.DR HT61 UQEYGNOG ,1-8 .ON AN
TEL: 07-3642250 / 2256 TEL: +886-4-2359-0688 / FAX: +886-4-2359-0689
Pulau Pinang Service Center Taiwan Taipei Service Center
25-G, Pusat Perniagaan Perdana Jaya, Jalan Permatang Rawa, 14000 Bukit Mertajam, Pulau Pinang 11F, NO.88, SEC.6, ZHONGSHAN N. RD., SHILIN DIST., TAIPEI CITY 11155, TAIWAN
5381-015-4-06+ :xaF / 8381-015-4-06+ :LET 3345-3382-2-688+ :XAF / 0345-3382-2-688+ :LET
Taiwan Tainan Service Center
THAILAND 11F-1, NO.30, ZHONGZHENG S. RD., YONGKANG DIST., TAINAN CITY 71067, TAIWAN
TEL: +886-6-252-5030 / FAX: +886-6-252-5031
MITSUBISHI ELECTRIC FACTORY AUTOMATION (THAILAND) CO., LTD.
Thailand Service Center (Bangkok)
101, TRUE DIGITAL PARK OFFICE, 5TH FLOOR, SUKHUMVIT ROAD, BANGCHAK, PHRA KHANONG, OCEANIA
BANGKOK, 10260 THAILAND
TEL: +66-2-092-8600 / FAX: +66-2-043-1231-33 MITSUBISHI ELECTRIC AUSTRALIA PTY. LTD.
Oceania Service Center
348 VICTORIA ROAD, RYDALMERE, N.S.W. 2116 AUSTRALIA
INDIA TEL: +61-2-9684-7269/ FAX: +61-2-9684-7245
MITSUBISHI ELECTRIC INDIA PVT., LTD.
Service Head office and South India Service Center (Bangalore)
CNC eXPerience Park, PLOT NO. 57/A, PEENYA PHASE 3,
PEENYA INDUSTRIAL AREA, BANGALORE 560058, KARNATAKA, INDIA
TEL : +91-80-4655-2121
Chennai Service Satellite
Coimbatore Service Satellite
Hyderabad Service Satellite
North India Service Center (Gurgaon)
PLOT 517, GROUND FLOOR, UDYOG VIHAR PHASE-III, GURUGRAM 122008, HARYANA, INDIA
TEL : +91-124-463-0300
Ludhiana Service Satellite
Panthnagar Service Satellite
Delhi Service Satellite
Jamshedpur Service Satellite
Manesar Service Satellite
West India Service Center (Pune)
ICC-Devi GAURAV TECHNOLOGY PARK, UNIT NO.402, FOURTH FLOOR, NORTH WING,
SURVEY NUMBER 191-192 (P), NEXT to INDIAN CARD CLOTHING COMPANY Ltd,
OPP. VALLABH NAGAR, PIMPRI, PUNE- 411 018, MAHARASHTRA, INDIA
TEL : +91-20-6819-2274
Kolhapur Service Satellite
Aurangabad Service Satellite
Mumbai Service Satellite
West India Service Center (Ahmedabad)
204-209, 2ND FLOOR, 31FIVE, CORPORATE ROAD PRAHLADNAGAR,
AHMEDABAD -380015, GUJARAT, INDIA
TEL : + 91-79-6777-7888
Rajkot Service Satellite
Notice
Every effort has been made to keep up with software and hardware revisions in the contents described in this
manual. However, please understand that in some unavoidable cases simultaneous revision is not possible.

Please contact your Mitsubishi Electric dealer with any questions or comments regarding the use of this product.

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Introduction

This manual describes the specifications of Mitsubishi Electric CNC.
Read this manual thoroughly and understand the product's functions and performance before use.
Supported models of this manual are as follows:
Abbreviations for model names used in this manual are as follows:
To safely use this CNC unit, thoroughly study the "Precautions for Safety" before use.
Be sure to keep this manual on hand so that users can refer to it at any time.
Also refer to the manuals on "Manual List" as necessary.

Details described in this manual

At the beginning of the section of each specification item, a reference table for each model of the item is described.
M: Machining center system
L: Lathe system
: Standard
: Optional
: Selection

Supported models Abbreviations in this manual

M800VW Series M850VW, M830VW
M800VS Series M850VS, M830VS
M80VW Series M80VW
M80V Series M80V TypeA, M80V TypeB

Abbreviations Supported models

M800V, M800V Series M800VW Series/M800VS Series
M80V, M80V Series M80VW Series/M80V Series
M800V/M80V, M800V/M80V Series M800VW Series/M800VS Series/M80VW Series/M80V Series
M8V, M8V Series

Manual List

Manuals related to M800V/M80V Series are listed as follows.
These manuals are written on the assumption that all optional functions are added to the targeted model.
Some functions or screens may not be available depending on the machine or specifications set by MTB. (Confirm the specifications before use.)
The manuals issued by MTB take precedence over these manuals.

Manual IB No. Purpose and Contents

M800V/M80V Series
Instruction Manual IB-1501618 Operation guide for NC
Explanation for screen operation, etc.
M800V/M80V Series
Programming Manual
(Lathe System) (1/2)
IB-1501619 G code programming for lathe system
Basic functions, etc.
M800V/M80V Series
Programming Manual
(Lathe System) (2/2)
IB-1501620 G code programming for lathe system
Functions for multi-part system, high-accuracy function, etc.
M800V/M80V Series
Programming Manual
(Machining Center System) (1/2)
IB-1501621 G code programming for machining center system
Basic functions, etc.
M800V/M80V Series
Programming Manual
(Machining Center System) (2/2)
IB-1501622 G code programming for machining center system
Functions for multi-part system, high-accuracy function, etc.
M800V/M80V Series
Alarm/Parameter Manual IB-1501623 Alarms
Parameters
Manuals for MTBs (NC)
Manuals for MTBs (drive section)

Manual IB No. Purpose and Contents

M800V/M80V Series
Specifications Manual (Function) IB-1501610 Model selection
Outline of various functions
M800V/M80V Series
Specifications Manual (Hardware) IB-1501611 Model selection
Specifications of hardware unit
M800VW/M80VW Series
Connection and Setup Manual IB-1501612 Detailed specifications of hardware unit
Installation, connection, wiring, setup (startup/adjustment)
M800VS/M80V Series
Connection and Setup Manual IB-1501613 Detailed specifications of hardware unit
Installation, connection, wiring, setup (startup/adjustment)
M800V/M80V Series
PLC Development Manual IB-1501614
Electrical design
I/O relation (assignment, setting, connection), field network
Development environment (PLC on-board, peripheral development environment), etc.
M800V/M80V Series
PLC Programming Manual (1/2) IB-1501667

Electrical design
Sequence programming
Explanation for instructions, functions, and parameters
M800V/M80V Series
PLC Programming Manual (2/2) IB-1501668
Electrical design
Sequence programming
Usage examples of instructions
M800V/M80V Series
PLC Interface Manual IB-1501616 Electrical design
Interface signals between NC and PLC
M800V/M80V Series
Maintenance Manual IB-1501617 Cleaning and replacement for each unit
Other items related to maintenance
High Speed Processing Unit User's
Manual IB-1501714 Specifications for high speed processing unit (HPU)
Manual IB No. Contents
MDS-E/EH Series
Specifications Manual IB-1501226 Specifications for power supply regeneration type
MDS-E/EH Series
Instruction Manual IB-1501229 Instruction for power supply regeneration type
MDS-EJ/EJH Series
Specifications Manual IB-1501232 Specifications for regenerative resistor type
MDS-EJ/EJH Series
Instruction Manual IB-1501235 Instruction for regenerative resistor type
MDS-EM/EMH Series
Specifications Manual IB-1501238 Specifications for multi-hybrid, power supply regeneration
type
MDS-EM/EMH Series
Instruction Manual IB-1501241 Instruction for multi-hybrid, power supply regeneration type
DATA BOOK IB-1501252 Specifications of servo drive unit, spindle drive unit, motor, etc.
MDS-EX-CVP Series
Specifications and Instruction
Manual
IB-1501587 Specifications and instruction for the power supply unit with
large capacity
Manuals for MTBs (Others)
Manual No. Purpose and Contents
GOT2000 Series Users Manual
(Hardware) SH-081194ENG Outline of hardware such as part names, external dimensions,
installation, wiring, maintenance, etc. of GOTs
GOT2000 Series Users Manual
(Utility) SH-081195ENG Outline of utilities such as screen display setting, operation
method, etc. of GOTs
GOT2000 Series Users Manual
(Monitor) SH-081196ENG Outline of each monitor function of GOTs
GOT2000 Series Connection Manual
(Mitsubishi Electric Products) SH-081197ENG Outline of connection types and connection method between
GOT and Mitsubishi Electric connection devices
GOT2000 Series Connection Manual
(Non-Mitsubishi Electric Products 1) SH-081198ENG Explanation for connection types and connection method
GOT2000 Series Connection Manual between GOT and other company's devices
(Non-Mitsubishi Electric Products 2) SH-081199ENG
GOT2000 Series Connection Manual
(Microcomputers, MODBUS/Fieldbus
Products, Peripherals)
SH-081200ENG
Explanation for connection types and connection method
between GOT and microcomputers, MODBUS/fieldbus
products, peripherals
GT SoftGOT2000 Version1 Operating
Manual SH-081201ENG
Explanation for system configuration, screen configuration
and operation method of monitoring software GT
SoftGOT2000
GT Designer3 (GOT2000) Screen
Design Manual SH-081220ENG Outline of screen design method using screen creation
software GT Designer3
GOT2000/GOT1000 Series CC-Link
Communication Unit User's Manual IB-0800351 Explanation for handling CC-Link communication unit (for
GOT2000 series/GOT1000 series)
GX Developer Version 8 Operating
Manual (Startup) SH-080372E Explanation for system configuration, installation, etc. of PLC
development tool GX Developer
GX Developer Version 8 Operating
Manual SH-080373E Explanation for operations using PLC development tool GX
Developer
GX Converter Version 1 Operating
Manual IB-0800004 Explanation for operations using data conversion tool GX
Converter
GX Works2 Installation Instructions BCN-P5999-0944 Explanation for the operating environment and installation
method of GX Works2
GX Works2 Version 1 Operating
Manual (Common) SH-080779ENG
Explanation for the system configuration of GX Works2 and
the functions common to Simple project and Structured project
such as parameter setting, operation method for the online
function

GX Works2 Version 1 Operating
Manual (Simple Project) SH-080780ENG Explanation for methods for such as creating and monitoring
programs in Simple project of GX Works2
GX Works2 Version 1 Operating
Manual (Simple Project, Function
Block)
SH-080984ENG
 Explanation for methods for such as creating function blocks,
pasting function blocks to sequence programs, and operating
FB library in Simple project of GX Works2
GX Works2 Version 1 Operating
Manual (Structured Project) SH-080781ENG Explanation for methods for such as creating and monitoring
programs in Structured project of GX Works2
GX Works3 Installation Instructions BCN-P5999-0391 Explanation for the operating environment and installation
method of GX Works3
MELSEC-Q/L/F Structured
Programming Manual (Fundamentals) SH-080782ENG Explanation for programming methods, types of programming
languages, etc. required to create structured programs
MELSEC-Q/L Structured
Programming Manual (Application
Functions)
SH-080784ENG
 Explanation for specifications and functions related to
application functions which can be used in structured
programs
MELSEC-Q CC-Link System Master/
Local Module Users Manual SH-080394E Explanation for system configuration, installation, wiring, etc.
of master/local modules for CC-Link system
MELSEC iQ-R Programming Manual
(CPU Module Instructions, Standard
Functions/Function Blocks)
SH-081266ENG
 Explanation for instructions, general-purpose functions, and
general-purpose function blocks required for programming the
sequencer MELSEC iQ-R series
Reference Manual for MTBs
Manual No. Purpose and Contents
M800/M80 Series Smart safety
observation Specification manual BNP-C3072-022 Explanation for smart safety observation function
M800/M80 Series Interactive cycle
insertion (Customization)
Specification manual
BNP-C3072-121-
0003 Explanation for interactive cycle insertion
M800/M80 Series Synchronous
Control Specifications manual BNP-C3072-074 Explanation for synchronous control
M800/M80 Series Multiple-Axis
Synchronization Control
Specifications manual
BNP-C3072-339 Explanation for multiple-axis synchronization control
M800/M80 Series GOT Connection
Specifications manual BNP-C3072-314 Explanation for GOT connection
M800/M80 Series PROFIBUS-DP
Specification manual BNP-C3072-118 Explanation for PROFIBUS-DP communication function
M800/M80 Series EtherNet/IP
Specifications manual BNP-C3072-263 Explanation for EtherNet/IP
M800/M80 Series FL-net
Specifications manual BNP-C3072-368 Explanation for FL-net
M800/M80 Series CC-Link (Master/
Local) Specification manual BNP-C3072-089 Explanation for CC-Link
M800/M80 Series CC-Link IE Field
(Master/local) Specifications manual BNP-C3072-283 Explanation for CC-Link IE Field
M800/M80 Series CC-Link IE Field
Basic Specifications manual BNP-C3072-337 Explanation for CC-Link IE Field Basic
Precautions for Safety
Always read this manual, related manuals and attached documents before installation, operation, programming, maintenance
or inspection to ensure correct use. Understand all the conditions described in this manual before using the unit.
We rank the safety precautions into "DANGER", "WARNING" and "CAUTION" for the manuals issued by Mitsubishi Electric,
including this manual.
Note that even items ranked as " CAUTION", may lead to serious consequences depending on the situation. All the items
are important and must always be observed.
The following signs indicate prohibition and compulsory.
The meaning of each pictorial sign is as follows.
Mitsubishi Electric CNC is designed and manufactured solely for applications to machine tools to be used for industrial
purposes.
Do not use this product in any applications other than those specified above, especially those which are substantially
influential on the public interest or which are expected to have significant influence on human lives or properties.
DANGER
When the user may be subject to imminent fatalities or major injuries if handling is mistaken.
WARNING
When the user may be subject to fatalities or major injuries if handling is mistaken.
CAUTION
When the user may be subject to medium or minor injuries or when only property damage may occur, if handling is
mistaken.
This sign indicates prohibited behavior (must not do).
For example, indicates "Keep fire away".
This sign indicated a thing that is pompously (must do).
For example, indicates "it must be grounded".

CAUTION CAUTION rotated ob ject CAUTION HOT Danger Electric
shock risk Danger explosive
Prohibited Disassembly is pro hibited KEEP FIRE AWAY General instruction Earth ground
For Safe Use
Not applicable in this manual.
Not applicable in this manual.
Items related to product and manual
The items that are not described in this manual must be interpreted as "not possible".
This manual is written on the assumption that all the applicable functions are included. Some of them, however, may not be available for your NC system. Refer to the specifications issued by the machine tool builder before use.
Some screens and functions may differ depending on each NC system (or version), and some functions may not be possible. Please confirm the specifications before starting to use.
To protect the availability, integrity and confidentiality of the NC system against cyber-attacks including unauthorized access, denial-of-service (Dos) (*1) attack, and computer virus from external sources via a network, take security measures such as firewall, VPN, and anti-virus software.
Mitsubishi Electric assumes no responsibility for any problems caused to the NC system by any type of cyber-attacks including DoS attack, unauthorized access and computer virus.
(*1) Denial-of-service (Dos) refers to a type of cyber-attack that disrupts services by overloading the system or by exploit ing a vulnerability of the system.
Items related to start up and maintenance
Follow the power specifications (input voltage range, frequency range, momentary power failure time range) described in this manual.
Follow the environment conditions (ambient temperature, humidity, vibration, atmosphere) described in this manual.
Follow the remote type machine contact input/output interface described in this manual. (Connect a diode in parallel with the inductive load or connect a protective resistor in serial with the capacitive load, etc.)
If the temperature rise detection function is invalidated with the parameters, the control could be disabled when the temperature is excessive. This could result in machine damage or personal injuries due to runaway axis, and could damage the device. Enable the detection function for normal use. The parameter for the temperature rise detection function will be validated forcibly when the NC unit is turned ON.
DANGER
WARNING
CAUTION
Treatment of waste
The following two laws will apply when disposing of this product. Considerations must be made to each law. The following laws are in effect in Japan. Thus, when using this product overseas, the local laws will have a priority. If necessary, indicate or notify these laws to the final user of the product.
(1) Requirements for "Law for Promotion of Effective Utilization of Resources"
(a) Recycle as much of this product as possible when finished with use.
(b) When recycling, often parts are sorted into steel scraps and electric parts, etc., and sold to scrap contractors. Mitsubishi Electric recommends sorting the product and selling the members to appropriate contractors.
(2) Requirements for "Law for Treatment of Waste and Cleaning"
(a) Mitsubishi Electric recommends recycling and selling the product when no longer needed according to item (1) above. The user should make an effort to reduce waste in this manner.
(b) When disposing a product that cannot be resold, it shall be treated as a waste product.
(c) The treatment of industrial waste must be commissioned to a licensed industrial waste treatment contractor, and appropriate measures, including a manifest control, must be taken.
(d) Batteries correspond to "primary batteries", and must be disposed of according to local disposal laws.
Disposal
(Note) This symbol mark is for EU countries only.
This symbol mark is according to the directive 2006/66/EC Article 20 Information for end-users and Annex II.
Your MITSUBISHI ELECTRIC product is designed and manufactured with high quality materials and components which can be recycled and/or reused.
This symbol means that batteries and accumulators, at their end-of-life, should be disposed of separately from your household waste.
If a chemical symbol is printed beneath the symbol shown above, this chemical symbol means that the battery or accumulator contains a heavy metal at a certain concentration. This will be indicated as follows:
Hg: mercury (0.0005%), Cd: cadmium (0.002%), Pb: lead (0.004%)
In the European Union there are separate collection systems for used batteries and accumulators.
Please, dispose of batteries and accumulators correctly at your local community waste collection/recycling centre.
Please, help us to conserve the environment we live in!
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(/Japanese)
(A)

Handling of our product
(English)
This is a class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

(/Korean)
(A)
.

WARRANTY
Please confirm the following product warranty details before using Mitsubishi Electric CNC.
1. Warranty Period and Coverage
Should any fault or defect (hereafter called "failure") for which we are liable occur in this product during the warranty period, repair services shall be provided at no cost through the distributor from which the product was purchased or through a Mitsubishi Electric service provider. Note, however, that this does not apply if the customer was informed prior to purchasing the product that the product is not covered under warranty. Also note that we are not responsible for any on-site readjustment and/or trial run that may be required after a defective unit is replaced.
[Warranty Term]
The term of warranty for this product shall be twenty-four (24) months from the date of delivery of the product to the end user, provided the product purchased from Mitsubishi Electric or a distributor in Japan is installed in Japan (but in no event longer than thirty (30) months, including distribution time after shipment from Mitsubishi Electric or a distributor).
Note that, in the case where the product purchased from Mitsubishi Electric or a distributor in or outside Japan is exported and installed in any country other than where it was purchased, please refer to "2. Service in Overseas Countries" below.
[Limitations]
(1) The machine tool builder is requested to conduct an initial failure diagnosis, as a general rule. The diagnosis may also be carried out by Mitsubishi Electric or our service provider for a fee at the machine tool builder's request.
(2) This warranty applies only when the conditions, method, environment, etc., of use are in compliance with the terms, conditions and instructions that are set forth in the instruction manual, users manual, and the caution label affixed to the product, etc.
(3) Even during the term of warranty, repair costs will be charged to the customer in the following cases:
(a) a failure caused by improper storage or handling, carelessness or negligence, etc., or a failure caused by a problem with the customer's hardware or software
(b) a failure caused by any alteration, etc., to the product made by the customer without Mitsubishi Electrics approval
(c) a failure which may be regarded as avoidable, if the customers equipment in which this product is incorporated is equipped with a safety device required by applicable laws or has any function or structure considered to be indispensable in the light of common sense in the industry
(d) a failure which could have been avoided if consumable parts designated in the instruction manual, etc. had been duly maintained and replaced
(e) any replacement of consumable parts (including the battery, relay and fuse)
(f) a failure caused by external factors such as inevitable accidents, including without limitation fire and abnormal fluctuation of voltage, and acts of God, including without limitation earthquakes, lightning, and natural disasters
(g) a failure which could not have been foreseen under technologies available at the time of shipment of this product from Mitsubishi Electric
(h) any other failures which are not attributable to Mitsubishi Electric or which the customer acknowledges are not attributable to Mitsubishi Electric
2. Service in Overseas Countries
If the customer installs a product purchased from Mitsubishi Electric in a machine or equipment and exports it to any country other than where it was purchased, the customer may sign a paid warranty contract with our local FA center.
This applies in the case where the product purchased from us in or outside Japan is exported and installed in any country other than where it was purchased.
For details please contact the distributor from which the product was purchased.
3. Exclusion of Responsibility for Compensation against Loss of Opportunity, Secondary Loss, etc.
Regardless of the gratis warranty term, Mitsubishi Electric shall not be liable for compensation for:
(1) Damage arising from any cause found not to be the responsibility of Mitsubishi Electric.
(2) Lost opportunity or lost profit incurred by the user due to a failure of a Mitsubishi Electric product.
(3) Special damage or secondary damage, whether foreseeable or not, compensation for accidents, and compensation for damages to products other than Mitsubishi Electric products.
(4) Replacement by the user, maintenance of on-site equipment, start-up test run and other tasks.
4. Changes in Product Specifications
Specifications shown in our catalogs, manuals or technical documents are subject to change without notice.
5. Product Application
(1) For use of this product, applications should be those that will not result in a serious damage even if a failure or malfunction occurs in the product, and a backup or failsafe function should operate on an external system when any failure or malfunction occurs to the product.
(2) Mitsubishi Electric CNC is designed and manufactured solely for applications to machine tools for industrial purposes.
Do not use this product in applications other than those specified above, especially those which have substantial influence on public interest or which are expected to have significant influence on human lives or properties.

CONTENTS

M800V/M80V Series Specifications List [L system]
: Standard : Option : Selection

Class
Lathe system
Page M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
1 Control Axes 1
1.1 Control Axes 2
1.1.1 Number of Basic Control Axes (NC Axes) 2 2 2 2 2 2 2 2
1.1.2 Max. Number of Axes (NC Axes + Spindles + PLC
Axes)
16

32
16
32
16
32
16
32
13 13 9 2
1.1.2.1 Max. Number of NC Axes (In Total for All the
Part Systems)
16
32
16
32
16
32
16
32
10 10 7 2
1.1.2.2 Max. Number of Spindles 8 8 8 8 6 6 4 2
1.1.2.3 Max. Number of PLC Axes 8 8 8 8 6 6 6 2
1.1.4 Max. Number of PLC Indexing Axes 8 8 8 8 4 4 4 3
1.1.5 Number of Simultaneous Contouring Control Axes 8 4 8 4 4 4 4 3
1.1.6 Max. Number of NC Axes in a Part System
8
12
16
8
12
16
8
12
16
8
12
16
8 8 53
1.1.7 Axis Name Extension 3
1.2 Control Part System 4
1.2.1 Standard Number of Part Systems 1 1 1 1 1 1 1 4
1.2.2 Max. Number of Part Systems (Main + Sub) 4
8
4
8
4
8
4
8 4 4 2 4
1.2.2.1 Max. Number of Main Part Systems 4
8
4
8
4
8
4
8 2 2 2 4
1.2.2.2 Max. Number of Sub Part Systems 4
8
4
8
4
8
4
8 2 2 1 4
1.3 Control Axes and Operation Modes 5
1.3.1 Tape (RS-232C Input) Mode 5
1.3.2 Memory Mode 5
1.3.3 MDI Mode 5
1.3.4 High-Speed Program Server Mode 5
1.3.4.1 Control Unit-Side High-Speed Program Server
Mode 5
1.3.4.2 Display Unit-Side High-Speed Program Server
Mode 6
1.3.5 Front-Side SD Card Mode 6
1.3.6 Front-Side USB Memory Mode 7
2 Input Command 9
2.1 Data Increment 10
2.1.1 Least Command Increment 10
Least command increment 1m 10
Least command increment 0.1m 10
Least command increment 0.01m(10nm) 10
Least command increment 0.001m(1nm) 10
2.1.2 Least Control Increment 12
Least control increment 0.01m(10nm) 12
Least control increment 0.001m(1nm) 12
2.1.3 Indexing Increment 12
2.2 Unit System 13
2.2.1 Inch/Metric Changeover 13

2.2.2 Input Command Increment Tenfold 14
2.3 Program Format 15
2.3.1 Program Format 15
2.3.1.1 Format 1 for Lathe (G Code List 2, 3) 15
2.3.1.2 Format 2 for Lathe (G Code List 4, 5) 15
2.3.1.3 Special Format for Lathe (G Code List 6, 7) 15
2.3.1.4 Format 1 for Machining Center 15
2.3.1.5 Format 2 for Machining Center (M2 Format) 15
2.3.1.6 MITSUBISHI CNC Special Format 15
2.3.2 Program Format Switch 16
2.4 Command Value 18
2.4.1 Decimal Point Input I, II 18
2.4.2 Absolute/Incremental Command 19
2.4.3 Diameter/Radius Designation 20
2.4.4 Diameter/Radius Designation Switch 21
3 Positioning/Interpolation 23
3.1 Positioning 24
3.1.1 Positioning 24
3.1.2 Unidirectional Positioning 25
3.2 Linear/Circular Interpolation 26
3.2.1 Linear Interpolation 26
3.2.2 Circular Interpolation (Center/Radius Designation) 27
3.2.3 Helical Interpolation 29
3.2.4 Spiral/Conical Interpolation 32
3.2.5 Cylindrical Interpolation 34
3.2.6 Polar Coordinate Interpolation 35
3.2.7 Milling Interpolation 36
3.2.8 Hypothetical Axis Interpolation 37
3.3 Curve Interpolation 38
3.3.1 Involute Interpolation 38
3.3.2 Exponential Interpolation 40
3.3.3 Spline Interpolation (G05.1Q2/G61.2) 41
3.3.4 NURBS Interpolation 42
3.3.5 3-Dimensional Circular Interpolation 43
3.3.6 Spline Interpolation 2 (G61.4) 44
4 Feed 47
4.1 Feedrate 48
4.1.1 Rapid Traverse Rate (m/min) 1000 1000 1000 1000 1000 1000 1000 48
4.1.2 Cutting Feedrate (m/min) 1000 1000 1000 1000 1000 1000 1000 49
4.1.3 Manual Feedrate (m/min) 1000 1000 1000 1000 1000 1000 1000 50
4.1.4 Rotary Axis Command Speed Tenfold 50
4.2 Feedrate Input Methods 51
4.2.1 Feed per Minute (Asynchronous Feed) 51
4.2.2 Feed per Revolution (Synchronous Feed) 52
4.2.3 Inverse Time Feed 53
4.2.4 F 1-Digit Feed 54
4.2.5 Manual Speed Command 55
4.2.7 G00 Feedrate Designation (,F Command) 56
4.2.8 Selection of Axis (Axes) for Feedrate Command 57
4.3 Override 58
4.3.1 Rapid Traverse Override 58
4.3.2 Cutting Feed Override 58
4.3.3 2nd Cutting Feed Override 58
: Standard : Option : Selection
Class
Lathe system
Page M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
4.3.4 Override Cancel 59
4.4 Acceleration/Deceleration 60
4.4.1 Automatic Acceleration/Deceleration After Inter polation 60
4.4.2 Rapid Traverse Constant-Gradient Acceleration/
Deceleration 62
4.4.3 Rapid Traverse Constant-Gradient Multi-Step Ac celeration/Deceleration 63
4.5 Thread Cutting 65
4.5.1 Thread Cutting (Lead/Thread Number Designa tion) 65
4.5.2 Variable Lead Thread Cutting 67
4.5.3 Synchronous Tapping 68
4.5.3.1 Synchronous Tapping Cycle 68
4.5.3.2 Pecking Tapping Cycle 70
4.5.3.3 Deep-Hole Tapping Cycle 72
4.5.3.5 Synchronous Tapping with Analog I/F Spindle 74
4.5.4 Chamfering 74
4.5.6 Circular Thread Cutting 75
4.5.8 High-Speed Synchronous Tapping (OMR-DD) 76
4.5.10 Thread Recutting 77
4.5.11 Thread Cutting Override 78
4.5.12 Variable Feed Thread Cutting 78
4.5.13 Thread Cutting Time Constant Switch 79
4.6 Manual Feed 80
4.6.1 Manual Rapid Traverse 80
4.6.2 Jog Feed 80
4.6.3 Incremental Feed 81
4.6.4 Handle Feed 81
4.6.5 Manual Feedrate B 82
4.6.6 Manual Feedrate B Surface Speed Control 83

4.6.8 Manual Speed Clamp 84
4.7 Dwell 85
4.7.1 Dwell (Time-Based Designation) 85
4.7.2 Dwell (Revolution-Based Designation) 86
5 Program Memory/Editing 87
5.1 Memory Capacity 88
5.1.1 Memory Capacity (Number of Programs Stored) 88
500KB[1280m] (1000 programs) 88
1000KB[2560m] (1000 programs) 88
2000KB[5120m] (1000 programs) 88
5.1.2 Extended Memory 88
2000KB[5120m] (1000 programs) 88
5.2 External Signal Display Switch 89
5.2.1 Program Editing 89
5.2.2 Background Editing 90
5.2.3 Buffer Correction 91
5.2.5 Multi-Part System Simultaneous Program Editing 92
5.2.6 Special Program Editing Display for Synchroniza tion Between Part Systems 92
5.2.7 Finish Shape View Programming 93
6 Operation and Display 95
6.1 Structure of Operation/Display Panel 96
: Standard : Option : Selection
Class
Lathe system
Page M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
6.1.1 Color Display (8.4-Type LCD TFT) 96
6.1.2 Color Touchscreen Display (10.4-Type LCD TFT) 96
6.1.3 Color Touchscreen Display (15-Type LCD TFT) 96
6.1.4 Color Touchscreen Display (19-Type LCD TFT) 96
6.1.8 Separated-Type Color Touchscreen Display (15-Type LCD TFT/Windows10) 96
6.1.9 Separated-Type Color Touchscreen Display (19-Type LCD TFT/Windows10) 96
6.1.10 Separated-Type Color Touchscreen Display (19-Type Horizontal LCD TFT/Windows10) 96
6.2 Operation Methods and Functions 97
6.2.1 Operation Input 97
6.2.2 Absolute/Incremental Setting 97
6.2.5 Displayed Part System Switch 98
6.2.6 Menu List 98
6.2.7 Display Switch by Operation Mode 98
6.2.8 External Signal Display Switch 98
6.2.9 Screen Saver 99
6.2.10 Parameter Guidance 99
6.2.11 Alarm Guidance 99
6.2.12 Machining Program Input Mistake Check Warn ing 100
6.2.14 Screenshot Capture 100
6.2.15 User Selectable Menu Configuration 100
6.2.16 PC-NC Network Automatic Connection 100
6.2.17 Device Open Parameter 101
6.2.18 SRAM Open Parameter 101
6.2.19 MTB Selectable Menu Configuration 101
6.2.20 Remote Desktop Connection 102
6.2.21 VNC Server 103
6.3 Display Methods and Contents 104
6.3.1 Status Display 104
6.3.2 Clock Display 104
6.3.3 Monitor Screen Display 105
6.3.4 Setup Screen Display 105
6.3.5 Edit Screen Display 106
6.3.6 Diagnosis Screen Display 106
6.3.7 Maintenance Screen Display 106
6.3.8 Home Application 107
6.3.9 Home Screen 108
6.3.10 Additional Languages 109
6.3.10.1 Japanese 109
6.3.10.2 English 109
6.3.10.3 German 109
6.3.10.4 Italian 109
6.3.10.5 French 109
6.3.10.6 Spanish 109
6.3.10.7 Chinese 110
6.3.10.7.1 Chinese (Traditional Chinese Characters) 110
6.3.10.7.2 Chinese (Simplified Chinese Characters) 110
6.3.10.8 Korean 110
6.3.10.9 Portuguese 110
6.3.10.10 Hungarian 110
: Standard : Option : Selection
Class
Lathe system
Page M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
6.3.10.11 Dutch 110

6.3.10.12 Swedish 110
6.3.10.13 Turkish 110
6.3.10.14 Polish 111
6.3.10.15 Russian 111
6.3.10.16 Czech 111
6.3.10.17 Indonesian 111
6.3.10.18 Vietnamese 111
7 Input/Output Functions and Devices 113
7.1 Input/Output Data 114
7.1.1 Machining Program Input/Output 114
7.1.2 Tool Offset Data Input/Output 114
7.1.3 Common Variable Input/Output 114
7.1.4 Parameter Input/Output 114
7.1.5 History Data Output 114
7.1.7 System Configuration Data Output 114
7.2 Input/Output I/F 115
7.2.1 RS-232C I/F 115
7.2.2 SD Card I/F 115
7.2.2.1 Control Unit-Side SD Card I/F [Up to 32 GB] 115
7.2.2.2 Front-Side SD Card I/F [Up to 32 GB] 115
7.2.3 Ethernet I/F 115
7.2.4 Display Unit-Side Data Server I/F 116
7.2.5 Front-Side USB Memory I/F [Up to 32 GB] 116
7.2.8 Image Input I/F 117
7.2.9 Measuring Instrument I/F 118
7.3 Computer Link 119
7.3.1 Computer Link B 119
7.4 Others 120
7.4.1 Handy Terminal Connection 120
7.4.3 IP Filter Setting 121
8 Spindle, Tool and Miscellaneous Functions 123
8.1 Spindle Functions (S) 124
8.1.1 Spindle Control Functions 124
8.1.1.1 Spindle Digital I/F 125
8.1.1.2 Spindle Analog I/F 125
8.1.1.3 Coil Switch 125
8.1.1.4 Automatic Coil Switch 125
8.1.1.5 Encoder Input I/F 126
8.1.1.6 Spindle-Mode Servo Motor Control 127
8.1.1.7 Spindle-Mode Rotary Axis Control 128
8.1.1.8 Turret Gear Change Control 129
8.1.1.9 Spindle Control with Pulse Train Output 130
8.1.2 S Code Output 131
8.1.3 Constant Surface Speed Control 132
8.1.4 Spindle Override 134
8.1.5 Multiple-Spindle Control 134
8.1.5.1 Multiple-Spindle Control I 135
8.1.5.2 Multiple-Spindle Control II 136
8.1.6 Spindle Orientation 137
8.1.7 Spindle Position Control (Spindle/C Axis Control) 139
8.1.7.1 Spindle Position Control (Spindle/C Axis Con trol) 139
: Standard : Option : Selection
Class
Lathe system
Page M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
8.1.7.2 C Axis Control During Spindle Synchronization 140
8.1.8 Spindle Synchronization 141
8.1.8.1 Spindle Synchronization I 141
8.1.8.2 Spindle Synchronization II 142
8.1.8.3 Guide Bushing Spindle Synchronization 142
8.1.9 Tool Spindle Synchronization I (Polygon) 143
8.1.9.1 Tool Spindle Synchronization IA (Spindle Spindle, Polygon) 143
8.1.9.2 Tool Spindle Synchronization IB (Spindle Spindle, Polygon) 144
8.1.9.3 Tool Spindle Synchronization IC (Spindle-NC
Axis, Polygon) 145
8.1.10 Tool Spindle Synchronization II (Hobbing) 146
8.1.11 Spindle Speed Clamp 147
8.1.13 Spindle Oscillation 147
8.1.14 Spindle Superimposition Control 148
8.1.15 Multiple Spindle Synchronization Set Control 150
8.1.16 Spindle Speed Fluctuation Detection 153
8.1.17 Spindle Motor Temperature Output to PLC 154
8.2 Tool Functions (T) 155
8.2.1 Tool Functions (T Command) 155
8.3 Miscellaneous Functions (M) 156
8.3.1 Miscellaneous Functions 156
8.3.2 Multiple M Codes in 1 Block 156
8.3.3 M Code Independent Output 157
8.3.4 Miscellaneous Function Finish 158
8.3.5 M Code Output during Axis Traveling 159
8.3.6 Miscellaneous Function Command High-speed
Output 160
8.4 2nd Miscellaneous Functions (B) 162
8.4.1 2nd Miscellaneous Functions 162
8.4.2 2nd Miscellaneous Function Name Extension 162

9 Tool Compensation 163
9.1 Tool Length/Tool Position 164
9.1.1 Tool Length Offset 164
9.1.2 Tool Position Offset 167
9.1.3 Tool Compensation for Additional Axes 167
9.1.4 Tool Position Compensation (G43.7) 168
9.2 Tool Radius 169
9.2.1 Tool Radius Compensation 169
9.2.2 3-Dimensional Tool Radius Compensation (*1) (*1) 171
9.2.3 Tool Nose Radius Compensation (G40/41/42) 172
9.2.4 Automatic Decision of Nose Radius Compensa tion Direction (G46/40) 173
9.2.5 Tool Radius Compensation Diameter Designation 173
9.3 Tool Offset Amount 174
9.3.1 Number of Tool Offset Sets 174
99 sets 174
128 sets 174
200 sets 174
256 sets 174
400 sets 174
999 sets 174
: Standard : Option : Selection
Class
Lathe system
Page M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
9.3.2 Offset Memory 175
9.3.2.1 Tool Shape/Wear Offset Amount 175
9.3.2.2 Compensation Type Selection by Parameter 178
9.3.3 Number of Tool Offset Sets Allocation to Part Sys tems 179
10 Coordinate System 181
10.1 Coordinate System Type and Setting 182
10.1.1 Machine Coordinate System 183
10.1.2 Coordinate System Setting 184
10.1.3 Automatic Coordinate System Setting 185
10.1.4 Workpiece Coordinate System Selection 186
10.1.4.1 Workpiece Coordinate System Selection (6
Sets) 187
10.1.4.2 Extended Workpiece Coordinate System Se lection (48 Sets) G54.1P1 to P48 188
10.1.4.3 Extended Workpiece Coordinate System Se lection (96 Sets) G54.1P1 to P96 188
10.1.4.4 Extended Workpiece Coordinate System Se lection (300 Sets) G54.1P1 to P300 188
10.1.5 External Workpiece Coordinate Offset 189
10.1.6 Workpiece Coordinate System Preset (G92.1) 190
10.1.7 Local Coordinate System 191
10.1.8 Coordinate System for Rotary Axis 192
10.1.9 Plane Selection 193
10.1.10 Origin Set/Origin Cancel 194
10.1.11 Counter Set 196
10.1.12 Workpiece Position Offset for Rotary Axis 197
10.1.13 Workpiece Coordinate System Shift 199
10.2 Return 200
10.2.1 Manual Reference Position Return 200
10.2.2 Automatic 1st Reference Position Return 201
10.2.3 2nd, 3rd, and 4th Reference Position Return 203
10.2.4 Reference Position Check 205
10.2.5 Absolute Position Detection 206
10.2.6 Tool Exchange Position Return 207
11 Operation Support Functions 209
11.1 Program Control 210
11.1.1 Optional Block Skip 210
11.1.2 Optional Block Skip Addition 210
11.1.3 Single Block 211
11.2 Program Test 212
11.2.1 Dry Run 212
11.2.2 Machine Lock 212
11.2.3 Miscellaneous Function Lock 212
11.2.4 Graphic Check 213
11.2.4.1 Graphic Check 213
11.2.4.2 3D Solid Program Check 214
11.2.4.3 Graphic Check Rotary Axis Drawing 215
11.2.4.4 3D Machining Simulation 216
11.2.5 Graphic Trace 217
11.2.5.1 Graphic Trace 217
11.2.5.2 Graphic Trace Rotary Axis Drawing 218
11.2.6 Machining Time Calculation 218
: Standard : Option : Selection
Class
Lathe system
Page M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
11.2.7 Manual Arbitrary Reverse Run (Program Check
Operation) 219
11.2.8 High-Speed Simple Program Check 220
11.3 Program Search/Start/Stop 221
11.3.1 Program Search 221

11.3.2 Sequence Number Search 221
11.3.3 Collation Stop 222
11.3.4 Program Restart 223
11.3.5 Automatic Operation Start 224
11.3.6 NC Reset 224
11.3.7 Feed Hold 225
11.3.8 Search & Start 225
11.3.10 Auto-restart 225
11.4 Interrupt Operation 226
11.4.1 Manual Interruption 226
11.4.2 Automatic Operation Handle Interruption 226
11.4.3 Manual Absolute Switch 227
11.4.4 Thread Cutting Cycle Retract 228
11.4.5 Tapping Retract 229
11.4.6 Manual Numerical Value Command 230
11.4.7 Arbitrary Reverse Run 231
11.4.8 MDI Interruption 232
11.4.9 Simultaneous Operation of Manual and Automat ic Modes 232
11.4.10 Simultaneous Operation of JOG and Handle
Modes 232
11.4.11 Reference Position Retract 233
11.4.12 Tool Retract and Return 234
11.4.13 Skip Retract 235
11.4.14 PLC Interruption 235
12 Program Support Functions 237
12.1 Machining Method Support Functions 238
12.1.1 Program 238
12.1.1.1 Subprogram Control [Layers] 10 10 10 10 10 10 10 238
12.1.1.2 Figure Rotation 241
12.1.1.3 Scaling 243
12.1.1.4 Axis Name Switch 244
12.1.2 Macro Program 245
12.1.2.1 User Macro [Layers] 4 4 4 4 4 4 4 245
12.1.2.2 Machine Tool Builder Macro 249
12.1.2.3 Macro Interruption 251
12.1.2.4 Variable Commands 252
600 sets 252
700 sets 252
8000 sets 252
(600+100number of part systems) sets 252
(7900+100number of part systems) sets 252
12.1.2.5 Extended Common Variable 254
12.1.3 Fixed Cycles 256
12.1.3.1 Fixed Cycle for Drilling 257
12.1.3.2 Fixed Cycle for Drilling (Type II) 264
12.1.3.3 Special Fixed Cycle 265
12.1.3.4 Fixed Cycle for Turning Machining 269
: Standard : Option : Selection
Class
Lathe system
Page M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
12.1.3.5 Compound Type Fixed Cycle for Turning Ma chining 274
12.1.3.6 Compound Type Fixed Cycle for Turning Ma chining (Type II) 279
12.1.3.7 Small-Diameter Deep-Hole Drilling Cycle 283
12.1.3.8 Two-Dimensional Barcode Engraving Cycle 284
12.1.3.9 Text Engraving Cycle 286
12.1.4 Mirror Image 287
12.1.4.1 Mirror Image by Parameter Setting 287
12.1.4.2 Mirror Image by External Input 287
12.1.4.3 Mirror Image by G Code 288
12.1.4.4 Mirror Image for Facing Tool Posts 289
12.1.4.5 T Code Mirror Image for Facing Tool Posts 289
12.1.5 Coordinate System Operation 290
12.1.5.1 Coordinate Rotation by Program 290
12.1.5.2 Coordinate Rotation by Parameter 292
12.1.5.3 3-Dimensional Coordinate Conversion 293
12.1.6 Dimension Input 294
12.1.6.1 Corner Chamfering/Corner R 294
12.1.6.2 Linear Angle Command 301
12.1.6.3 Geometric Command 302
12.1.6.4 Polar Coordinate Command 304
12.1.7 Axis Control 305
12.1.7.1 Chopping 305
12.1.7.1.1 Chopping 305
12.1.7.2 Normal Line Control 306
12.1.7.3 Circular Cutting 307
12.1.7.4 Vibration Cutting Control 308
12.1.8 Multi-Part System Control 309
12.1.8.1 Timing Synchronization Between Part Sys tems 309
12.1.8.2 Start Point Designation Timing Synchroniza tion 310
12.1.8.3 Mixed Control 313
12.1.8.3.1 Mixed Control (Cross Axis Control) 313
12.1.8.3.2 Arbitrary Axis Exchange Control 314
12.1.8.4 Control Axis Superimposition 316
12.1.8.4.1 Control Axis Superimposition 316

12.1.8.4.2 Arbitrary Axis Superimposition Control 317
12.1.8.5 Control Axis Synchronization Between Part
Systems 318
12.1.8.6 Balance Cut 320
12.1.8.7 Common Memory for Part Systems 321
12.1.8.8 Multi-Part System Simultaneous Thread Cut ting 322
12.1.8.8.1 Two-Part System Simultaneous Thread
Cutting 323
12.1.8.8.2 Multi-Part System Simultaneous Thread
Cutting 325
12.1.8.9 Multi-Part System Program Management 326
12.1.8.10 Synchronization Between Part Systems 327
12.1.8.10.1 Single Block Between Part Systems 327
12.1.8.10.2 Dwell/Miscellaneous Function Time
Override 328
: Standard : Option : Selection
Class
Lathe system
Page M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
12.1.8.10.3 Synchronization Between Part Systems
OFF 329
12.1.8.11 Sub Part System Control I 330
12.1.8.12 Sub Part System Control II 332
12.1.8.13 Loader Control Part System 334
12.1.9 Data Input/Output by Program 335
12.1.9.1 Parameter Input by Program 335
12.1.9.2 Compensation Data Input by Program 336
12.1.9.3 Tool/Material Shape Input by Program 340
12.1.9.5 API Section and Sub-Section Nos. Input/Out put by Program 342
12.1.9.6 R-Navi Data Input by Program 342
12.1.10 Machining Modal 343
12.1.10.1 Tapping Mode 343
12.1.10.2 Cutting Mode 343
12.1.11 High-Speed Parts Machining 344
12.1.11.1 Rapid Traverse Block Overlap 344
12.2 Machining Accuracy Support Functions 346
12.2.1 Automatic Corner Override 346
12.2.2 Deceleration Check 347
12.2.2.1 Exact Stop Check Mode 349
12.2.2.2 Exact Stop Check 349
12.2.2.3 Error Detection 349
12.2.2.4 Programmable In-Position Check 350
12.2.2.5 Automatic Error Detection 350
12.3 High-Speed and High-Accuracy Functions [kB PM: k Block per Minute] 351
12.3.1 High-Speed Machining Mode 351
12.3.1.1 High-Speed Machining Mode I (G05P1) Max imum [kBPM] 33.7 33.7 33.7 33.7 33.7 33.7 351
12.3.1.2 High-Speed Machining Mode II (G05P2)
Maximum [kBPM] 168 168 168 168 101 101 353
12.3.2 High-Accuracy Control 355
12.3.2.1 High-Accuracy Control (G61.1/G08) 355
12.3.2.2 Multi-Part System Simultaneous High-Accu racy Control 359
12.3.2.3 SSS Control 360
12.3.2.4 Tolerance Control 361
12.3.2.5 Variable-Acceleration Pre-Interpolation Ac celeration/Deceleration 362
12.3.2.6 High-Accuracy Acceleration/Deceleration
Time Constant Extension 362
12.3.2.7 Axis-Specific Acceleration Tolerance Control 363
12.3.3 High-Speed High-Accuracy Control 364
12.3.3.1 High-Speed High-Accuracy Control I
(G05.1Q1) Maximum [kBPM] 67.5 67.5 67.5 67.5 33.7 33.7 364
12.3.3.2 High-Speed High-Accuracy Control II
(G05P10000) Maximum [kBPM] 168 168 168 168 101 101 365
12.3.3.3 High-Speed High-Accuracy Control III
(G05P20000) Maximum [kBPM] 369
12.3.3.4 Smooth Fairing 371
12.3.4 Machining Condition Selection I 372
12.3.5 Direct Command Mode 372
12.4 Programming Support Functions 373
12.4.1 Playback 373
: Standard : Option : Selection
Class
Lathe system
Page M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
12.4.3 Interactive Cycle Insertion 374
12.4.4 Simple Programming (NAVI MILL/LATHE) 377
12.4.5 G Code Guidance 378
12.4.7 DXF Data Input 379
13 Machine Accuracy Compensation 381
13.1 Static Accuracy Compensation 382
13.1.1 Backlash Compensation 382
13.1.2 Memory-Type Pitch Error Compensation [Sets] 32 32 32 32 16 16 16 383
13.1.3 Memory-Type Relative Position Error Compen sation 384

13.1.4 External Machine Coordinate System Compen sation 385
13.1.5 Circular Radius Error Compensation 385
13.1.6 Ball Screw Thermal Expansion Compensation 386
13.1.7 Rotation Center Error Compensation 387
13.1.8 Position-Dependent Gradually Increasing-Type
Backlash Compensation 389
13.1.9 Bidirectional Pitch Error Compensation 390
13.1.10 Cyclic Error Compensation 390
13.1.11 Spatial Error Compensation 391
13.1.12 Backlash Compensation II 392
13.2 Dynamic Accuracy Compensation 393
13.2.1 Smooth High-Gain (SHG) Control 393
13.2.2 Dual Feedback 394
13.2.3 Lost Motion Compensation 395
13.2.4 OMR II (Backlash with Filter) 395
13.2.6 OMR-FF 396
13.2.7 Distance-Coded Reference Position Detection 397
13.2.8 OMR-CC (Optimum Machine Response - Con tour Control) 398
13.2.9 Variable Torsion Compensation 399
13.2.10 Cogging Torque Compensation 400
14 Automation Support Functions 401
14.1 Measurement 402
14.1.1 Skip 402
14.1.1.1 Skip 402
14.1.1.2 Multiple-Step Skip 404
14.1.1.4 PLC Skip 405
14.1.1.5 Speed Change Skip 405
14.1.1.6 Torque Limitation Skip 406
14.1.2 Automatic Tool Length Measurement 407
14.1.3 Manual Tool Length Measurement 1 410
14.1.4 Manual Tool Length Measurement 2 413
14.1.5 Workpiece Coordinate Offset Measurement 414
14.1.6 Workpiece Position Measurement 415
14.1.7 Rotation Measurement 417
14.1.8 Rotation Center Error Measurement 418
14.1.9 Workpiece Installation Error Measurement 419
14.2 Tool Life Management 420
14.2.1 Tool Life Management 420
14.2.1.1 Tool Life Management I 420
14.2.1.2 Tool Life Management II 420
14.2.1.3 Tool Life Management III 421
: Standard : Option : Selection
Class
Lathe system
Page M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
14.2.2 Number of Tool Life Management Sets 422
99 sets 422
128 sets 422
200 sets 422
256 sets 422
400 sets 422
999 sets 422
14.2.3 Tool Life Management Set Allocation to Part Sys tems 423
14.3 Others 425
14.3.1 Programmable Current Limitation 425
14.3.2 Auto Power OFF 425
14.3.4 Load Monitoring I 426
14.3.5 Power ON/OFF Sequence 426
14.3.7 Direct Robot Control 427
14.3.8 Cutting Load Control 428
15 Safety and Maintenance 429
15.1 Safety Switches 430
15.1.1 Emergency Stop 430
15.1.2 Data Protection Key 430
15.2 Display for Ensuring Safety 431
15.2.1 NC Warning 431
15.2.2 NC Alarm 432
15.2.3 Operation Stop Cause 432
15.2.4 Emergency Stop Cause 432
15.2.5 Thermal Detection 433
15.2.6 Battery Alarm/Warning 434
15.3 Protection 435
15.3.1 Stroke End (Over Travel) 435
15.3.2 Stored Stroke Limit 435
15.3.2.1 Stored Stroke Limit I/II 437
15.3.2.2 Stored Stroke Limit IB 439
15.3.2.3 Stored Stroke Limit IIB 440
15.3.2.4 Stored Stroke Limit IC 441
15.3.3 Stroke Check Before Travel 442
15.3.4 Chuck/Tailstock Barrier Check 444
15.3.5 Interlock 445
15.3.6 External Deceleration 445
15.3.7 Interference Check III 446
15.3.8 3D Machine Interference Check 447
15.3.9 Door Interlock 448

15.3.9.1 Door Interlock I 448
15.3.9.2 Door Interlock II 449
15.3.10 Parameter Lock 451
15.3.11 Program Protection (Edit Lock B, C) 451
15.3.12 Program Display Lock 451
15.3.13 Data Protection by User's Level 452
15.3.15 Vertical Axis Pull-Up 452
15.3.16 Machine Group-Based Alarm Stop 453
15.3.17 Interference Check Between Part Systems 455
15.3.18 Spindle Protection 456
15.3.19 Real-Time 3D Machine Interference Check 457
15.4 Maintenance and Troubleshooting 458
: Standard : Option : Selection
Class
Lathe system
Page M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
15.4.1 Operation History 458
15.4.2 Data Sampling 459
15.4.3 NC Data Backup 459
15.4.4 Servo Tuning Support 460
15.4.4.1 NC Analyzer2 460
15.4.5 Automatic Backup 462
15.4.8 Application Error Detection 462
15.4.9 Email Notification to Operator 463
15.4.10 NC Configurator2 464
15.4.11 Diagnosis Data Output 464
15.4.13 Security Feature for Windows Display 465
15.4.14 Field Network Diagnostics 466
15.4.15 Remote service iQ Care Remote4U 467
15.4.15.1 Connection with RGU 467
15.4.15.2 Connection with no RGU 467
15.4.16 Brake Wear Diagnostics 468
15.5 Functional Safety 469
15.5.1 Safety Observation 469
15.5.2 Smart Safety Observation 470
15.5.2.1 Safety-Related I/O Observation 470
15.5.2.2 Emergency Stop Observation 470
15.5.2.3 Drive Safety Function 471
15.5.2.3.1 SLS (Safely-Limited Speed) 471
15.5.2.3.2 SLP (Safely-Limited Position) 471
15.5.2.3.3 SOS (Safe Operating Stop) 471
15.5.2.3.4 SSM (Safe Speed Monitor) 471
15.5.2.3.5 SBC/SBT (Safe Brake Control/Safe Brake
Test) 472
15.5.2.3.6 SCA (Safe Cam) 472
15.5.2.3.7 SS1/SS2 (Safe Stop) 472
15.5.2.3.8 STO (Safe Torque Off) 472
16 Drive System 473
16.1 Servo/Spindle 474
16.1.1 Feed Axis 474
16.1.1.1 MDS-E-Vx 474
16.1.1.2 MDS-EH-Vx 474
16.1.1.3 MDS-EJ-Vx 474
16.1.1.4 MDS-EJH-Vx 474
16.1.1.5 MDS-EM-SPVx 474
16.1.1.6 MDS-EMH-SPVx 474
16.1.2 Spindle 475
16.1.2.1 MDS-E-SPx 475
16.1.2.2 MDS-EH-SPx 475
16.1.2.3 MDS-EJ-SPx 475
16.1.2.5 MDS-EM-SPVx 475
16.1.2.6 MDS-EMH-SPVx 475
16.1.4 Power Supply 475
16.1.4.1 MDS-E-CV 475
16.1.4.2 MDS-EH-CV 475
16.1.4.3 MDS-EX-CVP 475
17 Machine Support Functions 477
17.1 PLC 478
17.1.1 Built-in PLC Processing Mode 478
: Standard : Option : Selection
Class
Lathe system
Page M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
17.1.2 PLC Functions 478
17.1.2.1 Built-in PLC Basic Function 478
17.1.2.1.1 Index Modification 482
17.1.2.1.2 Multi-Program [Number of Programs] 120 120 120 120 60 60 60 482
17.1.2.1.3 Multi-Project [Number of Projects Stored] 482
Number of PLC projects: 2 482
Number of PLC projects: 3 482
Number of PLC projects: 6 482
17.1.2.1.4 Function Block (FB) 482

17.1.2.1.5 Label Programming 482
17.1.2.1.6 ST Language 482
17.1.2.2 PLC Exclusive Instruction 483
17.1.2.3 Enhanced PLC Security Mode 484
17.1.3 PLC Support Functions 485
17.1.3.1 Alarm Message Display 485
17.1.3.2 Operator Message Display 485
17.1.3.3 Memory Switch (PLC Switch) 486
17.1.3.3.1 Memory Switch (PLC Switch) 32 Points 486
17.1.3.3.2 Memory Switch (PLC Switch) 64 Points 486
17.1.3.3.3 Memory Switch (PLC Switch) 96 Points 486
17.1.3.4 Load Meter Display 487
17.1.3.5 User PLC Version Display 487
17.1.3.6 Ladder Program Writing During RUN 487
17.1.3.7 PLC Program Protection 487
17.1.4 Built-in PLC Capacity 488
17.1.4.1 Standard PLC Capacity [Number of Steps] 128K 128K 128K 128K 64K 64K 32K 488
17.1.4.2 Large PLC Capacity: 256 Ksteps 488
17.1.4.3 Large PLC Capacity: 512 Ksteps 488
17.1.5 Machine Contact Input/Output I/F 488
17.1.6 Ladder Monitor 489
17.1.7 PLC Development 490
17.1.7.1 On-Board Development 490
17.1.7.2 MELSEC Development Tool (GX Developer) 490
17.1.7.3 MELSEC Development Tool (GX Works2) 490
17.1.8 PLC Parameter 491
17.1.8.1 PLC Constant (150 Points) 491
17.1.8.2 PLC Constant Extension (Up to 750 Points) 491
17.1.9 GOT Connection 492
17.1.9.1 Ethernet Connection 492
17.1.9.2 CC-Link Connection 492
17.1.10 Pallet Program Registration 493
17.2 Machine Construction 494
17.2.1 Servo OFF 494
17.2.2 Axis Detachment 495
17.2.3 Synchronous Control 496
17.2.4 Inclined Axis Control 499
17.2.5 Position Switch 24 24 24 24 24 24 24 500
17.2.7 Index Table Indexing 501
17.2.8 Tool Length Compensation Along the Tool Axis (*1) (*1) (*1) (*1) 503
17.2.9 Tool Handle Feed & Interruption 504
17.2.10 Tool Center Coordinate Display 504
17.2.11 Tool Center Point Control 505
: Standard : Option : Selection
Class
Lathe system
Page M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
17.2.11.1 Tool Center Point Control (G43.4/G43.5) 505
17.2.11.2 Tool Cutting Point Control Command
(G43.8/G43.9) 507
17.2.12 Inclined Surface Machining Command 508
17.2.13 Simple Inclined Surface Machining Command 510
17.2.14 3-Dimensional Tool Radius Compensation
(Tool's Vertical-Direction Compensation) (*1) (*1) (*1) (*1) 512
17.2.15 Workpiece Installation Error Compensation (*1) (*1) 513
17.2.16 3-Dimensional Manual Feed 514
17.2.17 R-Navi 515
17.2.18 Simple Synchronous Control 517
17.2.20 Real-Time Tuning 518
17.2.20.1 Real-Time Tuning 1 (Speed Gain) 518
17.2.20.2 Real-Time Tuning 2 (Rapid Traverse Time
Constant) 519
17.2.21 Constant Torque Control 520
17.2.22 External Encoder Position Output I/F 521
17.2.23 Multiple-Axis Synchronization Control 522
17.2.25 BiSS Encoder I/F 523
17.2.26 Tool Head Hot Swapping 524
17.3 PLC Operation 525
17.3.1 Arbitrary Feed in Manual Mode 525
17.3.2 Circular Feed in Manual Mode 526
17.3.3 PLC Axis Control 528
17.3.5 PLC Axis Indexing 529
17.3.6 NC Axis/PLC Axis Switchover 531
17.4 PLC Interface 532
17.4.1 CNC Control Signal 532
17.4.2 CNC Status Signal 533
17.4.3 PLC Window 535
17.4.4 External Search 536
17.4.5 Direct Screen Selection 536
17.4.6 Buzzer Sound Control 537
17.5 Machine Contact I/O 538
17.5.1 Operation Panel I/O 538
17.5.1.1 DI:64/DO:64 538
17.5.1.2 DI:64/DO:64 + SDI:8 538
17.5.1.3 DI:96/DO:64 538

17.5.1.5 DI:64/DO:48/AO:1 538
17.5.2 Remote I/O 539
17.5.2.1 DI:32/DO:32 539
17.5.2.2 DI:64/DO:48 539
17.5.2.3 DI:64/DO:48+AO:1 539
17.5.2.5 DI:16/DO:8 539
17.5.2.6 DI:32/DO:32 + SDI:8/SDO:4 539
17.5.2.7 SDI:8/SDO:4 539
17.6 External PLC Link 540
17.6.1 CC-Link (Master/Local) 540
17.6.2 PROFIBUS-DP (Master) 546
17.6.3 CC-Link IE Field (Master/Local) 547
17.6.5 EtherNet/IP 549
17.6.8 FL-Net 550
17.6.10 CC-Link IE Field Basic 551
: Standard : Option : Selection
Class
Lathe system
Page M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
(*1) This function is available during program format switch.
17.6.11 CC-Link IE TSN (Remote Station) 553
17.7 Installing S/W for Machine Tools 554
17.7.1 Customization (NC Designer2) 554
17.7.1.1 Customization Data Storage Capacity [MB] 16 16 16 16 556
17.7.1.2 Customization Working Memory Size [MB] 6 6 6 6 6 6 6 556
17.7.2 User-Defined Key 556
17.7.3 EZSocket I/F 556
17.7.4 APLC Release 557
17.7.5 Custom API Library 558
17.7.6 MES Interface Library 558
17.7.7 SLMP Server 559
17.7.8 Numerical Control (CNC) Communication Soft ware FCSB1224W000 560
17.7.11 Motion Control Release 561
17.7.11.1 Coordinate Transformation 561
17.7.12 Connection with High Speed Processing Unit
(HPU) 562
17.8 Others 563
17.8.1 System Lock 563
17.8.2 CNC Remote Operation Tool 563
17.8.2.1 NC Monitor2 563
17.8.2.2 NC Explorer 563
17.8.3 Automatic Operation Lock 564
17.8.4 Power Consumption Computation 564
17.8.5 EcoMonitorLight Connection 564
17.8.8 Laser Processing Control 565
17.8.9 Wireless LAN 567
: Standard : Option : Selection
Class
Lathe system
Page M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M800V/M80V Series Specifications List [M system]
: Standard : Option : Selection
Class
Machining center system
Page M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
1 Control Axes 1
1.1 Control Axes 2
1.1.1 Number of Basic Control Axes (NC Axes) 3 3 3 3 3 3 3 2
1.1.2 Max. Number of Axes (NC Axes + Spindles + PLC
Axes)
16
32
16
32
16
32
16
32
11 11 9 2
1.1.2.1 Max. Number of NC Axes (In Total for All the
Part Systems) 16 16 16 16 9 9 52
1.1.2.2 Max. Number of Spindles 6 6 6 6 4 4 2 2
1.1.2.3 Max. Number of PLC Axes 8 8 8 8 6 6 6 2
1.1.4 Max. Number of PLC Indexing Axes 8 8 8 8 4 4 4 3
1.1.5 Number of Simultaneous Contouring Control Axes 8 4 8 4 4 4 4 3
1.1.6 Max. Number of NC Axes in a Part System
8
12
16

8
12
16
8
12
16
8
12
16
8 8 53
1.1.7 Axis Name Extension 3
1.2 Control Part System 4
1.2.1 Standard Number of Part Systems 1 1 1 1 1 1 1 4
1.2.2 Max. Number of Part Systems (Main + Sub) 2
3(*2)
2
3(*2)
2
3(*2)
2
3(*2) 2 2 1 4
1.2.2.1 Max. Number of Main Part Systems 2 2 2 2 2 2 1 4
1.2.2.2 Max. Number of Sub Part Systems 2 2 2 2 4
1.3 Control Axes and Operation Modes 5
1.3.1 Tape (RS-232C Input) Mode 5
1.3.2 Memory Mode 5
1.3.3 MDI Mode 5
1.3.4 High-Speed Program Server Mode 5
1.3.4.1 Control Unit-Side High-Speed Program Server
Mode 5
1.3.4.2 Display Unit-Side High-Speed Program Server
Mode 6
1.3.5 Front-Side SD Card Mode 6
1.3.6 Front-Side USB Memory Mode 7
2 Input Command 9
2.1 Data Increment 10
2.1.1 Least Command Increment 10
Least command increment 1m 10
Least command increment 0.1m 10
Least command increment 0.01m(10nm) 10
Least command increment 0.001m(1nm) 10
2.1.2 Least Control Increment 12
Least control increment 0.01m(10nm) 12
Least control increment 0.001m(1nm) 12
2.1.3 Indexing Increment 12
2.2 Unit System 13
2.2.1 Inch/Metric Changeover 13
2.2.2 Input Command Increment Tenfold 14
2.3 Program Format 15
2.3.1 Program Format 15
2.3.1.1 Format 1 for Lathe (G Code List 2, 3) 15
2.3.1.2 Format 2 for Lathe (G Code List 4, 5) 15
2.3.1.3 Special Format for Lathe (G Code List 6, 7) 15
2.3.1.4 Format 1 for Machining Center 15
2.3.1.5 Format 2 for Machining Center (M2 Format) 15
2.3.1.6 MITSUBISHI CNC Special Format 15
2.3.2 Program Format Switch 16
2.4 Command Value 18
2.4.1 Decimal Point Input I, II 18
2.4.2 Absolute/Incremental Command 19
2.4.3 Diameter/Radius Designation 20
2.4.4 Diameter/Radius Designation Switch 21
3 Positioning/Interpolation 23
3.1 Positioning 24
3.1.1 Positioning 24
3.1.2 Unidirectional Positioning 25
3.2 Linear/Circular Interpolation 26
3.2.1 Linear Interpolation 26
3.2.2 Circular Interpolation (Center/Radius Designation) 27
3.2.3 Helical Interpolation 29
3.2.4 Spiral/Conical Interpolation 32
3.2.5 Cylindrical Interpolation 34
3.2.6 Polar Coordinate Interpolation 35
3.2.7 Milling Interpolation 36
3.2.8 Hypothetical Axis Interpolation 37
3.3 Curve Interpolation 38
3.3.1 Involute Interpolation 38
3.3.2 Exponential Interpolation 40
3.3.3 Spline Interpolation (G05.1Q2/G61.2) 41
3.3.4 NURBS Interpolation 42
3.3.5 3-Dimensional Circular Interpolation 43
3.3.6 Spline Interpolation 2 (G61.4) 44
4 Feed 47
4.1 Feedrate 48
4.1.1 Rapid Traverse Rate (m/min) 1000 1000 1000 1000 1000 1000 1000 48
4.1.2 Cutting Feedrate (m/min) 1000 1000 1000 1000 1000 1000 1000 49
4.1.3 Manual Feedrate (m/min) 1000 1000 1000 1000 1000 1000 1000 50
4.1.4 Rotary Axis Command Speed Tenfold 50

4.2 Feedrate Input Methods 51
4.2.1 Feed per Minute (Asynchronous Feed) 51
4.2.2 Feed per Revolution (Synchronous Feed) 52
4.2.3 Inverse Time Feed 53
4.2.4 F 1-Digit Feed 54
4.2.5 Manual Speed Command 55
4.2.7 G00 Feedrate Designation (,F Command) 56
4.2.8 Selection of Axis (Axes) for Feedrate Command 57
4.3 Override 58
4.3.1 Rapid Traverse Override 58
4.3.2 Cutting Feed Override 58
4.3.3 2nd Cutting Feed Override 58
4.3.4 Override Cancel 59
4.4 Acceleration/Deceleration 60
4.4.1 Automatic Acceleration/Deceleration After Inter polation 60
: Standard : Option : Selection
Class
Machining center system
Page M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
4.4.2 Rapid Traverse Constant-Gradient Acceleration/
Deceleration 62
4.4.3 Rapid Traverse Constant-Gradient Multi-Step Ac celeration/Deceleration 63
4.5 Thread Cutting 65
4.5.1 Thread Cutting (Lead/Thread Number Designa tion) 65
4.5.2 Variable Lead Thread Cutting 67
4.5.3 Synchronous Tapping 68
4.5.3.1 Synchronous Tapping Cycle 68
4.5.3.2 Pecking Tapping Cycle 70
4.5.3.3 Deep-Hole Tapping Cycle 72
4.5.3.5 Synchronous Tapping with Analog I/F Spindle 74
4.5.4 Chamfering 74
4.5.6 Circular Thread Cutting 75
4.5.8 High-Speed Synchronous Tapping (OMR-DD) 76
4.5.10 Thread Recutting 77
4.5.11 Thread Cutting Override 78
4.5.12 Variable Feed Thread Cutting 78
4.5.13 Thread Cutting Time Constant Switch 79
4.6 Manual Feed 80
4.6.1 Manual Rapid Traverse 80
4.6.2 Jog Feed 80
4.6.3 Incremental Feed 81
4.6.4 Handle Feed 81
4.6.5 Manual Feedrate B 82
4.6.6 Manual Feedrate B Surface Speed Control 83
4.6.8 Manual Speed Clamp 84
4.7 Dwell 85
4.7.1 Dwell (Time-Based Designation) 85
4.7.2 Dwell (Revolution-Based Designation) 86
5 Program Memory/Editing 87
5.1 Memory Capacity 88
5.1.1 Memory Capacity (Number of Programs Stored) 88
500KB[1280m] (1000 programs) 88
1000KB[2560m] (1000 programs) 88
2000KB[5120m] (1000 programs) 88
5.1.2 Extended Memory 88
2000KB[5120m] (1000 programs) 88
5.2 External Signal Display Switch 89
5.2.1 Program Editing 89
5.2.2 Background Editing 90
5.2.3 Buffer Correction 91
5.2.5 Multi-Part System Simultaneous Program Editing 92
5.2.6 Special Program Editing Display for Synchroniza tion Between Part Systems 92
5.2.7 Finish Shape View Programming 93
6 Operation and Display 95
6.1 Structure of Operation/Display Panel 96
6.1.1 Color Display (8.4-Type LCD TFT) 96
6.1.2 Color Touchscreen Display (10.4-Type LCD TFT) 96
6.1.3 Color Touchscreen Display (15-Type LCD TFT) 96
6.1.4 Color Touchscreen Display (19-Type LCD TFT) 96
: Standard : Option : Selection
Class
Machining center system
Page M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
6.1.8 Separated-Type Color Touchscreen Display (15-
Type LCD TFT/Windows10) 96
6.1.9 Separated-Type Color Touchscreen Display (19-
Type LCD TFT/Windows10) 96
6.1.10 Separated-Type Color Touchscreen Display (19-
Type Horizontal LCD TFT/Windows10) 96
6.2 Operation Methods and Functions 97
6.2.1 Operation Input 97
6.2.2 Absolute/Incremental Setting 97

6.2.5 Displayed Part System Switch 98
6.2.6 Menu List 98
6.2.7 Display Switch by Operation Mode 98
6.2.8 External Signal Display Switch 98
6.2.9 Screen Saver 99
6.2.10 Parameter Guidance 99
6.2.11 Alarm Guidance 99
6.2.12 Machining Program Input Mistake Check Warn ing 100
6.2.14 Screenshot Capture 100
6.2.15 User Selectable Menu Configuration 100
6.2.16 PC-NC Network Automatic Connection 100
6.2.17 Device Open Parameter 101
6.2.18 SRAM Open Parameter 101
6.2.19 MTB Selectable Menu Configuration 101
6.2.20 Remote Desktop Connection 102
6.2.21 VNC Server 103
6.3 Display Methods and Contents 104
6.3.1 Status Display 104
6.3.2 Clock Display 104
6.3.3 Monitor Screen Display 105
6.3.4 Setup Screen Display 105
6.3.5 Edit Screen Display 106
6.3.6 Diagnosis Screen Display 106
6.3.7 Maintenance Screen Display 106
6.3.8 Home Application 107
6.3.9 Home Screen 108
6.3.10 Additional Languages 109
6.3.10.1 Japanese 109
6.3.10.2 English 109
6.3.10.3 German 109
6.3.10.4 Italian 109
6.3.10.5 French 109
6.3.10.6 Spanish 109
6.3.10.7 Chinese 110
6.3.10.7.1 Chinese (Traditional Chinese Characters) 110
6.3.10.7.2 Chinese (Simplified Chinese Characters) 110
6.3.10.8 Korean 110
6.3.10.9 Portuguese 110
6.3.10.10 Hungarian 110
6.3.10.11 Dutch 110
6.3.10.12 Swedish 110
6.3.10.13 Turkish 110
6.3.10.14 Polish 111
: Standard : Option : Selection
Class
Machining center system
Page M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
6.3.10.15 Russian 111
6.3.10.16 Czech 111
6.3.10.17 Indonesian 111
6.3.10.18 Vietnamese 111
7 Input/Output Functions and Devices 113
7.1 Input/Output Data 114
7.1.1 Machining Program Input/Output 114
7.1.2 Tool Offset Data Input/Output 114
7.1.3 Common Variable Input/Output 114
7.1.4 Parameter Input/Output 114
7.1.5 History Data Output 114
7.1.7 System Configuration Data Output 114
7.2 Input/Output I/F 115
7.2.1 RS-232C I/F 115
7.2.2 SD Card I/F 115
7.2.2.1 Control Unit-Side SD Card I/F [Up to 32 GB] 115
7.2.2.2 Front-Side SD Card I/F [Up to 32 GB] 115
7.2.3 Ethernet I/F 115
7.2.4 Display Unit-Side Data Server I/F 116
7.2.5 Front-Side USB Memory I/F [Up to 32 GB] 116
7.2.8 Image Input I/F 117
7.2.9 Measuring Instrument I/F 118
7.3 Computer Link 119
7.3.1 Computer Link B 119
7.4 Others 120
7.4.1 Handy Terminal Connection 120
7.4.3 IP Filter Setting 121
8 Spindle, Tool and Miscellaneous Functions 123
8.1 Spindle Functions (S) 124
8.1.1 Spindle Control Functions 124
8.1.1.1 Spindle Digital I/F 125
8.1.1.2 Spindle Analog I/F 125
8.1.1.3 Coil Switch 125
8.1.1.4 Automatic Coil Switch 125
8.1.1.5 Encoder Input I/F 126
8.1.1.6 Spindle-Mode Servo Motor Control 127
8.1.1.7 Spindle-Mode Rotary Axis Control 128
8.1.1.8 Turret Gear Change Control 129

8.1.1.9 Spindle Control with Pulse Train Output 130
8.1.2 S Code Output 131
8.1.3 Constant Surface Speed Control 132
8.1.4 Spindle Override 134
8.1.5 Multiple-Spindle Control 134
8.1.5.1 Multiple-Spindle Control I 135
8.1.5.2 Multiple-Spindle Control II 136
8.1.6 Spindle Orientation 137
8.1.7 Spindle Position Control (Spindle/C Axis Control) 139
8.1.7.1 Spindle Position Control (Spindle/C Axis Con trol) 139
8.1.7.2 C Axis Control During Spindle Synchronization 140
8.1.8 Spindle Synchronization 141
8.1.8.1 Spindle Synchronization I 141
8.1.8.2 Spindle Synchronization II 142
: Standard : Option : Selection
Class
Machining center system
Page M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
8.1.8.3 Guide Bushing Spindle Synchronization 142
8.1.9 Tool Spindle Synchronization I (Polygon) 143
8.1.9.1 Tool Spindle Synchronization IA (Spindle Spindle, Polygon) 143
8.1.9.2 Tool Spindle Synchronization IB (Spindle Spindle, Polygon) 144
8.1.9.3 Tool Spindle Synchronization IC (Spindle-NC
Axis, Polygon) 145
8.1.10 Tool Spindle Synchronization II (Hobbing) 146
8.1.11 Spindle Speed Clamp 147
8.1.13 Spindle Oscillation 147
8.1.14 Spindle Superimposition Control 148
8.1.15 Multiple Spindle Synchronization Set Control 150
8.1.16 Spindle Speed Fluctuation Detection 153
8.1.17 Spindle Motor Temperature Output to PLC 154
8.2 Tool Functions (T) 155
8.2.1 Tool Functions (T Command) 155
8.3 Miscellaneous Functions (M) 156
8.3.1 Miscellaneous Functions 156
8.3.2 Multiple M Codes in 1 Block 156
8.3.3 M Code Independent Output 157
8.3.4 Miscellaneous Function Finish 158
8.3.5 M Code Output during Axis Traveling 159
8.3.6 Miscellaneous Function Command High-speed
Output 160
8.4 2nd Miscellaneous Functions (B) 162
8.4.1 2nd Miscellaneous Functions 162
8.4.2 2nd Miscellaneous Function Name Extension 162
9 Tool Compensation 163
9.1 Tool Length/Tool Position 164
9.1.1 Tool Length Offset 164
9.1.2 Tool Position Offset 167
9.1.3 Tool Compensation for Additional Axes 167
9.1.4 Tool Position Compensation (G43.7) 168
9.2 Tool Radius 169
9.2.1 Tool Radius Compensation 169
9.2.2 3-Dimensional Tool Radius Compensation 171
9.2.3 Tool Nose Radius Compensation (G40/41/42) 172
9.2.4 Automatic Decision of Nose Radius Compensa tion Direction (G46/40) 173
9.2.5 Tool Radius Compensation Diameter Designation 173
9.3 Tool Offset Amount 174
9.3.1 Number of Tool Offset Sets 174
99 sets 174
128 sets 174
200 sets 174
256 sets 174
400 sets 174
999 sets 174
9.3.2 Offset Memory 175
9.3.2.1 Tool Shape/Wear Offset Amount 175
9.3.2.2 Compensation Type Selection by Parameter 178
9.3.3 Number of Tool Offset Sets Allocation to Part Sys tems 179
: Standard : Option : Selection
Class
Machining center system
Page M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
10 Coordinate System 181
10.1 Coordinate System Type and Setting 182
10.1.1 Machine Coordinate System 183
10.1.2 Coordinate System Setting 184
10.1.3 Automatic Coordinate System Setting 185
10.1.4 Workpiece Coordinate System Selection 186
10.1.4.1 Workpiece Coordinate System Selection (6
Sets) 187
10.1.4.2 Extended Workpiece Coordinate System Se lection (48 Sets) G54.1P1 to P48 188
10.1.4.3 Extended Workpiece Coordinate System Se lection (96 Sets) G54.1P1 to P96 188

10.1.4.4 Extended Workpiece Coordinate System Se lection (300 Sets) G54.1P1 to P300 188
10.1.5 External Workpiece Coordinate Offset 189
10.1.6 Workpiece Coordinate System Preset (G92.1) 190
10.1.7 Local Coordinate System 191
10.1.8 Coordinate System for Rotary Axis 192
10.1.9 Plane Selection 193
10.1.10 Origin Set/Origin Cancel 194
10.1.11 Counter Set 196
10.1.12 Workpiece Position Offset for Rotary Axis 197
10.1.13 Workpiece Coordinate System Shift 199
10.2 Return 200
10.2.1 Manual Reference Position Return 200
10.2.2 Automatic 1st Reference Position Return 201
10.2.3 2nd, 3rd, and 4th Reference Position Return 203
10.2.4 Reference Position Check 205
10.2.5 Absolute Position Detection 206
10.2.6 Tool Exchange Position Return 207
11 Operation Support Functions 209
11.1 Program Control 210
11.1.1 Optional Block Skip 210
11.1.2 Optional Block Skip Addition 210
11.1.3 Single Block 211
11.2 Program Test 212
11.2.1 Dry Run 212
11.2.2 Machine Lock 212
11.2.3 Miscellaneous Function Lock 212
11.2.4 Graphic Check 213
11.2.4.1 Graphic Check 213
11.2.4.2 3D Solid Program Check 214
11.2.4.3 Graphic Check Rotary Axis Drawing 215
11.2.4.4 3D Machining Simulation 216
11.2.5 Graphic Trace 217
11.2.5.1 Graphic Trace 217
11.2.5.2 Graphic Trace Rotary Axis Drawing 218
11.2.6 Machining Time Calculation 218
11.2.7 Manual Arbitrary Reverse Run (Program Check
Operation) 219
11.2.8 High-Speed Simple Program Check 220
11.3 Program Search/Start/Stop 221
11.3.1 Program Search 221
: Standard : Option : Selection
Class
Machining center system
Page M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
11.3.2 Sequence Number Search 221
11.3.3 Collation Stop 222
11.3.4 Program Restart 223
11.3.5 Automatic Operation Start 224
11.3.6 NC Reset 224
11.3.7 Feed Hold 225
11.3.8 Search & Start 225
11.3.10 Auto-restart 225
11.4 Interrupt Operation 226
11.4.1 Manual Interruption 226
11.4.2 Automatic Operation Handle Interruption 226
11.4.3 Manual Absolute Switch 227
11.4.4 Thread Cutting Cycle Retract 228
11.4.5 Tapping Retract 229
11.4.6 Manual Numerical Value Command 230
11.4.7 Arbitrary Reverse Run 231
11.4.8 MDI Interruption 232
11.4.9 Simultaneous Operation of Manual and Automat ic Modes 232
11.4.10 Simultaneous Operation of JOG and Handle
Modes 232
11.4.11 Reference Position Retract 233
11.4.12 Tool Retract and Return 234
11.4.13 Skip Retract 235
11.4.14 PLC Interruption 235
12 Program Support Functions 237
12.1 Machining Method Support Functions 238
12.1.1 Program 238
12.1.1.1 Subprogram Control [Layers] 10 10 10 10 10 10 10 238
12.1.1.2 Figure Rotation 241
12.1.1.3 Scaling 243
12.1.1.4 Axis Name Switch 244
12.1.2 Macro Program 245
12.1.2.1 User Macro [Layers] 4 4 4 4 4 4 4 245
12.1.2.2 Machine Tool Builder Macro 249
12.1.2.3 Macro Interruption 251
12.1.2.4 Variable Commands 252
600 sets 252
700 sets 252
8000 sets 252
(600+100number of part systems) sets 252
(7900+100number of part systems) sets 252

12.1.2.5 Extended Common Variable 254
12.1.3 Fixed Cycles 256
12.1.3.1 Fixed Cycle for Drilling 257
12.1.3.2 Fixed Cycle for Drilling (Type II) 264
12.1.3.3 Special Fixed Cycle 265
12.1.3.4 Fixed Cycle for Turning Machining 269
12.1.3.5 Compound Type Fixed Cycle for Turning Ma chining 274
12.1.3.6 Compound Type Fixed Cycle for Turning Ma chining (Type II) 279
12.1.3.7 Small-Diameter Deep-Hole Drilling Cycle 283
: Standard : Option : Selection
Class
Machining center system
Page M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
12.1.3.8 Two-Dimensional Barcode Engraving Cycle 284
12.1.3.9 Text Engraving Cycle 286
12.1.4 Mirror Image 287
12.1.4.1 Mirror Image by Parameter Setting 287
12.1.4.2 Mirror Image by External Input 287
12.1.4.3 Mirror Image by G Code 288
12.1.4.4 Mirror Image for Facing Tool Posts 289
12.1.4.5 T Code Mirror Image for Facing Tool Posts 289
12.1.5 Coordinate System Operation 290
12.1.5.1 Coordinate Rotation by Program 290
12.1.5.2 Coordinate Rotation by Parameter 292
12.1.5.3 3-Dimensional Coordinate Conversion 293
12.1.6 Dimension Input 294
12.1.6.1 Corner Chamfering/Corner R 294
12.1.6.2 Linear Angle Command 301
12.1.6.3 Geometric Command 302
12.1.6.4 Polar Coordinate Command 304
12.1.7 Axis Control 305
12.1.7.1 Chopping 305
12.1.7.1.1 Chopping 305
12.1.7.2 Normal Line Control 306
12.1.7.3 Circular Cutting 307
12.1.7.4 Vibration Cutting Control 308
12.1.8 Multi-Part System Control 309
12.1.8.1 Timing Synchronization Between Part Sys tems 309
12.1.8.2 Start Point Designation Timing Synchroniza tion 310
12.1.8.3 Mixed Control 313
12.1.8.3.1 Mixed Control (Cross Axis Control) 313
12.1.8.3.2 Arbitrary Axis Exchange Control 314
12.1.8.4 Control Axis Superimposition 316
12.1.8.4.1 Control Axis Superimposition 316
12.1.8.4.2 Arbitrary Axis Superimposition Control 317
12.1.8.5 Control Axis Synchronization Between Part
Systems 318
12.1.8.6 Balance Cut 320
12.1.8.7 Common Memory for Part Systems 321
12.1.8.8 Multi-Part System Simultaneous Thread Cut ting 322
12.1.8.8.1 Two-Part System Simultaneous Thread
Cutting 323
12.1.8.8.2 Multi-Part System Simultaneous Thread
Cutting 325
12.1.8.9 Multi-Part System Program Management 326
12.1.8.10 Synchronization Between Part Systems 327
12.1.8.10.1 Single Block Between Part Systems 327
12.1.8.10.2 Dwell/Miscellaneous Function Time
Override 328
12.1.8.10.3 Synchronization Between Part Systems
OFF 329
12.1.8.11 Sub Part System Control I 330
12.1.8.12 Sub Part System Control II 332
12.1.8.13 Loader Control Part System 334
: Standard : Option : Selection
Class
Machining center system
Page M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
12.1.9 Data Input/Output by Program 335
12.1.9.1 Parameter Input by Program 335
12.1.9.2 Compensation Data Input by Program 336
12.1.9.3 Tool/Material Shape Input by Program 340
12.1.9.5 API Section and Sub-Section Nos. Input/Out put by Program 342
12.1.9.6 R-Navi Data Input by Program 342
12.1.10 Machining Modal 343
12.1.10.1 Tapping Mode 343
12.1.10.2 Cutting Mode 343
12.1.11 High-Speed Parts Machining 344
12.1.11.1 Rapid Traverse Block Overlap 344
12.2 Machining Accuracy Support Functions 346
12.2.1 Automatic Corner Override 346
12.2.2 Deceleration Check 347

12.2.2.1 Exact Stop Check Mode 349
12.2.2.2 Exact Stop Check 349
12.2.2.3 Error Detection 349
12.2.2.4 Programmable In-Position Check 350
12.2.2.5 Automatic Error Detection 350
12.3 High-Speed and High-Accuracy Functions [kB PM: k Block per Minute] 351
12.3.1 High-Speed Machining Mode 351
12.3.1.1 High-Speed Machining Mode I (G05P1) Max imum [kBPM] 33.7 33.7 33.7 33.7 33.7 33.7 16.8 351
12.3.1.2 High-Speed Machining Mode II (G05P2)
Maximum [kBPM] 168 168 168 168 101 101 67.5 353
12.3.2 High-Accuracy Control 355
12.3.2.1 High-Accuracy Control (G61.1/G08) 355
12.3.2.2 Multi-Part System Simultaneous High-Accu racy Control 359
12.3.2.3 SSS Control 360
12.3.2.4 Tolerance Control 361
12.3.2.5 Variable-Acceleration Pre-Interpolation Ac celeration/Deceleration 362
12.3.2.6 High-Accuracy Acceleration/Deceleration
Time Constant Extension 362
12.3.2.7 Axis-Specific Acceleration Tolerance Control 363
12.3.3 High-Speed High-Accuracy Control 364
12.3.3.1 High-Speed High-Accuracy Control I
(G05.1Q1) Maximum [kBPM] 67.5 67.5 67.5 67.5 33.7 33.7 33.7 364
12.3.3.2 High-Speed High-Accuracy Control II
(G05P10000) Maximum [kBPM] 168 168 168 168 101 101 67.5 365
12.3.3.3 High-Speed High-Accuracy Control III
(G05P20000) Maximum [kBPM] 540 540 540 540 202 202 369
12.3.3.4 Smooth Fairing 371
12.3.4 Machining Condition Selection I 372
12.3.5 Direct Command Mode 372
12.4 Programming Support Functions 373
12.4.1 Playback 373
12.4.3 Interactive Cycle Insertion 374
12.4.4 Simple Programming (NAVI MILL/LATHE) 377
12.4.5 G Code Guidance 378
12.4.7 DXF Data Input 379
13 Machine Accuracy Compensation 381
: Standard : Option : Selection
Class
Machining center system
Page M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
13.1 Static Accuracy Compensation 382
13.1.1 Backlash Compensation 382
13.1.2 Memory-Type Pitch Error Compensation [Sets] 32 32 32 32 16 16 16 383
13.1.3 Memory-Type Relative Position Error Compen sation 384
13.1.4 External Machine Coordinate System Compen sation 385
13.1.5 Circular Radius Error Compensation 385
13.1.6 Ball Screw Thermal Expansion Compensation 386
13.1.7 Rotation Center Error Compensation 387
13.1.8 Position-Dependent Gradually Increasing-Type
Backlash Compensation 389
13.1.9 Bidirectional Pitch Error Compensation 390
13.1.10 Cyclic Error Compensation 390
13.1.11 Spatial Error Compensation 391
13.1.12 Backlash Compensation II 392
13.2 Dynamic Accuracy Compensation 393
13.2.1 Smooth High-Gain (SHG) Control 393
13.2.2 Dual Feedback 394
13.2.3 Lost Motion Compensation 395
13.2.4 OMR II (Backlash with Filter) 395
13.2.6 OMR-FF 396
13.2.7 Distance-Coded Reference Position Detection 397
13.2.8 OMR-CC (Optimum Machine Response - Con tour Control) 398
13.2.9 Variable Torsion Compensation 399
13.2.10 Cogging Torque Compensation 400
14 Automation Support Functions 401
14.1 Measurement 402
14.1.1 Skip 402
14.1.1.1 Skip 402
14.1.1.2 Multiple-Step Skip 404
14.1.1.4 PLC Skip 405
14.1.1.5 Speed Change Skip 405
14.1.1.6 Torque Limitation Skip 406
14.1.2 Automatic Tool Length Measurement 407
14.1.3 Manual Tool Length Measurement 1 410
14.1.4 Manual Tool Length Measurement 2 413
14.1.5 Workpiece Coordinate Offset Measurement 414
14.1.6 Workpiece Position Measurement 415
14.1.7 Rotation Measurement 417
14.1.8 Rotation Center Error Measurement 418
14.1.9 Workpiece Installation Error Measurement 419
14.2 Tool Life Management 420
14.2.1 Tool Life Management 420
14.2.1.1 Tool Life Management I 420
14.2.1.2 Tool Life Management II 420
14.2.1.3 Tool Life Management III 421

14.2.2 Number of Tool Life Management Sets 422
99 sets 422
128 sets 422
200 sets 422
256 sets 422
: Standard : Option : Selection
Class
Machining center system
Page M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
400 sets 422
999 sets 422
14.2.3 Tool Life Management Set Allocation to Part Sys tems 423
14.3 Others 425
14.3.1 Programmable Current Limitation 425
14.3.2 Auto Power OFF 425
14.3.4 Load Monitoring I 426
14.3.5 Power ON/OFF Sequence 426
14.3.7 Direct Robot Control 427
14.3.8 Cutting Load Control 428
15 Safety and Maintenance 429
15.1 Safety Switches 430
15.1.1 Emergency Stop 430
15.1.2 Data Protection Key 430
15.2 Display for Ensuring Safety 431
15.2.1 NC Warning 431
15.2.2 NC Alarm 432
15.2.3 Operation Stop Cause 432
15.2.4 Emergency Stop Cause 432
15.2.5 Thermal Detection 433
15.2.6 Battery Alarm/Warning 434
15.3 Protection 435
15.3.1 Stroke End (Over Travel) 435
15.3.2 Stored Stroke Limit 435
15.3.2.1 Stored Stroke Limit I/II 437
15.3.2.2 Stored Stroke Limit IB 439
15.3.2.3 Stored Stroke Limit IIB 440
15.3.2.4 Stored Stroke Limit IC 441
15.3.3 Stroke Check Before Travel 442
15.3.4 Chuck/Tailstock Barrier Check 444
15.3.5 Interlock 445
15.3.6 External Deceleration 445
15.3.7 Interference Check III 446
15.3.8 3D Machine Interference Check 447
15.3.9 Door Interlock 448
15.3.9.1 Door Interlock I 448
15.3.9.2 Door Interlock II 449
15.3.10 Parameter Lock 451
15.3.11 Program Protection (Edit Lock B, C) 451
15.3.12 Program Display Lock 451
15.3.13 Data Protection by User's Level 452
15.3.15 Vertical Axis Pull-Up 452
15.3.16 Machine Group-Based Alarm Stop 453
15.3.17 Interference Check Between Part Systems 455
15.3.18 Spindle Protection 456
15.3.19 Real-Time 3D Machine Interference Check 457
15.4 Maintenance and Troubleshooting 458
15.4.1 Operation History 458
15.4.2 Data Sampling 459
15.4.3 NC Data Backup 459
15.4.4 Servo Tuning Support 460
15.4.4.1 NC Analyzer2 460
: Standard : Option : Selection
Class
Machining center system
Page M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
15.4.5 Automatic Backup 462
15.4.8 Application Error Detection 462
15.4.9 Email Notification to Operator 463
15.4.10 NC Configurator2 464
15.4.11 Diagnosis Data Output 464
15.4.13 Security Feature for Windows Display 465
15.4.14 Field Network Diagnostics 466
15.4.15 Remote service iQ Care Remote4U 467
15.4.15.1 Connection with RGU 467
15.4.15.2 Connection with no RGU 467
15.4.16 Brake Wear Diagnostics 468
15.5 Functional Safety 469
15.5.1 Safety Observation 469
15.5.2 Smart Safety Observation 470
15.5.2.1 Safety-Related I/O Observation 470
15.5.2.2 Emergency Stop Observation 470
15.5.2.3 Drive Safety Function 471

15.5.2.3.1 SLS (Safely-Limited Speed) 471
15.5.2.3.2 SLP (Safely-Limited Position) 471
15.5.2.3.3 SOS (Safe Operating Stop) 471
15.5.2.3.4 SSM (Safe Speed Monitor) 471
15.5.2.3.5 SBC/SBT (Safe Brake Control/Safe Brake
Test) 472
15.5.2.3.6 SCA (Safe Cam) 472
15.5.2.3.7 SS1/SS2 (Safe Stop) 472
15.5.2.3.8 STO (Safe Torque Off) 472
16 Drive System 473
16.1 Servo/Spindle 474
16.1.1 Feed Axis 474
16.1.1.1 MDS-E-Vx 474
16.1.1.2 MDS-EH-Vx 474
16.1.1.3 MDS-EJ-Vx 474
16.1.1.4 MDS-EJH-Vx 474
16.1.1.5 MDS-EM-SPVx 474
16.1.1.6 MDS-EMH-SPVx 474
16.1.2 Spindle 475
16.1.2.1 MDS-E-SPx 475
16.1.2.2 MDS-EH-SPx 475
16.1.2.3 MDS-EJ-SPx 475
16.1.2.5 MDS-EM-SPVx 475
16.1.2.6 MDS-EMH-SPVx 475
16.1.4 Power Supply 475
16.1.4.1 MDS-E-CV 475
16.1.4.2 MDS-EH-CV 475
16.1.4.3 MDS-EX-CVP 475
17 Machine Support Functions 477
17.1 PLC 478
17.1.1 Built-in PLC Processing Mode 478
17.1.2 PLC Functions 478
17.1.2.1 Built-in PLC Basic Function 478
17.1.2.1.1 Index Modification 482
17.1.2.1.2 Multi-Program [Number of Programs] 120 120 120 120 60 60 60 482
: Standard : Option : Selection
Class
Machining center system
Page M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
17.1.2.1.3 Multi-Project [Number of Projects Stored] 482
Number of PLC projects: 2 482
Number of PLC projects: 3 482
Number of PLC projects: 6 482
17.1.2.1.4 Function Block (FB) 482
17.1.2.1.5 Label Programming 482
17.1.2.1.6 ST Language 482
17.1.2.2 PLC Exclusive Instruction 483
17.1.2.3 Enhanced PLC Security Mode 484
17.1.3 PLC Support Functions 485
17.1.3.1 Alarm Message Display 485
17.1.3.2 Operator Message Display 485
17.1.3.3 Memory Switch (PLC Switch) 486
17.1.3.3.1 Memory Switch (PLC Switch) 32 Points 486
17.1.3.3.2 Memory Switch (PLC Switch) 64 Points 486
17.1.3.3.3 Memory Switch (PLC Switch) 96 Points 486
17.1.3.4 Load Meter Display 487
17.1.3.5 User PLC Version Display 487
17.1.3.6 Ladder Program Writing During RUN 487
17.1.3.7 PLC Program Protection 487
17.1.4 Built-in PLC Capacity 488
17.1.4.1 Standard PLC Capacity [Number of Steps] 128K 128K 128K 128K 64K 64K 32K 488
17.1.4.2 Large PLC Capacity: 256 Ksteps 488
17.1.4.3 Large PLC Capacity: 512 Ksteps 488
17.1.5 Machine Contact Input/Output I/F 488
17.1.6 Ladder Monitor 489
17.1.7 PLC Development 490
17.1.7.1 On-Board Development 490
17.1.7.2 MELSEC Development Tool (GX Developer) 490
17.1.7.3 MELSEC Development Tool (GX Works2) 490
17.1.8 PLC Parameter 491
17.1.8.1 PLC Constant (150 Points) 491
17.1.8.2 PLC Constant Extension (Up to 750 Points) 491
17.1.9 GOT Connection 492
17.1.9.1 Ethernet Connection 492
17.1.9.2 CC-Link Connection 492
17.1.10 Pallet Program Registration 493
17.2 Machine Construction 494
17.2.1 Servo OFF 494
17.2.2 Axis Detachment 495
17.2.3 Synchronous Control 496
17.2.4 Inclined Axis Control 499
17.2.5 Position Switch 24 24 24 24 24 24 24 500
17.2.7 Index Table Indexing 501
17.2.8 Tool Length Compensation Along the Tool Axis 503
17.2.9 Tool Handle Feed & Interruption 504

17.2.10 Tool Center Coordinate Display 504
17.2.11 Tool Center Point Control 505
17.2.11.1 Tool Center Point Control (G43.4/G43.5) (*3) (*3) (*3) (*3) 505
17.2.11.2 Tool Cutting Point Control Command
(G43.8/G43.9) 507
17.2.12 Inclined Surface Machining Command 508
: Standard : Option : Selection
Class
Machining center system
Page M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
17.2.13 Simple Inclined Surface Machining Command 510
17.2.14 3-Dimensional Tool Radius Compensation
(Tool's Vertical-Direction Compensation) 512
17.2.15 Workpiece Installation Error Compensation 513
17.2.16 3-Dimensional Manual Feed 514
17.2.17 R-Navi 515
17.2.18 Simple Synchronous Control 517
17.2.20 Real-Time Tuning 518
17.2.20.1 Real-Time Tuning 1 (Speed Gain) 518
17.2.20.2 Real-Time Tuning 2 (Rapid Traverse Time
Constant) 519
17.2.21 Constant Torque Control 520
17.2.22 External Encoder Position Output I/F 521
17.2.23 Multiple-Axis Synchronization Control 522
17.2.25 BiSS Encoder I/F 523
17.2.26 Tool Head Hot Swapping 524
17.3 PLC Operation 525
17.3.1 Arbitrary Feed in Manual Mode 525
17.3.2 Circular Feed in Manual Mode 526
17.3.3 PLC Axis Control 528
17.3.5 PLC Axis Indexing 529
17.3.6 NC Axis/PLC Axis Switchover 531
17.4 PLC Interface 532
17.4.1 CNC Control Signal 532
17.4.2 CNC Status Signal 533
17.4.3 PLC Window 535
17.4.4 External Search 536
17.4.5 Direct Screen Selection 536
17.4.6 Buzzer Sound Control 537
17.5 Machine Contact I/O 538
17.5.1 Operation Panel I/O 538
17.5.1.1 DI:64/DO:64 538
17.5.1.2 DI:64/DO:64 + SDI:8 538
17.5.1.3 DI:96/DO:64 538
17.5.1.5 DI:64/DO:48/AO:1 538
17.5.2 Remote I/O 539
17.5.2.1 DI:32/DO:32 539
17.5.2.2 DI:64/DO:48 539
17.5.2.3 DI:64/DO:48+AO:1 539
17.5.2.5 DI:16/DO:8 539
17.5.2.6 DI:32/DO:32 + SDI:8/SDO:4 539
17.5.2.7 SDI:8/SDO:4 539
17.6 External PLC Link 540
17.6.1 CC-Link (Master/Local) 540
17.6.2 PROFIBUS-DP (Master) 546
17.6.3 CC-Link IE Field (Master/Local) 547
17.6.5 EtherNet/IP 549
17.6.8 FL-Net 550
17.6.10 CC-Link IE Field Basic 551
17.6.11 CC-Link IE TSN (Remote Station) 553
17.7 Installing S/W for Machine Tools 554
17.7.1 Customization (NC Designer2) 554
17.7.1.1 Customization Data Storage Capacity [MB] 16 16 16 16 556
: Standard : Option : Selection
Class
Machining center system
Page M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
(*2) The 3rd part system is the loader-dedicated part system.
(*3) Restrained to 4-axis simultaneous contouring control.
17.7.1.2 Customization Working Memory Size [MB] 6 6 6 6 6 6 6 556
17.7.2 User-Defined Key 556
17.7.3 EZSocket I/F 556
17.7.4 APLC Release 557
17.7.5 Custom API Library 558
17.7.6 MES Interface Library 558
17.7.7 SLMP Server 559
17.7.8 Numerical Control (CNC) Communication Soft ware FCSB1224W000 560
17.7.11 Motion Control Release 561
17.7.11.1 Coordinate Transformation 561
17.7.12 Connection with High Speed Processing Unit
(HPU) 562
17.8 Others 563

17.8.1 System Lock 563
17.8.2 CNC Remote Operation Tool 563
17.8.2.1 NC Monitor2 563
17.8.2.2 NC Explorer 563
17.8.3 Automatic Operation Lock 564
17.8.4 Power Consumption Computation 564
17.8.5 EcoMonitorLight Connection 564
17.8.8 Laser Processing Control 565
17.8.9 Wireless LAN 567
: Standard : Option : Selection
Class
Machining center system
Page M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB

1 Control Axes
1.1 Control Axes

1.1 Control Axes
The NC axis, spindle, PLC axis and auxiliary axis are generically called the control axis.
The NC axis is an axis that can be manually operated, or automatically operated with the machining program. X, Y, Z, U, V, W, A, B and C axis can be used.
The PLC axis is an axis that can be controlled from the PLC ladder.
1.1.1 Number of Basic Control Axes (NC Axes)
1.1.2 Max. Number of Axes (NC Axes + Spindles + PLC Axes)
A number of axes that are within the maximum number of axes, and that does not exceed the maximum number given for the NC axis, spindle and PLC axis can be used.
Connection specifications of NC axis, PLC axis and spindle:
NC axes, PLC axes and spindles (except for analog spindles) are connected to the high-speed optical servo communication (OPTH).
Refer to the "Connection and Setup Manual" for details.
1.1.2.1 Max. Number of NC Axes (In Total for All the Part Systems)
1.1.2.2 Max. Number of Spindles
Includes analog spindles.
1.1.2.3 Max. Number of PLC Axes
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M 3 3 3 3 3 3 3
L 2 2 2 2 2 2 2
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M 16
32
16
32
16
32
16
32 11 11 9
L 16
32
16
32
16
32
16
32 13 13 9
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M 16 16 16 16 995
L 16
32
16
32
16
32
16
32 10 10 7
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M6 6 6 6 4 4 2
L8 8 8 8 6 6 4
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V

TypeB
M8 8 8 8 6 6 6
L8 8 8 8 6 6 6
M800V/M80V Series Specifications Manual (Function)
1 Control Axes
1.1 Control Axes
3 IB-1501610-G
1.1.4 Max. Number of PLC Indexing Axes
PLC axis indexing is used to move the PLC axis to the positioning destination or an arbitrary coordinate position.
1.1.5 Number of Simultaneous Contouring Control Axes
Simultaneous control of all axes is possible as a principle in the same part system. However, for actual use, the machine tool builder specification will apply.
1.1.6 Max. Number of NC Axes in a Part System
Listed are the maximum number of axes which can be controlled in a part system. However, for actual use, the machine tool builder specification will apply.
1.1.7 Axis Name Extension
The axis name (command axis name) to perform the absolute/incremental command to NC control axis can be expanded to two letters. Because the command axis name while this function is invalid is set with one letter from A, B, C, H (*1), U, V, W, X, Y or Z, when the incremental command axis name is used (two letters of the alphabet are used per axis), the number of axes is limited. The incremental command axis name can be used to all axes by this function. The name extension axis cannot be designated to the parameter which sets the command axis name such as axes configuring plane I, J or K. Thus, apply this function to miscellaneous axis which is not used for machining (cutting).
(*1) "H" can be set only for the L system.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M8 8 8 8 4 4 4
L8 8 8 8 4 4 4
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M8 4 8 4 4 4 4
L8 4 8 4 4 4 4
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
8
12
16
8
12
16
8
12
16
8
12
16
885
L
8
12
16
8
12
16
8
12
16
8
12
16
885
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
M800V/M80V Series Specifications Manual (Function)
1 Control Axes
1.2 Control Part System
IB-1501610-G 4
1.2 Control Part System
1.2.1 Standard Number of Part Systems
1.2.2 Max. Number of Part Systems (Main + Sub)
(*1) The 3rd part system is the loader-dedicated part system.
For actual use, the machine tool builder specification will apply.
1.2.2.1 Max. Number of Main Part Systems
1.2.2.2 Max. Number of Sub Part Systems
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB

M1 1 1 1 1 1 1
L1 1 1 1 1 1 1
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M 2
3 (*1)
2
3 (*1)
2
3 (*1)
2
3 (*1) 2 2 1
L 4
8
4
8
4
8
4
8 4 4 2
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M 2 2 2 2 2 2 1
L 4
8
4
8
4
8
4
8 2 2 2
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M 2 2 2 2
L 4
8
4
8
4
8
4
8 2 2 1
M800V/M80V Series Specifications Manual (Function)
1 Control Axes
1.3 Control Axes and Operation Modes
5 IB-1501610-G
1.3 Control Axes and Operation Modes
1.3.1 Tape (RS-232C Input) Mode
In this mode, operation is performed using the machining program data from the RS-232C interface built in the CNC unit. A paper tape reader must be provided if machining programs on paper tape are to be run.
1.3.2 Memory Mode
The machining programs stored in the memory of the CNC unit are run.
1.3.3 MDI Mode
The MDI data stored in the memory of the CNC unit is executed. Once executed, the MDI data is set to the "setting incomplete" status, and the data will not be executed unless the "setting completed" status is established by screen operations.
1.3.4 High-Speed Program Server Mode
1.3.4.1 Control Unit-Side High-Speed Program Server Mode
The machining program stored in SD card can be operated by installing a SD card in the control unit SD card interface. From this, mass capacity and multi-process machining can be done.
Machining programs can be copied to SD card with the front SD card or Ethernet on the input/output screen.
When a machining program stored in SD card is searched while "DS" (Data server) is selected for device during operation search, the machining program in SD card can be operated as a main program. ("Memory mode" is used as the operation mode.)
Also, when "M198 Pp;" is commanded in the main program, the machining program in SD card can be called and operated as a sub program.
Macros such as WHILE, IF and GOTO can be used. Also, calling the sub program and macro program stored in memory or SD card is possible.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
M850VW M830VW M850VS M830VS M80VW M80V
TypeA

M80V
TypeB
M
L
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
M800V/M80V Series Specifications Manual (Function)
1 Control Axes
1.3 Control Axes and Operation Modes
IB-1501610-G 6
1.3.4.2 Display Unit-Side High-Speed Program Server Mode
The machining program stored in the built-in disk of the display unit can be operated.
The built-in disk of the display unit is mounted in the personal computer for M800VW/M80VW.
For M800VS/M80V, the SD card inserted into SD card I/F on the back of the display unit is equivalent to the built-in disk of the display unit.
When a machining program stored in the built-in disk of the display unit is searched while "HD" (M800VW/M80VW) or "DS" (M800VS/M80V) is selected for device during operation search, the machining program in the built-in disk of the display unit can be operated as a main program. ("Memory mode" is used as the operation mode.)
Also, when "M98 Pp ,Dd;" ("d" for designating a unit) is commanded in the main program, the machining program in the built in disk of the display unit can be called and operated as a sub program.
Macros such as WHILE, IF and GOTO can be used. Also, calling the sub program and macro program stored in memory or the built-in disk of the display unit is possible.
1.3.5 Front-Side SD Card Mode
The machining program stored in a SD card can be operated. This SD card is installed to the front-side SD card I/F.
When a machining program stored in SD card is searched while "Memory Card" is selected for device during operation search, the machining program in SD card can be operated as a main program. ("Memory mode" is used as the operation mode.)
Also, when "M98 Pp, Dd;" ("d" for designating a unit) is commanded in the main program, the machining program in SD card can be called and operated as a sub program.
Macros such as WHILE, IF and GOTO can be used. Also, calling the sub program and macro program stored in memory or SD card is possible.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
M800V/M80V Series Specifications Manual (Function)
1 Control Axes
1.3 Control Axes and Operation Modes
7 IB-1501610-G
1.3.6 Front-Side USB Memory Mode
The control is able to run a machining program stored in a USB memory when it is inserted into the front USB port of the display unit.
USB memory may be pulled off due to the machine vibration depending on the environment. Use this function at your own risk.
USB memory mode enables you to handle the same programs as for memory mode. In addition you can handle the greater number of large-capacity programs.
When a machining program stored in the USB memory is searched while USB is selected for device during operation search, the machining program in the USB memory can be operated as a main program.
("Memory mode" is used as the operation mode.)
Also, when "M98 Pp ,Dd;" ("d" for designating a unit) is commanded in the main program, the machining program in the USB memory can be called and operated as a sub program.
[Display unit]
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
Front USB port of the display unit
M800V/M80V Series Specifications Manual (Function)
1 Control Axes
1.3 Control Axes and Operation Modes
IB-1501610-G 8
9 IB-1501610-G
2
Input Command
M800V/M80V Series Specifications Manual (Function)
2 Input Command
2.1 Data Increment
IB-1501610-G 10
2.1 Data Increment
2.1.1 Least Command Increment
[M system]
[L system]
The data increment handled in the controller includes the input setting increment, PLC increment and machine error compensation increment. Each type is set with parameters.
The input setting increment applies to the data entered from or displayed in the Monitor or other screens, the travel distance

per pulse of manual pulse generator, machining programs, and maintenance data. (Excluding PLC increment and machine error compensation increment mentioned below.) This increment is applied per part system (1st to the maximum part system within the specification, PLC axis).

(1) The inch and metric systems cannot be used together.

Least command increment

(input setting increment) M850VW M830VW M850VS M830VS M80VW M80V

TypeA

M80V

TypeB

1 m (1 m)

0.1 m (0.1 m)

0.01 m (10 nm)

0.001 m (1 nm)

Least command increment

(input setting increment) M850VW M830VW M850VS M830VS M80VW M80V

TypeA

M80V

TypeB

1 m (1 m)

0.1 m (0.1 m)

0.01 m (10 nm)

0.001 m (1 nm)

Input setting increment

Input setting in crement

(parameter)

Metric unit system Inch unit system

Linear axis Rotary axis Linear axis Rotary axis

(Unit = mm) (Unit =) (Unit = inch) (Unit =)

1 m (B) 0.001 0.001 0.0001 0.001

0.1 m (C) 0.0001 0.0001 0.00001 0.0001

10 nm (D) 0.00001 0.00001 0.000001 0.00001

1 nm (E) 0.000001 0.000001 0.0000001 0.000001

Note

PLC increment is used for setting and display of PLC interface. Input-output to ladder is handled with this increment. (excluding machine error compensation increment) This increment is applied per part system.

(Example) When writing "90" to A axis and "180" to C axis in the A-C axis configuration using the rotary axis angle designation(*1)

[When PLC increment is 1 m (B)]

[When PLC increment is 1 nm (E)]

(*1) Set the angle of the rotary axis of the mechanical axis specification.

(When the PLC unit is 1 m (B))

Machine error compensation increment is used for setting and display of machine error compensation amount. This increment is applied per part system.

This increment is applied for following parameters and PLC interface.

Backlash compensation (parameter)

This function compensates for the error (backlash) produced when the direction is reversed.

Pitch error compensation (parameter)

This function compensates for the errors in pitch intervals of ball screws.

Machine rotation center error compensation (parameter)

This function compensates for the errors difference between the center of the actual rotary axis and the center of programmed rotary axis.

External machine coordinate system compensation (PLC interface)

This function shifts the coordinate system by PLC.

Ball screw thermal displacement compensation (PLC interface)

This function compensates for axis feed error caused by the ball screw thermal expansion, etc.

PLC increment

R register Details Input range

R2628, R2629 The angle of the 1st rotary axis with mechanical axis specifica tions (1st part system)

0 to 720000 (1/1000)

R2630, R2631 The angle of the 2nd rotary axis with mechanical axis specifica tions (1st part system)

Machine error compensation increment

90 1000 = 90000 [DMOV K90000 R2628]

180 1000 = 180000 [DMOV K180000 R2630]

1/1000

<A axis>

Angle System unit

<C axis>

90 1000000 = 90000000 [DMOV K90000000 R2628]

180 1000000 = 180000000 [DMOV K180000000 R2630]

1/1000000

<A axis>

Angle System unit

<C axis>

2.1.2 Least Control Increment

[M system]

[L system]

The least control increment determines the CNC's internal operation accuracy.

The control increment (the unit of the NC internal position data) and output increment (the unit of the data communicated to the drive unit) can be set individually.

2.1.3 Indexing Increment

This function limits the command value for the rotary axis.
This can be used for indexing the rotary table, etc. It is possible to cause a program error with a program command other than an indexing increment (parameter setting value).
(Example) When the indexing increment setting value is 2 degrees, only command with the 2-degree increment are possible.
Least control increment M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
0.01 m (10 nm)
0.001 m (1 nm)
Least control increment M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
0.01 m (10 nm)
0.001 m (1 nm)
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
G90 G01 C102.000 ; Moves to the 102 degree angle.
G90 G01 C101.000 ; Program error
G90 G01 C102 ; Moves to the 102 degree angle. (Decimal point type II)

2.2 Unit System
2.2.1 Inch/Metric Changeover
The unit systems of the data handled in the controller include the metric unit system and inch unit system. The unit (inch/mm) for the setting and display, as well as for the handle/incremental feed can be switched with either the parameters or machining program (G20/G21 command).
An additional specification is required when the unit is switched with the machining program command.
(1) For the angle data, 1.0 means 1 degree () regardless of the unit system.
(1) The parameter changeover is valid after the power is turned ON again.
(2) The unit system for the PLC axis can be switched with a parameter different from the one used with the NC axis.
The PLC axis unit system cannot be switched with the machining program (G20/G21 command).
(3) When the power is turned ON or resetting is performed, the command increment depends on the parameter setting.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
Unit system Length data Meaning
Metric unit system 1.0 1.0 mm
Inch unit system 1.0 1.0 inch
Parameter
Data
Machining program
Screen data (Compensation amount, user
parameter, counter, etc.) / Feedrate of
handle, etc.
Machine parameter/PLC interface
machine position, etc.
A
0 G20 Inch unit system Metric unit system
Not affected G21 Metric unit system
1 G20 Inch unit system Inch unit system G21 Metric unit system
B
0
Not affected Not affected Metric unit system
1 Inch unit system
Note
Note

2.2.2 Input Command Increment Tenfold
The program's command increment can be multiplied by an arbitrary scale with the parameter designation.
This function is valid when a decimal point is not used for the command increment.
For example, this function allows a CNC unit, for which the command increment is set to 1 m, to run a machining program, which has been created with a 10 m input command increment, as same as before.
The scale is set with the parameters.
(1) This function cannot be used for the dwell function G04_X_(P_);.
(2) This function cannot be used for the compensation amount of the tool offset input.
(3) This function can be used when decimal point type I is valid, but cannot be used when decimal point type II is valid.
(4) This function cannot be used for a tool shape setting command (in G10L100 format).
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
Note

2.3 Program Format
2.3.1 Program Format
This is G code (program) format.
The G-code of lathe system is selected by parameter.
This manual explains the G function with G-code list 3 as standard.
2.3.1.1 Format 1 for Lathe (G Code List 2, 3)
2.3.1.2 Format 2 for Lathe (G Code List 4, 5)
2.3.1.3 Special Format for Lathe (G Code List 6, 7)
2.3.1.4 Format 1 for Machining Center
2.3.1.5 Format 2 for Machining Center (M2 Format)
2.3.1.6 MITSUBISHI CNC Special Format
The formats of the turning fixed cycles (G77 to G79), compound type fixed cycle for turning machining (G71 to G76) and the fixed cycle for drilling (G80 to G89) can be switched to the MITSUBISHI CNC special formats.
(1) There is a specification (zigzag thread cutting) for specific machine tool builder.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
Note

2.3.2 Program Format Switch
Program format switch is a function designed to switch the program format (G code list) using G codes or PLC signal. While the switch is active, the control runs a program based on the switched G code list. When you run a lathe-based multi-tasking machine, and if you change to the G code list of Machining center system, you can use a free-curved surface machining program made with CAM without modifying the program.
Command format
Program format switch ON
When G188 is given, the control switches the L-system program format to M-system (G code list 1 (Command type II)). The control runs the next and subsequent program blocks based on the M-system G code list.
Program format switch cancel
When G189 is given, the control switches the M-system program format back to L-system (a system selected by command type parameter). The control runs the next and subsequent program blocks based on the L-system G code list.
Program example
<For G code list 2>
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
[Switchover using G codes (G code method)]
G188 ; Change to M-system G code list (G code list 1 (Command type II))
G189 ; Change back to L-system G code list (G code list determined by command type parameter)
O1
:
L system
(G code list 2 (Command type III)
G188; Program format switch ON
G90 G00 X20. Z200.;

G91 G01 X30. Z180. F100;
:
M system
(G code list 1 (Command type II))
G189; Program format switch cancel
: L system
(G code list 2 (Command type III)

(1) A switchover using the PLC I/F method is unavailable during automatic operation.
G code method and PLC I/F method are distinguished in the following points:
Switchover using PLC signal (PLC I/F method)
PFCHR ON; Change to M-system G code list (G code list 1 (Command type II))
PFCHR OFF; Change back to L-system G code list (G code list determined by command type parameter)
G code method This switches by G188/G189 commands in cycle operation.
(e.g. to switch the format dynamically for some machining processes)
PLC I/F method This switches by PLC signal not in cycle operation.
(e.g. to enable the switched state at the time of power up)
Note
Program format switch
request (PFCHR)
Program format being
switched (PFCHS)
In automatic operation
(OP)
Run a program based on the M-system G code list

2.4 Command Value
2.4.1 Decimal Point Input I, II
There are two types of the decimal point input commands and they can be selected by parameter.
Decimal point input type I
When axis coordinates and other data are issued in machining program commands, the assignment of the program data can be simplified by using a decimal point. The minimum digit of a command not using a decimal point is the same as the least command increment.
The decimal point can be applied not only to axis coordinate position but also to speed commands and dwell commands.
The decimal point position serves as the millimeter unit in the metric mode, as the inch unit in the inch mode and as the second unit in a time designation of dwell command.
Decimal point input type II
As opposed to type I, the minimum digit of a command without a decimal point serves as the millimeter unit in the metric mode, as the inch unit in the inch mode and as the second unit in the time designation.
The "." (point) must be added when commands below the decimal point are required.
(1) The F unit is mm/min for either type (inch system : inch/min).
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
Unit interpretation (for metric system)
Type I Type II
G00 X100. Y-200.5 X: 100 mm
Y: -200.5 mm
X: 100 mm
Y: -200.5 mm
G1 X100 F20. X100 m, F20 mm/min X100 mm, F20 mm/min
G1 Y200 F100 (Note 1) Y200 m, F100 mm/min Y200 mm, F100 mm/min
G4 X1.5 Dwell 1.5 s Dwell 1.5 s
G4 X2 Dwell 2 ms Dwell 2 s
Note

2.4.2 Absolute/Incremental Command
[M system]
When axis coordinate data is issued in a machining program command, either the incremental command method (G91) that commands a relative distance from the current position or the absolute command method (G90) that moves to a designated position in a predetermined coordinate system can be selected.
The absolute and incremental commands can be both used in one block, and are switched with G90 or G91. However, the arc radius designation (R) and arc center designation (I, J, K) always use incremental designations.
The absolute and incremental commands are switched with G190 and G191 depending on G code list.
These G codes can be commanded multiple times in one block.
[L system]
When axis coordinate data is issued in a machining program command, either the incremental command method that commands a relative distance from the current position or the absolute command method that moves to a designated position in a predetermined coordinate system can be selected.
When issuing an incremental command, register the axis address to be commanded as the incremental axis name in the parameter. However, the arc radius designation (R) and arc center designation (I, J, K) always use incremental designations.
(1) Absolute command and incremental command can be switched by the parameter. In addition to the command method using the axis addresses as indicated above, a command method using G code (G90/G91 or G190/G191) may be selected.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA

M80V
TypeB
M
L
G90, G190 Absolute command
G91, G191 Incremental command
Absolute command X, Z
Incremental command U, W
Note

2.4.3 Diameter/Radius Designation
For axis command value, the radius designation or diameter designation can be changed over with parameters.
When the diameter designation is selected, the scale of the length of the selected axis is doubled.
(Only the half (1/2) of the commanded amount moves.)
This function is used when programming the workpiece dimensions on a lathe as diameters.
Changing over from the diameter designation to the radius designation or vice versa can be set separately for each axis.
When the tool is to be moved from point P1 to point P2
Radius and diameter commands
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
SP Spindle
X command U command Remarks
Radius Diameter Radius Diameter Even when a diameter command has been selected, only
the U command can be made a radius command by pa rameter. X = r1 X = 2r1 U = r2 U = 2r2
r1
r2
P1
P2
SP
X
Z

2.4.4 Diameter/Radius Designation Switch
The method of commanding a travel distance (command with a diameter dimension/command with a radius dimension (as-is distance)) in a program is defined individually for each axis using the parameter. Diameter/Radius designation switch function; however, enables you to switch the diameter/radius designation of each axis using a G code at your desired timing. When you use the function to switch diameter/radius designation, it helps you create a program more flexibly, from turning to milling, according to each machining situation.
Command format
Diameter/Radius Designation Switch
Diameter/Radius designation switch enables you to select any desired NC axis, excluding rotary axes, and switch the diameter/radius designation of the axis.
If you select no axis address, the diameter/radius designation statuses of all the axes of the part system are returned to the initial power-on state.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
G10.9 Axis address 1__ Axis address 2__ ... Axis address n__ ;
Axis address n : Axis address for which diameter/radius designation is switched
Select radius or diameter designation with a value that follows the axis address.
0: Radius designation
1: Diameter designation
X X
Z Z
Radius
designation
Diameter
designation
Diameter/Radius designation for
X axis is switched with G code

3
Positioning/Interpolation

3.1 Positioning
3.1.1 Positioning
This function carries out high-speed positioning following the movement command given in a program.
The above command positions the tool with rapid traverse rate. The tool path takes the shortest distance to the end point in

the form of a straight line.
For details on the feedrate of the NC, refer to " 4.1.1 Rapid Traverse Rate (m/min)".
Since the actual rapid traverse feedrate depends on the machine, refer to the specifications of the machine concerned.
The rapid traverse feed rate can be set for each axis with parameters.
The number of axes which can be commanded simultaneously depends on the specifications (number of simultaneously controlled axes). The axes can be used in any combination within this range.
The feed rate is controlled within the range that it does not exceed the rapid traverse rate of each axis and so that the short est time is taken. (Linear type)
Parameter setting enables movement at the rapid traverse rates of the respective axes independently for each axis. In this case, the tool path does not take the form of a straight line to the end point. (Non-Linear type)
The tool is always accelerated at the start of the program command block and decelerated at the end of the block.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
G00 Xx1 Yy1 Zz1 ;(Also possible for additional axes A, B, C, U, V, W simultaneously)
Xx1, Yy1, Zz1 :Position data
M800V/M80V Series Specifications Manual (Function)
3 Positioning/Interpolation
3.1 Positioning
25 IB-1501610-G
3.1.2 Unidirectional Positioning
The G60 command always moves the tool to the final position in a direction determined with parameters.
The tool can be positioned without backlash.
The parameter setting enables G60 to switch between G code group 0 (non-modal) and G code group 01 (modal).
With the above command, the tool is first moved to a position distanced from the end point by an amount equivalent to the creep distance (parameter setting) with rapid traverse and then moved to its final position.
For details on the feedrate of the NC, refer to " 4.1.1 Rapid Traverse Rate (m/min)".
Since the actual rapid traverse feed rate depends on the machine, refer to the specifications of the machine concerned.
Positioning to the final point is shown below (when this positioning is in the "+" direction.)
(1) The processing of the above pattern will be followed even for the machine lock and Z-axis command cancel.
(2) On the creep distance, the tool is moved with rapid traverse.
(3) G60 is valid even for positioning in drilling in the fixed cycle.
(4) When the mirror image function is on, the tool will be moved in the reverse direction by mirror image as far as the interim position, but operation over the creep distance with the final advance will not be affected by the mirror image.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
G60 X__ Y__ Z__ ; (Also possible for additional axes A/B/C/U/V/W simultaneously)
X/Y/Z Position data
+ -
Note
M800V/M80V Series Specifications Manual (Function)
3 Positioning/Interpolation
3.2 Linear/Circular Interpolation
IB-1501610-G 26
3.2 Linear/Circular Interpolation
3.2.1 Linear Interpolation
Linear interpolation is a function that moves a tool linearly by the movement command value supplied in the program at the cutting feed rate designated by the F code.
Linear interpolation is executed by the above command at the f1 feed rate. The tool path takes the shortest distance to the end point in the form of a straight line.
For details on the f1 command values for NC, refer to " 4.1.2 Cutting Feedrate (m/min)".
Since the actual cutting feed rate depends on the machine, refer to the specifications of the machine concerned.
The number of axes which can be commanded simultaneously depends on the specifications (number of simultaneously controlled axes). The axes can be used in any combination within this range.
The feed rate is controlled so that it does not exceed the cutting feed rate clamp of each axis.
When a rotary axis has been commanded in the same block, it is treated as a linear axis in degree() units (1 = 1mm), and linear interpolation is performed.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
G01 Xx1 Yy1 Zz1 Ff1 ; (Also possible for additional axes A, B, C, U, V, W simultaneously)
Xx1,Yy1,z1 Position data
Ff1 Feedrate data
M800V/M80V Series Specifications Manual (Function)
3 Positioning/Interpolation
3.2 Linear/Circular Interpolation
27 IB-1501610-G
3.2.2 Circular Interpolation (Center/Radius Designation)
This function moves a tool along a circular arc on the plane selected by the plane selection G code with movement command supplied in the program.
The above commands move the tool along the circular arc at the f1 feed rate. The tool moves along a circular path, whose center is the position from the start point designated by distance "i1" in the X-axis direction and distance "j1" in the Y-axis direction, toward the end point.
The direction of the arc rotation is designated by G02 or G03.
The arc plane is designated by G17, G18 or G19.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB

M
L
Circular interpolation with I, J, K commands
G02(G03) Xx1 Yy1 Ii1 Jj1 Ff1
; (Also possible for additional axes A, B, C, U, V, W)
G02,G03 Arc rotation direction
Xx1,Yy1 End point coordinates
Ii1,Jj1 Arc center
Ff1 Feedrate
G02 Clockwise (CW)
G03 Counterclockwise (CCW)
G17 XY plane
G18 ZX plane
G19 YZ plane
G17 G18 Y X
Y
Z
X Z
G19
G02 G02
G02
G03 G03
G03

(Example) See below for examples of circular commands.
The axes that can be commanded simultaneously are the two axes for the selected plane.
The feed rate is controlled so that the tool always moves at a speed along the circumference of the circle.
Circular interpolation can be commanded within a range extending from 0 to 360.
A maximum of 6 digits before decimal point can be specified for the radius.
(1) The arc plane is always based on the G17, G18 or G19 command. If a command is issued with two addresses which do not match the plane, an alarm will occur.
(2) The axes configuring a plane can be designated by parameters. Refer to " 10.1.9 Plane Selection".
Besides the designation of the arc center coordinates using the above-mentioned I, J and K commands, arc commands can also be issued by designating the arc radius directly.
The direction of the arc rotation is designated by G02 or G03.
The arc plane is designated by G17, G18 or G19.
The arc center is on the bisector which orthogonally intersects the segment connecting the start and end points, and the point of intersection with the circle, whose radius has been designated with the start point serving as the center, is the center coordinate of the arc command.
When the sign of the value of R in the command program is positive, the command will be for an arc of 180 or less; when it is negative, it will be for an arc exceeding 180.
(1) The arc plane is always based on the G17, G18 or G19 command. If a command is issued with two addresses which do not match the plane, an alarm will occur.
R-specified circular interpolation
G02(G03) Xx1 Yy1 Rr1 Ff1 ; (Also possible for additional axes A, B, C, U, V, W)
G02,G03 Arc rotation direction
Xx1,Yy1 End point coordinates
Rr1 Arc radius
Ff1 Feedrate
F
Y
X
I,J
Start
point
Center
End
point
Note
Note

3.2.3 Helical Interpolation
With this function, any two of three axes intersecting orthogonally are made to perform circular interpolation while the third axis performs linear interpolation in synchronization with the arc rotation. This simultaneous 3-axis control can move helically to machine and be exercised to machine large-diameter screws or 3-dimensional cams.
This is commanded by combining a height axis to the circular interpolation command.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
Program command path XY plane projection path
(S) Start point
(E) End point
Program command path
Circular interpolation components
Linear interpolation components
Z
(S) Y
(E)
X

Y
X
(E)
(S)

Command format
[M system]
The arc center coordinate values and arc radius are commanded by the input increment. Pay attention to the case of the helical interpolation command of the axis which has a different input command increment.
To prevent confusion, command with a decimal point.
Absolute and incremental commands can be used for the arc end point coordinates and the end point coordinates of the linear axis, but incremental commands must be used for the arc center coordinates.
When executing the pitch command with ",P" address, the program error occurs.
[L system]
(1) Indicates as I axis: X, J axis: Y, and K axis: Z.
(2) When commanding "P" and ",P" for the number of pitches together, the command value ",P" is prioritized.
G17 G02/G03 X__ Y__ Z__ I__ J__ P__ F__ ; Helical interpolation command (Specify arc center)
G17 G02/G03 X__ Y__ Z__ R__ F__ ; Helical interpolation command (Specify radius (R))
G17/G18/G19 Arc plane (G17: XY plane, G18: ZX plane, G19: YZ plane)
G02/G03 Arc rotation direction (G02: clockwise, G03: counterclockwise)
X,Y Arc end point coordinates
Z Linear axis end point coordinates
I,J Arc center coordinate values
R Arc radius
P Number of pitches
F Feedrate
G17 G02/G03 X/U__ Y/V__ Z/W__ I__ J__ P/,P__ F__ ;
G17 G02/G03 X/U__ Y/V__ Z/W__ R__ F__ ;
G17/G18/G19 Arc plane (G17: XY plane, G18: ZX plane, G19: YZ plane)
G02/G03 Arc rotation direction (G02: clockwise, G03: counterclockwise)
X/U, Y/V Arc end point coordinates
Z/W Linear axis end point coordinates
I,J Arc center coordinate values
R Arc radius
P/,P Number of pitches
F Feedrate
Note

The arc plane is designated by G17, G18 or G19.
The direction of the arc rotation is designated by G02 or G03.
Absolute and incremental commands can be used for the arc end point coordinates and the end point coordinates of the lin ear axis, but incremental commands must be used for the arc center coordinates.
The linear interpolation axis is the other axis which is not included in the plane selection.
Command the speed in the component direction that represents all the axes combined for the feed rate.
The combination of the axes which can be commanded simultaneously depends on the specifications. The axes can be used in any combination under the specifications.
The feed rate is controlled so that the tool always moves at a speed along the circumference of the circle.
(1) Helical shapes are machined by assigning linear commands for one axis which is not a circular interpolation axis using an orthogonal coordinate system. It is also possible to assign these commands to two or more axes which are not circular interpolation axes.
When a simultaneous 4-axis command is used with the V axis as the axis parallel to the Y axis, helical interpolation will be carried out for a cylinder which is inclined as illustrated below. In other words, linear interpolation of the Z and V axes is carried out in synchronization with the circular interpolation on the XY plane.
Note
V
Z
Y
X
End point
Start point

3.2.4 Spiral/Conical Interpolation
This function interpolates arcs where the start point and end point are not on the circumference of the same circle into spiral shapes.
Conical interpolation is performed by commanding end point in height direction.
There are two types of command formats which can be changed with the parameters.
Spiral interpolation
The above commands move the tool along the circular arc at the f1 feed rate. The tool draws a spiral arc path whose center is at the position from the start point which is designated by distance i1 for the X-axis direction and distance j1 for the Y-axis direction as the tool moves toward the end point.
Designated by G18 or G19.
The direction of the arc rotation is designated by G02.1 or G03.1.
The number of pitches (number of rotations) is designated by p1.
By assigning zero to p1, the pitch designation can be omitted in this case, the interpolation is obtained as a spiral rotation of less than one full turn. Assigning 1 to p1 yields a spiral rotation of more than one full turn but less than two full turns.
Conical interpolation
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB

M
L
For command format type 1
G02.1(G03.1) Xx1 Yy1 Ii1 Jj1 Pp1 Ff1 ;
G02.1,G03.1 : Arc rotation direction
Xx1,Yy1 : End point coordinate
Ii1,Jj1 : Arc center
Pp1 : Number of pitches
Ff1 : Feed rate
G17 XY plane
G18 ZX plane
G19 YZ plane
G02.1 Clockwise (CW)
G03.1 Counterclockwise (CCW)
When an axis other than the ones for the spiral interpolation
plane has been designated at the same time, the other axis
will also be interpolated in synchronization with the spiral in terpolation.
G17 G91 G02.1 X100. Z150. I150. P3 F500;
In the example given above, truncated cone interpolation is
performed.
W
Z
Y
X
X
W
Z
X
XY plane
XZ plane

Spiral interpolation
The number of spiral rotations when the increment/decrement amount of radius is specified can be calculated with the fol lowing expression.
Number of rotations = |(arc end point radius - arc start point radius)| / |increment or decrement amount of radius|
Q takes precedence if both Q and L have been designated at the same time.
Conical interpolation
The number of rotations when the height increment or decrement amount is specified can be calculated with the following
expression.
Number of rotations = |Height| / |Amount by which height is incremented or decremented (I,J,K)|
Q takes precedence over K which in turn takes precedence over L if Q, K and L have been designated at the same time.
The tolerable error range (absolute position) for when the commanded end point position is deviated from the end point
position obtained from the number of pitches and increment/decrement amount is set with the parameters.
This function cannot be used in combination with a tool radius compensation command (G41, G42).
The arc plane always follows G17, G18 and G19. The plane arc control is carried out by G17, G18 and G19, even if desig nated by two addresses that do not match the plane.
For command format type 2
G02(G03) Xx1 Yy1 Ii1 Jj1 Qq1/Ll1 Ff1 ;
G02,G03 : Arc rotation direction
Xx1,Yy1 : End point coordinate
Ii1,Jj1 : Arc center
Qq1 : Amount by which radius is incremented or decremented per spiral rotation
Ll1 : Number of pitches
Ff1 : Feed rate
G17 G02(G03) Xx1 Yy1 Zz1 Ii1 Jj1 Kk1 /Qq /Ll1 Ff1 ;
G02,G03 : Arc rotation direction
Zz1 : End point coordinate in height direction
Ii1,Jj1 : Arc center
Kk1 : Amount by which height is incremented or decremented per spiral rotation
Qq1 : Amount by which radius is incremented or decremented per spiral rotation
Ll1 : Number of pitches
Ff1 : Feed rate
Common cautions for type 1 and 2

3.2.5 Cylindrical Interpolation
This function transfers the shape that is on the cylinder's side surface (shape yielded by the cylindrical coordinate system)
onto a plane, and when the transferred shape is designated in the program in the form of plane coordinates, the shape is
converted into a movement along the linear and rotary axes of the original cylinder coordinates, and the contours are
controlled by means of the CNC unit during machining.
Since the programming can be performed for the shapes produced by transferring the side surfaces of the cylinders, this
function is useful when it comes to machining cylindrical cams and other such parts.
The command is programmed with the rotary axis and its orthogonal axis, which are different between the lathe and the
machining center systems, to machine grooves and other shapes on the side of the cylinder.
Command format
Cylindrical interpolation mode start
Cylindrical interpolation mode cancel
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
G07.1 Name of rotary axis Cylinder radius;
or G107 Name of rotary axis Cylinder radius;

Name of rotary
axis
: Axis name set to the rotary axis
Cylinder radius : Radius value 0: Cylindrical interpolation mode start
Command a value other than "0".
G07.1 Name of rotary axis 0 ;
or G107 Name of rotary axis 0;
Hypothetical
axis C
X
Z
Z
Y
X
r
r C
B
Lathe
Machining
center

3.2.6 Polar Coordinate Interpolation
This function converts the commands programmed by the orthogonal coordinate axes into linear axis movements (tool movements) and rotary axis movements (workpiece rotation) to control the contours. It is useful for cutting linear cutouts on the outside diameter of the workpiece, grinding cam shafts, etc.
This function can be used with the G code list 1, 6 and 7.
Polar coordinate interpolation mode
(G12.1)
The polar coordinate interpolation mode is established by designating the G12.1 command.
The plane that uses the linear axis as the plane's 1st axis, and the intersecting hypothetical axis as the plane's 2nd axis (hereafter "polar coordinate interpolation plane") is selected. Polar coordinate interpolation is performed on this plane.
(Whether the linear axis is used as the plane's 1st axis or the plane's 2nd axis can be selected with the parameter.)
Linear interpolation and circular interpolation can be designated in the polar coordinate interpolation mode.
Either absolute command or incremental command can be issued.
Tool radius compensation can be applied to the program commands.
Polar coordinate interpolation is performed for the path after tool radius compensation.
For the feed rate, designate a tangential rate on the polar coordinate interpolation plane (orthogonal coordinate system) using the F command.
The F rate is in either mm/min or inch/mm units.
Polar coordinate interpolation cancel mode
(G13.1)
The polar coordinate interpolation cancel mode is established by designating the G13.1 command.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
Z
C
X
Hypothetical axis
Polar coordinate interpolation
plane (G17 plane)

3.2.7 Milling Interpolation
When a lathe with linear axes (X, Z axes) and rotary axis (C axis) serving as the control axes is to perform milling at a workpiece end face or in the longitudinal direction of the workpiece, this function uses the hypothetical axis Y which is at right angles to both the X and Z axes to enables the milling shape to be programmed as the X, Y and Z orthogonal coordinate system commands.
With this function, the workpiece can be treated as a cylinder with radius X, and commands can be designated on the plane formed by transferring the cylinder side surface instead.
With milling interpolation, the commands programmed by the orthogonal coordinate system are converted into linear axis and rotary axis movements (workpiece rotation) to control the contours.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
G12.1 ; Milling mode ON
G13.1 ; Milling mode OFF (Turning mode)
G16(Y-Z cylindrical plane) G17(X-Y plane) G19(Y-Z plane)
Plane on which radius X cylinder is devel oped.
Select this to machine the cylindrical plane of
a workpiece.
X-Y plane in XYZ orthogonal coordinate
system.
Select this to machine the workpiece end
face.
Y-Z plane in XYZ orthogonal coordinate sys tem.
Select this to machine a plane of a cylinder

cut in the longitudinal direction.
C
X
Y
Z
(Hypothetical axis)
X
Z
Y
X
Z
Y
Z
X
Y

3.2.8 Hypothetical Axis Interpolation
Take one of the axes of the helical interpolation or spiral interpolation, including a linear axis, as a hypothetical axis (axis with no actual movement) and perform pulse distribution. With this procedure, an interpolation equivalent to the helical interpolation or spiral interpolation looked from the side (hypothetical axis), or SIN or COS interpolation, will be possible.
The setting of this hypothetical axis is commanded with G07.
Interpolation functions that are used for hypothetical interpolation are helical interpolation and spiral interpolation.
During "G070;" to "G071;", axis will be the hypothetical axis. Thus, when axis is commanded independently during this time, dwell mode will be held until finishing the pulse distribution to the hypothetical axis.
(1) In order to perform hypothetical axis interpolation, helical interpolation must be added.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
G07 Y0 ; X axis command cancel ON
G07 Y1 ; X axis command cancel OFF
G07 Hypothetical axis interpolation command
Y Designate the axis for which hypothetical axis interpolation is performed.
Designation of the axis for which axis command cancellation is performed applies for all the NC axes.
(0: Cancel (normal), 1: Handle as hypothetical axis)
Note

3.3 Curve Interpolation
3.3.1 Involute Interpolation
Involute interpolation moves a tool along an involute curve. This function can also move a tool helically (spirally) while moving the tool along the involute curve. This can be used for scroll machining of involute gears or compressors. The interpolation can eliminate a path step that is generated at a micro segment command, as well as acceleration/deceleration that is caused due to differences of segment length, leading to smooth accurate machining.
Using the automatic speed control function, including "involute interpolation override" and "acceleration clamping during involute interpolation", further improves the machining accuracy.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
Involute Interpolation Helical involute interpolation
(S) Start point
(E) End point
Program command path
Projected trajectory of XY plane of command program
Involute curve is obtained with the following expres sion:
X() = R{cos(+ 0) + x sin(+ 0)} + X0
Y() = R{sin(+ 0) - x cos(+ 0)} + Y0
Circle in the right figure is the base circle.
Y
X
I
J
(S)
(E)
R
Z
X
Y
(S)
(E)
(X,Y)
Y0
R

0
X
X0

Y

Command format
Involute Interpolation
The range of command value follows the input range of coordinate position data.
Helical involute interpolation
The range of command value follows the input range of coordinate position data.
G02.2 (G03.2) X__ Y__ I__ J__ R__ F__ ; G17 plane
G02.2 (G03.2) Z__ X__ K__ I__ R__ F__ ; G18 plane
G02.2 (G03.2) Y__ Z__ J__ K__ R__ F__ ; G19 plane
G02.2 / G03.2 Involute curve rotation direction (G02.2: clockwise; G03.2: counterclockwise)
X End point of involute interpolation (X axis)
Y End point of involute interpolation (Y axis)
Z End point of involute interpolation (Z axis)
I Incremental value from the start point to the center of base circle (X axis)
J Incremental value from the start point to the center of base circle (Y axis)
K Incremental value from the start point to the center of base circle (Z axis)
R Base circle radius
F Feedrate (in involute curve tangent direction)
G02.2 (G03.2) X__ Y__ __ I__ J__ R__ F__ ; G17 plane
G02.2 (G03.2) Z__ X__ __ K__ I__ R__ F__ ; G18 plane
G02.2 (G03.2) Y__ Z__ __ J__ K__ R__ F__ ; G19 plane
G02.2 / G03.2 Involute curve rotation direction (G02.2: clockwise; G03.2: counterclockwise)
X End point of involute interpolation (X axis)
Y End point of involute interpolation (Y axis)
Z End point of involute interpolation (Z axis)
End point of linear axis (: the name of the linear axis)
When a rotary axis is designated, a program error occurs.
Multiple linear axes can be designated.
I Incremental value from the start point to the center of base circle (X axis)
J Incremental value from the start point to the center of base circle (Y axis)
K Incremental value from the start point to the center of base circle (Z axis)
R Base circle radius
F Feedrate (in involute curve tangent direction)

3.3.2 Exponential Interpolation
With this function, the rotary axis movement is changed into exponential functions vis-a-vis the linear axis movements.
When exponential function interpolation is performed, linear interpolation is performed between the other axes and the linear axis. This makes it possible to machine tapered grooves (regular helix machining of tapered shapes) whose helix angle is always constant.
The function can be used for slotting and grinding end mills and other tools.
[Uniform helix machining of taper shape]
[Relationship between linear and rotary axes]
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
A
Z
X
J1 J2 J3
(G02.3/G03.3)
(G00)
(G01)
(G01)
Helix angle : J1=J2=J3
(rotary axis)
(linear axis)
A
X X=B (eCA - 1)
(rotary axis)
(linear axis) {B, C = constants}

3.3.3 Spline Interpolation (G05.1Q2/G61.2)
This function automatically generates spline curves that smoothly pass through rows of dots designated by a micro-segment machining program, and performs interpolation for the paths along the curves. This enables high-speed and high-accuracy machining to be achieved.
There are two types of the spline interpolation command format: G61.2 and G05.1Q2.
The high-speed high-accuracy control II/III is required for G05.1Q2 command. Command G05.1Q2 for the high-speed and smooth machining in the high-speed high-accuracy control II/III mode.
(1) While the spline interpolation is valid, the high-speed high-accuracy control III operates as high-speed high-accuracy con trol II.
Command format
G61.2 command
G05.1Q2 command
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V

TypeB
M
L
G61.2 X__ Y__ Z__ F__ ; Spline interpolation mode ON
or
G61.2 ;
G64 ;
..... Spline interpolation mode OFF
G05.1 Q2 X0 Y0 Z0 ; Spline interpolation mode ON
G05.1 Q0 ; Spline interpolation mode OFF
G64/G61.1
G61.2 / G05.1Q2
Note

3.3.4 NURBS Interpolation
This function realizes NURBS curve machining by commanding NURBS curve parameters (number of stages, weight, knot, control point). The path does not need to be replaced with micro segments.
This function operates only in the high-speed high-accuracy control II/III mode, so the high-speed high-accuracy control II/III function is required.
During NURBS interpolation, interpolation takes place at the commanded speed. However, if the curvature is large, the speed is clamped so that the machine's tolerable acceleration rate is not exceeded.
NURBS interpolation cannot be used during graphic check (continuous/step check).
Linear interpolation that connects the control points is used during graphic check.
The multi-part system simultaneous high-accuracy function is required when the NURBS interpolation is commanded to 2nd part system or higher.
(1) While the NURBS interpolation is valid, the high-speed high-accuracy control III operates as high-speed high-accuracy control II.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
(x1, y1, z1)
(x2, y2, z2)
(x3, y3, z3) (x4, y4, z4)
(xn,yn,zn)
Program path passing through
control point
NURBS interpolation curve
Note

3.3.5 3-Dimensional Circular Interpolation
To issue a circular command over a three-dimensional space, an arbitrary point (intermediate point) must be designated on the arc in addition to the start point (current position) and end point. Using the 3-dimensional circular interpolation command, an arc shape determined by the three points (start point, intermediate point, end point) designated on the three-dimensional space can be machined.
The speed command during 3-dimensional circular interpolation is the tangential velocity on the arc.
Command format
The operation is the same for G02.4 and G03.4. (The rotation direction cannot be designated.)
The axes used as the reference in 3-dimensional circular interpolation are the three basic axes set with the parameters.
The X, Y, Z address in the block may be omitted. The intermediate point coordinates omitted in the 1st block become the start point coordinates, and the end point coordinates omitted in the 2nd block become the intermediate point coordinates.
When using the 3-dimensional circular interpolation command, an arbitrary axis can be commanded in addition to the orthogonal coordinate system (X, Y, Z) used as the reference. The arbitrary axis designated in the intermediate point desig nating block (1st block) will interpolate to the command point when moving from the start point to intermediate point move ment. The arbitrary axis designated in the end point command block (2nd block) will interpolate to the command point when moving from the intermediate point to the end point. The number of arbitrary axes that can be commanded differs according to the number of simultaneous contour control axes. The total of the basic three axes used as the reference of the 3-dimen sional circular interpolation and the arbitrary axes commanded simultaneously must be less than the number of simultane ous contour control axes.
To command 3-dimensional circular interpolation when the incremental command is enabled, specify as follows.
Intermediate point coordinates: The position of the intermediate point relative to the start point
End point coordinates: The position of the end point relative to the intermediate point
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
G02.4 (G03.4) Xx1 Yy1 Zz1 1... ; Intermediate point designation (1st block)
Xx2 Yy2 Zz2 2 ... ; End point designation (2nd block)
G02.4 (G03.4) : 3-dimensional circular interpolation command
Xx1, Yy1, Zz1 : Intermediate point coordinates
Xx2, Yy2, Zz2 : End point coordinates
1 : Arbitrary axis other than axis used as the reference in 3-dimensional circular interpolation
(May be omitted)
Z
X
Y
End point
Intermediate point
Start point
(current position)

3.3.6 Spline Interpolation 2 (G61.4)

This function automatically generates a curve that smoothly passes within the tolerance range and interpolates the path along this curve. By using this function, smooth machining can be achieved even when the speed commanded in the program is low or the program has minute steps.

This function allows the machine to operate with the optimum tool path and speed, simply by specifying the tolerance size, so an operator can easily attain high quality machining.

This function is enabled under the tolerance control, so the specification of the tolerance control is required, too.

The tolerance size is the allowable error value between the path commanded by machining program and the path output with NC.

When spline interpolation 2 is used in combination with tool center point (TCP) control, spline interpolation 2 is performed with 5 axes. It generates a curve that passes through the TCP points smoothly within the tolerance, with the rotary axis angle also within the tolerance. The tool moves along the curve.

M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
Command
position
Tolerance
Tool path
Tolerance of rotary axis
Program command
position
Tolerance of linear axis
Tool path

Command format

Spline interpolation 2 mode with command G61.4 will be cancelled by designating any one of G code group 13.

G61 (Exact stop check mode)
G61.1 (High-accuracy control mode)
G61.2 (Spline interpolation command)
G62 (Automatic corner override)
G63 (Tapping mode)
G64 (Cutting mode)
G08P1 (High-accuracy control mode start)
G08P0 (High-accuracy control mode end)

G61.4 (,K__) (,R__) ; Spline interpolation 2 mode ON
,K Tolerance size (mm) linear axis
,R Tolerance size (deg) rotary axis

4
Feed

4.1 Feedrate

4.1.1 Rapid Traverse Rate (m/min)

The rapid traverse rate is set in the parameters for each axis.

During high-accuracy control mode, the dedicated rapid traverse rate (parameter) is applied.

Override can be applied to the rapid traverse rate using the external signal supplied.

The rapid traverse rate is effective for the following commands.

M system: G00, G27, G28, G29, G30, G60
L system: G00, G27, G28, G29, G30

The high-accuracy control mode rapid traverse rate is effective for the following commands.

M system: High-accuracy control, high-speed high-accuracy control I/II/III, SSS control, high-accuracy spline control
L system: High-accuracy control, high-speed high-accuracy control I/II, SSS control

Rapid traverse rate and high-accuracy control mode rapid traverse rate setting

Least command increment B: 0.001 mm (0.0001 inch)
Least command increment C: 0.0001 mm (0.00001 inch)
Least command increment D: 0.00001 mm (0.000001 inch)
Least command increment E: 0.000001 mm (0.0000001 inch)

M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M 1000 1000 1000 1000 1000 1000 1000
L 1000 1000 1000 1000 1000 1000 1000
Least command increment BCDE
Metric input (mm/min, /min) 1 to 1000000 1 to 1000000 1 to 1000000 1 to 1000000
Inch input (inch/min) 1 to 100000 1 to 100000 1 to 100000 1 to 100000

4.1.2 Cutting Feedrate (m/min)

[M system]

This function specifies the feedrate of the cutting commands, and a feed amount per spindle rotation or feed amount per minute is commanded.

Once commanded, it is stored in the memory as a modal value. The feedrate modal value is cleared to zero only when the power is turned ON.

The maximum cutting feedrate is clamped by the cutting feedrate clamp parameter (whose setting range is the same as that for the cutting feedrate).

If the high-accuracy control mode's cutting clamp speed is set, the cutting feedrate will be clamped at that speed during high accuracy control, high-speed high-accuracy control, high-accuracy spline control or SSS control.

If the value set for high-accuracy control mode cutting clamp speed is 0, the axis will be clamped at the cutting feed clamp speed.

High-accuracy control mode cutting clamp speed is set with the parameters.

Cutting feedrate setting range

Least command increment B: 0.001 mm (0.0001 inch)

Least command increment C: 0.0001 mm (0.00001 inch)

Least command increment D: 0.00001 mm (0.000001 inch)

Least command increment E: 0.000001 mm (0.0000001 inch)

<G code command for which the cutting feedrate is effective>

For others such as G01,G02,G03,G02.1,G03.1,G33, etc., refer to the interpolation specifications.

[L system]

This function specifies the feedrate of the cutting commands, and a feed amount per spindle rotation or feed amount per minute is commanded.

Once commanded, it is stored in the memory as a modal value. The feedrate modal value is cleared to zero only when the power is turned ON.

The maximum cutting feedrate is clamped by the cutting feedrate clamp parameter (whose setting range is the same as that for the cutting feedrate).

Cutting feedrate setting range

Least command increment B: 0.001 mm (0.0001 inch)

Least command increment C: 0.0001 mm (0.00001 inch)

Least command increment D: 0.00001 mm (0.000001 inch)

Least command increment E: 0.000001 mm (0.0000001 inch)

<G code command for which the cutting feedrate is effective>

For others such as G01,G02,G03,G02.1,G03.1,G33, etc., refer to the interpolation specifications.

M850VW M830VW M850VS M830VS M80VW M80V

TypeA

M80V

TypeB

M 1000 1000 1000 1000 1000 1000 1000

L 1000 1000 1000 1000 1000 1000 1000

Least command increment BC D E

Metric input (mm/min, /min) 0.001 to 1000000 0.0001 to 1000000 0.00001 to 1000000 0.000001 to 1000000

Inch input (inch/min) 0.0001 to 100000 0.00001 to 100000 0.000001 to 100000 0.0000001 to 100000

Least command increment BC D E

Metric input (mm/min, /min) 0.001 to 1000000 0.0001 to 1000000 0.00001 to 1000000 0.000001 to 1000000

Inch input (inch/min) 0.0001 to 100000 0.00001 to 100000 0.000001 to 100000 0.0000001 to 100000

4.1.3 Manual Feedrate (m/min)

The manual feedrate are designated as the feedrate in the jog mode or incremental feed mode for manual operation and the feedrate during dry run ON for automatic operation. The manual feedrate are set with external signals.

The "manual feedrate" signals from the PLC include two methods, the code method and value setting method.

Which method to be applied is determined with a signal common to the entire system. The signals used by these methods are common to all axes.

Setting range under the code method

Setting range under the value setting method

Multiplication factor PCF1 and PCF2 are available with the value setting method.

4.1.4 Rotary Axis Command Speed Tenfold

This function multiplies the rotary axis' command speed by 10 during initial inching.

The commanded speeds are as follow.

M850VW M830VW M850VS M830VS M80VW M80V

TypeA

M80V

TypeB

M 1000 1000 1000 1000 1000 1000 1000

L 1000 1000 1000 1000 1000 1000 1000

Metric input 0.00 to 14000.00 mm/min (31 steps)

Inch input 0.000 to 551.000 inch/min (31 steps)

Metric input 0 to 1000000.00 mm/min in 0.01 mm/min increments

Inch input 0 to 39370 inch/min in 0.001 inch/min increments

M850VW M830VW M850VS M830VS M80VW M80V

TypeA

M80V

TypeB

M

L

Automatic op eration

Cutting feedrate

For the inch system, the rotary axis command speed is multiplied by 10.

For example, if the B axis is the rotary axis in the inch system and the following type of machining program is executed, the rotary axis command speed will be multiplied by 10, and the rotary axis will move at 1000 deg./min.

N1 G1 B100. F100.;

Rapid traverse rate

The rapid traverse rate is not multiplied by 10, and is the speed set in the parameters.

Manual operation The command speeds related to manual operation, such as JOG feed, are not multiplied by 10. The dis play speed unit also remains as "deg./min".

4.2 Feedrate Input Methods
4.2.1 Feed per Minute (Asynchronous Feed)
[M system]
By issuing the G94 command, the commands from that block are issued directly by the numerical value following F as the feedrate per minute (mm/min, inch/min).
Metric input
Inch input
[L system]
By issuing the G94 command, the commands from that block are issued directly by the numerical value following F as the feedrate per minute (mm/min, inch/min).
Metric input
Inch input
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
Input setting increment B (0.001 mm) C (0.0001 mm) D (0.00001 mm) E (0.000001 mm)
Command address F (mm/min) F (mm/min) F (mm/min) F (mm/min)
Least command increment 1 (= 1.000)
(1. = 1.000)
1 (= 1.0000)
(1. = 1.0000)
1 (= 1.00000)
(1. = 1.00000)
1 (= 1.000000)
(1. = 1.000000)
Command range 0.001 -
1000000.000
0.0001 -
1000000.0000
0.00001 -
1000000.00000
0.000001 -
1000000.000000
Input setting increment B (0.0001 inch) C (0.00001 inch) D (0.000001 inch) E (0.0000001 inch)
Command address F (inch/min) F (inch/min) F (inch/min) F (inch/min)
Least command increment 1 (= 1.0000)
(1. = 1.0000)
1 (= 1.00000)
(1. = 1.00000)
1 (= 1.000000)
(1. = 1.000000)
1 (= 1.0000000)
(1. = 1.0000000)
Command range 0.0001 -
100000.0000
0.00001 -
100000.00000
0.000001 -
100000.000000
0.0000001 -
100000.0000000
Input setting increment B (0.001 mm) C (0.0001 mm) D (0.00001 mm) E (0.000001 mm)
Command address F (mm/min) F (mm/min) F (mm/min) F (mm/min)
Least command increment 1 (= 1.000)
(1. = 1.000)
1 (= 1.0000)
(1. = 1.0000)
1 (= 1.00000)
(1. = 1.00000)
1 (= 1.000000)
(1. = 1.000000)
Command range 0.001 -
1000000.000
0.0001 -
1000000.0000
0.00001 -
1000000.00000
0.000001 -
1000000.000000
Input setting increment B (0.0001 inch) C (0.00001 inch) D (0.000001 inch) E (0.0000001 inch)
Command address F (inch/min) F (inch/min) F (inch/min) F (inch/min)
Least command increment 1 (= 0.0100)
(1. = 1.0000)
1 (= 0.01000)
(1. = 1.00000)
1 (= 0.010000)
(1. = 1.000000)
1 (= 0.0100000)
(1. = 1.0000000)
Command range 0.0001 -
100000.0000

0.00001 -
100000.00000
0.000001 -
100000.000000
0.0000001 -
100000.0000000

4.2.2 Feed per Revolution (Synchronous Feed)
By issuing the G95 command, the commands from that block are issued directly by the numerical value following F as the feedrate per spindle revolution (mm/revolution or inch/revolution).
The least command increment and command range of the feedrate designation F are as follows.
[M system]
Metric input
Inch input
[L system]
Metric input
Inch input
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
Input setting increment B (0.001 mm) C (0.0001 mm) D (0.00001 mm) E (0.000001 mm)
Command address F (mm/rev) F (mm/rev) F (mm/rev) F (mm/rev)
Least command increment 1 (= 0.001)
(1. = 1.000)
1 (= 0.0001)
(1. = 1.0000)
1 (= 0.00001)
(1. = 1.00000)
1 (= 0.000001)
(1. = 1.000000)
Command range 0.001 -
999.999
0.0001 -
999.9999
0.00001 -
999.99999
0.000001 -
999.999999
Input setting increment B (0.0001 inch) C (0.00001 inch) D (0.000001 inch) E (0.0000001 inch)
Command address F (inch/rev) F (inch/rev) F (inch/rev) F (inch/rev)
Least command increment 1 (= 0.0001)
(1. = 1.0000)
1 (= 0.00001)
(1. = 1.00000)
1 (= 0.000001)
(1. = 1.000000)
1 (= 0.0000001)
(1. = 1.0000000)
Command range 0.0001 -
999.9999
0.00001 -
999.99999
0.000001 -
999.999999
0.0000001 -
999.9999999
Input setting increment B (0.001 mm) C (0.0001 mm) D (0.00001 mm) E (0.000001 mm)
Command address F (mm/rev) F (mm/rev) F (mm/rev) F (mm/rev)
Least command increment 1 (= 0.0001)
(1. = 1.00)
1 (= 0.00001)
(1. = 1.00)
1 (= 0.000001)
(1. = 1.00)
1 (= 0.0000001)
(1. = 1.00)
Command range 0.0001 -
999.9999
0.00001 -
999.99999
0.000001 -
999.999999
0.0000001 -
999.9999999
Input setting increment B (0.0001 inch) C (0.00001 inch) D (0.000001 inch) E (0.0000001 inch)
Command address F (inch/rev) F (inch/rev) F (inch/rev) F (inch/rev)
Least command increment 1 (= 0.000001)
(1. = 1.000)
1 (= 0.0000001)
(1. = 1.000)
1 (= 0.00000001)
(1. = 1.000)

1 (= 0.000000001)
(1. = 1.000)
Command range 0.00001 -
99.99999
0.000001 -
99.999999
0.0000001 -
99.9999999
0.00000001 -
99.99999999

4.2.3 Inverse Time Feed
During inside cutting when machining curved shapes with tool radius compensation applied, the machining speed on the cutting surface becomes faster than the tool center feedrate. Therefore, problems such as reduced accuracy on the cutting surface may occur.
This reduced accuracy can be prevented with inverse time feed. This function can, in place of normal feed commands, issue one block of machining time (inverse) in F commands. The machining speed on the cutting surface is constantly controlled, even if radius compensation is applied to the machining program that expresses the free curve surface with micro segment lines.
Note that when the calculated machining time exceeds the cutting feed clamp speed, the F command value in the inverse time feed follows the cutting feed clamp speed.
Command format
Inverse time feed (G93) is a modal command and is valid until feed per minute (G94) or feed per revolution (G95) is commanded.
In movement blocks, since processing time is commanded to a line segment, command the feedrate "F" each time.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
Regular F command Inverse time feed
G93 ; Inverse Time Feed
G00 Xx1 Yy1 ;
G93 ; -> Inverse time feed mode ON
G01 Xx2 Yy2 Ff2 ; -> In inverse time feed mode
G02 Xx3 Yy3 Ii3 Jj3 Ff3 ; :
G94(G95) ; -> Inverse time feed mode OFF
Actual machining speed
Large Small
F command
Same
F command

4.2.4 F 1-Digit Feed
The feedrate registered by parameter can be assigned by designating a single digit following address F.
There are six F codes: F0 and F1 to F5. The rapid traverse rate is applied when F0 is issued which is the same as the G00 command.
When one of the codes F1 to F5 is issued, the cutting feedrate set to support the code serves as the valid rate command.
If F6 or larger value is command, the value is regarded as the cutting feedrate which has been directly commanded with numerical values.
When an F 1-digit command has been issued, the external output signal is output.
When the programmed feedrate has been issued as an F 1-digit command, the feedrate can be increased or reduced by turning the manual handle.
The feedrate cannot be changed by the 2nd and 3rd handles.
The F 1-digit feed speed changed by manual handle can be retained after power is turned OFF by setting parameters.
Amount by which speed is varied by manual handle
Speed variation amount F is expressed by the equation below:
P : Handle pulse ()
FM : F1 to F5 upper limit (parameter setting)
K :Speed variation constant (parameter setting)
(Example) When the feedrate is to be increased or reduced by 10 mm/min per manual handle scale increment
If FM is made 3600 mm/min, "K" must be set to "360" according to the following formula.
Enabling conditions
Cycle start must be underway.
Cutting feed must be underway, and the F 1-digit feedrate must be designated.
The F 1-digit valid parameter must be ON
The "F 1-digit speed change valid" signal must be ON.
The handle mode must not be selected.
A dry run must not be in progress.
Machine lock must not be activated.
The parameter settings (the F 1-digit feedrate upper limit and F 1-digit feedrate change constant) must not be "0".
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
K
FM = PF
K
F 3600 10 == 1

4.2.5 Manual Speed Command
In the memory or MDI mode, validate the manual speed command and select either handle feed or jog (manual) feed so that the automatic operation is carried out at the feedrate.
With a command in the (-) direction, the program path can be reversed. Note that, however, program path can be reversed only within the currently executing block and not beyond the block.
Whether or not to execute reverse run with a command in the (-) direction is set with the PLC interface.
Furthermore, by setting the parameter, handle, jog and manual feed speed can be executed at the feed speed according to the ratio of program command speed of running block when issuing the manual speed command in multiple systems.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L

4.2.7 G00 Feedrate Designation (,F Command)
Feedrates can be specified for G00 (positioning command).
The speed of tool exchange, axis movement of gantry, etc. can be specified with the machining program so that the mechanical vibration can be suppressed.
Operations other than the feedrate follows the G00 specification.
Command format
The feedrates of the movement by the G00 block, the movement during the G00 mode, and the movement during the fixed cycle for drilling are commanded with ",F".
Feedrate designation in G00 block
Feedrate designation for movement command in G00 mode
(1) , F command is ignored in the G01 mode.
Feedrate designation for movement command during drilling cycle
,F command range
The range is equal to the range of the feed per minute F command (mm/min, inch/min) in the G01 mode.
Commands that exceed the command range cause the error "P67: F value is exceeding the limit".
Switching inch/mm is invalid for rotary axes.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
Gantry
Spindle
G00 X__ Z__ ,F1000 ;
G00 ;
X__ Z__ ,F1000 ;
G8 (G7) X/Z__ ..... ,F1000;
X/Z__ ..... ,F500;
:
G80
:
L system G83/G87: Deep-hole drilling, G84/G88: Tapping, G85/G89: Boring
M system G81: Drilling/Spot drilling, G82: Drilling/Counter boring, G83: Deep-hole drilling, G84: Tapping, G85/G86: Boring, G87: Back bor ing, G88/G89: Boring, G73: Step, G74: Reverse tapping, G75: Circular cutting, G76: Fine boring
G00 Z_ ,F2000
G00 X_ ,F1500
G00 X_ ,F500
Note

4.2.8 Selection of Axis (Axes) for Feedrate Command
This function enables designation of the feedrate of a specific axis (with the command F).
When the feedrate of a specific axis fluctuates wildly, desired surface finish may fail to be attained. The fluctuation can be suppressed with this function, resulting in improved surface quality.
Command format
Selection of Axis (Axes) for Feedrate Command
Selection of axis (axes) for feedrate command cancel
G130 is a non-modal command of group 0.
G130 must be commanded in an independent block. A program error occurs when another G code is commanded in the same block.
Designate the axis name "n" using an axis address set in the parameter. If the designated axis does not exist, a program error occurs.
When an axis address enabled with the axis name extension function is specified for the axis name "n", a program error occurs.
The selection of axis (axes) for feedrate command is canceled with reset 1, reset 2, Reset & Rewind, or emergency stop.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
G130 Axis name 1 Axis name 2 ... Axis name n ;
Axis name n : Axis (axes) for feedrate command as axis address
G130 ;

Speed
Resultant speed of all axes when the function is valid
(with X axis being selected)
Time
Resultant speed of all axes when the function is invalid
Speed
Time
Speed Speed
Time Time
Feedrate of each axis when the function is valid
(with X axis being selected)
Feedrate of each axis when the function is invalid
X axis
Y axis
Z axis
X axis
Y axis
Z axis
Speed differs in
each block.
Speed is kept
constant.

4.3 Override
4.3.1 Rapid Traverse Override
Type 1 (code method)
Four levels of override (1%, 25%, 50% and 100%) can be applied to manual or automatic rapid traverse using the external input signal supplied.
Type 2 (value setting method)
Override can be applied in 1% steps from 0% to 100% to manual or automatic rapid traverse using the external input signal supplied.
(1) Type 1 and type 2 can be selected by PLC processing.
(2) This function requires a built-in PLC for type 2.
4.3.2 Cutting Feed Override
Type 1 (code method)
Override can be applied in 10% steps from 0% to 300% to the feed rate command designated in the machining program using the external input signal supplied.
Type 2 (value setting method)
Override can be applied in 1% steps from 0% to 327% to the feed rate command designated in the machining program using the external input signal supplied.
(1) This function requires a built-in PLC for type 2.
4.3.3 2nd Cutting Feed Override
Override can be further applied in 0.01% steps from 0% to 327.67% as a second stage override to the feed rate after the cutting feed override has been applied.
(1) This function requires a built-in PLC.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
Note
Note
Note

4.3.4 Override Cancel
By turning on the "Override cancel external" signal, the override is automatically set to 100% for the cutting feed during an automatic operation mode (tape, memory and MDI).
(1) The "Override cancel" signal is not valid for manual operation.
(2) When the cutting feed override or 2nd cutting feed override is 0%, the 0% override takes precedence and the override is not canceled.
(3) The "Override cancel" signal is not valid for rapid traverse.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
Note

4.4 Acceleration/Deceleration
4.4.1 Automatic Acceleration/Deceleration After Interpolation
Acceleration/deceleration is applied to all commands automatically. The acceleration/deceleration patterns are linear acceleration/deceleration, soft acceleration/deceleration, exponent function acceleration/ deceleration, exponent function acceleration/linear deceleration and any of which can be selected by using a parameter.
For rapid traverse feed or manual feed, acceleration/deceleration is always made for each block, and the time constant can be set for each axis separately.
G0tL: G0 time constant (linear)
G0t1: G0 time constant (primary delay)/The 2nd step time constant of the soft acceleration/deceleration
G1tL: G1 time constant (linear)
G1t1: G1 time constant (primary delay)/The 2nd step time constant of the soft acceleration/deceleration
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
Rapid traverse Cutting feed
<Linear acceleration/deceleration> <Linear acceleration/deceleration>
<Primary delay> <Primary delay>
<Exponential acceleration-Linear deceleration> <Exponential acceleration-Linear deceleration>
<Soft acceleration/deceleration> <Soft acceleration/deceleration>
F
t
G0tL G0tL
F
t
G1tL G1tL
F
t
G0t1 G0t1
F
t
G1t1 G1t1
F
t
G0t1 2G0t1
F
t
G1t1 2G1t1
F
t
G0t1
G0t1 G0t1
G0t1
G0tL G0tL
F
t
G1t1
G1t1 G1t1
G1t1
G1tL G1tL

(1) The rapid traverse feed acceleration/deceleration patterns are effective for the following:
G00, G27, G28, G29, G30, rapid traverse feed in manual run, JOG feed, incremental feed, return to reference position.
Invalid for G31 and handle feed.
(2) Acceleration/deceleration in handle feed mode is usually performed according to the acceleration/deceleration pattern for cutting feed. However, a parameter can be specified to select a pattern with no acceleration/deceleration (step).
(3) Acceleration/deceleration time of soft acceleration/deceleration can be changed by parameter as follows.
A rapid traverse time constant can be switched by "Rapid traverse time constant: Switchover request" signal.
Total accelerating time:G0tL+G0t1
S-pattern part time:G0t1
Linear part time:G0tL-G0t1
Note
F
t
G0tL+G0t1
G0tL
G0t1 G0t1
Y1
#2004 G0tL
#2005 G0t1
#2598 G0tL_2
#2599 G0t1_2
#2004 G0tL
#2005 G0t1
#2598 G0tL_2
#2599 G0t1_2
#2004 G0tL
#2005 G0t1
#2598 G0tL_2
#2599 G0t1_2

X1 Z1
Set the rapid traverse time
constant by axis
Basic rapid
traverse time
constant
Rapid traverse time
constant to use
Rapid traverse
acceleration/deceleration
Rapid traverse
acceleration/deceleration
Rapid traverse
acceleration/deceleration
Rapid traverse time
constant to use
Rapid traverse time
constant to use
Rapid traverse
time constant
for switching
Basic rapid
traverse time
constant
Rapid traverse
time constant
for switching
Basic rapid
traverse time
constant
Rapid traverse
time constant
for switching
Switch between basic rapid
traverse time constant and
rapid traverse time constant for
switching using the rapid
traverse time constant changeover
request signal

4.4.2 Rapid Traverse Constant-Gradient Acceleration/Deceleration
This function performs acceleration and deceleration at a constant-gradient during linear acceleration/deceleration by the rapid traverse command or the linear interpolation command. Compared to the method of acceleration/deceleration after interpolation, the constant-gradient acceleration/deceleration method makes for improved cycle time.
This function is valid for the rapid traverse (G00) command and the linear interpolation (G01) command only when the acceleration/deceleration mode is set to linear acceleration/deceleration or soft acceleration/deceleration.
(Example) When the interpolation distance is so short that the rapid traverse rate is not achieved
For acceleration/deceleration with fixed time constant, the gradient is determined by the rapid traverse rate; however, the cycle time is determined by the time constant, and the reaching speed is slower than constant-gradient acceleration/deceleration.
For constant-gradient acceleration/deceleration, the gradient is determined by the rapid traverse rate and the time constant. The reaching time is determined by interpolation distance; therefore, the cycle time is shorter than acceleration/deceleration with fixed time constant.
rapid: Rapid traverse rate
Ts1: Acceleration/deceleration time
Ts2: Acceleration/deceleration time to reach the maximum speed
Td: Command deceleration check time
: Acceleration/deceleration gradient
T1: Interpolation time (Acceleration/deceleration with fixed time constant)
T2: Interpolation time (Constant-gradient acceleration/deceleration)
L: Interpolation distance
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
L
Ts1 Ts2
Td
T1

L
Ts1
Ts2 Td
T2
rapid
rapid T1 = Ts1 + Ts2
T2 = 2 Ts1 L
rapid
Td = Ts2 + (0 to 14 ms)
= tan1 ( ) rapid
Ts1
In case of acceleration/deceleration with fixed time constant:
In case of constant-gradient acceleration/deceleration:

Speed
Speed
Next block
Time
Next block
Time

4.4.3 Rapid Traverse Constant-Gradient Multi-Step Acceleration/Deceleration
This function carries out the acceleration/deceleration according to the torque characteristic of the motor in the rapid traverse mode during automatic operation. (This function is not available in manual operation.) The rapid traverse constant-gradient multi-step acceleration/deceleration method makes for improved cycle time because the positioning time is shortened by using the motor ability to its maximum.
In general, the servo motor has the characteristic that the torque falls in the high-speed rotation range.
(1) This characteristic is data at input voltage 380VAC.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
0
0
1000 2000 3000 3500
25
50
75
100
125
Rotation speed [r/min]
Torque [N*m]
Note

In the rapid traverse constant-gradient acceleration/deceleration method, the acceleration has been treated constantly because this torque characteristic is not considered. So, it is necessary to use a minimum acceleration within the used speed range. Therefore, the margin of acceleration must be had in a low-speed range. Or if the acceleration is used to its maximum, the upper limit of the rotation speed must be slowed.
Then, to use the servo motor ability to its maximum, acceleration/deceleration to which the torque characteristic is considered is carried out by the rapid traverse constant-gradient multi-step acceleration/deceleration method.
The acceleration/deceleration patterns in the case where rapid traverse constant-gradient multi-step acceleration/ deceleration are performed are as follows.
t b t a
(b) Rapid traverse constant-gradient
acceleration/deceleration
(a) Rapid traverse constant-gradient
multi-step acceleration/deceleration
Number of steps is
automatically adjusted
by parameter setting.
It was necessary to slow down the
acceleration for high speed rotation.
Time
Acceler ation
Acceler ation
Speed Speed
Time
Time
Time

4.5 Thread Cutting
4.5.1 Thread Cutting (Lead/Thread Number Designation)
Thread cutting with designated lead can be performed. Designate the number of threads per inch with the E address to cut inch threads.
Lead designation
The thread cutting with designated lead is performed based on the synchronization signals from the spindle encoder.
Thread number designation
Designate the number of threads per inch with the E address to cut inch threads.
Whether the E command is a thread number designation or lead designation is selected with the parameters.
[M system]
Thread cutting metric input
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
G33 Zz1/Ww1 Xx1/Uu1 Qq1 Ff1/Ee1 ;
G33
Zz1/Ww1, Xx1/Uu1
Qq1

Ff1
Ee1
: Thread cutting command
: Thread end point coordinates
: Shift angle at start of thread cutting (0.000 to 360.000)
: Thread lead (normal lead threads)
: Thread lead (precise lead threads)
G33 Zz1/Ww1 Xx1/Uu1 Qq1 Ee1 ;
G33
Zz1/Ww1, Xx1/Uu1
Qq1
Ee1
: Thread cutting command
: Thread end point coordinates
: Shift angle at start of thread cutting (0.000 to 360.000)
: Thread number per inch
Input setting increment B (0.001 mm) C (0.0001 mm)
Command address F (mm/rev) E (mm/rev) E (ridges/inch) F (mm/rev) E (mm/rev) E (ridges/inch)
Least command incre ment
1 (=0.001)
(1.=1.000)
1 (=0.0001)
(1.=1.0000)
1 (=1.00)
(1.=1.00)
1 (=0.0001)
(1.=1.0000)
1 (=0.00001)
(1.=1.00000)
1 (=1.000)
(1.=1.000)
Command range 0.001 to
999.999
0.0001 to
999.9999
0.03 to
999.99
0.0001 to
999.9999
0.00001 to
999.99999
0.026 to
222807.017
Input setting increment D (0.00001 mm) E (0.000001 mm)
Command address F (mm/rev) E (mm/rev) E (ridges/inch) F (mm/rev) E (mm/rev) E (ridges/inch)
Least command incre ment
1 (=0.00001)
(1.=1.00000)
1 (=0.000001)
(1.=1.000000)
1 (=1.0000)
(1.=1.0000)
1 (=0.000001)
(1.=1.000000)
1 (=0.0000001)
(1.=1.0000000)
1 (=1.00000)
(1.=1.00000)
Command range 0.00001 to
999.99999
0.000001 to
999.999999
0.0255 to
224580.0000
0.000001 to
999.999999
0.0000001 to
999.9999999
0.02541 to
224719.00000
M800V/M80V Series Specifications Manual (Function)
4 Feed
4.5 Thread Cutting
IB-1501610-G 66
Thread cutting inch input
(1) It is not possible to assign a lead that causes the feedrate converted into the feed per minute value to exceed the maxi mum cutting feedrate.
[L system]
Thread cutting metric input
Thread cutting inch input
(1) It is not possible to assign a lead that causes the feedrate converted into the feed per minute value to exceed the maxi mum cutting feedrate.
Input setting increment B (0.0001 inch) C (0.00001 inch)
Command address F (inch/rev) E (inch/rev) E (ridges/inch) F (inch/rev) E (inch/rev) E (ridges/inch)
Least command incre ment
1 (=0.0001)
(1.=1.0000)
1 (=0.00001)
(1.=1.00000)
1 (=1.000)

(1.=1.000)
1 (=0.00001)
(1.=1.00000)
1 (=0.000001)
(1.=1.000000)
1 (=1.0000)
(1.=1.0000)
Command range 0.0001 to
39.3700
0.00001 to
39.37007
0.025 to
9999.999
0.00001 to
39.37007
0.000001 to
39.370078
0.0255 to
9999.9999
Input setting increment D (0.000001 inch) E (0.0000001 inch)
Command address F (inch/rev) E (inch/rev) E (ridges/inch) F (inch/rev) E (inch/rev) E (ridges/inch)
Least command incre ment
1 (=0.000001)
(1.=1.000000)
1 (=0.0000001)
(1.=1.0000000)
1 (=1.00000)
(1.=1.00000)
1 (=0.0000001)
(1.=1.0000000)
1 (=0.00000001)
(1.=1.00000000)
1 (=1.000000)
(1.=1.000000)
Command range 0.000001 to
39.370078
0.0000001 to
39.3700787
0.02541 to
9999.99999
0.0000001 to
39.3700787
0.00000001 to
39.37007873
0.025401 to
9999.999999
Input setting increment B (0.001 mm) C (0.0001 mm)
Command address F (mm/rev) E (mm/rev) E (ridges/inch) F (mm/rev) E (mm/rev) E (ridges/inch)
Least command incre ment
1 (=0.0001)
(1.=1.0000)
1 (=0.00001)
(1.=1.00000)
1 (=1.00)
(1.=1.00)
1 (=0.00001)
(1.=1.00000)
1 (=0.000001)
(1.=1.000000)
1 (=1.000)
(1.=1.000)
Command range 0.0001 to
999.9999
0.00001 to
999.99999
0.03 to
999.99
0.00001 to
999.99999
0.000001 to
999.999999
0.026 to
222807.017
Input setting increment D (0.00001 mm) E (0.000001 mm)
Command address F (mm/rev) E (mm/rev) E (ridges/inch) F (mm/rev) E (mm/rev) E (ridges/inch)
Least command incre ment
1 (=0.000001)
(1.=1.000000)
1 (=0.0000001)
(1.=1.0000000)
1 (=1.0000)
(1.=1.0000)
1 (=0.0000001)
(1.=1.0000000)
1 (=0.00000001)
(1.=1.00000000)
1 (=1.00000)
(1.=1.00000)

Command range 0.000001 to
999.999999
0.0000001 to
999.9999999
0.0255 to
224580.0000
0.0000001 to
999.9999999
0.00000001 to
999.99999999
0.02540 to
224719.00000
Input setting increment B (0.0001 inch) C (0.00001 inch)
Command address F (inch/rev) E (inch/rev) E (ridges/inch) F (inch/rev) E (inch/rev) E (ridges/inch)
Least command incre ment
1 (=0.00001)
(1.=1.00000)
1 (=0.000001)
(1.=1.000000)
1 (=1.000)
(1.=1.000)
1 (=0.000001)
(1.=1.000000)
1 (=0.0000001)
(1.=1.0000000)
1 (=1.0000)
(1.=1.0000)
Command range 0.00001 to
39.37007
0.000001 to
39.370078
0.025 to
9999.999
0.000001 to
39.370078
0.0000001 to
39.3700787
0.0254 to
9999.9999
Input setting increment D (0.000001 inch) E (0.0000001 inch)
Command address F (inch/rev) E (inch/rev) E (ridges/inch) F (inch/rev) E (inch/rev) E (ridges/inch)
Least command incre ment
1 (=0.0000001)
(1.=1.0000000)
1 (=0.00000001)
(1.=1.00000000)
1 (=1.00000)
(1.=1.00000)
1 (=0.00000001)
(1.=1.00000000)
1 (=0.000000001)
(1.=1.000000000)
1 (=1.000000)
(1.=1.000000)
Command range 0.0000001 to
39.3700787
0.00000001 to
39.37007873
0.02540 to
9999.99999
0.00000001 to
39.37007873
0.000000001 to
39.370078736
0.025400 to
9999.999999
Note
Note

4.5.2 Variable Lead Thread Cutting
By commanding the lead increment/decrement amount per thread rotation, variable lead thread cutting can be done.
The machining program is commanded as follows.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
G34 Xx1/Uu1 Zz1/Ww1 Ff1/Ee1 Kk1 ;
G34
Xx1/Uu1
Zz1/Ww1
Ff1/Ee1
Kk1
: Variable lead thread cutting command

: Thread end point X coordinate
: Thread end point Z coordinate
: Thread's basic lead
: Lead increment/decrement amount per thread rotation
F+3.5K F+2.5K F+1.5K F+0.5K
F+4K
F+3K F+2K F+K F
Non-lead axis
Lead axis
Lead speed

4.5.3 Synchronous Tapping
(1) With digital I/F spindle
4.5.3.1 Synchronous Tapping Cycle
This function performs tapping through the synchronized control of the digital spindle and servo axis. This eliminates the need for floating taps and enables tapping to be conducted at a highly precise tap depth.
Tapping pitch assignment
Tapping thread number assignment
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
G84(G74) Xx1 Yy1 Zz1 Rr1 Dd1 Pp1 Ff1 Kk1 Ss1 ,Ss2 ,Rr2 ,Ii1 ,Jj1 Mm1 ;
G84 : Mode, forward tapping
G74 : Mode, reverse tapping
Xx1,Yy1 : Hole position data, hole drilling position
Zz1 : Hole machining data, hole bottom position
Rr1 : Hole machining data, point R position
Dd1 : Tool spindle number (d is 1 to number of spindles)
Depending on the parameter setting, command as "-d1" to carry out reverse tapping.
Pp1 : Hole machining data, dwell time at hole bottom
Ff1 : Z-axis feed amount (tapping pitch) per spindle rotation
Kk1 : Number of repetitions
Ss1 : Spindle rotation speed
,Ss2 : Spindle rotation speed during retract
,Rr2 : Synchronization method selection (r2=1 Synchronous, r2=0 Asynchronous)
,Ii1/,Jj1 : In-position width of positioning axis/hole drilling axis
Mm1 : M function designation
G84(G74) Xx1 Yy1 Zz1 Rr1 Dd1 Pp1 Ee1 Kk1 Ss1 ,Ss2 ,Rr2 ,Ii1 ,Jj1 Mm1 ;
G84 : Mode, forward tapping
G74 : Mode, reverse tapping
Xx1,Yy1 : Hole position data, hole drilling position
Zz1 : Hole machining data, hole bottom position
Rr1 : Hole machining data, point R position
Dd1 : Tool spindle number (d is 1 to number of spindles)
Depending on the parameter setting, command as "-d1" to carry out reverse tapping.
Pp1 : Hole machining data, dwell time at hole bottom
Ee1 : Tap thread number per 1-inch feed of Z axis
Kk1 : Number of repetitions
Ss1 : Spindle rotation speed
,Ss2 : Spindle rotation speed during retract
,Rr2 : Synchronization method selection (r2=1 Synchronous, r2=0 Asynchronous)
,Ii1/,Jj1 : In-position width of positioning axis/hole drilling axis
Mm1 : M function designation
Note

The synchronous tapping cycle can be used for axes other than the Z axis with the plane selection.
Furthermore, in-position checks can be performed at the hole bottom or point R, etc. using the parameters.
The figure below shows the correlation between the in-position width and the movement of the tapping axis of the synchro nous tapping in-position check.
(1) Section where in-position check is performed using servo in-position width
(2) Section where in-position check is performed using in-position width for tapping
(3) Section where in-position check is performed using in-position width for cutting feed (G1, G2, G3)
(4) Section where in-position check is performed using in-position width for rapid traverse (G0)
Note
FIN
(4) (2) (3) (1)

Feed
rate
Hole bottom
Time T
Point R
In-position finish
for G0 feed from
point R
G1
deceleration
start during
tapping cutting
G1

deceleration
start during
tapping retract
G0 feed
start to
point R

4.5.3.2 Pecking Tapping Cycle
Designate the depth of cut per pass, and the depth to the hole bottom for a multiple number of passes. This reduces the load applied to the tool.
The amount retracted from the hole bottom is set to the parameters.
Select either the pecking tapping cycle or the deep-hole tapping cycle by parameter.
When the pecking tapping cycle is executed in the synchronous tapping mode, the synchronous tapping cycle function and pecking tapping cycle function are required.
When "depth of cutting per pass Q" is designated in the block containing the G84 or G74 command in the state where the pecking tapping cycle is selected by parameter, the pecking tapping cycle is executed.
Hole drilling can be performed by specifying the cutting reduction amount while the depth of cut in each cutting operation (step) is reduced.
In the following cases, the normal tapping cycle is established.
When Q is not designated
When the command value of Q is zero
When there is no Pecking tapping cycle function
[M system]
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
G84(G74) Xx1 Yy1 Zz1 Rr1 Qq1 Ff1(Ee1) Pp1 Ss1 ,Ss2 ,Ii1 ,Jj1 ,Rr2 Ll1 (Kk1) Jj2 ,Kk2 ;
G84 G84 forward tapping cycle
G74 G74 reverse tapping cycle
Xx1,Yy1 Hole drilling position
Zz1 Hole bottom position
Rr1 Point R position
Qq1 Depth of cutting in each pass (designated with incremental position)
Ff1 During synchronous tapping: Designation of drilling axis feed amount (tapping pitch) per spin dle revolution (modal)
During asynchronous tapping: Designation of the feedrate for cutting feed (modal)
Ee1 Tap thread number per 1-inch feed of Z axis
Pp1 Dwell time at hole bottom position
Ss1 Spindle rotation speed
,Ss2 Spindle rotation speed during retract
,Ii1 position width of positioning axis
,Jj1 position width of hole drilling axis
,Rr2 Synchronization method selection (r2=1:synchronous, r2=0:asynchronous)
Ll1 Number of repetitions
Kk1 Number of repetitions (It can be commanded by parameter.)
Jj2 Cutting reduction amount (When omitted, the mode will follow the setting of parameter.)
,Kk2 Minimum cutting amount (When omitted, the mode will follow the setting of parameter.)

[L system]
d : Retract amount (parameter)
(1) This program is for the G84 command. The spindle forward rotation (M3) and reverse rotation (M4) are reversed with the G74 command.
G84(G88, G84.1, G88.1) Xx1 Cc1 Zz1 Rr1 Qq1 Ff1(Ee1) Pp1 Ss1 ,Ss2 ,Ii1 ,Jj1 ,Rr2 Dd1 Kk1 Mm1 Jj2 ,Kk2 ;
G84 G84 Face forward tapping cycle
G88 G88 Side forward tapping cycle
G84.1 G84.1 Face reverse tapping cycle (It can be commanded by setting of parameter)
G88.1 G88.1 Side reverse tapping cycle (It can be commanded by setting of parameter)
Xx1,Cc1 Hole position data
Zz1 Hole bottom position
Rr1 Point R position
Qq1 Depth of cutting in each pass (designated with incremental position)
Ff1 During synchronous tapping: Designation of drilling axis feed amount (tapping pitch) per spin dle revolution (modal)
During asynchronous tapping: Designation of the feedrate for cuttingfeed (modal)
Ee1 Number of tap threads per 1-inch feed of Z axis
Pp1 Dwell time at hole bottom and point R return
Ss1 Spindle rotation speed
,Ss2 Spindle rotation speed during retract
,Ii1 In-position width of positioning axis
,Jj1 In-position width of hole drilling axis
,Rr2 Synchronization method selection (r2=1:synchronous, r2=0:asynchronous)
Dd1 Tapping spindle number assignment
(By minus command, reverse tapping can be commanded by setting of parameter.
It can be commanded when it is multiple-spindle control I.
Program error occurs when multiple-spindle control II is commanded by D command.)
Kk1 Number of repetitions
Mm1 C axis clamp M code
Jj2 Cutting reduction amount (When omitted, the mode will follow the setting of parameter.)
,Kk2 Minimum cutting amount (When omitted, the mode will follow the setting of parameter.)
(1): G00 Xx1 Cc1 ,Ii1
(2): G00 Zr1

(3): G01 Zq1 Ff1
(4): M4 (Spindle reverse rota tion)
(5): G01 Z-d Ff1
(6): M3 (Spindle forward rota tion)
(7): G01 Z(q1+d) Ff1
:
(n1) G01 Z(z1-q1*n) Ff1
(n2) G04 Pp1
(n3) M4
(n4) G01 Z-z1 Ff1
(n5) G04 Pp1
(n6) M3
(n7) G00Z-r1 ,Ij1 G98 mode
No movement G99 mode
G98
G99
q1q1q1
d
d
r1
d
(1)
(2) (3)
(4)
(5)
(6)
(7)
(n1)
(n6) (n7)
(n5) (n4) (n3)
(n2)
x1,c1
z1
Note

4.5.3.3 Deep-Hole Tapping Cycle
In the deep-hole tapping, the load applied to the tool can be reduced by designating the depth of cut per pass and cutting the workpiece to the hole bottom for a multiple number of passes.
Adding this function, the pecking tapping cycle function is also added.
Under the deep-hole tapping cycle, the tool is retracted to the R-point every time.
Select either the pecking tapping cycle or the deep-hole tapping cycle by parameter.
When the deep-hole tapping cycle is executed in the synchronous tapping mode, the synchronous tapping cycle function and deep-hole tapping cycle function are required.
When "depth of cutting per pass Q" is designated in the block containing the G84 or G74 command in the state where the deep-hole tapping cycle is selected by parameter, the deep-hole tapping cycle is executed.
Hole drilling can be performed by specifying the cutting reduction amount while the depth of cut in each cutting operation (step) is reduced.
In the following cases, the normal tapping cycle is established.
When Q is not designated
When the command value of Q is zero
When there is no deep tapping cycle function
[M system]
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
G84(G74) Xx1 Yy1 Zz1 Rr1 Qq1 Ff1(Ee1) Pp1 Ss1 ,Ss2 ,Ii1 ,Jj1 ,Rr2 LI1 (Kk1) Jj2 ,Kk2 ;
G84 G84 forward tapping cycle
G74 G74 reverse tapping cycle
Xx1,Yy1 Hole drilling position
Zz1 Hole bottom position
Rr1 Point R position
Qq1 Depth of cutting in each pass (designated with incremental position)
Ff1 During synchronous tapping: Designation of drilling axis feed amount (tapping pitch) per spin dle revolution (modal)
During asynchronous tapping: Designation of the feedrate for cutting feed (modal)
Ee1 Tap thread number per 1-inch feed of Z axis
Pp1 Dwell time at hole bottom and point R return
Ss1 Spindle rotation speed
,Ss2 Spindle rotation speed during retract
,Ii1 In-position width of positioning axis
,Jj1 In-position width of hole drilling axis
,Rr2 Synchronization method selection (r2=1:synchronous, r2=0:asynchronous)
LI1 Number of repetitions
Kk1 Number of repetitions (It commanded by parameter)
Jj2 Cutting reduction amount (When omitted, the mode will follow the setting of parameter.)
,Kk2 Minimum cutting amount (When omitted, the mode will follow the setting of parameter.)

[L system]
(1) This program is for the G84 command. The spindle forward rotation (M3) and reverse rotation (M4) are reversed with the G74 command.

G84(G88, G84.1, G88.1) Xx1 Cc1 Zz1 Rr1 Qq1 Ff1(Ee1) Pp1 Ss1 ,Ss2 ,Ii1 ,Jj1 ,Rr2 Dd1 Kk1 Mm1 Jj2 ,Kk2 ;
G84 G84 Face forward tapping cycle
G88 G88 Side forward tapping cycle
G84.1 G84.1 Face reverse tapping cycle (It can be commanded by setting of parameter)
G88.1 G88.1 Side reverse tapping cycle (It can be commanded by setting of parameter)
Xx1,Cc1 Hole position data
Zz1 Hole bottom position
Rr1 Point R position
Qq1 Depth of cutting in each pass (designated with incremental position)
Ff1 During synchronous tapping: Designation of drilling axis feed amount (tapping pitch) per spin dle revolution (modal)
During asynchronous tapping: Designation of the feedrate for cutting feed (modal
Ee1 Number of tap threads per 1-inch feed of Z axis
Pp1 Dwell time at hole bottom and point R return
Ss1 Spindle rotation speed
,Ss2 Spindle rotation speed during retract
,Ii1 In-position width of positioning axis
,Jj1 In-position width of hole drilling axis
,Rr2 Synchronization method selection (r2=1:synchronous, r2=0:asynchronous)
Dd1 Tapping spindle number assignment
(By minus command, reverse tapping can be commanded by setting of parameter.
It can be commanded when it is multiple-spindle control I.
Program error occurs when multiple-spindle control II is commanded by D command.)
Kk1 Number of repetitions
Mm1 C axis clamp M code
Jj2 Cutting reduction amount (When omitted, the mode will follow the setting of parameter.)
,Kk2 Minimum cutting amount (When omitted, the mode will follow the setting of parameter.)
(1): G00 Xx1 Cc1
(2): G00 Zr1
(3): G01 Zq1 Ff1
(4): M4 (Spindle reverse rota tion)
(5): G01 Z-q1 Ff1
(6): G04 Pp1
(7): M3 (Spindle forward rota tion)
(8): G01 Z(2*q1)Ff1
(9):
:
(n1) G01 Zz1 Ff1
(n2) G4 Pp1
(n3) M4
(n4) G01 Z-z1 Ff1
(n5) G04 Pp1
(n6) M3
(n7) G00Z-r1 G98 mode
No movement G99 mode
G98
G99
qqq
r1
(1)
(2) (3)
(4)
(5) (6)
(7)
(n1)
(n6) (n7)
(n5)
(n4)
(n3)
(n2)
x1,c1
z1
(8)
(9)
Note

4.5.3.5 Synchronous Tapping with Analog I/F Spindle
This function performs tapping using the analog-connected spindle. The functions in the table below can be used using the spindle analog-connected by inverter, etc. The operation of synchronous tapping cycle other than this function follows the specification in the table below.
When this function is used, the analog spindle with the function to control the spindle position needs to be connected. Also, the parameter needs to be turned ON.
The voltage value to be output to the analog spindle is between -10V and 10V, which is determined by the ratio of the spindle rotation speed corresponding to the command to analog spindle and the setting value of the parameter.
4.5.4 Chamfering
Chamfering can be validated during the thread cutting cycle by using external signals.
The chamfer amount and angle are designated with parameters.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
Function name G code
M system Tapping cycle G84
Reverse tapping cycle G74

L system
Face tapping cycle G84
Face reverse tapping cycle G84.1
Longitudinal tapping cycle G88
Longitudinal reverse tapping cycle G88.1
Synchronous tapping cycle G84.2
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
Thread cutting cycle
Chamfer angle
Chamfer amount

4.5.6 Circular Thread Cutting
Circular thread in which the lead is in longitudinal direction can be cut.
This function can be used with the G code list 6 or 7.
Command format
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
G35(G36) Xx/Uu Zz/Ww {
Ii Kk
} Ff/Ee Qq ; Rr
G35 Clockwise (CW)
(G36) : Counterclockwise (CCW)
Xx/Uu : X-axis arc end point coordinate
Zz/Ww : Z-axis arc end point coordinate
Ii : X-axis arc center (incremental value from start point to arc center)
Kk : Z-axis arc center (incremental value from start point to arc center)
Rr : Arc radius
Ff/Ee : Longitudinal axis (axis with most travel) direction lead
(Ff: normal lead thread cutting, Ee: precise lead threads or inch threads)
Qq : Thread cutting start shift angle (0.000 to 360.000)
X
Z
R
Z W
I
K
X
U/2
Center
End point
Start point

4.5.8 High-Speed Synchronous Tapping (OMR-DD)
The servo axis directly detects and compensates of the spindle's delay in tracking by using the communication between drive unit over the high-speed optical servo network. By minimizing the synchronization error, the accuracy of the synchronous tapping is increased.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
Without OMR-DD control
Implement to increase the
accuracy of the synchronous
tapping
With OMR-DD control
(sec)
4000
3000
0 0.5 1 1.5 2 2.5 3 3.5
2000
1000
1000
2000
3000
4000
0
Spindle rotation speed
Synchronization
error
4000
3000

0 0.5 1 1.5 2 2.5 3 3.5
2000
1000
1000
2000
3000
4000
0
(sec)
Spindle rotation speed
Synchronization
error

4.5.10 Thread Recutting
The function stores a thread groove position and compensates a start position of spindle thread cutting automatically so that the tool can pass along the memorized position of the thread groove at the thread cutting execution. Thread machined workpieces which have problems such as the thread number shortage, striped groove, etc., can be re-chucked and thread re cut.
[Thread recutting correspondence table]
: Machinable
: Machinable with conditions
: Impossible
Machinable with conditions ()
(*1) Continuous thread: Conduct a memorizing of thread recutting position at the groove on the first block of continuous thread.
(*2) Variable lead thread: thread recutting is disable during an automatic operation with thread recutting enabled when the first thread cutting command is the variable lead thread cutting.
(*3) Compound type fixed cycle: Thread re-cutting can be performed only for the workpiece which has been cut its finishing allowance.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
(1) Re-chucking of thread machined workpiece (2) Memorizing thread groove position (memorizing lead axis and spindle position)
(3) Moving to start position after tool retract (4) Thread recutting ON and program operation start
The start position of spindle thread cutting is automatically compen sated with the memorized position of the lead axis and spindle.
Thread cutting command
Z direction feed thread X direction feed thread
Right-handed/Left-handed thread Scroll thread
Thread cutting
Continuous thread (*1) (*1)
Variable lead thread (*2) (*2)
Fixed Cycle for Turning Machining
Compound Type Fixed Cycle for Turning Machining (*3) (*3)

4.5.11 Thread Cutting Override
The thread cutting feedrate can be changed by changing the spindle override depending on rough cutting, finish machining, etc.
The spindle speed during thread cutting is determined with the spindle override at the start of thread cutting.
4.5.12 Variable Feed Thread Cutting
This function changes the cutting feedrate by the spindle override at the time of the thread cutting. The machining condition during thread cutting can be changed.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L

4.5.13 Thread Cutting Time Constant Switch
Thread cutting time constant can be applied to the acceleration/deceleration time constant of the NC control axis during the thread cutting. Usually, incorrect lead parts occur at the start and the end of thread cutting due to the acceleration/deceleration of the NC control axis. However, the acceleration/deceleration time, which causes incorrect lead parts, can be reduced by applying the thread cutting time constant to the NC control axis during the thread cutting so that the incorrect thread parts can be reduced. Additionally, the machining time can be reduced as much as the acceleration/deceleration time reduction of thread cutting.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M

L
Approach distance can be shorter by applying
thread cutting time constant.
Approach position with G01 time constant
Approach position with thread cutting time con stant
Ttop: G01 time constant
Tthr: Thread cutting time constant
Cutting feedrate (max.)
Thread cutting rate (max.)
Acceleration time can be reduced
G01 acceleration curve with G01 time constant
G33 acceleration curve with thread cutting time constant
G33 acceleration curve with G01 time constant
Axis speed
F
ime t 0 Tthr Ttop
G33
G00 G00
G00

4.6 Manual Feed
4.6.1 Manual Rapid Traverse
When the manual rapid traverse mode is selected, the tool can be moved at the rapid traverse rate for each axis separately.
Override can also be applied to the rapid traverse rate by means of the rapid traverse override function.
Rapid traverse override can be set for each part system respectively.
4.6.2 Jog Feed
When the jog feed mode is selected, the tool can be moved in the axis direction (+ or -) in which the machine is to be moved
at the per-minute feed.
The jog feedrate can be set for each axis with the parameters.
If the jog feedrate is not set with the parameters, the jog feedrate is set with the PLC signal.
There are two methods for PLC signal which sets the jog feed rate: the code method and the value setting method.
The method to be used is selected by PLC signal for each part system. The signals of code and value setting methods are set
for each part system.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
CNC
PLC
1 100
25 50
X
- +
Y
- +
Z
- +
Rapid traverse override
Axis
movement
control
Machine tool
Tool
Rapid traverse
Rapid traverse
CNC
PLC
0 3000 0 200
X
- +
Y
- +
Z
- +
Jog Feed rate Override
Axis
movement
control
Machine tool
Tool
Manual cutting feed

4.6.3 Incremental Feed
When the incremental feed mode is selected, the tool can be operated by an amount equivalent to the designated amount

(incremental amount) in the axis direction each time the jog switch is pressed. The incremental feed amount is the amount obtained by multiplying the least command increment that was set with the parameter by the incremental feed magnification rate.

The incremental feed amount parameter and its magnification rate can be set for each part system respectively.

4.6.4 Handle Feed

In the handle feed mode, the machine can be moved in very small amounts by rotating the manual pulse generator.

The scale can be selected from 1, 10, 100, 1000 or arbitrary value.

If the least command increment is 10 nm or 1 nm, the scale can be selected from 5000, 10000, 50000 or 100000, as well.

Individual axes can be moved in very small amounts separately by rotating the manual pulse generators installed on each of the axes.

(1) The actual movement amount and scale may not match if the manual pulse generator is rotated quickly.

Up to three handles (manual pulse generators) can be used with tthis CNC.

The handles can be connected to the control unit and remote I/O unit. If the operation panel I/O unit is connected, the handle can also be connected to the operation panel I/O unit.

M850VW M830VW M850VS M830VS M80VW M80V

TypeA

M80V

TypeB

M

L

M850VW M830VW M850VS M830VS M80VW M80V

TypeA

M80V

TypeB

M

L

PLC

1000 CNC

X

- +

Y

- +

Z

- +

Incremental Scale factor

Axis

movement

control

Machine tool

Tool

Step feed

Note

4.6.5 Manual Feedrate B

Manual feedrate B is a function that sets an arbitrary axis feedrate from the user PLC separately from the "manual feedrate".

The "manual feedrate B" feedrate setting can be selected from the feedrate common for all axes and the feedrate independent of reach axis.

By combining the "manual feedrate B" function with the manual/automatic simultaneous function, an arbitrary axis can be moved at the "manual feedrate B" independently of the machining program operation even during automatic operation.

Similarly, if the jog mode and other manual operation mode are set simultaneously, an arbitrary axis can be moved at a speed independent from the "manual feedrate" even during the manual operation mode.

The "manual feedrate B" function can move an axis at a speed different from the "manual feedrate". This is not affected by dry run, or by manual or cutting override, so an arbitrary axis can be moved independently even in operations during automatic operation or override during manual axis movement.

The relation of the "manual feedrate B" and "manual feedrate" is shown below.

(1) For the axis to which manual feedrate B is applied, the feedrate is not displayed on the screen.

M850VW M830VW M850VS M830VS M80VW M80V

TypeA

M80V

TypeB

M

L

Manual override validity

Each axis manual feedrate B speed

1st axis

Manual feedrate

Dry run speed

Cutting override

Each axis manual feedrate B speed

2nd axis

Each axis manual feedrate B speed

3rd axis

Each axis manual feedrate B speed

4th axis

Manual feedrate B speed

Dry run validity

X axis speed

Y axis speed

Z axis speed

B axis speed

Each axis manual

feedrate B valid Validity

Manual feedrate B valid

n-th axis Validity

Note

4.6.6 Manual Feedrate B Surface Speed Control
When using the manual feedrate B function and machining by moving the orthogonal axis while rotating the rotary table, the tool nose and workpiece's relative speed will drop as the tool nears the rotation center if the table rotation speed remains under the set conditions. This function controls the table rotation speed according to the distance from the rotation center.
As shown below, the distance (radius) from the rotation center at two points and the rotary axis speed at each point is set in the parameters. When the "Manual feedrate B surface speed control valid" signal is turned ON, the rotary axis speed will be automatically calculated according to the current radius R.
(1) If R R1, then V1 will be applied.
(2) If R1 < R < R2, the speed V is calculated with the following expression.
(3) If R2 R, then V2 will be applied.
Override can be applied in the range of 0 to 200% in respect to the rotary axis's speed for which the manual feedrate B surface speed control is valid.
This function can be used with a rotary axis for which the manual feedrate B function is valid.
The manual feedrate B speed and each axis' manual feedrate B speed which are issued from the user PLC is ignored for an axis for which this function is valid.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
(1) (2) (3)
R1 R2
V1
V2
Rotary axis speed
Radius
V= (V2 - V1)
(R2 - R1) *(R - R1)+V1

4.6.8 Manual Speed Clamp
The maximum speed for manual feed can be switched to the rapid traverse rate or the manual feed clamp speed.
This function is usable, for instance, when the axis speed needs to be clamped at an arbitrary rate for performing a manual feed with a cutting cover opened.
The clamp speed is switched with the parameter or PLC signal.
The manual feed clamp speed can be set to an arbitrary speed with the parameter.
The manual feedrate can be applied for operation modes as follows:
Jog mode
Handle mode
Incremental mode
Manual reference position return (high-speed) mode
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
Rapid traverse rate (rapid)
Manual feed clamp speed (m_clamp)
Manual speed clamp ON
Manual speed clamp OFF

4.7 Dwell
With this function, the program command temporarily stops the machine movement and puts the machine into standby status.
Allowing the starting time of the next block to be delayed. The waiting time state can be canceled by inputting the skip signal.
4.7.1 Dwell (Time-Based Designation)
When G04 is commanded in the asynchronous feed mode (G94), the machine waits for the specified amount of time before executing the next block.
Command format
G94 is not necessary in the asynchronous feed mode (G94).
The decimal point command is valid for dwell time designated with the address "X" or "U".
The decimal point command is valid for dwell time designated with the address "P", depending on the parameter setting.
When the decimal point command is set to be invalid by the parameter, the number below the decimal point of the P com mand value is ignored.
When the decimal point command is valid or invalid, the dwell time command range for each status is as follows.
When the dwell is commanded with no decimal point, the setting unit for dwell time can be changed by setting the parame ter.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
G94 G04 X/U__ ; or G94 G04 P__ ;
X/P/U : Dwell time
Command range when the decimal point command is valid
Command range when the decimal point command is invalid

0 to 99999.999 (s) 0 to 99999999 (ms)

4.7.2 Dwell (Revolution-Based Designation)
When G04 is commanded in the synchronous feed mode (G95), the machine waits for the spindle to rotate for the number of the revolutions designated.
Command format
When there is a D command in the same block as G04, dwell (revolution-based designation) is executed regardless of the parameter setting and irrespective of asynchronous feed mode (G94) or synchronous feed mode (G95).
When there is no D command, the setting will be as follows depending on the parameter setting to enable dwell (revolution based designation).
G95 is not necessary in the synchronous feed mode (G95).
The decimal point command is valid for the number of revolutions for dwell designated with the address "X" or "U".
The decimal point command is valid for the number of revolutions for dwell designated with the address "P", depending on the parameter setting. When the decimal point command is set to be invalid by the parameter, the number below the deci mal point of the P command value is ignored.
When the decimal point command is valid or invalid, the command range of number of revolution for dwell is as follows for each status.
When the dwell is commanded with no decimal point, the setting unit for the number of revolution can be changed by set ting the parameter.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
G95 G04 X/U__ D__ ; or G95 G04 P__ D__ ;
X/P/U : Number of revolutions for dwell
D : Dwell target spindle (For command using the spindle number, the spindle number should be within the number of spindles for specifications. For command using the spindle name, the number from 1 to 9 is valid for the spindle name.)
Parameter setting
Valid Dwell (revolution-based designation) is executed for the first spindle.
Invalid Dwell (time-based designation) is executed.
Command range when the decimal point command is valid
Command range when the decimal point command is invalid
0 to 99999.999 (rev) 0 to 99999999 (0.001 rev)

5.1 Memory Capacity
Machining programs are stored in the NC memory, NC memory 2, DS, and external memory device (front SD card, built-in disk of display unit, etc.).
When using devices such as the built-in disk (HD) of the display unit, DS and memory card, mass-editing, which is carried out on those devices, is possible.
The data size that can be handled in the mass-editing differs depending on the devices.
5.1.1 Memory Capacity (Number of Programs Stored)
[M system]
[L system]
(1) The tape length for the multi-part system specifications is the total for all part systems.
5.1.2 Extended Memory
[M system]]
[L system]]
To use the extended memory, select the device "NC memory 2".
(1) The tape length for the multi-part system specifications is the total for all part systems.
Memory capacity (number of programs stored)
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
500 KB [1280 m] (1000 programs)
1000 KB [2560 m] (1000 programs)
2000 KB [5120 m] (1000 programs)
Memory capacity (number of programs stored)
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
500 KB [1280 m] (1000 programs)
1000 KB [2560 m] (1000 programs)
2000 KB [5120 m] (1000 programs)
Memory capacity (number of programs

stored)
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
2000 KB [5120 m]
(1000 programs)
Memory capacity
(number of programs
stored)
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
2000 KB [5120 m]
(1000 programs)
Note
Note
M800V/M80V Series Specifications Manual (Function)
5 Program Memory/Editing
5.2 External Signal Display Switch
89 IB-1501610-G
5.2 External Signal Display Switch
5.2.1 Program Editing
The following editing functions are possible.
Program erasing
Machining programs can be erased individually or totally.
Program filing
This function displays a list of the machining programs stored (registered) in the controller memory.
The programs are displayed in ascending order.
Comments can be added to corresponding program numbers.
Program copying
Machining programs stored in the controller memory can be copied, condensed or merged.
The program No. of the machining programs in the memory can be changed.
Program editing
Overwriting, inserting and erasing can be done per character.
Mass editing
There are regular editing and mass-editing for program editing. The specification and restrictions are different between the
regular editing and mass-editing.
Refer to the table below for conditions to be mass-editing and its maximum editing size.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
Model Conditions to be mass-editing Maximum editing size
M800V Series
M80VW Series
The storage location of the machining program to be edited is either a built-in disk (HD)
of the display unit, a USB memory, a memory card or a DS.
A file size is 1.0 MB or larger. (The size could be 2.0 MB or larger, depending on the
parameter settings.) 1 GB
M80V Series
The storage location of the machining program to be edited is either a memory card, a
USB memory or a DS.
A file size is 0.5 MB or larger.
M800V/M80V Series Specifications Manual (Function)
5 Program Memory/Editing
5.2 External Signal Display Switch
IB-1501610-G 90
5.2.2 Background Editing
This function enables one machining program to be created or editing while another program is being run.
The data of the machining programs being used in memory operation can be displayed and scrolled on the setting and dis play unit, but data cannot be added, revised or deleted.
The editing functions mentioned in the preceding section can be used at any time for machining programs which are not
being used for memory operation.
This makes it possible to prepare and edit the next program for machining, and so the machining preparations can be made
more efficiently.
The machining program will not be searched as the operation target even when searched in the edit screen.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
O1000
O2000
O3000
O4000
Prohibited Program
registered
in memory
Editing Memory
operation
Program editing Machining with memory operation
Display unit
M800V/M80V Series Specifications Manual (Function)
5 Program Memory/Editing

5.2.3 Buffer Correction
During automatic operation (NC memory, NC memory 2, SD card, USB memory or DS operation) or MDI operation, this function initiates single block stop and enables the next command to be corrected or changed.
Only memory or DS operation allows the changes with buffer corrections to be updated in the machining program.
When a program error has occurred, the function enables the block in which the error occurred to be corrected and operation to be resumed without having to perform NC resetting.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
MDI
Memory mode Pre-read
block
Execution
block NC
operation
Machine
control
MDI mode
Display unit
Buffer correction
Memory,
The built-in disk of the
display unit (HD),
SD card,
DS,
USB memory

5.2.5 Multi-Part System Simultaneous Program Editing
When an operation to open a machining program in the NC memory is performed on the edit screen, machining programs are opened in the right and left areas at the same time; the specified machining program of the displayed part system in the edit area being selected and the machining program of another part system with the same name in the unselected edit area.
5.2.6 Special Program Editing Display for Synchronization Between Part Systems
Pressing the [Synchro view] menu enables synchronized display of the left- and right-side programs aligned using the timing synchronization symbols, when all the following conditions are met:
Multi-part system program management is ON
Multi-program display type is selected
The left and right edit areas are displaying the same named programs of different part systems stored on the NC memory
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L

5.2.7 Finish Shape View Programming
This function is used to display the machining shape according to the commands of the machining program input on the edit screen, and is intended to eliminate mistakes in programming. Therefore, the machining shape can be confirmed easily without performing the automatic operation or the graphic check.
(Example) For a new program file, confirm the finish shape by inputting the machining program.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
The input machining program will be reflected in
the shape.
* In this example, as the cutting is not performed
with G54, the shape will not be changed.
Input the machining program.
Each time a block of machining program is input, the
machining shape is drawn graphically.
The input machining program will be reflected in
the shape.

6
Operation and Display

6.1 Structure of Operation/Display Panel
Setting display unit consists of the display and keyboard unit.
Refer to the "Specifications Manual (Hardware)" for details.
(1) For Separated-type color touchscreen display (19-type LCD TFT/Windows10), only software keyboard is available and there is no hardware keyboard.
6.1.1 Color Display (8.4-Type LCD TFT)
6.1.2 Color Touchscreen Display (10.4-Type LCD TFT)
6.1.3 Color Touchscreen Display (15-Type LCD TFT)
6.1.4 Color Touchscreen Display (19-Type LCD TFT)
6.1.8 Separated-Type Color Touchscreen Display (15-Type LCD TFT/Windows10)
6.1.9 Separated-Type Color Touchscreen Display (19-Type LCD TFT/Windows10)
6.1.10 Separated-Type Color Touchscreen Display (19-Type Horizontal LCD TFT/ Windows10)
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
Note

6.2 Operation Methods and Functions
6.2.1 Operation Input
In addition to the method of directly inputting numeric data, a method to input the operation results using four rules operators and function symbols can be used for specific data settings.
Numeric values, function symbols, operators and parentheses ( ) are combined and set in the data setting area.
Press the INPUT key to display the operation results. Press the INPUT key again to process the data and display the result on the screen. The contents in the data setting area are erased.
6.2.2 Absolute/Incremental Setting
When setting the data, the absolute/incremental setting can be selected from the menu.
The absolute/incremental settings can be selected on the following screens.
Common variable screen
Tool compensation amount screen
Coordinate system offset screen
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
Examples of operator settings and results Function symbols, setting examples and results
Operation Setting example Operation results Function Function sym bol Setting example Operation results
Addition = 100+50 150.000 Absolute value ABS = ABS(50-60) 10
Subtraction = 100-50 50.000 Square root SQRT = SQRT(3) 1.732
Multiplication = 12.3*4 49.200 Sine SIN = SIN(30) 0.5

Division = 100/3 33.333 Cosine COS = COS(15) 0.966
Function = 1.2*(2.5+SQRT(4)) 5.4 Tangent TAN = TAN(45) 1
Arc tangent ATAN = ATAN(1.3) 52.431
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L

6.2.5 Displayed Part System Switch
The part system displayed on the screen can be changed with the [$<->$] keys.
The number of displayed part systems is counted by one each time the [$<->$] keys are pressed. The screen corresponding to that part system opens.
If the number of displayed part systems exceeds the valid number of part systems, the number of displayed part systems will return to 1.
6.2.6 Menu List
The menu list function displays the menu configuration of each screen as a list making it possible to directly select the menu for other screens.
When the cursor is moved to the menu, the outline of that menu's functions will also appear. The menu can be selected while checking the details of the menu.
6.2.7 Display Switch by Operation Mode
The screen display changes when the screen mode selection switch is changed.
The details corresponding to the operation mode are displayed.
6.2.8 External Signal Display Switch
The screen display changes with the signal from PLC.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L

6.2.9 Screen Saver
The screen saver function protects the screen display unit by turning the backlight OFF after the time set in the parameters has elapsed. The backlight is turned OFF after a certain period of time (automatic change function) or after the key operations (manual change function).
The screen is displayed again by pressing any key, or by touching anywhere on the screen if the display unit carries a touch sensitive screen.
6.2.10 Parameter Guidance
The parameter guidance function displays the details of the parameters according to the state of the screen currently being displayed.
If the [?] key is pressed on any screen, the parameter guidance window will open. If a pop-up window other than the parameter guidance window is opened, the parameter guidance window will open over the currently opened pop-up window.
For the display unit with a touch-sensitive screen, if you hold down the parameter data area (tap the target and keep your finger down for a while), the guidance of that parameter is displayed.
6.2.11 Alarm Guidance
The alarm guidance displays the alarm message, details and remedy for the alarm currently issued.
By utilizing the guidance information, identify the cause from possible factors and determine the countermeasures.
When a multiple number of alarms are issued at the same time, guidance will be displayed for all the alarm issued.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V

TypeB
M
L

6.2.12 Machining Program Input Mistake Check Warning
If an illegal input is found in the decimal point after the current cursor position, the cursor will move to that position, and a warning message will appear.
If this function is ON when editing the program, the decimal point will be checked for the block each time an edit key (alphabet, number, symbol, Delete, etc.) is pressed. The block is not checked when the cursor keys or page feed keys are pressed.
The warning for illegal machining program can also be issued while editing an MDI program.
The comment block is also subject to the warning for illegal machining program.
A warning does not appear in the following cases.
When the data in the address subject to the illegal decimal point input is "0", a warning will not be issued regardless of whether there is a decimal point or not. (Example: A warning is not issued for "X0".)
When the data in the address subject to the illegal decimal point input is omitted, a warning will not be issued. (Example: A warning is not issued for "G28XYZ".)
Blocks containing "[" or "]" are not subject to the warning for illegal machining program.
6.2.14 Screenshot Capture
This function allows to output a bitmap file of a screen displayed on the setting and display unit to USB memory or SD card.
6.2.15 User Selectable Menu Configuration
This function allows to change the display order of operations, procedure and edit screen, and to change display/non-display selection.
6.2.16 PC-NC Network Automatic Connection
This function supports to restore the connection when the network connection cannot be created between the display unit and the control unit.
When the connection is not established even after the time out has expired, the connectable control unit IP address list appears. From the IP address list, the network connection can be re-established and restored when the IP address, which is to be connected with the control unit, is selected.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L

6.2.17 Device Open Parameter
This function can set or change the user backed up area of the PLC device from the NC screen.
The following settings are available from the NC screen.
Divide the device area accordance with the specifications of the machine maker and set and display for each divided area.
Switch the display format or data type for each divided area.
6.2.18 SRAM Open Parameter
This function can set or change the SRAM open area for the machine maker from the NC screen.
The following settings are available from the NC screen.
Divide the SRAM area accordance with the specifications of the machine maker and set and display for each divided area.
Switch the display format or data type for each divided area.
6.2.19 MTB Selectable Menu Configuration
Menu items on the "Monitor", "Setup", and "Edit" screens of Mitsubishi Electric standard format can be moved within a screen or hidden as desired.
The custom screen menu items added by machine tool builders, to the contrary, cannot be moved or hidden.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
M850VW M830VW M850VS M830VS M80VW M80V
TypeA

M80V
TypeB
M
L

6.2.20 Remote Desktop Connection
Remote desktop connection enables you to operate an external personal computer through the NC screen whenUltraVNC server is installed in the PC.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
In-house Network
Server PC that can deal with TCP/IP
Application
UltraVNC Server
Control unit [M80V]
Control unit [M800VS]
Connect to LAN1
Connect to LAN2

6.2.21 VNC Server
This function enables status confirmation and remote operation by displaying the NC screen display on the external computer or tablet PC.
This function can be valid by setting the parameter.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
Tablet
Application
VNC client
Wireless connection
Wireless LAN
router
Wired connection
Application
VNC client
Computer
Connect to LAN 1
Connect to LAN 1
Control unit [M80V]
Control unit [M800VS]
Factory network

6.3 Display Methods and Contents
6.3.1 Status Display
The status of the program now being executed is indicated.
Display of G, S, T, M commands and 2nd miscellaneous command modal values
Feed rate display
Tool compensation No. and compensation amount display
Real speed display(*1)
(*1) The feed rate of each axis is converted from the final speed output to the drive unit, and is displayed. However, during follow up, the speed is converted and displayed with the signals from the detector installed on the servo motor.
6.3.2 Clock Display
The clock is built-in, and the date (year, month, date) and time (hour, minute, second) are displayed.
Once the time is set, it can be seen as a clock on the screen.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L

6.3.3 Monitor Screen Display

A variety of information related to operation, such as the axis counter, speed display and MSTB command is displayed. The display can be switched according to the machining application (prototype or mass production).
The following operations regarding operation can be executed:
- Operation search
- Restart search
- Editing of searched machining program
- Trace (Display of machine movement path)
- Check (Display of NC program's tool movement path)
- Correction of running program's buffer
- Counter set
- Manual Numerical Value Command

etc.
- Simple monitor screen

The information displayed on the simple monitor screen is limited. Therefore, the size of the text is larger and it is readable from a distance.
- Selective display

A part of monitor screen can be customized to suit user's need (to display data which a user always needs to refer to).
The following can be displayed on the selective display area by selecting with the parameter:
- Tool offset
- Common variable
- Workpiece offset, etc.

(1) The display is not selective on the simple monitor screen.
6.3.4 Setup Screen Display
Tool/workpiece related settings, user parameter settings, MDI editing, counter setting, manual numeric command issuing, etc., can be carried out.
When the data of the selected workpiece offset has been changed, the timing when the change is reflected in each counter can be selected by the parameter.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
Note

6.3.5 Edit Screen Display
Machining program editing (addition, deletion, change, interactive cycle insertion), program check, simple programming, playback and file input/output can be carried out.
The specified character string can be searched even during the mass-editing.
6.3.6 Diagnosis Screen Display
The data related CNC diagnosis can be set and displayed as follows:
- Display of hardware and software configuration
- Display of CNC options
- Diagnosis of PLC interface
- Display of drive unit information
- Display of CNC internal data
- Display of alarm message / alarm history list etc.
- Display of H/W and Operation stop status
- Setting of sampling parameter and sampling of NC internal data
- Diagnosis for functional safety

6.3.7 Maintenance Screen Display
Parameter setting and display, NC data input/output, NC memory format, etc., can be carried out on the Maintenance screen.
Important operations are protected with a password.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L

6.3.8 Home Application
19-type vertical display unit has the expansion applications that display the machine status, software keyboard, etc. in the lower half of the screen in no linkage with the upper half.
This CNC provides the following expansion applications.

Home screen (machine state display)
Software keyboard
Software operation panel
Manual
Notepad
MTB unique applications can also be added.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
<Home screen>
<Operation panel screen> <Software keyboard screen>
Touch the application button.
Touch the shortcut button.
Touch the shortcut button. Touch the home button.

6.3.9 Home Screen
Home screen is able to display the machine status (including spindle loads and positions of linear and rotary axes) which can be monitored by an operator. Also, each application can be called by pressing the application button on the home screen.
Registered applications differ depending on MTB.
It can be selected by the parameter as to whether to hide, display (display at power ON) or display (not display at power ON) the home screen.
The screen can also be changed between the home screen and standard screen by pressing the window display key ( ).
(Example) Case in which you want to call the manual display application using the application button
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
When the manual to be displayed is touched
on the manual selection screen, the selected
manual is displayed. The manuals which can
be displayed differ depending on MTB.
Touch the standard screen
changeover button
Touch the home screen
changeover button
[Home screen] [Standard screen]
Touch the application
(manual display) button.
Touch the home button.

6.3.10 Additional Languages
A language of choice can be selected by parameter setting.
6.3.10.1 Japanese
6.3.10.2 English
6.3.10.3 German
6.3.10.4 Italian
6.3.10.5 French
6.3.10.6 Spanish
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M

L
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
M800V/M80V Series Specifications Manual (Function)
6 Operation and Display
6.3 Display Methods and Contents
IB-1501610-G 110
6.3.10.7 Chinese
6.3.10.7.1 Chinese (Traditional Chinese Characters)
6.3.10.7.2 Chinese (Simplified Chinese Characters)
6.3.10.8 Korean
6.3.10.9 Portuguese
6.3.10.10 Hungarian
6.3.10.11 Dutch
6.3.10.12 Swedish
6.3.10.13 Turkish
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
M800V/M80V Series Specifications Manual (Function)
6 Operation and Display
6.3 Display Methods and Contents
111 IB-1501610-G
6.3.10.14 Polish
6.3.10.15 Russian
6.3.10.16 Czech
6.3.10.17 Indonesian
6.3.10.18 Vietnamese
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M

L
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
M800V/M80V Series Specifications Manual (Function)
6 Operation and Display
6.3 Display Methods and Contents
IB-1501610-G 112
113 IB-1501610-G
7
Input/Output Functions and Devices
M800V/M80V Series Specifications Manual (Function)
7 Input/Output Functions and Devices
7.1 Input/Output Data
IB-1501610-G 114
7.1 Input/Output Data
Certain kinds of data handled by the NC system can be input and output between the NC system's memory and external devices.
7.1.1 Machining Program Input/Output
User Macros and Fixed Cycle Macros are included.
7.1.2 Tool Offset Data Input/Output
7.1.3 Common Variable Input/Output
7.1.4 Parameter Input/Output
7.1.5 History Data Output
7.1.7 System Configuration Data Output
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
M800V/M80V Series Specifications Manual (Function)
7 Input/Output Functions and Devices
7.2 Input/Output I/F
115 IB-1501610-G
7.2 Input/Output I/F
7.2.1 RS-232C I/F
Two ports (port 1 and port 2) can be used for control unit of the RS-232C interface.
RS-232C devices can be used by connecting to each of the ports.
7.2.2 SD Card I/F
7.2.2.1 Control Unit-Side SD Card I/F [Up to 32 GB]
An SD card can be inserted into the slot inside the control unit and used.
7.2.2.2 Front-Side SD Card I/F [Up to 32 GB]

An SD card can be inserted into the slot in front of the display unit and used.
7.2.3 Ethernet I/F
The NC unit can be connected to Ethernet and used.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
Control unit
Port Port 1, Port 2
Baudrate Up to 19.2 kbps
Handshake method DC code method, RTS/CTS method possible
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L

7.2.4 Display Unit-Side Data Server I/F
A built-in disk (HD) of display unit can be used.
7.2.5 Front-Side USB Memory I/F [Up to 32 GB]
A USB memory can be mounted.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L

7.2.8 Image Input I/F
This function displays image information which was input to an image input expansion unit from an industrial PC (IPC) or a camera, on the NC display unit.
Display/non-display of the screen input from the IPC or camera image can be switched by the PLC signal or parameter setting.
The IPC screen and camera image can be partially displayed depending on the parameter setting.For the portion where the IPC screen or camera image is partially displayed, the display range and position can be changed, and the display can be enlarged/reduced and reversed vertically/horizontally.
When the IPC screen is displayed, information operated by the NC keyboard, menu key, and touchscreen is transmitted to the Mitsubishi Electric standard screen or IPC screen.
The destination to transmit information operated on the partially displayed screen (IPC screen or camera image) can be switched with the PLC signal.
[System configuration drawing (Connected with IPC)]
[System configuration drawing (Connected with camera)]
This function can be used only when the image input expansion unit is connected and the NC display unit is 10.4-type, 15-type, or 19-type.
The image input expansion unit (FCU8-EX752) is used for M8V Series. The image input expansion unit (FCU8-EX751) for M8 Series cannot be used.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
IPC
HDMI
USB
Ethernet
CNC control unit Image input expansion unit
M800VS/M80V
IPC screen
Mitsubishi Electric
standard screen

(Without IPC screen)
Mitsubishi Electric standard screen
(Wth IPC screen)
Switch the
screen by PLC
signal
HDMI
CNC control unit Image input expansion unit
M800VS/M80V
Camera image
Mitsubishi Electric
standard screen
(Without camera image)
Mitsubishi Electric standard screen
(With camera image)
Switch the
screen by PLC
signal
Camera

7.2.9 Measuring Instrument I/F
This function establishes a system such as an on-machine measurement system by connecting NC and a measuring instrument. This function enables establishment of the SPRINT system.
SPRINT is the sensor system manufactured by Renishaw, which measures the workpiece surface with a probe continuously at high speed. Compared with a method to measure the points on a workpiece one by one with a touch probe, the measurement can be performed at higher speed and with higher accuracy.
For example of measuring a round shape hole, when a touch probe is used, four points (or three points) shown in (A) below are measured with skip, and the radius, center, etc. of the circle are calculated based on the measurement points. On the other hand, when SPRINT is used, the hole shape is traced with a probe at high speed as shown in (B) below, the continuous coordinate values are read and the SPRINT application analyzes the measurement points and calculates the circle specifications.
The following items are required to establish the SPRINT system.
(1) M800VW Series
(2) Function expansion unit FCU8-EX543
(3) Windows-based display unit (PC display unit) or industrial computer (IPC)
(4) Sensor system of Renishaw
(5) Specifications of measuring instrument I/F of NC
(6) Cable to connect the SPRINT interface unit and M800VW Series (hereinafter called "SPRINT cable") (This needs to be prepared by MTB.)
SPRINT is configured as shown below.
[SPRINT system configuration]
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
(A) Measure a circle with a touch probe (B) Measure a circle with SPRINT
SPRINT interface unit
(OSI-S)
SPRINT analog
probe (OSP60)
SPRINT receiver
(OMM-S)
Sensor system device of Renishaw
Industrial computer (IPC) or
Windows-based display unit
(PC display unit)
+
SPRINT plug-in software
Infrared
communication
Cable for OMM-S
Ethernet
Ethernet
SPRINT cable
NC (M800VW Series)
+
Function expansion unit
FCU8-EX543

7.3 Computer Link
7.3.1 Computer Link B
Computer link B is a function that passes the data between host computer (hereafter abbreviated to "HOST") and CNC.
This function sends [DC1] to the HOST at the CNC cycle start, and it enables operation to be performed while the machining programs are received from the HOST.
The computer link has a reception buffer so that operation will be less susceptible to the effects of the data transfer status at the HOST end.
The high-speed machining mode function is required for high-speed micro segment machining.
This function cannot be operated in the 2nd and following part systems.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA

M80V
TypeB
M
L
CNC HOST
CNC RS - 232C
Operation
Command
Machining program

7.4 Others
7.4.1 Handy Terminal Connection
This function controls the serial communication (RS232C) of CNC and handy terminal.
Handy terminal is a downsized machine operation panel which enables you to operate the machine including setup at hand. Consequently, machine interference can be detected at hand and the usability and safety can be improved.
CNC receives data from the handy terminal and outputs them to PLC interface. CNC also sends the transmission data which PLC set in PLC interface to the handy terminal.
Each MTB needs to create PLC program corresponding to the handy terminal.
The handy terminal needs to be customized such as the configuration of the display area, key input and communication conditions with CNC.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L

7.4.3 IP Filter Setting
This function prevents unauthorized access from external devices by filtering the IP address of the access source when the NC is being connected to Ethernet. By setting the IP addresses to be passed or rejected, access from external devices can be restricted.
Ports compatible with each model are as follows.
M800VW/M80VW Series: LAN1, LAN3, GDI
M800VS/M80V Series: LAN1, LAN2, wireless LAN
Access to the NC is limited with one of the following two methods. This is specified by the parameter.
Pass
When the range of IP addresses from which access to the NC should be allowed is set, access from an IP address within the range is permitted. Access from the other IP addresses is restricted.
Reject
When the range of IP addresses to block is set, access from an IP address within the range is blocked. Access from the other IP addresses is permitted.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
NC
LAN 1
Internet
PC
Ethernet
PC
Pass the access
Reject the access
Reject the access
Router

8
Spindle, Tool and Miscellaneous Functions

8.1 Spindle Functions (S)
8.1.1 Spindle Control Functions
The spindle rotation speed is determined in consideration of the override and gear ratio for the S command commanded in automatic operation or with manual numerical commands, and the spindle is rotated. The following diagram shows an outline of the spindle control.
When an 8-digit number following address S (S0 to S99999999) is commanded, a signed 32-bit binary data and start signal, or a non-signed 32-bit binary data and start signal will be output to the PLC.
One set of S commands can be issued in one block.
Processing and complete sequences must be incorporated on the PLC side for all S commands.
The override can be designated as 50% to 120% in 10% increments or 0% to 200% in 1% increments (with built-in PLC specifications).
The override is not changed while the spindle stop input is ON, during the tapping mode, or during the thread cutting mode.
The number of gear steps can be commanded up to four steps.
The maximum spindle rotation speed can be set for each gear.

(1) The spindle functions can work on serially connected spindles.
Check the specifications of your machine.
PLC NC
BIN
S
command
Machining program,
manual numerical
command
S command
analysis
S command value
Start signal
Spindle rotation
command
Spindle rotation
command
Spindle drive
unit MDS-E
series, etc.
Changeover
(Parameter)
Remote I/O unit
D/A converter
Analog spindle (Parameter)
Spindle output
command
creation
Gear ratio
Max. rotation
8-digit
8-digit BIN
Gear selection
Override
8-digit
Note

8.1.1.1 Spindle Digital I/F
This interface is used to connect the digital spindle (AC spindle motor and spindle driver).
8.1.1.2 Spindle Analog I/F
Spindle control can be executed using an analog spindle instead of the digital spindle.
8.1.1.3 Coil Switch
Constant output characteristics can be achieved across a broad spectrum down to the low-speed range by switching the spindle motor connections.
This is a system under which commands are assigned from the PLC.
8.1.1.4 Automatic Coil Switch
Constant output characteristics can be achieved across a broad spectrum down to the low-speed range by switching the spindle motor connections.
This is a system under which the NC unit switches the coils automatically in accordance with the motor speed.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L

8.1.1.5 Encoder Input I/F
Encoder I/F expansion unit is required for M800VW/M80VW.
Arbitrary pulse can be input by values set to R register.
The maximum number of input pulse is 76800. Synchronous feed function can be activated with the arbitrary pulse if the number of pulse to be used is set in R register and the external signal is turned ON.
When the arbitrary pulse is invalid, the input pulse is fixed to 1024 pulses.
[Encoder arbitrary pulse input]
Two kinds of encoders can be switched over and connected. Encoder switch-over is possible, using PLC device.

[Encoder switched pulse input]
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
NC
NC
ENC interface
Encoder
Fixed to 1024 pulses
ENC interface
High resolution Encoder
R register Input pulse Maximum 76800 pulse
NC
Input pulse
Input pulse
R register
R register
ENC interface
Encoder1
(High resolution)
Encoder2
(Low resolution)
Switch with ladder
Switch internally

8.1.1.6 Spindle-Mode Servo Motor Control
This function controls a spindle using the combination of servo motor and servo drive unit (MDS-E Series) which controls NC axis.
The maximum rotation speed of servo motor is low compared with a spindle motor. However, if the rated output is the same, the machine components can be downsized by using a servo motor to drive tool spindle, etc., because the servo motor is smaller than the spindle motor.
Note that some spindle functions can not be used under the spindle-mode servo motor control.
The figure below is the example of the application.
Normally, the components "spindle drive unit + spindle motor" are needed when turning, drilling or milling is performed on a lathe with turret-type tool selection mechanism. This means two pairs of "spindle drive unit + spindle motor" are needed; one for a main spindle and one for a turret.
However, downsizing of the turret, space-saving of the lathe and cost reduction can be achieved by replacing the turret side spindle drive with a servo motor and using spindle-mode servo motor control.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
X
S1/C
S2
Z Turret
Spindle
Spindle motor
Drive unit
Servo motor
Rotary tool
Gear switching mechanism
- Turret rotation
- Tool spindle rotation

8.1.1.7 Spindle-Mode Rotary Axis Control
This function enables a rotary axis driven by a servo motor to be controlled as a spindle. When the "Spindle-mode rotary axis control command" signal is turned ON, the rotary axis is controlled as a spindle. This enables lathe-turning machining, including synchronous feed and thread cutting, to be performed in synchronization with the feedback speed of the rotary axis (spindle-mode rotary axis mode). When the signal is turned OFF, positioning and interpolation commands can be given to the rotary axis (servo axis mode).
The following is the example of the application.
Add S2 as B axis spindle. B axis can be controlled as S2 spindle by setting "2" to B axis parameter "#1020 sp_ax" and setting the same value as the B axis (servo axis) drive unit I/F number to S2 axis parameter "#3031 smcp_no". B axis can be controlled as S2 spindle by turning the "Spindle-mode rotary axis control command" signal ON after being used as B axis for indexing the machining surface. This enables turning machining, including thread cutting.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
B(S2) S2(B)
S1
X
Y
Z Z

Y
Milling machining
(Spindle-mode rotary axis control command signal OFF)
Turning machining
(Spindle-mode rotary axis control command signal ON)
Spindle
B axis (rotary axis) is used for
indexing the machining surface, etc.
Servo motor
Thread cutting
B axis (rotary axis) is controlled as a
spindle (S2). This enables turning
machining.

8.1.1.8 Turret Gear Change Control
This function enables axes in the semi-closed system to select four types of gear ratios which are set to the spindle specification parameters according to the control input from the PLC.
There are differences from normal gear change as follows:
Positioning can be made at the predefined motor side position regardless of the selected gear step during spindle orienta tion or change to spindle position control (C axis control).
Gears can be changed during the rotation.
Example of application
[Gear change between turret swiveling and tool spindle rotation in turret type tool post]
For gear change on a turret where the turret swiveling and tool rotation are switched by physical gear using one servo or spindle motor as illustrated below, the positioning to motor side Z-phase position (orientation) can be made regardless of the selected gear steps by using this function. Consequently, the gears for the physical gear change are engaged and the physical gears can be changed.
[Gear change during rotation]
For example, the tool for polygon has a tool system in which the reduction gear is for starting torque (cutter + tool folder). If this tool is installed in a tool post that has mechanism which rotates multiple tools by one motor, the gear change is needed when selecting the polygon tool. However, the gear change can be performed during the tool rotation without temporary stop so that the tool change time can be reduced.
[Gear change during spindle-mode servo motor control]
This function is used when gear change is needed in the spindle-mode servo motor control which controls a servo motor as spindle using the combination of servo drive unit and servo motor.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
Turret
Rotary tool
Gear change mechanism
Turret swiveling
Tool spindle rotation
Servo motor
or
Spindle motor

8.1.1.9 Spindle Control with Pulse Train Output
This function controls a spindle using pulse trains output from the NC. You can control a spindle which is connected mainly to an inverter by outputting pulse trains.
Using this function requires an inverter which is capable of controlling spindle operation through pulse train input.
When this function is used, RIO port 1 and 2 are exclusively used for outputting pulse trains.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
60
=
NC
RIO1
RIO2 Spindle operation
Inverter
Pulse output
A phase
B phase
Waveform of pulse train output (A/B phase 1-fold output)
Frequency of output pulse train (Hz) Programmed rotation speed (r/min) x Number of pulses per motor revolution
Spindle

8.1.2 S Code Output
When an 8-digit number following address S (S0 to S99999999) is commanded, a signed 32-bit binary data and start signal, or a non-signed 32-bit binary data and start signal will be output to the PLC.
One set of S commands can be issued in one block.
Processing and complete sequences are required on the PLC side for all S commands.
S function can be designated with any other kind of commands. In the case where a movement command is in the same

block, two different command sequences are available. Depending on user PLC specifications, either one of the following two will be applied.

S function is executed after the movement is completed.

S function is executed at the same time as when the movement command is issued.

M850VW M830VW M850VS M830VS M80VW M80V

TypeA

M80V

TypeB

M

L

8.1.3 Constant Surface Speed Control

This function enables the spindle rotation speed to be adjusted (constant surface speed control) in accordance with the movement of tool nose point so that the cutting point always remains at the constant speed (constant surface speed).

Using this function for processes such as a cutting-off process is effective for a machining time and tool life, etc.

Note that when the tool nose point is moving to the workpiece zero point, the rotation may be at the maximum rotation speed of the machine specification and this is dangerous. Be sure to specify the maximum clamp rotation speed with the spindle clamp speed setting command (G92/G50).

Command format

Constant surface speed ON

Constant surface speed cancel

The surface speed is commanded with an S code. For the metric designation, the speed is commanded with an m/min unit, and for the inch designation, the speed is commanded with a feet/min unit.

In the constant surface speed cancel mode, the S code is a spindle rotation speed command.

The axis for which constant surface speed is controlled is generally the X axis. However, this can be changed with the parameter settings or with address P in the G96 block.

Select with the parameter whether to enable the spindle rotation command from other part systems to the spindle which is in the constant surface speed control.

M850VW M830VW M850VS M830VS M80VW M80V

TypeA

M80V

TypeB

M

L

G96 S__ P__ ;

S : Surface speed designation (-99999999 to 99999999 (m/min), (feet/min))

P : Constant surface speed control axis designation (0 to the maximum number of the controllable axes in G96 part system.)

G97 S__ ;

S : Spindle rotation speed (-99999999 to 99999999 (r/min))

(1) Under the constant surface speed control (during G96 modal), if the axis targeted for the constant surface speed control moves toward the spindle center, the spindle rotation speed will increase and may exceed the allowable speed of the workpiece or chuck, etc. In this case, the workpiece, etc. may jump out during machining, which may result in breakage of tools or machine or may cause damage to the operators. Thus make sure to use this control while the "spindle speed clamp" is enabled. When the constant surface speed control is commanded, keep enough distance from the program zero point.

(2) If there is only one spindle, the spindle will not operate normally if the constant surface speed control command, S com mand or spindle related M command is commanded randomly from each part system. These commands must be com manded from only one certain part system, or commanded simultaneously with timing synchronization function.

The controller will execute the following control for the constant surface speed control and S commands. The part system from which an S command was issued last will have the spindle control rights. That part system will judge whether the constant surface speed command mode is valid or canceled, and will execute spindle control.

$1: Part system 1

$2: Part system 2

Note

1000r/min S200m/min S2000r/min S100m/min

G97 S1000 S2000 G96 S200

G96 S100

$1 $2 $1

Spindle control rights

Spindle speed

Part system 2 program

Part system 1 program

8.1.4 Spindle Override

This function applies override to the rotation speed of a spindle or mill spindle assigned by the machining program command during automatic operation or by manual operation. There are two types of override.

Type 1 (code method)

Using an external signal, override can be applied to the commanded rotation speed of a spindle or mill spindle in 10% increments from 50% to 120%.

Type 2 (value setting method)

Using an external signal, override can be applied to the commanded rotation speed of a spindle or mill spindle in 1% increments from 0% to 200%.

(1) Selection between type 1 and type 2 can be designated by user PLC processing.

8.1.5 Multiple-Spindle Control

Multiple-spindle control is a function that controls second and following spindles in addition to the first spindle in a machine tool equipped with multiple spindles.

Multiple-spindle control I can be switched to multiple-spindle control II or vice versa using a parameter and, by so doing, the spindle control method changes.

The figure below shows an example of the configuration for a machine which is equipped with second and third spindles.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
Multiple-spindle
control I
(L system only)
: Control based on a spindle selection command (such as G43.1) and spindle control command ([S*****;] or
[SO=*****;]), etc.
Multiple-spindle
control II
: Control based on a PLC signal ("Spindle command selection" signal, "Spindle selection" signal) and spindle
control command ([S*****;] only), etc.
Spindle selection command and control command of [SO=*****;] cannot be used.
Note
First spindle Second spindle
Tool post 1
Tool spindle
(third spindle)

8.1.5.1 Multiple-Spindle Control I
In a machine with two or more spindles, this function makes it possible to select the spindle to apply the S commands or feed per revolution.
Spindle selection command (G43.1/G44.1/G44.1 D_) makes it possible to select the spindle.
Using the 1st spindle control command (G43.1) and the 2nd spindle control command (G44.1), the commands can be given to the spindle designated with the parameter.
Using the arbitrary spindle control command (G44.1 D_), an arbitrary spindle can be selected with address D.
Using all spindles simultaneous control command (G47.1), all spindles are selected.
Use this function when cutting the back of workpiece by shifting it to the second spindle from the first spindle, cutting multiple workpieces with the respective spindles or on the respective tool posts, etc.
[When selecting G43.1 = 1st spindle, G44.1 = 2nd spindle]
Command format
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
Spindle selection command
G43.1 ; First spindle control mode ON (The spindle to be used is set using the parameter.)
G44.1 ; Second spindle control mode ON (The spindle to be used is set using the parame ter.)
G44.1 D__; Arbitrary spindle control mode ON (The spindle to be used is set using address D.)
G47.1 ; All spindles simultaneous control mode ON (Encoder of the 1st spindle is used)
D Designate the spindle. (For a spindle number command, the range is from 1 to the number of available spindles, or from 1 to 9 for a spindle name command.)
G43.1 G44.1
G44.1
G44.1 Dn
G43.1
1st spindle
(main spindle)
1st tool post
2nd tool post
"n"th spindle
(sub spindle)
2nd spindle
(sub spindle)

In addition to using the "S*****" S commands, it is also possible to assign commands which differentiate each spindle by using the S =*****.
Command format
8.1.5.2 Multiple-Spindle Control II
This function selects which spindle to perform spindle function (S) command or feed per revolution (synchronous feed) on a machine equipped with 2 or more spindles.
Command to spindles is issued with one spindle function (S) command, and you can select the target spindle with a PLC signal (spindle selection or spindle command selection).
A parameter is used to switch the control to multiple-spindle control I.
There are two types of spindle rotation speed control: common to part systems (which validates the S function command issued last to each spindle), and separated by each part system (which validates the S function command issued last in the part system to which the selected spindle belongs).
Spindle control command (Using extended word address (S =****))
S =***** ;
Number assigned as the spindle number (1: first spindle; 2:second spindle; ...; n: "n"th spindle
(n =maximum number of spindles for the specification)); Variables can be designated.
***** Rotational speed or surface speed value assigned by command. Variables can be designated.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB

M
L

8.1.6 Spindle Orientation
This function stops the spindle at a specified position.
The spindle zero position is determined to be the Z-phase position at the encoder method spindle orientation (PLG and external encoder). At the proximity switch method spindle orientation, the spindle zero position is determined to be the position of the proximity switch attached at the spindle end.
On a lathe, this function can be used for the workpiece positioning to align the attaching/removing direction and the turret turn positioning for the tool exchanges.
When Z-phase has not yet been passed, pass Z-phase twice (excluding reciprocations within one rotation), and then position to the orientation position.
When Z-phase has been passed already, immediately position to the orientation position.
The rotation direction of the spindle orientation is determined by the spindle zero point return specification parameter.
The spindle does not rotate if Z-phase has been passed and the orientation position is already established when orientation command is issued.
When the spindle has been rotating in the direction opposite from that of orientation rotation when the orientation command is issued, orientation operation will be executed after decelerating to stop. By using the parameter, the orientation operation can be executed with the spindle revolution direction as it is, without having to decelerate and stop.
Orientation
This function stops the spindle rotation at a certain position when using the digital spindle.
When the orientation command is used, the spindle will rotate several times and then stop at the orientation point.
The orientation position differs depending on the detector.
When the orientation (PLG and external encoder) is used:
At the Z-phase position
When the proximity switch method orientation is used:
At the proximity switch installation position
Multi-point orientation
This function performs orientation to a position other than the Z-phase position by inputting a shift amount with the parameter or PLC. The shift amount is -35999 to 35999. (Unit: 360/36000=0.01)
(1) Multi-point orientation cannot be executed when using the proximity switch.
(2) Orientation is possible only when the gear ratio is 1:1 for the PLG orientation.
(The orientation is completed at the PLG encoder's Z-phase, so when using reduction gears, the orientation points will be generated at several points during one spindle rotation.)
Orientation in-position advance output
This function turns the "Spindle in-position" signal ON as soon as the spindle reaches within the second in-position width.
Then, the "Spindle 2nd in-position" signal is turned ON as soon as the spindle reaches within the in-position width.
Since orientation completion can be predicted using this function, it is possible to eliminate the sequence delay time, etc. for tool changes and other such operations, thereby achieving a faster takt time.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
Note

Proximity switch method orientation
Proximity switch method orientation enables the spindle positioning by providing the proximity switch position installed on the spindle side as the spindle position zero point.
When the spindle motor and the spindle are connected with V-belt, the spindle position zero point calculated from the spindle motor position varies due to belt slipping, etc. Thus, the spindle position zero point must be detected from the proximity switch signal every time orientation or zero point return is carried out.
In the conventional spindle position zero point detection method, the spindle position zero point is calculated from the spindle drive unit and transmitted to NC when the position detector detects the one-time rotation signal (Z-phase) for the first time after the system has been turned ON, and the zero point will not be changed thereafter.
In the case of proximity switch signal orientation, NC updates the spindle position zero point every time orientation or zero point return is carried out.

8.1.7 Spindle Position Control (Spindle/C Axis Control)
8.1.7.1 Spindle Position Control (Spindle/C Axis Control)
A spindle can be controlled as the rotary axis. After switching the spindle to the rotary axis, the positioning and the interpolation between the spindle and other NC axes can be operated in the same way as the NC axis by executing the position command (the movement command).
The NC axis for controlling the spindle as the rotary axis or the machinery for switching the spindle and NC axis (such as a gear switching machinery) had been necessary for controlling a spindle readily as the rotary axis, but they are not necessary with this function.
There are two methods for switching a spindle and a rotary axis: PLC signal method and program command method. The method can be selected with the parameter.
The spindle mode and the C axis mode can be switched with the "Servo OFF" signal (*SVFn) ON/OF with PLC ladder.
The interpolation operation is enabled by executing the movement command to the C axis in the C axis mode same as NC axis.
[Switching spindle mode to C axis mode]
Change the "Servo OFF" signal (*SVFn) OFF to ON.
[Switching C axis mode to spindle mode]
Change the "Servo OFF" signal (*SVFn) ON to OFF.
In the machining program, the program switches to the C axis mode with G00 command, and to the spindle mode with S command. The C axis "Servo OFF" signal (*SVFn) must be kept ON while the program command method is selected.
[Switching spindle mode to C axis mode]

Command [G00 C__] in the NC program during the spindle mode. The axis is positioned directly to the specified position. The non-interpolation positioning for each axes is performed by specifying [G00 X__ Z__ C__] regardless of the parameter setting, and C axis is switched to the C axis mode.

[Switching C axis mode to spindle mode]

The switching is performed with the spindle forward run signal (SRN) ON or the spindle reverse run signal (SRI) ON and the S command.

The switching is performed with the rising edge of the spindle forward run signal (SRN) or the spindle reverse run signal (SRI).

M850VW M830VW M850VS M830VS M80VW M80V

TypeA

M80V

TypeB

M

L

PLC signal method

Program command method

Servo ON

Spindle mode C axis mode Spindle mode

Servo OFF signal

(*SVFn)

Servo ready

completion signal

(RDYn)

Servo OFF

Ready ON

Ready OFF

8.1.7.2 C Axis Control During Spindle Synchronization

This control enables C axis positioning while a long workpiece is controlled by front and rear spindles that are in synchronization with each other. Under this control, the machine can perform milling at the center of workpiece.

M850VW M830VW M850VS M830VS M80VW M80V

TypeA

M80V

TypeB

M

L

8.1.8 Spindle Synchronization

In a machine with two or more spindles, this function controls the rotation speed and phase of one selected spindle (synchronized spindle) in synchronization with the rotation of the other selected spindle (reference spindle). This function can be assigned by G code or by PLC.

It is used in cases where, for instance, workpiece clamped to the reference spindle is to be clamped to the synchronized spindle instead or where the spindle rotation speed is to be changed while one workpiece remains clamped to both spindles.

8.1.8.1 Spindle Synchronization I

The synchronized spindle is designated and the start/end of the synchronization are commanded with the G command in the machining program.

This function cannot be combined with the following spindle synchronization functions while it is active. An operation error occurs.

Spindle synchronization I

Spindle synchronization II

Tool spindle synchronization IA

Tool spindle synchronization IB (IC)

Tool Spindle Synchronization II

Spindle superimposition control

However, if multiple spindle synchronization set control is enabled, multiple spindle synchronization functions can be commanded. For details on the multiple spindle synchronization set control, refer to " 8.1.15 Multiple Spindle Synchronization Set Control".

Command format

Spindle synchronization control ON (G114.1)

This command is used to designate the reference spindle and the spindle to be synchronized with the reference spindle, and it places the two designated spindles in the synchronized state.

By designating the synchronized spindle phase shift amount, the phases of the reference spindle and synchronized spindle can be aligned.

Spindle synchronization control cancel (G113 or G113.1)

This command releases the state of synchronization between two spindles whose rotation has been synchronized by the spindle synchronization command.

M850VW M830VW M850VS M830VS M80VW M80V

TypeA

M80V

TypeB

M

L

G114.1 H__ D__ R__ A__ ;

H Designate the reference spindle.

D Designate the spindle to be synchronized with the reference spindle.

R Designate the synchronized spindle phase shift amount.

A Designates the spindle synchronization acceleration/deceleration time constant.

G113 ; (Lathe system)

G113.1 ; (Lathe system/Machining center system)

8.1.8.2 Spindle Synchronization II
The selection of the spindles to be synchronized, the start of the synchronization and other settings are all designated from the PLC.
The spindle synchronization control mode is established by inputting the "Spindle synchronization" signal. While this mode is established, the synchronized spindle is controlled in synchronization with the rotation speed assigned for the reference spindle.
This function cannot be combined with the following spindle synchronization functions while it is active. An operation error occurs.
- Spindle synchronization I
- Spindle synchronization II
- Tool spindle synchronization IA
- Tool spindle synchronization IB (IC)
- Tool Spindle Synchronization II
- Spindle superimposition control

8.1.8.3 Guide Bushing Spindle Synchronization
This function is for a machine with a spindle motor to rotate a guide bushing: This function allows the guide bushing spindle motor (G/B spindle) to synchronize with a reference spindle motor (Reference spindle). The position error compensation function reduces the spindle's vibration due to the workpiece's torsion, and the motor's overload.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
Collet Chuck (Reference spindle) Guide bushing
(G/B spindle)
Bar feeder
Bar feeder

8.1.9 Tool Spindle Synchronization I (Polygon)
8.1.9.1 Tool Spindle Synchronization IA (Spindle-Spindle, Polygon)
In a machine containing a rotary tool axis and that has a spindle controlled as the workpiece axis, spindle-spindle polygon machining can be carried out by controlling the workpiece axis rotation in synchronization with the rotation of the rotary tool axis.
This function can be used with the G code list 1 to 5.
This function cannot be combined with the following spindle synchronization functions while it is active. An operation error occurs.
- Spindle synchronization I
- Spindle synchronization II
- Tool spindle synchronization IA
- Tool spindle synchronization IB (IC)
- Tool Spindle Synchronization II
- Spindle superimposition control

However, if multiple spindle synchronization set control is enabled, multiple spindle synchronization functions can be commanded.
- Command format

Tool spindle synchronization IA mode command (G114.2)
This command establishes the spindle-spindle polygon machining mode (IA) in which two spindles are rotated in synchronization at two different speeds. It is required to designate the rotary tool spindle, workpiece spindle and the rotational ratios (number of rotary tool teeth and number of work angles) of the two designated spindles.
Tool spindle synchronization IA mode cancel command (G113/G113.1)
This command releases the state of synchronization between two spindles whose rotation has been synchronized by the spindle synchronization command.
(1) An axis that involves any travel cannot be put in the same block as Tool spindle synchronization IA mode cancel com mand. If the axis address is included in the block, a program error occurs upon the cancel command, causing the auto matic operation to stop.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
G114.2 H__ D__ E__ L__ R__ ;
H : Selects the rotary tool spindle (spindle).
D : Selects the workpiece spindle (spindle).
E : Designates the rotary tool spindle rotational ratio.
L : Designates the workpiece spindle rotational ratio.
R : Synchronized spindle phase shift amount
G113 ; (Lathe system)
G113.1 ; (Lathe system/Machining center system)
Note

8.1.9.2 Tool Spindle Synchronization IB (Spindle-Spindle, Polygon)
In a machine containing a workpiece axis and that has a spindle controlled as the rotary tool axis, spindle-spindle polygon machining can be carried out by controlling the rotary tool axis rotation in synchronization with the rotation of the workpiece axis.

A parameter is used to switch from Tool spindle synchronization IB to Tool spindle synchronization IC or vice versa.
This function can be used with the G code list 1, 6 and 7.
This function cannot be combined with the following spindle synchronization functions while it is active. An operation error occurs.
Spindle synchronization I
Spindle synchronization II
Tool spindle synchronization IA
Tool spindle synchronization IB (IC)
Tool Spindle Synchronization II
Spindle superimposition control
However, if multiple spindle synchronization set control is enabled, multiple spindle synchronization functions can be commanded.
Command format
Tool spindle synchronization IB mode ON (G51.2 or G251)
This command establishes the spindle-spindle polygon machining mode in which two spindles are rotated in synchronization at two different speeds. It is required to designate the rotary tool spindle, workpiece spindle and the rotational ratios (number of work angles and number of rotary tool teeth) of the two designated spindles.
Tool spindle synchronization IB mode cancel command (G50.2 or G250)
(1) An axis that involves any travel cannot be put in the same block as Tool spindle synchronization IA mode cancel com mand. Doing so causes a program error when the spindle synchronization IB mode cancel command is issued, which causes automatic operation to be paused.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
G51.2 H__ D__ P__ Q__ R__ ;
H : Selects the workpiece spindle (spindle).
D : Selects the rotary tool spindle (spindle).
P : Designates the workpiece spindle rotational ratio.
Q : Designates the rotary tool spindle rotational ratio.
R : Synchronized spindle phase shift amount
G50.2 ;
Note

8.1.9.3 Tool Spindle Synchronization IC (Spindle-NC Axis, Polygon)
This function controls so that the workpiece (spindle) and tool (NC axis) synchronously rotate at the commanded ratio and allows polygon machining. By changing the rotational ratio of workpieces and tools and the number of tool blades mounted, polygons such as rectangles and hexagons can be machined.
A parameter is used to switch from Tool spindle synchronization IB to Tool spindle synchronization IC or vice versa.
This function can be used with the G code list 1, 6 and 7.
Command format
Tool spindle synchronization IC mode ON (G51.2 or G251)
Tool spindle synchronization IC mode OFF (G50.2 or G250)
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
G51.2 P__ Q__ ; Spindle synchronization start (Tool spindle synchronization IC mode start)
P Spindle rotational ratio
Q Rotary tool axis rotational ratio
Rotation direction is specified with a sign.
+: Forward rotation, -: Reverse rotation
G50.2 ;

8.1.10 Tool Spindle Synchronization II (Hobbing)
This function is to cut the gear with hob (hob cutter).
A spur gear can be machined by synchronizing and rotating the hob axis and the workpiece axis in a constant ratio.
A helical gear can be machined by compensating the workpiece axis according to the gear torsion angle for the Z axis movement.
Different command format is used for G code list 1 to 5 and G code list 6 or 7.
By synchronizing and rotating the hob axis and the workpiece axis in a constant rotation ratio, a gear is machined so that the cutter is engaged with gear.
This function cannot be combined with the following spindle synchronization functions while it is active. An operation error occurs.
Spindle synchronization I
Spindle synchronization II
Tool spindle synchronization IA
Tool spindle synchronization IB (IC)
Tool Spindle Synchronization II
Spindle superimposition control
However, if multiple spindle synchronization set control is enabled, multiple spindle synchronization functions can be commanded.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
Spur gears Helical gears

Hob axis: Rotary tool spindle to mount a hob
Workpiece axis: Rotary axis to mount a workpiece
Hob
Gear

8.1.11 Spindle Speed Clamp
This function is to limit the spindle rotation speed to the ranges between the maximum rotation speed and the minimum rotation speed.
This function can be set by a parameter or a program.
An alarm will occur if the constant surface speed control is conducted without issuing the spindle clamp speed command (G92).
8.1.13 Spindle Oscillation
This function reciprocates (oscillates) the spindles with designated amplitude and frequency.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
G92 S__ Q__ ; Spindle speed clamp setting
S Maximum clamp rotation speed
Q Minimum clamp rotation speed
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L

8.1.14 Spindle Superimposition Control
Spindles are controlled by superimposing the rotation speed of one spindle on the rotary speed of other spindle.
Use this function when the tool spindle needs to be rotated with the superimposed speed on the spindle rotation speed. If this function is used when tapping is performed to the center of a workpiece clamped to a spindle during its rotation, for instance, the tapping to the center of the workpiece (shown in Figure (b) below) can be performed during the turning machining (shown in Figure (a) below) so that the cycle time can be reduced.
This function cannot be combined with the following spindle synchronization functions while it is active. An operation error occurs.
Spindle synchronization I
Spindle synchronization II
Tool spindle synchronization IA
Tool spindle synchronization IB (IC)
Tool Spindle Synchronization II
Spindle superimposition control
However, if multiple spindle synchronization set control is enabled, multiple spindle synchronization functions can be commanded.
Conventional method
Using the spindle superimposition control
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
Synchronous tapping
Forward:
+500 (r/min)
Backward:
-500 (r/min)
Normal turning machining The rotation of the front workpiece is stopped, and then the tapping is started at the front center.
Synchronous tapping
Forward:
+1500 (r/min)
Backward:
+500 (r/min)
Turning (a) and tapping at the front center (b) are performed simultaneously.
S1=1000(r/min)
(a)
S1 = 0 (r/min)
(b)
S1=1000(r/min)
(a)
(b)

Command format
Spindle superimposition control valid command
G164 command specifies the reference spindle and superimposed spindle and makes the two spindles to be superimposed.
Command with the spindle name if all spindle names are set to the spindle name parameter. For others, command with the spindle number.

Spindle superimposition control cancel command
G113 command cancels the superimposition of two spindles which are rotating by the differential velocity rotation tool command.
The superimposition can be cancelled also with "Spindle synchronization cancel" signal ON.
For G code list 6 and 7, only G113.1 is available for the cancel command.
(1) An axis that involves any travel cannot be put in the same block as the spindle superimposition control cancel command.
If the axis address is included in the block, a program error occurs upon the cancel command, causing the automatic operation to stop.
G164 H__ D__ ;
H : Select the reference spindle (For command using the spindle number, the spindle number should be within the number of spindles for specifications. For command using the spindle name, the name is valid from 1 to 9.)
D : Select the superimposed spindle (For command using the spindle number, the spindle number should be within the number of spindles for specifications. For command using the spindle name, the number from 1 to 9 or from -1 to -9 is valid for the spindle name.)
G113 ;
G113.1 ;
Note

8.1.15 Multiple Spindle Synchronization Set Control
This function enables users to combine the following spindle control functions and control them simultaneously.
The same function can be combined.
When a certain pair of spindles has been designated for one spindle control function, a different pair of spindles can be used for another spindle control function.
Spindle synchronization I
Tool spindle synchronization I A (Spindle-Spindle, Polygon)
Tool spindle synchronization I B (Spindle-Spindle, Polygon)
Tool spindle synchronization II (Hobbing)
Spindle superimposition control
The following spindle control functions can be commanded simultaneously by using the same reference spindle.
Spindle synchronization I
Tool spindle synchronization IA
(1) The guide bushing spindle synchronization is not included in the multiple spindle synchronization sets.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
Note

This function enables the following machining.
[Example for Lathe systems]
Spindle synchronization I command (S1-S2) + Tool spindle syn chronization IA command (S3-S4)
Spindle synchronization I command (S1-S2) + Tool spindle syn chronization IA command (S1-S5)
Spindle synchronization I command (S1-S2) + Tool spindle syn chronization II command (S3-C4)
Spindle/C axis synchronization control command (S1/C1-S2) +
Tool spindle synchronization II command (S5-C1)
Spindle synchronization I command (S1-S2) + Spindle superimpo sition control command (S4-S3)
Tool spindle synchronization IA command (S5-S1) + Tool spindle
synchronization IA command (S3-S4)
Tool spindle synchronization II command (S5-C1) + Tool spindle
synchronization II command (S3-C4)
Spindle superimposition control command (S1-S5) + Spindle su perimposition control command (S4-S3)
S1
S4
S2
S3
S1 S2
S5
S1
C4
S2
S3
S1/C1 S2
S5
S1
S4
S2
S3
S1
S4
S5
S3
C1
C4
S5
S3
S1
S4
S5
S3

Command format
For details on the command format which starts each function, refer to the respective chapters.
[Spindle synchronization control cancel]
Command to cancel all synchronization modes
Cancels all the synchronized sets. The format varies depending on the parameter settings.
Spindle synchronization I, Tool spindle synchronization IA (Spindle-Spindle, Polygon), or Spindle superimposition control cancel command
Tool spindle synchronization II (hobbing) cancel command (when the G code list of the program is 2, 3, 4, or 5)
Tool spindle synchronization II (hobbing) cancel command (when the G code list of the program is 6 or 7)
Cancel tool spindle synchronization II (hobbing) of the specified part system.
Tool spindle synchronization IB (spindle-spindle, polygon) cancel command
Cancel tool spindle synchronization IB (spindle-spindle, polygon) of the specified part system.
G113 H0 ; Cancels all the active tool spindle synchronization II (hobbing) commands.
G113 D0 ; Cancels all the active Spindle synchronization I, Tool spindle synchronization IA (Spindle-Spindle, Polygon), and Spindle superimposition commands.
G113 ;
G113 D_ ;
D Synchronized or superimposed spindle to cancel
(For a spindle number command, the range is from 1 to the number of available spindles, or from 1 to 9 for a spindle name command.)
G113 H_ ;
H Reference spindle to cancel
(For a spindle number command, the range is from 1 to the number of available spindles, or from 1 to 9 for a spindle name command.)
G80.4 ;
G50.2 ;

8.1.16 Spindle Speed Fluctuation Detection
When this function is valid and the spindle actual speed fluctuates for the commanded speed by the program due to external factors such as load fluctuation, the NC outputs the signal (Spindle speed out of setting range) to PLC and the operation error occurs. PLC can take the necessary measure for the fluctuation of the spindle speed using the output signal (Spindle speed out of setting range) from the NC. The operation error output from the NC does not stop the automatic operation or the spindle. A parameter is used to switch whether or not to output the operation error during spindle speed fluctuation detection (G162).
Command format
Starting the spindle speed fluctuation detection
The spindle speed fluctuation detection is started by commanding G162.
Canceling the spindle speed fluctuation detection
The spindle speed fluctuation detection is canceled by commanding G163.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
G162 S__ P__ Q__ R__ I__ ;
S : Detection target spindle name (1 to 9)
P : Delay time for starting spindle speed fluctuation detection (0 to 99.999 (s))
Q : Spindle speed attainment detection range (1 to 100 (%))
R : Spindle speed fluctuation allowance rate (1 to 100 (%))
I : Allowable fluctuation range in spindle speed (0 to 999999 (r/min))
G163 S__ ;
S : Detection target spindle name (1 to 9)
(r/min)
(S)
Spindle rotation speed
Spindle speed fluctuation detection in monitor
Allowable fluctuation speed range
(Set by "R" or "I" address.)
In spindle speed fluctuation
detection
Spindle speed fluctuation detection:
Spindle speed out of setting range
Commanded speed
Actual speed
Time
G162 command

8.1.17 Spindle Motor Temperature Output to PLC
This function outputs spindle motor temperature information to R registers.
Spindle motor temperature can be monitored by this function. The function makes it possible, for instance, to add MTB original custom spindle control based on the spindle motor temperature, and to notify external equipment of temperature information.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L

8.2 Tool Functions (T)

8.2.1 Tool Functions (T Command)

The command is issued with an 8-digit number following address T (T0 - T99999999). The tool function is used to command the tool No. In the lathe specification controller, the tool compensation (tool length compensation, tool nose wear compensation) Nos. are also indicated.

[M system]

Tool function, or T function, is used to designate the tool No. and tool compensation No.

This can be designated with an 8-digit number following address T (0 to 99999999). Up to four sets of T commands can be issued in one block. However, the number of M commands that can be issued within the same block depends on the parameter setting.

BCD output or binary output can be selected by parameter.

Output signal is 8-digit BCD code and start signal, signed 32-bit binary data and start signal, or non-signed 32-bit binary data and start signal.

T function can be designated with any other kind of commands. In the case where a movement command is in the same block, two different command sequences are available. Depending on machine specifications, either one of the following two will be applied.

T function is executed after the movement is completed.

T function is executed at the same time as when the movement command is issued.

Processing and completion sequences are required for all the T commands.

(1) In some setting and display units, there may be screens that cannot display all eight digits.

[L system]

The command is issued with an 8-digit number following address T (T0 to T99999999). The high-order digits are designated as the tool No., and the low-order digit(s) are designated as the offset No. Each number of high/low-order digits depends on the specifications of MTB (the parameter setting).

The tool No. code data and start signal will be output to the PLC.

All the other details are the same as in M system.

M850VW M830VW M850VS M830VS M80VW M80V

TypeA

M80V

TypeB

M

L

Note

T

T

Tool offset No.

Tool offset No.

Tool No.

Tool No.

T

Tool offset No.

Tool No.

8.3 Miscellaneous Functions (M)

8.3.1 Miscellaneous Functions

Miscellaneous function, or M function, is used to command auxiliary functions for NC, such as rotating the spindle forward/backward or stopping it, as well as turning the cooling oil ON/OFF.

These functions are designated by an 8-digit number (0 to 99999999) following the address M, and multiple commands can be issued in a single block. The number of M commands that can be issued within the same block depends on the parameter setting. (Maximum 4 sets)

BCD output or binary output can be selected by parameter.

Output signal is 8-digit BCD code and start signal, signed 32-bit binary data and start signal, or non-signed 32-bit binary data and start signal.

(Example) G00 Xx1 Mm1 Mm2 Mm3 Mm4 ;

When the number of M commands in a single block is greater than the setting value of the parameter, the commands issued later are valid.

M00, M01, M02, M30, M96, M97, M98 and M99 are used only for some specific purposes and cannot be assigned as reg ular M functions.

Processing and completion sequences are required for all M functions except M96, M97, M98 and M99.

Refer to user PLC specification for the relationship between values and functions.
As for M00, M01, M02 and M30, next block is not read into pre-reading buffer due to ban on pre-reading processing.
Although M00, M01, M02, and M30 output an independent signal for each, the independent output of M00, M01, M02 and M30 will be reset upon pressing a reset key.
M command can be designated with other commands within the same block. In the case where a movement command is in the same block, two different command sequences are available. Depending on user PLC specifications, either one of the following two will be applied.
- M function is executed after the movement is completed.
- M function is executed at the same time as when the movement command is issued.
Processing and completion sequences are required for all the M commands except M96, M97, M98 and M99.
(1) In some setting and display units, there may be screens that cannot display all eight digits.
8.3.2 Multiple M Codes in 1 Block
Multiple sets of M commands can be issued in a block. (Maximum 4 sets)
Respective processing and completion sequences are required for all M commands included in a block. (except M96, M97, M98 and M99.)
(1) This function requires a built-in PLC. In this case, the code data and start signals of all the M commands in the same block are transferred simultaneously from the controller to the PLC, and so high-speed machine control can be done by the PLC processing sequence.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
Note
Note
M800V/M80V Series Specifications Manual (Function)
8 Spindle, Tool and Miscellaneous Functions
8.3 Miscellaneous Functions (M)
157 IB-1501610-G
8.3.3 M Code Independent Output
When the M00, M01, M02 or M30 command is assigned during an automatic operation (tape, memory, MDI) or by a manual numerical command, the signal of this function is output. It is turned OFF after the miscellaneous function finishes or by the "Reset & rewind" signal.
If movement or dwell command exists in the same block as these M commands, this signal is output upon completion of the movement or dwell command.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
Machining program M code independent
output Response to controller
M00 M00 Fin1 or Fin2
M01 M01 Fin1 or Fin2
M02 M02 Reset & rewind
M30 M30 Reset & rewind
M800V/M80V Series Specifications Manual (Function)
8 Spindle, Tool and Miscellaneous Functions
8.3 Miscellaneous Functions (M)
IB-1501610-G 158
8.3.4 Miscellaneous Function Finish
These signals inform the CNC system that a miscellaneous function (M), spindle function (S), tool function (T) or 2nd miscellaneous function (A, B, C) has been assigned and that the PLC which has received it has completed the required operation. They include miscellaneous function finish signal 1 (FIN1) and miscellaneous function finish signal 2 (FIN2).
Miscellaneous function finish signal 1 (FIN1)
When the controller checks that FIN1 is ON, it sets the function strobes OFF. Furthermore, when the PLC checks that the function strobes are OFF, it sets FIN1 OFF. The controller checks that FIN1 is OFF and advances to the next block.
Below is an example of a time chart applying when a miscellaneous function has been assigned.
Miscellaneous function finish signal 2 (FIN2)
When the controller checks that FIN2 is ON, it sets the function strobes OFF and simultaneously advances to the next block.
The PLC checks that the strobe signals are OFF and sets FIN2 OFF.
Below is an example of a time chart applying when a miscellaneous function has been assigned.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
Miscellaneous function finish signal
(FIN1)
Miscellaneous function strobe (MF)
Command
Next block
Miscellaneous function finish signal
(FIN2)
Miscellaneous function strobe (MF)
Command
Next block
M800V/M80V Series Specifications Manual (Function)
8 Spindle, Tool and Miscellaneous Functions

8.3.5 M Code Output during Axis Traveling

This function controls the timing at which miscellaneous functions are output. It outputs a miscellaneous function when a traveling axis reaches a designated position.

The command format is as follows.

This command is issued independently immediately before the block with the movement command that activates the mis cellaneous function.

Single block stop does not apply to this command.

The maximum number of groups to which the miscellaneous functions in the G117 block can be issued is as follows:

This command can be issued in up to two consecutive blocks.

When issued in three or more consecutive blocks, the last two blocks will be valid.

(Example)

G117 Xx1 Zz1 Mm1 Mm2 Mm3 Mm4 ;

G117 Xx2 Zz2 Mm5 Mm6 Mm7 Mm8 ;

G01 X200 Z200 ;

:

M850VW M830VW M850VS M830VS M80VW M80V

TypeA

M80V

TypeB

M

L

G117 Xx1 Zz1 Cc1 ;

G117

Xx1,Zz1,Cc1

: Command of M code output during axis traveling

: Movement start points

: Miscellaneous function

M commands 4 sets

S commands 2 sets

T commands 1 set

2nd miscellaneous

function 1 set

Mm 1

Mm 2

Mm 3

Mm 4

Mm5

Mm6

Mm7

Mm8

(200, 200)

(x1, z1)

(x2, z2)

Start point

End point

8.3.6 Miscellaneous Function Command High-speed Output

The miscellaneous command high-speed output shortens a processing time per miscellaneous function. There are two functions that can be selected individually.

Change miscellaneous command completion method

Select one of the following methods by the parameter.

High-speed method:

The controller inverts a strobe signal logically at the time of outputting a miscellaneous command. The PLC performs the designated operation and logically inverts the "High-speed miscellaneous function finish" signal. The controller completes the miscellaneous function when the strobe signal and the "High-speed miscellaneous function finish" signal become the same logic level.

Normal method:

Conventional method (Refer to " 8.3.4 Miscellaneous Function Finish" for details.)

Selecting miscellaneous command completion method

Select whether or not to wait for a finish signal from the PLC using the parameter.

It can be selected for M, S, T or B individually.

M850VW M830VW M850VS M830VS M80VW M80V

TypeA

M80V

TypeB

M

L

The miscellaneous function completes by matching the logic level of the finish signal with that of the strobe signal.

When a series of miscellaneous commands is issued, the completion of the previous miscellaneous command is waited.

Conventional method.

When a series of miscellaneous commands is issued, the completion of the previous miscellaneous command is waited.

High-speed method that waits for a finish signal from the PLC

High-speed method that does not wait for a finish signal from the PLC

Normal method that waits for a finish signal from the PLC

Normal method that does not wait for a finish signal from the PLC

Mxx Myy

MFINn

M code data Mxx code

data

Mxx
strobe
Myy
strobe
Myy code
data
Machining program Next block
Strobe (MFn)
Mxx Myy
MFINn
M code data
Strobe (MFn)
Machining program Next block
Mxx code
data Myy code data
Mxx
strobe
Myy strobe
Myy
FIN2
Mxx
M code data
Strobe (MFn)
Machining program
Mxx code
data Myy code data
Mxx
strobe
Myy
strobe
Next block
Myy
FIN2
Mxx Next block
Strobe (MFn)
M code data
Machining program
Mxx code
data Myy code data
Mxx
strobe
Myy
strobe

8.4.1 2nd Miscellaneous Functions
The code data and start signals are output when an 8-digit number is assigned following the address code A, B or C - whichever does not duplicate the axis name being used.
Processing and complete sequences must be incorporated on the PLC side for all 2nd miscellaneous commands.
(1) This function requires a built-in PLC.
(2) There are some screens in the setting and display unit that cannot display all eight digits.
8.4.2 2nd Miscellaneous Function Name Extension
The 2nd miscellaneous function name same as the additional axes (A, B, C) can be used by specifying the command address of the 2nd miscellaneous function with two characters.
Whether the command address has one character or two characters can be set by the parameter.
The operation of the 2nd miscellaneous function is same as the operation with the one character address method.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
Note

9.1.1 Tool Length Offset
These commands make it possible to control the axis movement by compensating the position of the end point of the movement command by a compensation amount set on the tool compensation screen.
Using this function, it is possible to compensate the difference in distance between the actual position of the machine's tool nose and the program coordinate position made by the tool length and to enhance both the programming and operational efficiency.
[M system]
Compensation can be canceled by the following G commands.

(1) When the tool length compensation axis is returned to the reference position, the compensation of that axis is canceled.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
G43 Zz1 Hh1 ;
G44 Zz1 Hh1 ;
G43 Tool length compensation command + direction (z1+h1)
G44 Tool length compensation command - direction (z1-h1)
Zz1 Compensation axis
Tool length compensation can be provided not only for the Z axis but for all the other axes (X,
Y, etc.) which can be controlled in the system.
Hh1 Compensation No.
G49 ;
G43 H0 ;
G44 H0 ;
Note

[L system]
Shape compensation
Tool length is compensated in reference to the programmed base position. Generally, the center of the tool rest or the tip of the base tool is used as the programmed base position.
Wear compensation
The wear of a tool nose can be compensated.

X-axis tool nose wear com pensation amount
Z-axis tool nose wear compensation amount
Z-axis tool length
compensation
Z-axis tool length
compensation
Tool used for machinin
Base tool
Base position
(base point)
X-axis tool length
compensation
X-axis tool length
compensation
The programmed base position is
the center of the tool rest:
The programmed base position is
the nose of the base tool:
X
Z

Command format
Tool compensation is performed by a T command. It is specified in eight digits following address T. Tool compensation is divided into two types: tool length compensation and tool nose wear compensation. It depends on the machine specifications as to which digit of T command denotes the tool No., tool length compensation No. or tool nose wear compensation No. (specified by parameters).
[Specifying tool length and wear compensation Nos. together using low-order digits of the T command]
[Specifying tool length and wear compensation Nos. separately]
The tool compensation for the lathe is valid only for the X and Z axes. If an additional axis (Y axis) and the second additional axis are added, the tool compensation will be validated for each additional axis. It supports 4 axes in total.
The additional axis is the third or fourth axis which is selected using a parameter.
T

T

Tool length compensation No. and tool nose wear
compensation No.
Tool No.
Tool No.
Tool length compensation No. and tool nose wear
compensation No.

T

Tool No.
Tool length compensation No. and tool nose wear
compensation No.
T

T

Tool nose wear compensation No.
Tool length compensation No.
Tool No.
Tool nose wear compensation No.
Tool length compensation No.
Tool No.
T

Tool nose wear compensation No.
Tool length compensation No.
Tool No.

9.1.2 Tool Position Offset
This function uses commands to control the movement by changing the positions of the end points of the movement
commands to positions which have been extended or reduced by an amount equivalent to the tool compensation amount.
This function can be used to compensate for the difference in distance between the position where the tool on the machine is
actually mounted and the programmed coordinate position based on the tool position and thereby improve the efficiency of
both machining and operation.
With tool position offset, the offset operation is performed only for blocks containing a G45 to G48 command.
If the start and end points are on an axis, the radius can be extended or reduced only for one-quarter, one-half and three quarter arcs.
In the case of absolute commands, the position is extended or reduced in each axial direction from the end point of the pre vious block along the line of the movement toward the position commanded in the block containing the G45 (or G46, G47 or
G48) command.
In the case of simultaneous n axes command, the same amount of offset is applied to all the axes that have the command
within the range of the number of the axes which can be simultaneously controlled.
Tool position offset is also valid for additional axes.
9.1.3 Tool Compensation for Additional Axes
The tool compensation for the lathe is valid for the first axis (normally X axis) and the second axis (normally Z axis). If
additional or second additional axes are added as the third and subsequent axes, the tool compensation is also valid for each
additional axes.
The additional axes to which the tool compensation is executed are determined according to the parameter setting.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
G45 G00 Xx1 Yy1 Dd1 ;
G45
Xx1,Yy1
Dd1
: Tool position offset command
: Movement axis
: Offset No.
G45 command G46 command G47 command G48 command
Extension by amount equivalent
to offset amount
Reduction by amount equivalent

to offset amount
Extension by twice the offset
amount
Reduction by twice the offset
amount
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
Program
command
Program
command
Program
command
Program
command
Actual
movement
amount
Actual
movement
amount
Actual
movement
amount
Actual
movement
amount

9.1.4 Tool Position Compensation (G43.7)
The position compensation of a turning tool is executed when turning is performed in a machine of machining center system. Use of the tool position compensation enables the three base axes (X, Y and Z axes) to be compensated from the tool base position (base point).
Before setting the compensations of the three base axes, set the parameter to switch the tool compensation display type to type III.
Command format
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
G43.7 H__; Tool position compensation start
G49; Tool position compensation cancel
H Compensation No. (H0 cancels tool position compensation.)
X(+)
Z(+)
Y(+)
Y axis tool compen sation amount
(base axis J)
X axis tool compensation
amount
(base axis I)
Z axis tool
compensation
amount
(base axis K)
Base position (base point)

9.2.1 Tool Radius Compensation
These commands function to provide tool radius compensation. Through a combination with the G command and D address assignment, they compensate for the actual tool center path either inside or outside the programmed path by an amount equivalent to the tool radius.
The tool path is calculated by the intersection point arithmetic system and, as a result, excessive cutting amounts on the inside of corners are avoided.
The tool radius compensation command controls the compensation from that block in which G41 or G42 is commanded. Whether in continuous or single block operation, compensation always starts after reading three blocks, or if the three blocks do not contain any movement command, up to five continuous blocks will be pre-read.
In compensation mode, too, up to five blocks are pre-read and the compensation is arithmetically processed.
In the compensation mode, the program is read up to five blocks ahead including blocks with no movement, and interference check using tool radius is conducted up to three blocks ahead in any of those blocks with movement.
The maximum number of blocks pre-read at start of the compensation and during the compensation mode can be changed by the parameter.
The compensation plane, movement axes and next advance direction vector are based on the plane selection command designated by G17 to G19.
G17: XY plane, X, Y, I, J
G18: ZX plane, Z, X, K, I
G19: YZ plane, Y, Z, J, K

M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
G code Function
G38 Vector designation during tool radius compensation
G39 Corner arc during tool radius compensation
G40 Tool radius compensation cancel
G41 Tool radius compensation left command
G42 Tool radius compensation right command
G17 G01 G41 Xx1 Yy1 Dd1 ;
G17 Compensation plane
G01 Cutting command
G41 Tool radius compensation left command
Xx1,Yy1 Movement axis
Dd1 Compensation No.
r r
r: Tool radius compensation amount Programmed path
Tool center path

An arc is inserted at the corner by the following command during tool radius compensation.
The compensation vector can be changed in following two ways.
The tool radius compensation vector amount and direction are retained.
The tool radius compensation vector direction is updated by I and J.
The tool radius compensation is canceled by the following command.
The vector prior to canceling is prepared by calculating the intersection point with the I and J direction.
G39 Xx1 Yy1 ;
G39
Xx1,Yy1
: Corner arc during tool radius compensation
: Movement amount
G38 Xx1 Yy1 ;
G38
Xx1,Yy1
: Vector designation for tool radius compensation
: Movement amount
G38 Xx1 Yy1 Ii1 Jj1 Dd1 ;
G38
Xx1,Yy1
Ii1,Jj1
Dd1
: Vector designation for tool radius compensation
: Movement amount
: Compensation vector direction
: Compensation vector length
G40 Xx1 Yy1 Ii1 Jj1 ;
G40
Xx1,Yy1
Ii1,Jj1
: Tool radius compensation cancel
: Movement amount
: Compensation vector direction
Tool center path Arc inserted at corner
Programmed path
N12
N11
N13
N14 N15
N11 G01 Xx11;
N12 G38 Xx12 Yy12;
N13 G38 Xx13 Yy13;
N14 G38 Xx14 Ii14 Ji14 Dd14;
N15 G40 Xx15 Yy15; Intersection point vector
Tool center path
Vector with length D (i14, j14)
Holding of previous
intersection point vector
N11
N12 N13
N14
(i14,J14)
N11 G01 Xx11 ;
N12 Xx12 Yy12 ;
N13 Xx13 Yy13 ;
N14 G40 Xx14 Ii14 Jj14 ;
When i and j commands
are assigned to G40
Tool center path

9.2.2 3-Dimensional Tool Radius Compensation

(*1) This function is available during program format switch.
This command serves the function of compensating for the spherical radius of ball end mills. It compensates for the actual tool center path to be either more outside or inside the programmed path by an amount equivalent to the tool radius amount in accordance with the 3-dimensional vectors.
With 3-dimensional tool radius compensation, the compensation is controlled from the block in which the block containing the G41 or G42 command has been designated.
The radius from the tool spherical center to the end nose serves as the compensation amount that corresponds to the tool compensation No. designated by d1.
The compensation Nos. that can be used are limited by the "number of tool compensation sets." (Refer to " 9.3.1 Number of Tool Offset Sets".)
If the compensation vectors (tool spherical center vectors) are to be changed, the G41 and I, J and K commands must be assigned.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L (*1) (*1)
G code Function
G40
G41
G42
Tool radius compensation cancel
Tool radius compensation left command (compensation in the di rection toward IJK)
Tool radius compensation right command (compensation in the di rection away from IJK)
G01 G41 Xx1 Yy1 Zz1 Ii1 Jj1 Kk1 Dd1 ;
G01
G41
Xx1,Yy1,Zz1
Ii1,Jj1,Kk1
Dd1
: Cutting command
: Tool radius compensation left command
: Movement axis
: Tool sphere center vectors
: Compensation No.
(x, y, z)
r:
(x, y, z)
Z (K)
X (I) Y (J)
Tool
Tool center
coordinates
(I, J, K) Normal line vector
Tool radius
Work
Programmed
coordinates position 3-dimensional
compensation vector

9.2.3 Tool Nose Radius Compensation (G40/41/42)
Because a tool nose is generally rounded, a hypothetical tool nose point is used for creating programming. As a result, due to this roundness of the tool nose, there will be a gap between the programmed shape and the actual cutting shape during taper cutting or circular cutting. Nose radius compensation is a function to automatically calculate and offset this error by setting the tool nose radius value.
Nose radius compensation is a type of compensation that is available when turning is performed on a lathe.
Nose radius compensation for machining center system is a function which enables the nose radius compensation when turning is performed on a machining center. The basic operation follows the specifications of "Tool Nose Radius Compensation".
Before starting a compensation, two to five blocks are pre-read for the intersection point calculation regardless of single block operation or continuous operation. (Two blocks are pre-read if there is a movement command, and up to five blocks are pre read if not.)
Similarly, during compensation mode, up to five blocks are pre-read for compensation calculation.
The maximum number of blocks pre-read at start of the compensation and during the compensation mode can be changed by the parameter.
Nose R interference check
In the nose radius compensation mode, the program is read up to five blocks ahead including blocks with no movement, and an interference check using the nose radius is conducted up to three blocks ahead in any of those blocks with movement.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
G code Function
G40 Nose radius compensation cancel
G41 Nose R compensation left command
G42 Nose R compensation right command
Tool nose center path with no nose R
compensation (Shaded part indicates the
cutting shape gap)
Tool nose center path with
nose R compensation
Tool nose
center

Tool nose R
Hypothetical tool
nose point

9.2.4 Automatic Decision of Nose Radius Compensation Direction (G46/40)
The nose radius compensation direction is automatically determined from the tool nose point and the specified movement vector.
The compensation directions based on the movement vectors at the tool nose points are as follows:
9.2.5 Tool Radius Compensation Diameter Designation
Tool diameter designation handles the compensation amount as diameter value and compensates the amount set in the tool compensation amount screen when tool radius compensation (G41/G42 command) is commanded.
Whether compensation amount is handled in radius value or diameter value is switched by the parameter.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
G code Function
G40
G46
Nose radius compensation cancel
Nose radius compensation ON (Automatic decision of compensa tion direction)
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
12 34 5678
R R L L
R
R R
R
R R
R
R R
R L
L
L L
L
L L
L
L L

R R L L
R
R R
R
R R
R
R R
R L
L
L L
L
L L
L
L L
Tool nose
direction
Tool nose
direction Tool
nose
progress
direction
Tool
nose
progress
direction
Tool nose point Tool nose point
Mouvement vectors
(tool nose points 1 to 4)
Mouvement vectors
(tool nose points 5 to 8)
Range of each
tool nose point
(1 to 4)
Range of each
tool nose point
(5 to 8)

9.3 Tool Offset Amount
9.3.1 Number of Tool Offset Sets
[M system]
[L system]
The number of tool compensation sets (the number of tool offset sets) for the fixed allocation is shown in the following tables.
For details on the arbitrary allocation, refer to " 9.3.3 Number of Tool Offset Sets Allocation to Part Systems".
[M system]
[L system]
(1) Whether the tool compensation memory is provided commonly to the part systems or independently for the part systems depends on the parameter settings.
Number of tool compensation sets M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
Number of tool offset sets (99 sets)
Number of tool offset sets (128 sets)
Number of tool offset sets (200 sets)
Number of tool offset sets (256 sets)
Number of tool offset sets (400 sets)
Number of tool offset sets (999 sets)
Number of tool compensation sets M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
Number of tool offset sets (99 sets)
Number of tool offset sets (128 sets)
Number of tool offset sets (200 sets)
Number of tool offset sets (256 sets)
Number of tool offset sets (400 sets)
Number of tool offset sets (999 sets)
Function name Common for part systems or 1-part
system specification
Independent to each part system and multi-part sys tem specification
Number of tool offset sets (200 sets) 200 sets Divide the number of tool offset sets by the number to obtain the number of sets per part system.
(If there is a remainder, the remainder is allocated to the
1st part system.)
Number of tool offset sets (400 sets) 400 sets
Number of tool offset sets (999 sets) 999 sets
Function name Common for part systems or 1-part
system specification
Independent to each part system and multi-part sys tem specification
Number of tool offset sets (99 sets) 99 sets Divide the number of tool offset sets by the number to obtain the number of sets per part system.
(If there is a remainder, the remainder is allocated to the
1st part system.)
Number of tool offset sets (128 sets) 128 sets
Number of tool offset sets (256 sets) 256 sets
Number of tool offset sets (400 sets) 400 sets
Number of tool offset sets (999 sets) 999 sets
Note

9.3.2 Offset Memory
9.3.2.1 Tool Shape/Wear Offset Amount
This function registers the tool shape compensation and wear compensation amounts. Compensation may encompass two or more axes.
Tool compensation types I, II and III are available for M system, which can be selected by the parameter. For L system, tool compensation type III is always used.
The tool length compensation amount, tool radius compensation amount, nose radius compensation amount, nose radius imaginary tool tip point or tool width can be set as the shape compensation amount.
The compensation amount that can be set and used differs depending on whether compensation amount setting type I,II or III is used.
When the tip of the tool used has become worn, the wear compensation amount is used to compensate this wear. Types of wear compensation amounts include the tool length wear compensation amount, tool radius wear compensation amount, and nose radius wear compensation amount.
The wear compensation amount can be used with compensation amount setting types II and III, and it is added to the shape compensation amount for compensation.
Type I: 1-axis compensation amount [M system]
This is the value that is used by rotary tools.
As the tool length compensation amount, among the compensation amounts for the position of the tool moving in the direction parallel to the control axis, the compensation amount in the longitudinal direction of the rotary tool is registered. The tool length compensation amount is set as a minus value.
As the tool radius compensation amount, among the compensation amounts for the position of the tool moving in the direction parallel to the control axis, the compensation amount in the radial direction of the rotary tool is registered. The tool radius compensation amount is set as a plus value.
One compensation amount data is registered in one compensation No., and the compensation Nos. are assigned using the address D or H commands. When a No. is assigned by a D address command, compensation is provided in the form of the tool radius; when it is assigned by an H address command, it is provided in the form of the tool length.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
Shape compensation amount

Wear compensation amount

Type II: 1-axis compensation amounts/with wear compensation [M system]
As with type I, type II is for the compensation amounts used by rotary tools.
With type II, four kinds of compensation amount data are registered in one compensation No.: the tool length compensation amount, tool length wear compensation amount, tool radius compensation amount, and tool radius wear compensation amount.
When a compensation No. is assigned by address D as the compensation amount, the tool radius is compensated using the amount obtained by adding the shape compensation amount and tool radius wear compensation amount. Further, the tool length is compensation using the amount obtained by adding the shape compensation amount and tool length wear compensation amount.
Tool length compensation amount Wear compensation amount when
Compensation type I Compensation type II using type II
R
Tool length
compensation
amount
Workpiece
Table
R
Tool length
compensa tion amount
Shape
compen sation
amount
Tool radius wear
compensation
amount
Workpiece
Table
M
Tool length
wear
compensation
Tool radius wear amount
compensation
amount

Type III: 2-axis compensation amounts [M system] [L system]
Type III is for the compensation amounts used by non-rotary tools.
As the compensation amounts, the tool length along the X, Y and Z axes and the wear amount along each of these axes, the nose radius and nose radius wear amount, tool tip point P and tool width can be registered.
Compensation is carried out in the directions of the X, Y and Z axes from the base position in the program. Generally, the center of the tool rest or the tip of the base tool is used as the programmed base position.
The tool tip contour arc radius (nose radius) of a non-rotary tool with an arc (nose radius) at its tip is registered as the nose radius compensation amount.
The X-axis tool length compensation amount, Z-axis tool length compensation amount and nose radius compensation amount are set as plus amounts.
1. The programmed base position is the
center of the tool rest: 2. The programmed base position is the tip of the base tool:
axis tool length
compensation
amount
Base
position
(base point
Z-axis tool length
compensation amount
Z-axis tool length
compensation amount
Tool used for machining
X-axis tool length
compensation
amount
Base position
(base point)
Base tool
Nose radius
compensation
amount
Tool nose
center
Imaginary tool
nose point
X
Z
Z-axis tool length wear
compensation amount
Tool nose
X-axis tool length
wear compensa tion amount

9.3.2.2 Compensation Type Selection by Parameter
This function switches the tool compensation type with the parameter.
The type is switched to the tool compensation type III by setting the parameter, regardless of #1037 cmdtyp.
This function enables tool compensation for a turning tool by registering the tool compensation amount of the base axes IJK and tool tip point for a machining center system.
Machining center system
Tool compensation type I and II are used for machining center system. However, use of this function switches the type to tool compensation type III.
[Correspondence of the registered data between the compensation types]
Tool compensation type I -> Tool compensation type III
The tool compensation amount of tool compensation type I is handled as tool length Z of tool compensation type III.
Tool compensation type II -> Tool compensation type III
The table below shows the relationship between the registered items.
Lathe system
The tool compensation type is not switched by using this function.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
Tool compensation type II Tool compensation type III
Length Length Z
L wear Wear Z
Radius Nose R
R wear R-wear

9.3.3 Number of Tool Offset Sets Allocation to Part Systems
(*) Variable number of per-part-system tool offset sets
The number of tool offset sets can be set per part system.
There are two types of the allocation: "Arbitrary allocation" which allocates the number of tool offset sets to each part system arbitrarily and "Fixed allocation" which automatically allocates the number of tool offset sets to each part system equally, and the type can be selected using the parameter.
The arbitrary allocation enables the efficient allocation because when a certain part system needs only a small number of offset sets, the rest can be allocated to another part system. If an auxiliary-axis part system does not need the tool offset set at all, the number of tool offset sets can be set 0 in the auxiliary-axis part system.
Number of tool offset sets in system is the total number of tool offset sets of all part systems.
Arbitrary allocation
[When the number of tool offset sets is increased in the 1st part system of 4-part system]
[When the number of offset sets is set "0" to the 3rd part system of 3-part system for use of the 3rd part system as auxiliary-axis part system]
Fixed allocation
(*1) The maximum number of tool offset sets per part system is 999.
(*2) If there is any remainder, the remainder is allocated to the 1st part system.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
Number of tool offset sets in system [1000 sets] Number of tool offset sets in system [1000 sets]
Number of tool offset sets in system [1000 sets] Number of tool offset sets in system [1000 sets]
Number of tool offset sets in system [1000 sets]
250
250
250
250
200
200
200
400
1st part system
2nd part system
3rd part system
4th part system
1st part system
2nd part system
3rd part system
4th part system
334
333
333 500
0
500
1st part system 1st part system
2nd part system
3rd part system
2nd part system
3rd part system
250
250
250

250
1st part
system
2nd part
system
3rd part
system
4th part
system
999
(*1)
1st part
system
500
500
1st part
system
2nd part
system
333
333
334
(*2)
1st part
system
2nd part
system
3rd part
system

181 IB-1501610-G
10
Coordinate System

10.1 Coordinate System Type and Setting
The coordinate system handled by the NC is shown below.
The points that can be commanded with the movement command are points on the local coordinate system or machine coordinate system.
(*1) The G52 offset is available independently for G54 to G59.
L0 Local coordinate system zero point Offset set with parameters
G52 Local coordinate system offset(*1) Offset set with program
W0-54 Workpiece coordinate system zero point (G54) (0 when power is turned ON)
W0-55 Workpiece coordinate system zero point (G55)
G54 Workpiece coordinate system (G54) offset(*1)
G55 Workpiece coordinate (G55) system offset
G92 G92 coordinate system shift
EXT External workpiece coordinate offset
M0 Machine coordinate system zero point
ref Reference position
G52
G92
G55 G54
EXT
ref
G52
R
M 0
W 0 - 54
L 0
L 0
W 0 - 55

10.1.1 Machine Coordinate System
The machine coordinate system is used to express the prescribed positions (such as the tool exchange and stroke end positions) that are specific to each machine.
The G53 command followed by coordinates moves the tool to the command position in the machine coordinate system.
If a coordinate command is included in the same block as G53, it is treated as a command not in the workpiece coordinate system but in the machine coordinate system.
When the initial position of workpiece coordinate is (0,0) with absolute command.
N01 G01 X500. Y0. F1000
N02 G53 X-500. Y500.
N03 X-500. Y500.
Command format
If the incremental or absolute commands and movement mode have been omitted, operation complies with the modal command that prevails at the time.
G53 (movement on machine coordinate system) is an non-modal command which is effective only in the block where it is assigned. The workpiece coordinate system being selected is not changed by this command.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA

M80V
TypeB
M
L
G53 X__ (U__) Y__ (V__) Z__ (W__) __ __ ;
X/U/Y/V/Z/W// : Axis address (range of coordinate position command (mm, inch))
(R1)
(M)
X
Y
(W1)
N01
N02
N03
500
1st reference position
Workpiece coordinate system 1
Machine coordinate system

10.1.2 Coordinate System Setting
The zero point position of the program coordinate system can be shifted to an arbitrary position by G92 command.
As shown in the figure below, when a coordinate system setting is specified by G92, G92 shift amount is applied so that the tool position(*1) in the current workpiece coordinate system is set to the coordinate position specified by G92, and the workpiece coordinate system is shifted accordingly. All the workpiece coordinate systems (G54 to G59 and G54.1 Pn) are also shifted simultaneously at this time, but the machine does not move.
(*1) The "tool position in the current workpiece coordinate system" includes the compensation amounts for tool radius, tool length and tool position compensation.
The following values are set as G92 shift amounts.
X: x0 - x1
Y: y0 - y1
There are two methods to return a coordinate system shifted by G92 command to its original position.
Carry out dog-type reference position return.
Move the coordinate system to the machine coordinate system zero point, then command G92 and G53 in the same block to set the machine coordinate system.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
Coordinate system created by automatic coor dinate system setting
Coordinate system after coordinate system
setting by G92
A workpiece coordinate system in which the
current tool position is set at (x1, y1) will be
newly created.
(a) Tool position
(b) G92 commanded position
(c) G92 shift amount
(W0) Workpiece coordinate system
(W1) Workpiece coordinate system after G92 command
(M) Basic machine coordinate system
G90 G53 G00 X0 Y0 ; Positioning at machine coordinate system zero point
G92 G53 X0 Y0 ; Coordinate system zero setting in machine coordinate system
This returns all the workpiece coordinates (G54 to G59 and G54.1 Pn) to their original positions.
M
W0 y0
(a) x0
M
W0
y1
x1
W1
(b)
(c)
G92 Xx1 Yy1 ;

10.1.3 Automatic Coordinate System Setting
After the power is turned ON, the basic machine coordinate system and the workpiece coordinate system are automatically set without executing the zero point return.
The coordinate systems created are given below.
Machine coordinate system corresponding to G53
G54 to G59 workpiece coordinate system
Local coordinate systems created under G54 to G59 workpiece coordinate systems
The distances from the zero point of G53 machine coordinate system are set to the controller coordinate related parameters.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L

10.1.4 Workpiece Coordinate System Selection
The workpiece coordinate systems facilitate the programming on the workpiece, serving the reference position of the machining workpiece as the zero point.
These commands enable the tool to move to the positions in the workpiece coordinate system. There are extended workpiece coordinate systems (G54.1) in addition to 6 workpiece coordinate systems, which are used by the programmer for programming (G54 to G59). The number of the extended workpiece coordinate systems varies depending on the MTB specifications.
Among the workpiece coordinate systems currently selected by these commands, any workpiece coordinate system with coordinates that have been commanded by the current position of the tool is reset. (The "current position of the tool" includes the compensation amounts for tool radius, tool length and tool position.)
A hypothetical machine coordinate system with coordinates that have been commanded by the current position of the tool is set by these commands. (The "current position of the tool" includes the compensation amounts for tool radius, tool length and tool position.) (G54,G92)

10.1.4.1 Workpiece Coordinate System Selection (6 Sets)
Up to 6 workpiece coordinate systems can be selected.
The G54 workpiece coordinate system is selected when the power is turned ON.
Command format
Workpiece coordinate system selection
Workpiece coordinate system setting
The workpiece coordinate zero points are provided as distances from the zero point of the machine coordinate system.
Settings can be performed in one of the following two ways:
Setting using the setting and display unit
Setting using commands assigned from the machining program
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
G code Function
G54
G55
G56
G57
G58
G59
Workpiece coordinate system 1 (W1)
Workpiece coordinate system 2 (W2)
Workpiece coordinate system 3 (W3)
Workpiece coordinate system 4 (W4)
Workpiece coordinate system 5 (W5)
Workpiece coordinate system 6 (W6)
(G90) G54 to G59 ;
(G54 to G59)G92 X__ Y__ Z__ a__ ;
X, Y, Z : Coordinate position of end point
a : Additional axis
W1
M
W2
W4 W3
G90 G56 G00 X0 Y0 ;
Start
Machine coordinate system (G53)
Workpiece coordinate
system 1 (G54)
Workpiece coordinate
system 2 (G55)
Workpiece coordinate
system 3 (G56)
Workpiece coordinate
system 4 (G57)

10.1.4.2 Extended Workpiece Coordinate System Selection (48 Sets) G54.1P1 to P48
In addition to the six workpiece coordinate systems G54 to G59, 48 workpiece coordinate systems can be used by assigning G54.1Pn command.
The command format to select the workpiece coordinate system using the G54.1Pn command and to move on the workpiece coordinate system are given below.
Workpiece coordinate system selection
The numerical value n of P following G54.1 indicates each workpiece coordinate system. Specify a value between 1 and 48.
The workpiece coordinate zero points are provided as distances from the zero point of the machine coordinate system.
Settings can be performed in one of the following two ways:
Setting using the setting and display unit
Setting using commands assigned from the machining program
G54Pn can be used as the extended workpiece coordinate system selection command by setting the parameter.
10.1.4.3 Extended Workpiece Coordinate System Selection (96 Sets) G54.1P1 to P96
In addition to the six workpiece coordinate systems G54 to G59, 96 workpiece coordinate systems can be used by assigning G54.1Pn command.
For details, refer to " 10.1.4.2 Extended Workpiece Coordinate System Selection (48 Sets) G54.1P1 to P48".

10.1.4.4 Extended Workpiece Coordinate System Selection (300 Sets) G54.1P1 to P300

In addition to the six workpiece coordinate systems G54 to G59, 300 workpiece coordinate systems can be used by assigning G54.1Pn command. For details, refer to " 10.1.4.2 Extended Workpiece Coordinate System Selection (48 Sets) G54.1P1 to P48".

M850VW M830VW M850VS M830VS M80VW M80V

TypeA

M80V

TypeB

M

L

(G90) G54.1Pn ;

M850VW M830VW M850VS M830VS M80VW M80V

TypeA

M80V

TypeB

M

L

M850VW M830VW M850VS M830VS M80VW M80V

TypeA

M80V

TypeB

M

L

10.1.5 External Workpiece Coordinate Offset

External workpiece coordinate offset that serves as the reference for all the workpiece coordinate systems is available outside the workpiece coordinates.

By setting the external workpiece coordinate offset, the external workpiece coordinate system can be shifted from the machine coordinate system, and all the workpiece coordinate systems can be simultaneously shifted by an amount equivalent to the offset.

When the external workpiece coordinate offset is zero, the external workpiece coordinate systems coincide with the machine coordinate system.

It is not possible to assign movement commands with the external workpiece coordinate selected.

M850VW M830VW M850VS M830VS M80VW M80V

TypeA

M80V

TypeB

M

L

Workpiece

coordinate 3 (G56)

Workpiece

coordinate 3 (G56)

Workpiece

coordinate 2 (G55)

Workpiece

coordinate 2 (G55)

Workpiece

coordinate 1 (G54)

Workpiece

coordinate 1 (G54)

Workpiece

coordinate 6 (G59)

Workpiece

coordinate 6 (G59)

Workpiece

coordinate 5 (G58)

Workpiece

coordinate 5 (G58)

Workpiece

coordinate 4 (G57)

Workpiece

coordinate 4 (G57)

Machine coordinate zero point

Machine coordinate zero point

Machine coordinate system (= External workpiece coordinate system)

Machine coordinate system

External workpiece coordinate system

External workpiece coordinate offset

10.1.6 Workpiece Coordinate System Preset (G92.1)

This function presets the workpiece coordinate system, which has been shifted by the programmed command or the manual operation, as the workpiece coordinate system which has been offset by the programmed command (G92.1) from the machine zero point by an amount equivalent to the workpiece coordinate offset amount.

The workpiece coordinate system is shifted from the machine coordinate system when the such operations or the programmed commands as below have been performed.

- When manual intervention has occurred in the manual absolute OFF status
- When a movement command was performed in the machine lock status
- When movement was initiated by handle interrupt
- When a movement command was performed in the mirror image mode
- When a local coordinate system was set using the G52 command
- When a workpiece coordinate system was shifted using the G92 command

Just as when manual reference position return has been performed, this function presets the workpiece coordinate system which has been shifted once to the workpiece coordinate system which has been offset from the machine zero point by an amount equivalent to the workpiece coordinate offset amount.
Furthermore, whether to preset relative coordinates as well is selected with a parameter.
Command format
Designate the addresses of the axes to be preset.
Axes whose addresses have not designated will not be preset.
Depending on the command type, G50.3 command is used in stead.
A program error results when a value other than 0 is commanded.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
G92.1 (G50.3) X0 Y0 Z0 0 ; (is the additional axis.)

10.1.7 Local Coordinate System
This function is for assigning a coordinate system on the workpiece coordinate system now being selected. This enables the workpiece coordinate system to be changed temporarily.
The local coordinate system can be selected independently on each workpiece coordinate system G54 to G59.
The command format of the local coordinate system is given below.
The local coordinate zero points are provided as distances from the zero point of the designated workpiece coordinate system (local coordinate offset).
In the incremental command mode, the position obtained by adding the local coordinate offset amount to the previously specified offset amount serves as the new local coordinate zero point.
If no workpiece coordinates are designated, the local coordinates will be created on the currently selected workpiece coordinates.
This command is non-modal but the local coordinate system created by G52 is valid until the next G52 command is issued.
The local coordinate system is canceled by the input of the reset signal or by manual or automatic dog-type reference position return.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
G code Function
G54 G52
G55 G52
G56 G52
G57 G52
G58 G52
G59 G52
Local coordinate system on the workpiece coordinate system 1
Local coordinate system on the workpiece coordinate system 2
Local coordinate system on the workpiece coordinate system 3
Local coordinate system on the workpiece coordinate system 4
Local coordinate system on the workpiece coordinate system 5
Local coordinate system on the workpiece coordinate system 6
(G54) G52 Xx1 Yy1 Zz1 ;
(G54)
G52
Xx1,Yy1,Zz1
: Workpiece coordinate system selection
: Local coordinate system setting
: Local coordinate offset amount
M
G54 G52
(G53)
(G54)
W 1
L 1
y 1
x 1
Local coordinate
Workpiece coordinate 1
Machine coordinate system

10.1.8 Coordinate System for Rotary Axis
The axis designated as the rotary axis with the parameters is controlled with the rotary axis' coordinate system.
The rotary axis includes the rotating type (short-cut valid/invalid) and linear type (workpiece coordinate position linear type, all coordinate position linear type).
The workpiece coordinate position range is 0 to 359.999 for the rotating type, and 0 to 99999.999 for the linear type.
The machine position and relative position differ according to the parameters.
The rotary axis is commanded with a degree () unit regardless of the inch or metric designation.
The rotary axis type can be set with the parameters for each axis.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M

L
Rotary axis
Linear
axis
Rotating type rotary axis Linear type rotary axis
Short-cut invalid Short-cut valid Workpiece coordinate po sition linear type
All coordinate position
linear type
Workpiece coordinate
position
Displayed in the range of 0 to 359.999. Displayed in the range of 0 to 99999.999.
Machine position/rel ative position
Displayed in the range of 0 to 359.999. Displayed in the range of 0 to
99999.999.
ABS command
The incremental amount
from the end point to the cur rent position is divided by
360, and the axis moves by
the remainder amount ac cording to the sign.
Moves with a short cut to the end point.
In the same manner as the normal linear axis, moves according
to the sign by the amount obtained by subtracting the current po sition from the end point (without rounding up to 360 degrees).
INC command Moves in the direction of the commanded sign by the commanded incremental amount starting at the current posi tion.
Reference position re turn
Follows the absolute/incremental command for a movement to the interim position.
Returns to the reference position from the interim position within a 360 degree
movement.
Moves and returns in the refer ence position direction for the dif ference from the current position
to the reference position.

10.1.9 Plane Selection
G17, G18, and G19 are for specifying the planes for the arc, tool radius compensation, coordinate rotation and other such
commands.
A parameter can be used to set either the X, Y or Z axis to which the additional axis is to be parallel.
A parameter can be used to set the initialization status (when the power has been turned ON or when the reset status has
been entered) to G17, G18 or G19.
The movement commands have no connection with the plane selection.
(Example)
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
G17; Xp-Yp plane designation
G18; Zp-Xp plane designation
G19; Yp-Zp plane designation
G19 X100. With these program commands, X100. is the axis which does not exist on the G19 (Yp, Zp) plane, Yp-Zp plane
is selected by G19 and the X axis moves by 100. mm separately from the plane selection.
G17 X100 . R50. ; With these program commands, the Xp-Yp plane is selected by G17 and the arc command is controlled on the
X-Y plane by this command.

10.1.10 Origin Set/Origin Cancel
Origin set is a function that shifts the coordinate system so that the current position is the zero point on the workpiece
coordinate system containing the workpiece coordinate system's offset value.
The relative position counter and workpiece coordinate counter are set to "0" with this operation. In other words, this is the
same as the coordinate system setting command “G92 X0;”. (For target axis: X)
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
Origin set
Items updated by origin set
Workpiece offset (10, 15)
Workpiece coordinate
zero point
Workpiece
coordinate zero
point
Current coordinate
(50, 30)
Machine
zero point
Machine
zero point
Execution of origin set
G92 offset (10, 15)
Current coordinate
(0, 30)
Workpiece offset (10, 15)

G92 offset (60, 15)

Origin cancel is a function that manually cancels all deviated amounts, and shifts to the designated zero point with the workpiece offset.
The relative position counter and machine position counter are set to "0" with this operation. In other words, this is the same "G92 G53 X0 ;". (For target axis: X)
Origin cancel
Execution of origin cancel
G54 Workpiece
coordinate zero point
G52G54 Local offset
(20, 15)
G54 Workpiece
offset (10, 15)
G92 offset (10, 15)
G55 Workpiece offset (20, 0)
G54 Current coordinates
(30, 15)
Machine
zero point
Machine zero
point
G55 Current coordinates
(30,15)
G55 Workpiece coordinate
zero point
G52G55 Local offset
(50,30)
G54 Workpiece
coordinate zero point
G52G54 Local offset
(0,15)
G54 Workpiece
offset (10,15)
G92 Offset (0,15)
G54 Current coordinates
(60,15)
G55 Current coordinates
(90,15)
G55 Workpiece
coordinate zero point
G52G55 Local offset
(0,30)
G55 Workpiece offset
(20,0) Items updated by origin cancel

10.1.11 Counter Set
The relative position counter can be set to an arbitrary value by operating the setting and display unit screens.
Select the axis and then input a value. Finally, press the key.
Only the [Relative Position] display field will change to the set value. The other coordinate positions displayed will not change.
Up to 9 digits can be input in the integer section. The number of digits after the decimal point depends on the parameter setting.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
INPUT

10.1.12 Workpiece Position Offset for Rotary Axis
For a machine equipped with a table rotary axis, this function corrects installation errors between workpiece coordinate zero point and workpiece reference position.
When a workpiece set on a rotary table is machined, if there is a difference between the workpiece coordinate zero point and the workpiece reference position, an error occurs in a machined shape. Setting the installation error between the workpiece coordinate zero point and the workpiece reference position (workpiece position offset amount for rotary axis) corrects in accordance with the table rotation angle for each block. This makes it possible to reduce the shape error at the time of machining, which enables machining with high accuracy.
This function is available only in the 1st part system. When this function is used in other than the 1st part system, an program error occurs.
The error is compensated for the axis set to be valid by the relevant parameter.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
<When the workpiece position offset for
rotary axis is disabled>

<When the workpiece position offset for
rotary axis is enabled>
Workpiece position
after rotating -90 Workpiece position
before rotating
Rotate -90 Rotate -90
Shape error
Tool path
Workpiece coordinate
system zero point
Workpiece reference
position
Installation
error
Tool path
Offset amount after
rotation
Installation
error

Workpiece position offset for rotary axis is valid in a machine configuration of the right-hand orthogonal coordinate system
defined in ISO standard.
Workpiece position offset for rotary axis is applicable to the following three types of machine configuration:
(1) This function cannot be applied to a machine whose tool direction from the tool tip to the base is not parallel to the Z axis
(Z axis positive direction) when machine position of all the rotary axes is 0 degree.
(2) This function cannot be applied to a machine whose rotation center axis of rotary axis is not parallel to any of the orthog onal coordinate axes.
Command format
Workpiece position offset for rotary axis
Make sure to command G54.2 alone in a block. When it is commanded in the same block with other G codes, travel com mands and miscellaneous commands, an program error occurs.
When address P is not commanded, an alarm occurs. Also, commanding values other than "0" to "8" to the address P
causes an alarm.
If P is given in a block that contains no G54.2 command, the address P is not regarded as a command for specifying the
workpiece position offset No. for rotary axis.
G54.2 is a modal command of the G group 23.
When "G54.2 Pm" is given during "G54.2 Pn", offset is applied with the offset set No. "m".
Set the compensation amount of the group specified with address P to system variables. Refer to the "Programing Manual"
for system variables for setting compensation amount.
Type Table tilt type Combined type 4-axis machine
Description 2 rotary axes on table side A rotary axis each on tool head
side and table side 3 orthogonal axes and 1 rotary axis
Example of
machines
Primary ro tary axis (a) The 1st rotary axis on the table side Rotary axis on the tool side Not applicable
Secondary
rotary axis
(b)
The 2nd rotary axis on the table side Rotary axis on the table side Not applicable
G54.2 P__ ;
P : Set No. of workpiece position offset for rotary axis (n = 0 to 8)
(a)
(b)
(a)
(b)
Note

10.1.13 Workpiece Coordinate System Shift
This function can shift the workpiece coordinate system.
A workpiece coordinate system which was considered at machining programming may be misaligned with a coordinate
system which is actually set or which is set by automatic coordinate system setting. The measured workpiece coordinate
system can be shifted to the workpiece coordinate system at the program creation so that the machining can be performed
without modification of the machining program. This function also eliminates the need to change the machining program even
when the workpiece shape is changed.
[Setting the shift amount to O' -O to the shift amount of the workpiece coordinate system]
[Setting the change amount of the workpiece shape to the shift amount of the workpiece coordinate system]
The base point of the shift amount of the workpiece coordinate system can be set to an arbitrary position. (This depends on
the MTB specifications. (parameter setting))
M: Basic machine coordinate zero point
P: Base point of shift amount of workpiece coordinate system (arbitrary position)
O: Coordinate system zero point at programming
The methods for the setting are as follows:
Setting ON screen
Setting with machining program (G code command)
Setting by automatic measurement
Setting and acquiring with system variables
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
X' -Z': Actual measured coordinate sys tem
X .Z: Coordinate system at program ming

Without workpiece base point offset With workpiece base point offset
Z
Z'
X'
X
O
O'
Z
M
O
X
Workpiece coordinate
system shift amount
Z
M
O
X
P Workpiece coordinate
system shift amount
Workpiece base point offset

10.2 Return
10.2.1 Manual Reference Position Return
This function enables the tool to be returned manually to the position (reference position) which is characteristic to the machine.
Return pattern to reference position
[Dog type]
[High-speed type]
Differences according to detection method
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
When starting in same direction as final ad vance direction
When starting in opposite direction as final ad vance direction
First return after power ON Second return and following
Incremental position detection
method Dog-type High-speed type
Absolute position detection method High-speed type High-speed type
R
Dog
Creep speed
Reference position
return speed
R
Dog
R
Dog
Rapid traverse rate

10.2.2 Automatic 1st Reference Position Return
The machine can be returned to the first reference position by assigning the G28 command during automatic operation. If the interim point is commanded, the machine is moved up to that point by rapid traverse so that it is positioned and then returned separately for each axis to the first reference position.
Alternatively, by assigning the G29 command, the machine can be first positioned separately for each axis at the G28 or G30 interim point, and then positioned at the assigned position.
G29
The G28 programming format is given below.
Tool is first positioned by rapid traverse to the assigned position (interim point) and then is returned to the 1st reference position for each axis independently.
The G29 programming format is given below.
The tool is first moved by rapid traverse for each axis to the interim position which is passed through with G28 or G30, and is then positioned by rapid traverse at the position assigned by the program.
R1: 1st reference position
If the position detector is for the incremental detection system, the first reference position return for the first time after the NC power has been turned ON will be the dog-type. However, whether the second and subsequent returns are to be the dog type or the high-speed type can be selected by designating a parameter.
The high-speed type is always used when the position detector is for the absolute position detection system.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
G code Function
G28
G29
Automatic 1st Reference Position Return
Start position return (The tool first returns to the interim position from the 1st reference position, and then is positioned at the position assigned in the program.)

G28 Xx1 Yy1 Zz1 ;
G28
Xx1,Yy1,Zz1
: Return command
: Return control axes (coordinate of interim point)
G29 Xx1 Yy1 Zz1 ;
G29
Xx1,Yy1,Zz1
: Return command
: Return control axes (coordinate of assigned position)
R
G28
G28
G29
G29 - Y
- X
R1
Non-interpolation
movement
Interpolation or
non-interpolation can
be selected
Interim
point
Interpolation or
non-interpolation can be
selected

(1) The automatic 1st reference position return pattern is the same as for manual reference position return.
(2) The number of axes for which the 1st reference position return can be performed simultaneously depends on the number of simultaneously controlled axes.
(3) If, at the time of the first reference position return, the tool radius compensation or nose radius compensation has not been canceled, it will be temporarily canceled during the movement to the interim point. The compensation is restored at the next movement after the return.
(4) If, at the time of the reference position return, the tool length compensation has not been canceled, it will be canceled and the compensation amount also cleared upon completion of reference position return. The tool length compensation can also be canceled temporarily using a parameter. In this case, however, the tool compensation is restored by the next movement command.
(5) Interpolation or non-interpolation can be selected using a parameter for the movement up to the G28 interim point or for the movement from the G29 interim point to the command point. Non-interpolation applies for movement from the G28 interim point to the reference position and movement up to the G29 interim point.
(6) When a single block operation is selected, it can be chosen by parameter setting whether or not to enable interim point stop.
Note

10.2.3 2nd, 3rd, and 4th Reference Position Return
As with automatic 1st reference position return, commanding G30Pn during automatic operation enables the tool to be returned to the set points (2nd, 3rd or 4th reference positions) characteristic to the machine. The 2nd, 3rd and 4th reference positions can be set by parameters.
The G30 programming format is given below.
The tool is first positioned by rapid traverse to the assigned interim point and then is returned to the reference position for each axis independently.
R1: 1st reference position
R2: 2nd reference position
R3: 3rd reference position
R4: 4th reference position
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
G code Function
G30 P2
G30 P3
G30 P4
2nd reference position return
3rd reference position return
4th reference position return
G30 Xx1 Yy1 Zz1 Pp1 ;
G30
Xx1,Yy1,Zz1
Pp1
: Return command
: Return control axes (coordinate of interim point)
: Return position No.
R1
R2
R4
R3
G30 P2
G30 P3

G30 P4
- Y
- X
Start point Interim point

(1) The second reference position return is performed if the P address is omitted.
(2) The number of axes for which reference position return can be performed simultaneously depends on the number of simultaneously controlled axes.
(3) If, at the time of the reference position return, the tool radius compensation or nose R compensation has not been can celed, it will be temporarily canceled during the movement up to the interim point. The compensation is restored at the next movement after the return.
(4) If, at the time of the reference position return, the tool length compensation has not been canceled, it will be canceled and the compensation amount also cleared upon completion of reference position return. The tool length compensation can also be canceled temporarily using a parameter. In this case, however, the tool compensation is restored by the next movement command.
(5) Whether interpolation or non-interpolation is to apply to the movement up to the interim point can be selected using a parameter. Non-interpolation applies for movement from the interim point to each of the reference positions.
(6) When a single block operation is selected, it can be chosen by parameter setting whether or not to enable interim point stop.
Note

10.2.4 Reference Position Check
By commanding G27, a machining program, which has been prepared so that the tool starts off from the reference position and returns to the reference position, can be checked to see whether the tool will return properly to the reference position.
Command format
The tool is first positioned by rapid traverse to the assigned position and then, if this is the reference position, the reference position arrival signal is output.
When the address P is omitted, the first reference position check will be applied.
(1) The number of axes for which reference position check can be performed simultaneously depends on the number of simultaneously controlled axes.
(2) An alarm results unless the tool is positioned at the reference position upon completion of the command.
(3) Whether interpolation or non-interpolation is to apply to the movement can be selected using a parameter.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
G27 Xx1 Yy1 Zz1 Pp1 ;
G27
Xx1,Yy1,Zz1
Pp1
: Check command
: Return control axes
: Check No.
P1:1st reference position check
P2: 2
P3: 3
P4: 4
Note

10.2.5 Absolute Position Detection
The absolute position detection function holds the position data of the actual machine position and the machine coordinates in the controller even after the power is turned OFF. When the power is turned ON again, a position command can be executed in automatic operation immediately without executing reference position return. (High-speed return is always used for the reference position return command.)
There are two types of absolute position detection method: dog type and dog-less type, which use different reference position establishment methods.
This is specified by the parameter.
(1) This function is valid for the NC axis and the PLC axis. This function cannot be used for the spindle and the auxiliary axis.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
Method Details Establishment of zero point Adjustment of zero point po sition
Dog-less
type
Machine end stopper meth od
The zero point is established by
pressing the machine against a
set point on the machine.
The zero point is established
when a torque limit is applied
on the servo and the torque lim it is reached by pressing
against the machine stopper.
Input a value equivalent to the
shift amount on the absolute
position setting screen.

Basic position
alignment
method
Method I The zero point position is set
from the screen.
The zero point is established by
inputting it through the absolute
position setting screen.
Input a value equivalent to the
shift amount on the absolute
position setting screen.
Method II
Dog-type Same method as incremental
detection dog-type.
The zero point is established
with dog-type reference posi tion return completion.
Set a value in the parameter.
Note

10.2.6 Tool Exchange Position Return
By specifying the tool change position in a parameter and also assigning a tool change position return command in a
machining program, the tool can be changed at the most appropriate position.
The axes for which returning to the tool change position is performed and the order in which the axes begin to return can be
changed by commands.
Command and return order
[M system]
[L system]
(1) An arrow (->) indicates the order of axes that begin to return. A period (/) indicates that the axes begin to return simulta neously.
Example : "Z axis -> X axis" indicate that the Z axis returns to the tool change position, then the X axis does.
(2) G30.6 is only for the M system.
The tool change position return ON/OFF for the additional axis can be set with parameter for the additional axis.
For the order to return to the tool change position, the axes return after the standard axis completes the return to the tool
change position (refer to above table).
The additional axis cannot return to the tool change position alone.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
G30.n ;
n = 1 to 6: Specify the axes that return to the tool change position and the order in which they return. (For L system, n = 1 to 5)
Command Return order
G30. 1 Z axis -> X axis/Y axis (-> additional
axis)
G30. 2 Z axis -> X axis -> Y axis (-> addition al axis)
G30. 3 Z axis -> Y axis -> X axis (-> addition al axis)
G30. 4 X axis -> Y axis/Z axis (-> additional
axis)
G30. 5 Y axis -> X axis/Z axis (-> additional
axis)
G30. 6 X axis/Y axis/Z axis (-> additional ax is)
Command Return order
G30. 1 X axis only (-> additional axis)
G30. 2 Z axis only (-> additional axis)
G30. 3 X axis -> Z axis (-> additional axis)
G30. 4 Z axis -> X axis (-> additional axis)
G30. 5 X axis/Z axis (-> additional axis)
Note

11
Operation Support Functions

11.1.1 Optional Block Skip
It is possible to command to selectively ignore a part, from a "/" (slash) code to the end of the block, of a machining program.
When the optional block skip input signal from the external source is turned ON for automatic operation, the block with the "/"
code is skipped.
If the "Optional block skip" signal is turned OFF, the block with the "/" code will be executed without being skipped.
Skipping from a "/" in the middle of a program to the end of the program can also be enabled by parameter setting.
11.1.2 Optional Block Skip Addition
When "/n" (n: 1 to 9, slant code) is programmed at the head of a block, and the optional block skip n input signal from the
external source is turned ON for automatic operation, the block with the "/n" code is skipped.
If the "Optional block skip n" signal is turned OFF, the block with the "/n" code will be executed without being skipped.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB

M
L
Program example "Optional block skip"
Switch OFF Switch ON
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
:
N7 ;
N6 ;
N3 ;
N2 ;
N1 ;
/ N4 ;
/ N5 ;
:
N1
N2
N3
N4
N5
N6
N7
:
N1
N2
N3
N6
N7

11.1.3 Single Block
The commands for automatic operation can be executed one block at a time (block stop) by turning ON the "Single block input" signal. When the single block input signal is turned ON temporarily during continuous operation, the machine will stop after that block has been executed.
Even when operation is switched to another automatic operation mode (for example, memory operation mode to MDI operation mode) during continuous operation, the machine will stop after that block has been executed.
As with the multi-part system specification, the following function can be selected instead.
Multi-part system single block (L system)
This function is for executing single block operation while maintaining the synchronization between the part systems when two or more part systems are operated. When one part system has been stopped by single block stop, the other part systems are stopped by feed hold.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
G01 X1000 G01 Z100 G01 Z1000

Automatic operation
start (ST)
Movement block
INVALID VALID VALID
Single block (SBK)
SBK ON at start SBK change during movement SBK ON after block completion

11.2 Program Test
11.2.1 Dry Run
F code feed commands for automatic operation can be switched to the manual feed rate data of the machine operation board by turning ON the "Dry run input" signal.
11.2.2 Machine Lock
When the machine lock input signal is set to ON, the NC operations can be executed without assigning commands to the NC axes.
The feed rate in the machine lock status is the command speed.
The M, S, T and B commands are executed as usual and operation is completed by returning the FIN signal.
Reference position return (manual, G28, G29, G30) is controlled as far as the interim point in the machine lock status but the block is completed when the interim point is reached.
Machine lock is effective in the signal status applying when the axis has stopped.
Block stop will be applied if the machine lock signal is turned ON to OFF or OFF to ON during automatic operation.
11.2.3 Miscellaneous Function Lock
The M, S, T and B (2nd miscellaneous function) output signals are not output to the machine or PLC when the "Miscellaneous function lock" signal of external input is turned ON. This function can be used when checking only the movement commands in a program check.
The start signals of the M command are output for the M00, M01, M02 and M30 commands, and so a completion signal must be returned.

Fixed cycle spindle functions containing an S code and any M, S, T or B function assigned by a manual numerical com mand or in automatic operation will not be executed. The code data and strobe (MF, SF, TF, BF) outputs are stopped.
If this signal is set ON after the code data has already been output, the output is executed as it would normally be executed until the end (until FIN1 or FIN2 is received and the strobe is turned OFF).
Even when this signal is ON, the M00, M01, M02 and M30 commands among the miscellaneous functions are executed, and the decode signal, code data and strobe signals are also output as they would be normally.
Any miscellaneous functions which are executed only inside the controller and not output (M96, M97, M98, M99) are exe cuted as they would be normally even if this signal is ON.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
Command Dry run switch ON
Rapid traverse selection switch OFF Rapid traverse selection switch ON
G00,G27,G28,G29,G30,G60 Manual feedrate Rapid traverse rate
G01,G02,G03 Manual feedrate Cutting clamp speed
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L

11.2.4 Graphic Check
11.2.4.1 Graphic Check
The machining program movement path can be confirmed with the graphic drawing without executing automatic operation.
Therefore, the machining program can be checked while drawing the figure accurately at a high speed.
There are two description method for the graphic check function: 2D check and 3D check.
The drawing's viewpoint can be moved, enlarged and reduced while drawing. The three axes displayed are set with the parameters.
(1) Automatic operation is disabled during graphic check for M80V.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
Note

11.2.4.2 3D Solid Program Check
The machining program movement path can be confirmed with the graphic drawing without executing automatic operation.
Therefore, the machining program can be checked while drawing the figure accurately at a high speed.
There are two types of check methods for the 3D check: Check method I and Check method II. The Check method I simplifies the machining result of machining program and simulates at a high speed. The check method II simulates the machining result of machining program at a higher accuracy than the Check method I.
The workpiece shape's viewpoint can be moved, enlarged and reduced while drawing. The three axes displayed are set with the parameters.
The workpiece shape and tool shape used are set on this screen.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
[Drawing image (L system)] [Drawing image (M system)]

11.2.4.3 Graphic Check Rotary Axis Drawing
When the rotary axis (C axis) is designated with the parameter in program check (2D), the path is drawn depending on the rotary axis. The rotary axis can be set for each part system.
For details on the graphic check, refer to " 11.2.4.1 Graphic Check".
(1) When the control axis address other than C axis is designated with the parameter, the path corresponding to the rotary axis is not drawn.
(2) The workpiece coordinate system must be set so that the center of the rotary axis becomes the coordinate system zero point.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
Image of actual tool and workpiece Example of machining program
G83Z-20.R-5.Q5000F300 ;
G0C90. ;

G83Z-20.R-5.Q5000F300 ;
G0C180. ;
G83Z-20.R-5.Q5000F300 ;
G0C270. ;
G83Z-20.R-5.Q5000F300 ;
G80 ;
Drawing image when the rotary axis
drawing is invalid
Drawing image when the rotary axis
drawing is valid
Note
X
Y
Z
C

11.2.4.4 3D Machining Simulation
3D machining simulation is a function to check the workpiece shape, tool movement, and interference of the cutting process without performing automatic operation. When any interference occurs, the contact area is displayed in the interference color set on the workpiece setting screen, and the program check is stopped.
Interference check is performed between the following items:
- Tool and other tool
- Tool and workpiece
- Tool and machine parts
- Workpiece and machine parts
- Machine parts and other machine parts

When the machine simulation is not supported, interference between the non-cutting part of the tool and the workpiece is checked.
Workpiece simulation and machine simulation can be switched.
There are two types of check methods: Check method I and Check method II. Check method I simplifies the machining result and simulates it at high speed. Check method II simulates the machining result with higher accuracy than Check method I.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
[Workpiece simulation] [Machine simulation]
[Interference check]

11.2.5 Graphic Trace
11.2.5.1 Graphic Trace
This function draws the machine tool's machine position. The movement path following the actual automatic operation or manual operation, or the tool tip movement path can be drawn. In addition, the machine operation during machining can be monitored.
For the display mode, 1-plane, 2-plane and 3-dimensional display are provided. In the 3-dimensional display mode, cubic shapes can be rotated and tracing of the figure seen from the desired direction can be assigned.
One of the following functions is required to validate this function.
- Tool length compensation along the tool axis
- Tool handle feed & interruption
- Tool center point control
- Workpiece installation error compensation
- Inclined surface machining command
- Simple inclined surface machining command
- 3-dimensional tool radius compensation (tool's vertical-direction compensation)
- 3-dimensional manual feed
- R-Navi

M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L

11.2.5.2 Graphic Trace Rotary Axis Drawing
When the rotary axis (C axis) is designated with the parameter in program trace, the path is drawn depending on the rotary axis. The rotary axis can be set for each part system.
For details on the graphic trace, refer to " 11.2.5.1 Graphic Trace".
(1) When the control axis address other than C axis is designated with the parameter, the path corresponding to the rotary axis is not drawn.
(2) The workpiece coordinate system must be set so that the center of the rotary axis becomes the coordinate system zero point.
11.2.6 Machining Time Calculation
This function analyzes the machining program without moving the axis and calculates the approximate time required for machining.
Machining time is calculated by accumulating the following times:
- Rapid traverse time
- Cutting feed time
- Dwell time

MSTB time
The machining time is displayed as "hour: minute: second".
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
Image of actual tool and workpiece Example of machining program
G83Z-20.R-5.Q5000F300 ;
G0C90. ;
G83Z-20.R-5.Q5000F300 ;
G0C180. ;
G83Z-20.R-5.Q5000F300 ;
G0C270. ;
G83Z-20.R-5.Q5000F300 ;
G80 ;
Drawing image when the rotary axis
drawing is invalid
Drawing image when the rotary axis
drawing is valid
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
Note
X
Y
Z
C

11.2.7 Manual Arbitrary Reverse Run (Program Check Operation)
The manual arbitrary reverse run can be performed by controlling the feedrate being in the automatic operation in the memory or MDI mode in proportion to the manual feedrate by jog or the rotation speed by manual handle.
This function allows a program to run the executed blocks backward (reverse run) after the block stop in the automatic operation. The buffer correction of the program can be performed after reverse run to a desired point and the corrected program can be run.
Example of machining operation
$1: Part system 1
$2: Part system 2
[Timing chart in override 100%]
[Timing chart in manual arbitrary reverse run]
The total operation time is increased in the timing diagram for the manual arbitrary reverse run, however the synchronization between part systems can be maintained and the cutting-off machining starts after the turning machining is completed in forward run. The synchronization between part systems is maintained in both forward and reverse run.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
N103 G4
N102 G1 X
N203 G1 X
N101 G1 Z
N201 T1000 N202 G0 Z
$1
$2
$1:
$2:
$1:
$2:
$1:
$2:
$2
$1
$1
$2
Turning machining
Tool exchange
Turning machining
Tool positioning
Standby
Cutting-off machining
Tool exchange
$1 N101 G1 Z
$2
N102 G1 X N103 G4
N201 T1000 N202 G0 Z N203 G1 X
N101 G1 Z
N201 T1000
$1
$2

N102 G1 X
N202 G0 Z
N103 G4
N203 G1 X
The synchronization is maintained and the cutting-off machining
starts in the part system 2 after the turning machining is
completed in the part system 1 (in forward run).
Reverse run: Executed blocks can be executed again in the reverse order.
Forward run: Blocks are executed in the order same as automatic operation.

11.2.8 High-Speed Simple Program Check
This function checks whether a program error occurs by operating the machining program without the axes movements.
The estimated machining time can be checked in time shorter than the actual execution time of the machining program.
This function is valid with the "High-speed simple program check" signal ON .
The machining program is operated in the reduced time according to the coefficient which is set to the time reduce coefficient.
The estimated machining time of the machining program is output to time measurement output.
The miscellaneous command code which outputs strobes can be allocated arbitrarily with the parameter during the high speed simple program check.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
Reducing execution time according to time reduce coefficient
Actual execution time
Execution time by high-speed simple
program check (example: 1/4)
Estimated machining time to be output [ms]
Converting to time of normal operation

11.3 Program Search/Start/Stop
11.3.1 Program Search
The program No. of the program to be operated automatically can be designated and called. Upon completion of search, the
head of the program searched is displayed.
Machining programs are stored in the memory inside the NC system.
11.3.2 Sequence Number Search
Blocks can be indexed by setting the program No., sequence No. and block No. of the program to be operated automatically.
The searched program is displayed upon completion of the search.
Machining programs are stored in the memory inside the NC system.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L

11.3.3 Collation Stop
This function enables the single block stop status to be established at any block without having to set the SINGLE BLOCK
switch to ON.
It can be used to readily check the machining shape up to the designated block and resume machining.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
->
G91 ;
:
G00 Z-150. ;
N100 G81 X-100. Z-100. R-50. F100 ;
N101 X-100. ;
N102 X-100. ;
N103 Y100. ;
N104 X100. ;
N105 X-100. ;
:
Collation and stop is executed when drilling of one hole is completed
(N100 block is completed) as shown on the left.
The hole depth is measured to confirm that the dimensions are cor rect. If the dimensions are not correct, the tool compensation amount
is changed.
If machining is started from the head of the program, accurate hole
drilling can be carried out.

11.3.4 Program Restart

With this function, the program search can be executed while updating the coordinate values and the modal information in the same manner as an actual program operation.

Therefore, this function enables machining from a block in the middle of the program as if the actual machining was carried out from the beginning.

This function is used to restart machining when a machining program is to be resumed after it has been suspended midway due to tool damage or for some other reason.

The machine will not move during the search.

When the search is completed, the distance from the current position of the machine (workpiece coordinates) to the restart position (start point of the searched block) is displayed as restart remaining distance on the screen.

After the program restart, positioning to the restart position is carried out at the cycle start, and automatic operation is performed for the searched and subsequent blocks.

Positioning to the restart position can also be manually performed.

After the program restart, an arbitrary M, S, T or B command can be executed by the manual numerical value command before the cycle start.

There are two search methods by the program restart.

The validity of the automatic top search can be changed with control parameter.

M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L

Restart method Details

Restart search type 1 After machining is reset due to a tool breakage, etc., machining is restarted from the designated sequence number and/or block number.

Only the program which had been executed just before can be restarted.

Even after the power is turned ON again, the program can be restarted if the program has been executed before the power supply is turned OFF.

Restart search type 2 If a machining program different from the machining program to be restarted was run before starting restart search, specify the sequence No. and block No. before restarting the machining.

Automatic top search OFF A top search must be executed from the screen. Then, command a se quence No. and block No., and restart a program.

Automatic top search ON A top search may not be executed from the screen. A top search is automat ically executed, so it is not necessary to execute a top search from the screen. Command a program No., sequence No., and block No., and restart a machining.

An arbitrary program can be restarted by designating the program No.

When a program No. is omitted, the program currently searched is restarted.

11.3.5 Automatic Operation Start

With the input of the "Automatic operation start" signal (change from ON to OFF), the automatic operation of the program that has been operation searched is started by the controller (or the halted program is restarted).

Automatic operation startup is performed on a part system by part system basis.

11.3.6 NC Reset

This function enables the controller to be reset.

M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L

M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L

Reset 1 Reset 2 Reset & Rewind
(1) G command modals Retained Initialized Initialized
(2) Tool compensation
data
Retained Cancel (no operations) Cancel
(3) Memory indexing Executed Not executed Executed
(4) Errors/alarms Reset Reset Reset
(5) M, S and T code out puts
Retained Retained Retained
(6) M code independent
output
OFF OFF OFF
(7) Control axis moving Deceleration stop Deceleration stop Deceleration stop
(8) Output signals "In reset" signal "In reset" signal "In reset" signal
"In rewind" signal
G01 X100 G01 Z100
Automatic operation
start (ST)
Movement block

11.3.7 Feed Hold

When the feed hold signal is set ON during automatic operation, the machine feed is immediately decelerated and stopped. The machine is started again by the "Automatic operation start (cycle start)" signal.

When the feed hold mode is entered during cycle start, the machine feed is stopped immediately, but the M, S, T and B commands in the same block are still executed as programmed.

When the mode is switched during automatic operation to manual operation (such as jog feed, handle feed or incremental feed), the feed hold stop mode is entered.

An interrupt operation based on manual operation (such as jog feed, handle feed or incremental feed) can be executed during feed hold.

11.3.8 Search & Start

If the "Search & start" signal is input in a status where the memory mode is selected, the designated machining program is searched and executed from its head.

If the "Search & start" signal has been input during automatic operation in the memory mode, search & start is executed after resetting.

11.3.10 Auto-restart

A machining program is restarted automatically at the completion of the machining program execution.

M850VW M830VW M850VS M830VS M80VW M80V

TypeA

M80V

TypeB

M

L

M850VW M830VW M850VS M830VS M80VW M80V

TypeA

M80V

TypeB

M

L

M850VW M830VW M850VS M830VS M80VW M80V

TypeA

M80V

TypeB

M

L

Atomatic operation

start

Feed hold

Axis movement

state

11.4 Interrupt Operation

11.4.1 Manual Interruption

Manual interrupt is a function that enables manual operations to be performed during automatic operation.

The methods to select the operation mode are as follows:

Initiates the interrupt by switching from the automatic operation mode to manual operation mode

Initiates the interrupt by selecting the manual operation mode at the same time as the automatic operation mode

(Refer to " 11.4.9 Simultaneous Operation of Manual and Automatic Modes".)

Whether the manual interrupt amount is to be retained and automatic operation is to be continued is determined by setting manual absolute mode ON or OFF (refer to " 11.4.3 Manual Absolute Switch").

11.4.2 Automatic Operation Handle Interruption

The handle command can interrupt and be superimposed onto a command without suspending automatic operation and the machine can be moved by rotating the manual pulse generator during automatic operation.

If the spindle load is greatly exceeded when cutting a workpiece as per the machining program due to a high rough cutting amount in face machining, for instance, automatic handle interrupt makes it possible to raise the Z surface and reduce the load easily without suspending feed in the automatic operation mode.

Automatic handle interrupt is conducted by setting the "automatic handle interrupt" valid switch which is provided separately from the "manual operation mode". The axis selection, pulse scale factor and operation are conducted as for manual handle feed.

Whether, after an interrupt, to return to the path of the machining program by automatic operation or remain offset by the amount equivalent to the interrupt amount is determined using a parameter.

M850VW M830VW M850VS M830VS M80VW M80V

TypeA

M80V

TypeB

M

L

M850VW M830VW M850VS M830VS M80VW M80V

TypeA

M80V

TypeB

M

L

100

10

1

Z Y X

~

~

G01 Z _ F_;

X _ Y _;

X _ Y_;

Z _ Y _;

Interrupt

Tool

Handle feed

Workpiece
Automatic
feed
Feed path with automatic feed and handle feed
superimposed

11.4.3 Manual Absolute Switch
The program absolute positions are updated by an amount equivalent to the distance by which the tool is moved by hand when the manual absolute switch signal is turned ON.
In other words, the coordinate system based on the original program will not shift even if the tool (machine) is moved by hand.
Thus, if automatic operation is started in this case, the tool will return to the path before manual movement.
The manual absolute ON state will be entered when the power is turned ON.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
W
X M0
-Y
Feed hold stop Programmed path (absolute command)
Manual interrupt
(The coordinate system W is not shifted)
Path after manual interrupt
Tool passes along same path as that programmed
With manual absolute signal ON
W
W
X M0
-Y
Manual interrupt
(The coordinate
system W is shifted) Manual interrupt amount
Feed hold stop
Programmed path (absolute command)
Manual interrupt
(The coordinate system W is shifted)
Path after manual interrupt
Path is shifted by an amount equivalent to manual interrupt
value (Zero point of the coordinate system W moves)
With manual absolute signal OFF

11.4.4 Thread Cutting Cycle Retract
This function suspends the thread cutting cycle if a feed hold signal has been input during thread cutting in a thread cutting cycle.
If a feed hold signal is input during chamfering or thread cutting without chamfering, operation stops at the position where the block following the thread cutting is completed.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L

Position where the block following the thread cutting is
completed
Chamfering angle
Suspension position
Feed hold
Period when thread cutting is
performed

11.4.5 Tapping Retract
If tapping is interrupted by a reset or emergency stop signal that is input during tapping and the tap is left engaged inside the workpiece, the tap tool engaged inside the workpiece can be rotated in the reverse direction so that it will be disengaged by inputting the "Tap retract" signal.
This function can be used when the machining was interrupted upon reset, emergency stop or power OFF during tapping cycle. (Note that "power OFF" is applied only when the absolute position detection system is valid.)
A return is made to the initial point by tap retract.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
Z
Tap feed
(spindle forward)

Tap retract
(spindle reverse)
Retract signal
Tap bottom
spindle

11.4.6 Manual Numerical Value Command
Commands of spindle function (S), miscellaneous function (M), tool function (T) and 2nd miscellaneous function (B) can be executed through the Monitor screen or Setup screen.
This enables operations such as spindle speed changing, starting, stopping, calling and selecting assigned tools and replacing of the spindle tools to be done easily without having to prepare or revise the machining program.
The corresponding macro program can be executed from the manual numerical value command.
(*1) The M code macros that can be used for manual numerical value command are limited to those with a call type of M98.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
Miscellaneous command macro call Calls and executes the macro program registered as an M code macro (*1) from the M command.
T command macro call Calls and executes the T code macro program registered exclusively for manual nu merical value command from the T command.

11.4.7 Arbitrary Reverse Run
This function allows a program to run the executed blocks backward (hereinafter called "reverse run") after the block stop in the automatic operation.
Perform the reverse run as shown below.
(1) Execute the reverse run to the point to go back.
(2) Run the reversed blocks again following the program (hereinafter called "forward run").
(3) Continue executing the remaining blocks from the interrupted position.
Maximum 200 blocks can be executed in the reverse run.
Only the 1st to 3rd axes of each part system can be used for this function.
[Reverse run]
[Forward run after the reverse run]
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
Reverse
run
Block stop
Reverse
run
Block stop
Forward
run

11.4.8 MDI Interruption
This function enables MDI programs to be executed during automatic operation in the single block stop status. When the modal status is changed in the MDI program, the modal status in the automatic operation mode is also changed.
11.4.9 Simultaneous Operation of Manual and Automatic Modes
This function enables manual operations to be performed during automatic operation by selecting an automatic operation mode (tape, MDI or memory) and manual mode (handle, step, jog or manual reference position return) simultaneously.
(Arbitrary feed based on the PLC is also possible.)
The feed rates for the axes subject to automatic commands and the feed rates for axes subject to manual command are set separately. The acceleration/deceleration modes (rapid traverse, cutting feed) are also set separately. Rapid traverse override, cutting feed override and 2nd cutting feed override are valid both for axes subject to automatic commands and manual commands. Override cancel is valid for axes subject to automatic commands.
Manual interlock is applied to axes subject to manual commands; automatic interlock is applied to axes subject to automatic commands.
11.4.10 Simultaneous Operation of JOG and Handle Modes
When executing the jog feed and handle feed, both these feeds are available without changing the mode each time by inputting the jog mode signal and simultaneous operation of jog and handle modes signal to the control unit. However, while axis is moving in one of the two modes, the feed in the other mode is not valid.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
M850VW M830VW M850VS M830VS M80VW M80V

TypeA
M80V
TypeB
M
L
M800V/M80V Series Specifications Manual (Function)
11 Operation Support Functions
11.4 Interrupt Operation
233 IB-1501610-G
11.4.11 Reference Position Retract
When the retract signal is turned ON during the automatic and manual operation, this function can retract the tool immediately to a set reference position.
The reference position to be retracted to can be selected from the 1st reference position to 4th reference position with 2-bit input signal.
Set the retracting order of axes with parameter.
Other operations
When the retract signal is turned ON, the control unit is reset, the operation is interrupted, and the machining program is indexed.
When the "Rapid traverse input" signal is input, the rapid traverse rate is applied. When the "Rapid traverse input" signal is not input, the manual feed rate is applied.
If the retract signal is input during execution of a tapping cycle, the operation will be the tapping retract, and the normal ref erence position retract will be executed from the end point of tapping retract operation.
Even if the retract signal is input during the thread cutting cycle, it will be invalid. However, if the retract signal is input in a block other than the thread cutting block, the retracting operation will be executed.
If the retract signal is turned OFF midway during retracting, the operation will decelerate and stop. However, since the machining program is indexed, the block can not be resumed.
The retract signal is invalid if the coordinate system is not established. An operation error will occur when the retract signal is input in such case.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
M800V/M80V Series Specifications Manual (Function)
11 Operation Support Functions
11.4 Interrupt Operation
IB-1501610-G 234
11.4.12 Tool Retract and Return
Even if the machining program's operation is halted and the tool is escaped to change the tool or check the workpiece, etc., the tool can be returned to the halted point (machining halted point) and machining resumed.
The two main functions are as follow.
After the machining program is halted, the halt point is designated, and the tool is escaped manually.
The transit points for returning are designated when escaping.
The tool returns automatically.
When returning, the tool passes through the transit points designated when escaping and returns to the halt point. Then, machining restarts.
(a) Machining program halt
(b) Halt point designation
(c) Operation mode changeover
(d) Tool retract
(e) Transit point designation
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
#1
#2

a,b,c
e
d
d
d e
Y
Z
X
Halt point
Return start point
#2
#1
Escape path
No. 2 transit point
No. 1 transit point
M800V/M80V Series Specifications Manual (Function)
11 Operation Support Functions
11.4 Interrupt Operation
235 IB-1501610-G
11.4.13 Skip Retract
This function is used to return to the opposite advance direction when the skip signal is input during G31 command.
11.4.14 PLC Interruption
The interrupt program set with the R register is executed with the signals from the PLC during single block stop in program operation or during the manual mode.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB

M
L
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L

12.1 Machining Method Support Functions
12.1.1 Program
12.1.1.1 Subprogram Control [Layers]
When the same pattern is repeated during machining, the machining pattern can be registered as one subprogram and the subprogram can be called from the main program as required, thereby realizing the same machining easily. Efficient use of program can be made. The subprogram is called with the program No. and sequence No. or the file name and sequence No.
Subprograms can be nested up to 10 levels deep. (The nesting depth depends on the model.)
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M 10 10 10 10 10 10 10
L 10 10 10 10 10 10 10
Calling the subprogram with M98 command
M98 P__ H__ L__ ,D__ ;
or, M98 <File name> H__ L__ ,D__ ;
M98 Subprogram call command
P Program No. in subprogram to be called (Own program if omitted.)
Note that "P" can be omitted only during memory mode operation (NC memory, NC memory
2, high-speed program server, SD card, hard disk, USB) and MDI operation.
(Maximum 8-digit value)
A four-digit or eight-digit program No. starting with O No. can be called by the parameter. How ever, the commanded subprogram is called when the number of digits of the command value is larger than the one set in the parameter.
<File name> A file name can be designated instead of the program No. In this case, enclose the file name inside brackets < >.
(The file name can have up to 32 characters, including the extension.)
(Example) M98 <BUHIN-12.RAF>;
H Sequence No. in subprogram to be called (Head block if omitted)
L Number of subprogram repetitions
(If omitted, this is handled as L1. When "L0" is set, the subprogram is not called.)
(1 to 9999 times)
,D Device No. where subprogram is stored.
The setting of ",D" depends on the model.
M98 P1 ;
P1000 P1 P2 P10
M99 ;
M99 ;
M99 ;
M02/M30 ;
M98 P2 ;
M98 P3 ;

10-level nesting
Main program:
Level 0 (P1000)
Subprogram:
Level 1 (P1)
Subprogram:
Level 2 (P2)
Subprogram:
Level 10 (P10)

A subprogram branch destination or repetition of a subprogram can be specified.
Specifying a subprogram branch destination Specifying repetition of a subprogram
Returning to main program from the subprogram with M99 command
M99 P__ ;
P Sequence No. of return destination (returned to block that follows the calling block)

P1000
M98 P1 H1;
M98 P1 H100;
M02 / M30;
P1
N1;
M99;
N100;

M99;
Main program Subprogram
M 9 9 ;
M 9 8 P 1 L 5 ;
M 0 2 / M 3 0 ;

P1000 P1
M98 P1 L5;
M02 / M30;
M99 ;
Main program Subprogram
Return after executing
five times
Executin
five time

A program registered on the SD card can be called as a subprogram. To call a program in the SD card as the subprogram, command as shown below in the main program.
(1) Sequence No. call (M198 H****) is not possible.
(2) The device that can be used for M198 subprogram call differs depending on the NC models.
M800VW/M80VW: Control unit-side SD card
M800VS/M80V: Front-side SD card
(3) Calling of the subprogram with the M198 command is limited to once in the subprogram nest.
The subprogram can be called only from the NC memory, NC memory 2 or MDI program.
(4) The section from the head of the program to the first LF (line feed code, 0x0A hexadecimal) is invalid, and is not run or displayed. Note that if the head starts from an O number (program No.), the program is valid from the head.
(5) A program registered in an SD card can be executed from only one part system. A program error will occur if an attempt is made to execute the programs in the SD card simultaneously by two or more part systems. If all the part system is reset when the error occurred, programs will be displayed as only "%" except for the first part system.
(6) For information on how to call a subprogram with "<File name>, O number", refer to "Calling the subprogram with M98 command".
Calling the subprogram with M198 command
M198 P__ L__ ;
or, M198 <File name> L__ ;
M198 Call command
P Program No. in SD card to be called as subprogram (Maximum 8 digits)
A four-digit or eight-digit program No. starting with O No. can be called by the parameter. How ever, the commanded subprogram is called when the number of digits of the command value is larger than the one set in the parameter.
<File name> A file name can be designated instead of the program No. In this case, enclose the file name inside brackets < >.
(The file name can have up to 32 characters, including the extension.)
L Number of subprogram repetitions (Maximum 4 digits)
This can be omitted. (In this case, the subprogram will be called once.)
When L0 is set, the subprogram is not called.
Returning to main program from the subprogram with M99 command
M99 ;
Note

12.1.1.2 Figure Rotation
If the same pattern is used repeatedly on a concentric circle, one of the rotating machining patterns can be registered as a subprogram. When the subprogram is called from the main program, if the rotation center is designated, a path similar to the rotary phase can be easily created on the concentric circle. This simplifies creation of the program.
The program format is shown below.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
M98 Ii1 Jj1 (Kk1) Pp1 Hh1 Ll1 ,Dd1;
or, M98 Ii1 Jj1 (Kk1) <File name> Hh1 Ll1 ,Dd1 ;
M98 Subprogram call command
Ii1 Jj1 (Kk1) Rotation center coordinates
Pp1 Program No. in subprogram to be called (Own program if omitted.)
Note that P can be omitted only during memory mode operation (NC memory, NC memory 2, high-speed program server, SD card, hard disk, USB) and MDI operation.
(Maximum 8-digit value)
A four-digit or eight-digit program No. starting with O No. can be called by the parameter.
<File name> A file name can be designated instead of the program No. In this case, enclose the file name inside brackets < >.
(The file name can have up to 32 characters, including the extension.)
(Example) M98 <BUHIN-12. RAF> ;
Hh1 Sequence No. in subprogram to be called (Head block if omitted)
Ll1 Number of subprogram repetitions
(If omitted, this is handled as L1. When "L0" is set, the subprogram is not called.)
(1 to 9999 times)
,Dd1 Subprogram device No. (0 to 4)
The subprogram in the memory can be used when ,D is omitted.
The device No. is set with the machining parameters.
j1
i1

Rotation
center
l1 times Basic figure

The first subprogram called out with subprogram call is executed at a 0 rotation angle. The path is created as commanded.
If the number of repetitions is set to two or more, the rotation angle is obtained from the called subprogram's start point, end point and rotation center coordinate. The path of the first subprogram is used as a basic figure and is rotated and arranged for the designated number of call repetitions, using the rotation center coordinates as a reference.
During figure rotation, all blocks in the subprogram are treated as to be rotated.
If the subprogram start point and end point are not on the same circle having the commanded figure rotation center coordi nates as the center, the axis will interpolate using the subprogram's end point as the start point, and the end point in the first
movement command block in the rotated subprogram as the end point.
The figure is rotated on the workpiece coordinate system, and can be shifted with the G92, G52, G54 to G59 (workpiece coordinate system shift) command.
Functions (reference position return, uni-direction positioning, etc.) on the machine coordinate system for the rotary plane axis cannot be used while the figure is rotated. However, the machine coordinate system functions can be used for axes other than the rotation plane.
A program error will occur if figure rotation is commanded during figure rotation.
Figure rotation and coordinate rotation by program cannot be commanded simultaneously.

12.1.1.3 Scaling
The shape commanded by the program can be extended or reduced to the desired size by applying a scale factor to the movement axis command position.
Command format
The scale factor ranges from 0.000001 to 99.999999 times.
(1) Scaling cannot be applied to compensation amount for tool radius compensation, tool position offset, or tool length com pensation, etc. (The compensation and offset are calculated for the scaled shape.)
(2) Scaling applies only to the axes commanded with G51 block; it does not apply to axes which have not been commanded.
When the scale factor is not assigned, the parameter setting applies instead.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
G code Function
G50
G51
Scaling cancel
Scaling ON
G51 Xx1 Yy1 Zz1 Pp1 ;
G51
Xx1,Yy1,Zz1
Pp1
: Call command
: Scaling center coordinate position
: Scale factor
Y
X
sc :
:
s1, s2, s3 :
p1, p2, p3
sc s1 p1
s2 s3
p2
p3
x 1
y 1
Scaling center
Programmed shape
Shape after scaling
Note

12.1.1.4 Axis Name Switch
The axis name switch function switches the name of command axis and control axis.
When switching the name of X-axis and Y-axis by axis name switch command, the machine performs as follow.
(Example)
G111 X Y ;
G01 X100. ; (Y axis moves to 100.mm)
G01 Y100. ; (X axis moves to 100.mm)
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
G111 Axis name1 Axis name2 ;
G111 Axis name switch command
Axis name 1,2 Axes to be performed the name switch command

When the axis name switch command is canceled, assign only "G111;" command.
<Before axis name switch> <After axis name switch>
Command axis
name
Control axis Command axis
name
Control axis
X X axis X Y axis
Y Y axis Y X axis

12.1.2 Macro Program
12.1.2.1 User Macro [Layers]
In order to carry through one integrated function, a group of control and arithmetic instructions can be used and registered as a macro program. Furthermore, subprograms with a high degree of expandability can be configured by setting these macro programs as types which are capable of conducting control and arithmetic operations using variable commands.
The program formats are given below
The macro program is called immediately by this command
The macro program is executed from the block with the axis command following this command.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M 4 4 4 4 4 4 4
L 4 4 4 4 4 4 4
Macro commands 1 ; G65 to G67
G code Function
G65
G66
G66.1
G67
Macro call (Sample call)
Macro modal call A
Macro modal call B
Macro modal call cancel
G65 P__ L__ Argument ;
or G65 <File name> L__ Argument ;
G65 : Call command
P : Program No.
A four-digit or eight-digit program No. starting with O No. can be called by the parameter.
<File name> : File name
When designating the file name, enclose the file name in angle brackets < >.
L : Number of repeats
Argument : Variable data designation
G66 P__ L__ Argument ;
or G66 <File name> L__ Argument ;
G66 : Call command
P : Program No.
A four-digit or eight-digit program No. starting with O No. can be called by the parameter.
<File name> : File name
When designating the file name, enclose the file name in angle brackets < >.
L : Number of repeats
Argument : Variable data designation

The macro program is executed with the word data of each block as the argument.
The following macro command functions are available.
(1) The variable commands are provided under the optional specifications independently of the user macros. If they are to be used, specify the optional specifications separately.
G66.1 P__ L__ Argument ;
or G66.1 <File name> L__ Argument ;
G66.1 : Call command
P : Program No.
A four-digit or eight-digit program No. starting with O No. can be called by the parameter.
<File name> : File name
When designating the file name, enclose the file name in angle brackets < >.
L : Number of repeats
Argument : Variable data designation
Arithmetic com mands
#1=<Expression> ;
Various arithmetic operations can be conducted between variables by the above.
<Expression> is a combination of constants, variables, functions and operators.
Assignment of
priority of arith metic operations
The portion in which the operator is to be given priority can be enclosed in [ ].
Up to five pairs of square parentheses [ ] including the function [ ] can be used. The normal priority of oper ation is functions and multiplication/division followed by addition/subtraction.
Control com mands
(1) If[<Conditional expres sion>]GOTO n ;
(2) WHILE[<Conditional expres sion>]
Do m ;

END m ;
The flow of the program can be controlled by these commands. "n" de notes the sequence numbers of the branching destination. "m" is an identification number, and 1 to 127 can be used. Note that only 27 nest ings can be used.

Note

Specific G commands and the miscellaneous commands (M, S, T, B) can be used for macro call.
Macro call using G codes
Simply by assigning a G code, it is possible to call user macro programs with the prescribed program number.
[Command format]
The correspondence between the G** code which performs macro call and the program number for the macro to be called is set by a parameter.
G codes and G codes with decimal points can be used for this function. Consecutive G code macros can be set all at once by designating the first G code, the first No. of the program, consecutive number of G codes, and macro call type.
Maximum of 538 G codes can be used.
In the range of G01 to G9999, 10 G codes can be set individually, and 255 G codes can be set all at once.
In the range of G0.1 to G999.9, 10 G codes can be set individually, and 255 G codes can be set all at once.
8 codes are set by parameters (G200, G300, G400, G500, G600, G700, G800 and G900)
(1) The G codes that are used in the system also can be made available for this use by parameter setting.
(2) G101 to G110 and G200 to G202 are user macro I codes. However, if a parameter is set for the G code call code, the G code call will have the priority, and these cannot be used as the user macro I.
Macro call using miscellaneous commands (M, S, T, B code macro call)
Simply by designating an M (or S, T, B) code, it is possible to call user macro programs with the prescribed program number.
(Entered M codes and all S, T and B codes can be used.)
[Command format]
The correspondence between the M** code which performs macro call and the program number for the macro to be called is set by a parameter. Among M00 through M9999, 10 M codes can be registered individually, and the number of M codes specified by the parameter can be registered by batch setting. The batch setting of consecutive macro programs as many as specified is possible by specifying the first M code, the first program number, the number of consecutive programs, and the type of macro call with the parameters.
Select codes to be entered other than the codes basically required by the machine and the following M codes.
M0, M1, M2, M30, M96 to M99, M198, and M codes for G83 (parameter setting)
(1) G commands in G code macro programs are not subject to macro calls but normal G commands. M commands in M code macro programs are not subject to macro calls but normal M commands. (The same applies to S, T and B codes.)
(2) The registration of the program number used for calling the G code macro or M (or S, T, B) code macro can be done inde pendently for each part system.
Macro commands 2
G** P__ L__ Argument;
G** : G code for performing macro call
P : Available when the macro argument L/P valid function is enabled. It is not available when the mac ro argument L/P valid function is disabled.
L : Available when the macro argument L/P valid function is enabled. It is not available when the mac ro argument L/P valid function is disabled.
Argument : Variable data designation
M** (or S**;, T**;, B**;) P__ L__ Argument;
M** (S**,T**,B**) : M (or S, T, B) code for performing macro call
P : Available when the macro argument L/P valid function is enabled. It is not available when the macro argument L/P valid function is disabled.
L : Available when the macro argument L/P valid function is enabled. It is not available when the macro argument L/P valid function is disabled.
Note
Note

This function allows the addresses L (number of subprogram repetitions) and P (calling program No.) used as commands in user macro to be used as arguments. This function is enabled by a parameter.
Followings can be used by user macro.
G65 Macro call (Sample call)
G66 Macro modal call A
G66.1 Macro modal call B
Macro call using G codes
Macro call using miscellaneous commands
ASCII macro
This function protects the common variables used for machine tool builder macro from being changed by user operation.
The common variables in the range designated with the parameter cannot be changed by user operation, such as through a machining program, screen operation or file input.
The range of common variables to be protected can be designated individually for each part system.
Macro argument L/P valid
Common variables protection

12.1.2.2 Machine Tool Builder Macro
This function enables dedicated macro programs made by MTB to be registered in the CNC. By registering the macro as a program numbered in the display, editing, and input/output of the macro programs can be protected by a password, and the confidentiality of the macro programs can be maintained.
MTB unique numbers can be registered as the password.
There are the following two methods to manage the password.
Type 1: The password is set with numbers ("2" to "99999999"). (R register setting)
Type 2: The password is set with alphanumeric characters (one to eight letters). (Parameter setting)
For Type 2, the password is not displayed on the screen, and the confidentiality of the machine tool builder macro programs is improved compared to Type 1.
Machine tool builder macro programs are stored in a dedicated area which means that the user program registration area is not reduced in the process.
When registering a machine tool builder macro, secure its space by formatting.
[Macro program memory capacity]
(*1) When the simple programming is in use means that the simple programing (NAVI MILL/NAVI Lathe) is being used and the macro is stored in the machine tool builder macro area.
(1) The memory capacity and the maximum registerable number of programs vary depending on the simple programing

macro when the simple programming macro is registered in the machine tool builder macro area.
The macro program registered as a machine tool builder macro is called out as "G65 command" or "G code macro equivalent to G65". The macro program is described in the same manner as a conventional machining program.
Variables for the machine tool builder macros can be used within the machine tool builder macros. These variables can be used commonly within the machine tool builder macro programs.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
Model
When the simple programming is in use (*1) When the simple programming is not in use
Memory capacity (KB)
Maximum registerable
number of programs (pro grams)
Memory capacity (KB)
Maximum registerable
number of programs (pro grams)
M800VW/M800VS 128 500 256 600
M80VW/M80V 80 100 208 200
Note
M800V/M80V Series Specifications Manual (Function)
12 Program Support Functions
12.1 Machining Method Support Functions
IB-1501610-G 250
Command format
User macro call (G65)
(1) The machine tool builder macro program cannot be called with G66, G66.1 or M98. Note that a machine tool builder macro program can be called from a machine tool builder macro program using M98.
Macro call with G code (G***)
Miscellaneous command macro call (M or T code macro call)
(1) If M96, M97, M98, M99, M198 or the M code for G83 S Mode (for M system only) is commanded, machine tool builder macro will not be called. The said M code will be handled as a normal miscellaneous command
G65 P__ L__ Argument ;
P : Machine tool builder macro program No.(100010000 to 199999998)
L : Number of repetitions (0 to 9999)
Argument : Variable data designation
G*** Argument;
*** : G code defined in macro definition program or G command macro parameter
Argument : Variable data designation
Use this argument when a local variable needs to be passed on to the macro program. Designate a real value after the address.
M*** Argument; (or T***)
*** : M (or T) code defined in macro definition program
Argument : Variable data designation
Use this argument when a local variable needs to be passed on to the macro program. Designate a real value after the address.
Note
Note
M800V/M80V Series Specifications Manual (Function)
12 Program Support Functions
12.1 Machining Method Support Functions
251 IB-1501610-G
12.1.2.3 Macro Interruption
This function inputs from the machine to interrupt the program currently being executed, and instead calls and executes another program.
The program can be operated flexibly enough to meet varying conditions.
There are two types of interrupts, type 1 and type 2, as described below, and they are selected using a parameter.
[Interrupt type 1] The block being executed is immediately interrupted, and the interrupt program is run immediately.
[Interrupt type 2] After the block being executed is complete, the interrupt program is executed.
Command format
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
M96 P__ H__ ; User macro interrupt valid
M96 <File name> H__ ; User macro interrupt valid
M96 Interrupt valid command
P Interrupt program number
A four-digit or eight-digit program No. starting with O No. can be called by the parameter.
<File name> File name
When designating a file name, enclose the file name in angle brackets < >.
H Interrupt sequence No.
M97 ; User macro interrupt invalid
M97 User macro interrupt end command
M96 Pp1;
M99 (Pp2) ;
Op1 ;
Np2 ;
Np2 ;
M97 ;
User macro interrupt signal (UIT)
Current program
Interrupt program
(If Pp2 is specified)

Interrupt signal (UIT) not acceptable
within a user macro program

12.1.2.4 Variable Commands
[M system]
[L system]
Programming can be given flexible and general-purpose capabilities by designating variables instead of directly assigning numbers for addresses in programs and by supplying the values of those variables as required when running the programs.
Arithmetic operations (adding, subtracting, multiplying and dividing) can also be conducted for the variables.
Variable sets M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
600 sets
700 sets
8000 sets
(600 + 100 number of part systems) sets
(7900 + 100 number of part systems) sets
Variable sets M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
600 sets
700 sets
8000 sets
(600 + 100 number of part systems) sets
(7900 + 100 number of part systems) sets

Number of variable sets specifications
(*1) The part system common variable which can be used is shown in the table below.
(1) All common variables are held even when the power is turned OFF.
(2) The common variables can be emptied by resetting or turning the power OFF when the parameters are set accordingly.
(3) The common variables are divided into the following two types.
Common variable 1: Variables that can be used commonly through the part systems.
Common variable 2: Variables that can be used commonly within that part system's program.
(4) The variable names can be set for some common variables.
(5) The common variables used for machine tool builder macro can be protected from being changed by user operation.
[Variable expressions]
[Variable definition]
Variable = expression
(1) Variables cannot be used with addresses "O" and "N".
Type Number Function
Common variable Common variables 1 Common variables 2
Can be used commonly for main,
sub and each macro program.
When using the common variables
across multiple part systems, Some
MTB specifications allow you to
designate the number of common
variables that are common to part
systems.
For 1-part sys tem specifica tions
200 sets 500 to 599 100 to 199
600 sets 500 to 999
100100 to 800199 (*1)
100 to 199
700 sets 400 to 999
100100 to 800199 (*1)
100 to 199
8000 sets
400 to 999
100100 to 800199 (*1)
900000 to 907399
100 to 199
For multi-part
system specifi cations
600 + 100 sets 400 to 999
100100 to 800199 (*1)
100 to 199 number of
part systems
7900 + 100 sets
400 to 999
100100 to 800199 (*1)
900000 to 907399
100 to 199 number of
part systems
Local variables 1 to 33 Can be used as local in macro pro gram.
System variables 1000 to Application is fixed in system.
Fixed cycle variables 1 to 32 Local variables in fixed cycle pro gram.
Variable sets Common variables 1
Variable sets
specification

600 sets #100100 to #100199 (Equivalent to # 100 to #199 in 1st part system)
#200100 to #200199 (Equivalent to # 100 to #199 in 2nd part system)
#300100 to #300199 (Equivalent to # 100 to #199 in 3rd part system)
#400100 to #400199 (Equivalent to # 100 to #199 in 4th part system)
#500100 to #500199 (Equivalent to # 100 to #199 in 5th part system)
#600100 to #600199 (Equivalent to # 100 to #199 in 6th part system)
#700100 to #700199 (Equivalent to # 100 to #199 in 7th part system)
#800100 to #800199 (Equivalent to # 100 to #199 in 8th part system)
700 sets
(600 + 100 sets)
8000 sets
(7900 + 100 sets)
Example
#m m = value consisting of 0 to 9 #100
[f] f = one of the followings in the formula # [-#120]
Numerical value m 123
Variable #543
Formula Operator Formula #110+#119
- (minus) formula -#120
[Formula] [#119]
Function [formula] SIN[#110]
Note
Note
M800V/M80V Series Specifications Manual (Function)
12 Program Support Functions
12.1 Machining Method Support Functions
IB-1501610-G 254
12.1.2.5 Extended Common Variable
In addition to common variables, 80000 sets (#10000 to #89999) of extended common variable I/II and up to 8 million sets
(8000 sets (#90000 to # 97999) 1000 files) of extended common variable III can be used.
The extended common variable I/II data is saved in NC internal data (SRAM).
The extended common variable III data is stored as the extended common variable data file on an SD card.
Extended common variable can be used commonly for main program, subprogram and each macro program.
Command format, variable expressions, and variable quotations are the same as those of variable commands.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
#500 = #90000
#90000 = #501
#90000 - #97999
#97999
#90000~
#97999
#90000 - #97999
#9000 = 1
#9000 = 0
#10000 - #89999
#502 = #10000
#89999 = #501
#9001 = 1
#9001 = 0
The contents in the work memory are not held when the
power is turned OFF.
Load file No.: 1
Custom screen
Extended common variable III Machining program Settable/displayable
Save/read
Work memory (*)
SD card
Extended common variable data file
Up to 1000 files
Load file No.: 1
Extended common
variable I Machining program
Readable/writable
Extended common
variable II
Built-in memory
(SRAM)
SRAM open area
(*)
Readable/writable
M800V/M80V Series Specifications Manual (Function)
12 Program Support Functions
12.1 Machining Method Support Functions
255 IB-1501610-G
The number of sets of each variable can be set with the parameters.
[Extended common variable I]
There are variables that handle real values (up to 10000 sets) and variables that handle integer values (up to 40000 sets).
The total data size of real-type variables and integer-type variables is up to 80000 bytes.
Character strings can be set and displayed for the integer-type variables.
The variables are held even when the power is turned OFF.
[Extended common variable II]
A part of program storage area allocated with the SRAM open parameter is used as variables.
Only integer-type variables (up to 80000 sets) can be used.

The variables are held even when the power is turned OFF.
[Extended common variable III]
There are variables that handle real values (up to 2000 sets) and variables that handle integer values (up to 8000 sets).
Up to 8 million sets (8000 sets x 1000 files) of variables can be used by preparing multiple extended common variable data files.
The variables are read/written after the extended common variable data file is read out to the work memory.
The file can be saved/read out between the work memory and the SD card by the machining program (system variable #9000), custom API, PLC signals, etc.
(1) Total number of extended common variable I and extended common variable II is up to 80000 sets.
(2) The upper limit of the extended common variable II data size is free space of SRAM open space.
(3) An SD card is required to use the extended common variable III. Use a dedicated SD card as the SD card.
Note

12.1.3 Fixed Cycles
[List of fixed cycles]
Type of fixed cycle
M system L system
G code
list: 1
G code
list: 2
G code
list: 3
G code
list: 4
G code
list: 5
G code
list: 6
G code
list: 7
Fixed cycle for drill ing
G73 G80 G80 G80 G80 G80 G80 Refer to " 12.1.3.1 Fixed Cycle for
Drilling".
Refer to " 12.1.3.2 Fixed Cycle for
Drilling (Type II)".
Refer to " 4.5.3 Synchronous Tap ping".
::::::
G89 G89 G89 G89 G89 G89 G89
G79 G83.2 G79 G83.2 G79 G83.2
G98 G98 G98 G98 G98 G98 G98
G99 G99 G99 G99 G99 G99 G99
G187 G187 G187 G187 G187 G187 G187
Special fixed cycle
G34 Refer to " 12.1.3.3 Special Fixed
G35 - - - - - - Cycle".
G36
Fixed cycle for turn ing machining
G174 G90 G77 G90 G77 G90 G77 Refer to " 12.1.3.4 Fixed Cycle for
G175 G92 G78 G92 G78 G92 G78 Turning Machining".
G176 G94 G79 G94 G79 G94 G79
Compound type fixed
cycle for turning ma chining
G70 G70 G70 G70 G70 G70 Refer to " 12.1.3.5 Compound
Type Fixed Cycle for Turning Ma chining".
Refer to " 12.1.3.6 Compound
Type Fixed Cycle for Turning Ma chining (Type II)".
Refer to " 12.1.8.8 Multi-Part Sys tem Simultaneous Thread Cut ting".
::::::
- G76 G76 G76 G76 G76 G76
G76.1 G76.1 G76.1 G76.1 G76.1 G76.1
G76.2 G76.2 G76.2 G76.2 G76.2 G76.2
Small-diameter deep hole drilling cycle
G83 - - - - - -

12.1.3.1 Fixed Cycle for Drilling
These functions enable drilling, tapping and other hole machining cycles to be assigned in a simple 1-block program.
(*1) Hole drilling can be performed by specifying the cutting reduction amount while the depth of cut in each cutting operation (step) is reduced.
(*2) Chips adhered to the tool can be removed by spindle reversal. (Chip removal)
(*3) Punchtap cycle is a function which synchronously controls the spindle and the servo axis using Punchtap-exclusive tools to cut into the workpiece and to execute tapping.
There are two levels of hole machining axis return which apply upon completion of the fixed cycle machining operation.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
M system
G code Function
G73 Step cycle (*1) (*2)

G74 Deep-hole reverse tapping cycle
Pecking reverse tapping cycle (*1)
G75 Circular cutting cycle
G76 Fine boring cycle
G80 Fixed cycle cancel
G81 Drilling, spot drilling cycle (*2)
G82 Drilling, counterboring cycle (*2)
G83 Deep hole drilling cycle (*1) (*2)
G84 Deep-hole tapping cycle
Pecking tapping cycle (*1)
G85 Boring cycle
G86 Boring cycle
G87 Backboring cycle
G88 Boring cycle
G89 Boring cycle
G187 Thread milling cycle
G84.5, G84.6, G84.8 Punchtap cycle (*3)
G74.5, G74.6, G74.8 Reverse Punchtap cycle (*3)
G code Function
G98 Initial point level return
G99 R point level return

The basic program format for the fixed cycle commands is shown below.
For details on the synchronous tapping cycle (including pecking tapping cycle and deep-hole tapping cycle), refer to " 4.5.3 Synchronous Tapping".
G8*(G7*) X__ Y__ Z__ R__ Q__ P__ F__ L__ S__ ,S__ ,I__ ,J__ D__ E__ J__ ,K__ ;
G8*(G7*) X__ Y__ Z__ R__ Q__ P__ F__ L__ S__ ,R__ ,I__ ,J__ D__ E__ J__ ,K__ ;
G8*(G7*) Hole drilling mode
X/Y Hole position data
Z/R/Q/P/F/J/,K Hole machining data
L Number of repetitions
S Spindle rotation speed
,S Spindle rotation speed during retract
,R Synchronization switch
,I Positioning axis in-position width
,J Drilling axis in-position width
D Spindle number for which chip removal is made (It can be commanded only in G81, G82, G83, and G73.)
E Frequency in which chip removal is made (It can be commanded only in G81, G82, G83 and G73.)

n q
q M03
M04
q
q
q
n
q
q
M03
M04
M03
M05
M03
M19
M19
M03
M03
M05
M03
X
Z
Y (1)
(2)
(3)
G73
Step cycle
G98 mode
Initial
point
R point
G99 mode
Z point
G74
Reverse tapping cycle
G98 mode
Initial point
R point
Z point
G75
Perfect circle cutting cycle

Initial
point
R point
Z point
G98 mode
G99 mode
G76
Fine boring cycle
Initial point
G98 mode
R point
Z point
M19 Shift
G99 mode
G81
Drilling, spot drilling cycle
Initial point
R point
Z point
G98 mode
G98 mode
G98 mode
G98 mode
G98 mode
G98 mode
G98 mode
G98 mode
G99 mode
G99 mode
G99 mode
Dwell
Dwell
Dwell
G82
Drilling, counterboring cycle
Initial point
R point
Z point
G83
Deep hole drilling cycle
Initial
point
R point
Z point
G84
Tapping cycle
Initial point
R point
Z point
G85
Boring cycle
Initial point
R point
Z point
G86
Boring cycle
Initial
point
R point
Z point
G87
Back boring cycle
Initial point
R point
Z point
G88
Boring cycle
Initial point
R point
Z point
G89
Boring cycle
Initial point
R point
Z point
G187
Thread milling cycle
Dwell
Helical
interpolation
Movement
Tool pull-out
Movement (approach)
(1) Helical grooving
(2) Tapping
(3) Retract
G84.5 (G84.6, G84.8)
Punchtap cycle

Dotted line: Tool edge path at
conventional tapping
Tool edge path at
executing Punchtap
Solid line:

These functions enable drilling, tapping and other hole machining cycles to be assigned in a simple 1-block program.
(*1) Hole drilling can be performed by specifying the cutting reduction amount while the depth of cut in each cutting operation (step) is reduced.
(*2) Chips adhered to the tool can be removed by spindle reversal. (Chip removal)
The fixed cycle mode is canceled when G80 or some G command of the G01 group is issued. Data is also cleared to zero simultaneously.
L system
G code Drilling axis Drilling work start Motion at hole bottom Retract motion Application
G80 Cancel
G83 Z Cutting feed
Intermittent feed
In-position check, Dwell Rapid traverse Deep hole drilling cycle 1 (*1) (*2)
G84
(G84.1)
Z Cutting feed In-position check, Dwell, Spindle CCW Cutting feed Tapping cycle
(Reverse tapping cycle)
Pecking tapping cycle
Deep-hole tapping cycle (*1)
G85 Z Cutting feed In-position check, Dwell Cutting feed Boring cycle
G87 X Cutting feed
Intermittent feed
In-position check, Dwell Rapid traverse Deep hole drilling cycle 1 (*1) (*2)
G88
(G88.1)
X Cutting feed In-position check, Dwell, Spindle CCW Cutting feed Tapping cycle
(Reverse tapping cycle)
Pecking tapping cycle
Deep-hole tapping cycle (*1)
G89 X Cutting feed In-position check, Dwell Cutting feed Boring cycle
G83.2 Z/X Cutting feed
Intermittent feed
In-position check, Dwell Rapid traverse Deep hole drilling cycle 2 (*2)
G185 X Circular interpola tion
- Rapid traverse Hole edge chamfering cycle
G187 X/Y/Z Cutting feed - Rapid traverse Thread milling cycle

Command format
End-face drilling
Longitudinal hole drilling
Cancel
G8* X/U__ C/H__ Z/W__ R__ Q__ P__ F__ K__ D__ S__ ,S__ M__ E__ J__ ,K__ ;
G8* Hole machining mode (G83, G84, G85)
X/U/C/H Hole position data
Z/W/R/Q/P/F/J/,K Hole machining data
K Number of repetitions
D Tool spindle number / Spindle number for which chip removal is made (It can be commanded only in G83 and G83.2.)
S Spindle rotation speed
,S Spindle rotation speed during retract
M Miscellaneous command
E Frequency in which chip removal is made (It can be commanded only in G83 and G83.2.)
G8* Z/W__ C/H__ X/U__ R__ Q__ P__ F__ K__ D__ S__ ,S__ M__ E__ J__ ,K__ ;
G8* Hole machining mode (G87, G88, G89)
Z/W/C/H Hole position data
X/U/R/Q/P/F/J/,K Hole machining data
K Number of repetitions
D Tool spindle number / Spindle number for which chip removal is made (It can be commanded only in G87 and G83.2.)
S Spindle rotation speed
,S Spindle rotation speed during retract
M Miscellaneous command
E Frequency in which chip removal is made (It can be commanded only in G87 and G83.2.)
G80 ;

The drilling cycle motions generally are classified into the following seven.
Motion 1: Rapid positioning up to the initial point of X (Z) and C axes. If the "positioning axis in-position width" is designated, the in-position check is conducted upon completion of the block.
Motion 2: Output if the C axis clamp M code is given.
Motion 3: Rapid positioning up to the R point.
Motion 4: Hole machining at cutting feed.
If the "drilling axis in-position width" is designated, the in-position check is conducted upon completion of the block.
However, in the case of deep-hole drilling cycles 1 and 2, the in-position check is not conducted with the drilling of any holes except the last one. The in-position check is conducted at the commanded hole bottom position (last hole drilling).

Motion 5: Motion at the hole bottom position. It varies depending on the fixed cycle mode. Spindle CCW (M04), spindle CW (M03), dwell, etc., are included.
Motion 6: Return to the R point.
Motion 7: Return to the initial point at rapid traverse feed.
(Motions 6 and 7 may be conducted as a single motion depending on the fixed cycle mode.)
(1) With a synchronous tap command, the in-position check is conducted in accordance with the parameters.
Whether the fixed cycle is complete with motion 6 or 7 can be specified by using either of the following G commands:
G98: Initial level return
G99: R point level return
These commands are modal. For example, once G98 is given, the G98 mode is entered until G99 is given. The G98 mode is entered in the initial state when the controller is ready.
Motion 1 Motion 2
Motion 3
R point
Motion 4
Motion 5
Motion 6
Motion 7
Initial point
Note

There are two levels of hole machining axis return which apply upon completion of the fixed cycle machining operation.
G code Function
G98 Initial point level return
G99 R point level return
n
q q
f
2f
X
Z
Y X
Y Z
(A)
C
G185
Hole chamfering cycle
Dwell
Helical
interpolation
Movement
Tool pull-out
Movement (approach)
G187
Thread milling cycle
Dwell
Dwell
Dwell
Dwell
Dwell
Dwell
Dwell
Initial point
Dwell
Initial point
Dwell
G83.2
Deep-hole drilling cycle
Z / X point
G84/88
Tapping cycle
(C-axis clamp)
Reverse
rotation of
spindle/rotary
tool Z / X point
R point
G98 mode
(C-axis unclamp)
Forward rotation of
spindle/rotary tool
Output or no output can be set using a
parameter for the C-axis clamp/unclamp
M code
The rotation direction of the tapping is
reversed using Reverse tapping cycle
G84.1 (G88.1).
G85/89
Boring cycle
(C-axis clamp)
Z / X point
R point
G98 mode
(C-axis unclamp)
Dwell

Output or no output can be set using a
parameter for the C-axis clamp/unclamp
M code
Initial point
Initial point
Z / X point
G99 mode G98 mode R point
Z / X point
G99 mode G98 mode
R point
G83/G87
Deep-hole drilling cycle (G83: Z-axis direction, G87: X-axis direction)
When Q command is given When Q command is not given
(A) Chamfering width

12.1.3.2 Fixed Cycle for Drilling (Type II)
In the longitudinal hole drilling fixed cycle, the X axis is designated as the hole drilling axis. However, in the longitudinal hole drilling fixed cycle (type II), the Y axis can be designated as the hole drilling axis with the longitudinal hole drilling axis selection function.
The relationship between the "Longitudinal hole drilling axis selection" signal's ON/OFF state and the hole drilling axis of the fixed cycle for drilling is shown below.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
G code Application Y axis cross tap function se lection signal state Hole drilling axis
G80 Cancel - -
G83 Deep hole drilling cycle 1 ON Z
OFF
G84 (G84.1) Tapping cycle ON Z
OFF
G85 Boring cycle ON Z
OFF
G87 Deep hole drilling cycle 1 ON Y
OFF X
G88 (G88.1) Tapping cycle ON Y
OFF X
G89 Boring cycle ON Y
OFF X
G83.2 Deep hole drilling cycle 2 ON Z/X
OFF

12.1.3.3 Special Fixed Cycle
These functions enable drilling, tapping and other hole machining cycles to be assigned in a simple 1-block program.
Special fixed cycles must always be used in combination with fixed cycles.
The special fixed cycles are as follows:
The tool starts at the point forming angle with the X axis on the circumference of a circle with radius R whose center is the coordinates designated by X and Y, and it drills "n" number of holes at "n" equal intervals along the circumference of that circle. The drilling data for the standard fixed cycle of the G81 or other such command is retained for the drilling operation at each hole position.
All movements between the hole positions are conducted in the G00 mode. The data is not retained upon completion of the G34 command.
As shown in the figure, the tool is positioned above the final hole upon completion of the G34 command. This means that when it is to be moved to the next position, if the command is issued with incremental position, it will be necessary to calculate the coordinate position. Thus, it is convenient to issue the command with absolute position.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
G code Function
G34 Bolt hole circle
G35 Line at angle
G36 Arc
G37.1 Grid
Bolt hole circle (G34)
G34 Xx Yy Ir J Kn ;
Xx,Yy Center position of bolt hole circle
They are affected by the G90/G91 commands.
Ir Radius "r" of circle
It is based on the least command increment and is provided with a positive number.
J Angle at the point to be drilled initially
The counterclockwise direction is taken to be positive.
Kn Number "n" of holes to be drilled
Any number of holes from 1 through 9999 can be designated; 0 cannot be assigned.
When 0 has been designated, the alarm will occur. A positive number provides positioning in
the counterclockwise direction; a negative number provides positioning in the clockwise direc tion.
I
W

Y1
X1

G0 command Position prior to
execution of G34
command
n = 6 holes

With the starting point at the position designated by X and Y, the tool drills "n" number of holes each at interval "d" in the direction forming angle with the X axis. A standard fixed cycle applies for the drilling operation at each of the hole positions and so there is a need to retain beforehand the drilling data (drilling mode and drilling data). All movements between the hole positions are conducted in the G00 mode. The data is not retained upon completion of the G35 command.
Line at angle (G35)
G35 Xx Yy Id J Kn ;
Xx,Yy The starting point coordinates
They are affected by the G90/G91 commands.
Id Interval "d"
It is based on the least command increment and when "d" is negative, drilling proceeds in the point symmetrical direction centered on the starting point.
J Angle
The counterclockwise direction is taken to be positive.
Kn Number "n" of holes to be drilled
Number "n" of holes to be drilled including the starting point; any number of holes from 1 through 9999 can be assigned.
W
Y
X
X1
d

y1
Position prior to
execution of G35
command
N=5 holes

The tool starts at the point forming angle with the X axis on the circumference of a circle with radius "r" whose center is the coordinates designated by X and Y, and it drills "n" number of holes aligned at angle interval . As with the bolt hole circle function, the drilling operation at each of the hole positions is based on a hold drilling fixed cycle and so there is a need to retain the drilling data beforehand.
All movements between the hole positions are conducted in the G00 mode. The data is not retained upon completion of the G36 command.
Arc (G36)
G36 Xx Yy Ir J P Kn ;
Xx,Yy Center coordinates of arc
They are affected by the G90/G91 commands.
Ir Radius "r" of arc
It is based on the least command increment and is provided with a positive number.
J Angle at the point to be drilled initially
The counterclockwise direction is taken to be positive.
P Angle interval
When it is positive, the tool drills in the counterclockwise direction and when it is negative, it drills in the clockwise direction.
Kn Number "n" of holes to be drilled
Any number of holes from 1 through 9999 can be assigned.
W
X1
Y1

n=6 holes
Position prior to
execution of G36
command

With the starting point at on the position designated by X and Y, this function enables the tool to drill the holes on the lattice with "nx" number of holes at parallel intervals of x to the X axis. Drilling proceeds in the X-axis direction. The drilling operation at each of the hole positions is based on a standard fixed cycle and so there is a need to command the drilling data (drilling mode and drilling data) beforehand. All movements between the hole positions are conducted in the G00 mode. The data is not retained upon completion of the G37.1 command.
Grid (G37.1)
G37.1 Xx Yy Ix Pnx Jy Kny ;
Xx,Yy The starting point coordinates
They are affected by the G90/G91 commands.
I x X-axis interval x
It is based on the least command increment; when x is positive, the intervals are provided in the positive direction as seen from the starting point and when it is negative, they are provided in the negative direction.
Pnx Number of holes "nx" in the X-axis direction

The specifiable range is 1 to 9999.
J y Y-axis interval y
It is based on the least command increment; when y is positive, the intervals are provided in
the positive direction as seen from the starting point and when it is negative, they are provided
in the negative direction.
Kny Number of holes "ny" in the Y-axis direction
The specifiable range is 1 to 9999.
W
x1
y
x
y1
Position prior to execution
of G37.1 command
nx=10 holes
ny=8 holes

12.1.3.4 Fixed Cycle for Turning Machining
By using this function, the shape normally programmed in several blocks for rough cutting, etc., in the turning machining can
be commanded in one block.
By editing the standard fixed cycle subprograms, the fixed cycle sequences can be changed by the user. The user can also
register and edit an original fixed cycle program.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
G code [L system] G code [M system] Function
G77 G174 Longitudinal cutting fixed cycle
G78 G175 Thread cutting fixed cycle
G79 G176 Face cutting fixed cycle

Straight cutting
Straight cutting in the longitudinal direction can be performed consecutively by the following block:
Taper cutting
Taper cutting in the longitudinal direction can be performed consecutively by the following block:
r: Taper part depth (radius designation, incremental position, sign is required)
Longitudinal cutting fixed cycle (G77/G174)
G77 X/U__ Z/W__ F__ ; [L system]
G174 X__ Z__ F__ ; [M system]
X/U X axis end point coordinate
Z/W Z axis end point coordinate
F Feedrate
G77 X/U__ Z/W__ R__ F__ ; [L system]
G174 X__ Z__ R__ F__ ; [M system]
X/U X axis end point coordinate
Z/W Z axis end point coordinate
R Taper part depth (radius designation, incremental position, sign is required)
F Feedrate
X
2
Z
X
1
4
3
Z W
U
2 Cutting feed
Cutting feed
Rapid traverse feed
Rapid
traverse feed
End point
coordinate
X
Z X
1
4
3
Z W
2
U
2
r
r
Cutting feed
Cutting feed
Rapid traverse feed
Rapid
traverse feed

End point
coordinate

Straight thread cutting
Straight thread cutting can be performed by the following block:
Taper thread cutting
Taper thread cutting can be performed by the following block:
r: Taper part depth (radius designation, incremental position, sign is required)
Thread cutting fixed cycle (G78/G175)
G78 X/U__ Z/W__ F/E__ Q__ ; [L system]
G175 X__ Z__ F/E__ Q__ ; [M system]
X/U X axis end point coordinate
Z/W Z axis end point coordinate
F/E Lead of Longitudinal axis (axis which moves most) direction
Q Thread cutting start shift angle
G78 X/U__ Z/W__ R__ F/E__ Q__ ; [L system]
G175 X__ Z__ R__ F/E__ Q__ ; [M system]
X/U X axis end point coordinate
Z/W Z axis end point coordinate
R Taper part depth (radius designation, incremental position, sign is required)
F/E Lead of Longitudinal axis (axis which moves most) direction
Q Thread cutting start shift angle
Z W
1
2
4
3
X
Z
X
U
2
Rapid traverse feed
Rapid traverse feed
Thread cutting cycle Rapid
traverse feed
End point coordinate
Z W
1
2
4
3
X
X
Z
U
2
r
End point
coordinate
Rapid traverse feed
Rapid traverse feed
Rapid
traverse feed Thread cutting
cycle

[Chamfering]
: Thread chamfering amount
Set the chamfer amount with the parameters.
The available range is 0 to 12.7 leads. It can be set with increments of 0.1L
: Thread chamfering angle
The thread chamfering angle can be set in a given parameter in 1 steps in the range of 0 to 89

Straight cutting
Straight cutting in the end face direction can be performed consecutively by the following block:
Taper cutting
Taper cutting in the end face direction can be performed consecutively by the following block:
r: Taper part depth (radius designation, incremental position, sign is required)
Face cutting fixed cycle (G79/G176)
G79 X/U__ Z/W__ F__ ; [L system]
G176 X__ Z__ F__ ; [M system]
X/U X axis end point coordinate
Z/W Z axis end point coordinate
F Feedrate
G79 X/U__ Z/W__ R__ F__ ; [L system]
G176 X__ Z__ R__ F__ ; [M system]
X/U X axis end point coordinate

Z/W Z axis end point coordinate
R Taper part depth (radius designation, incremental position, sign is required)
F Feedrate
Z X W
1
2
4
3
X
Z
U
2
End point coordinate
Cutting
feed
Rapid traverse
feed
Rapid
traverse feed
Cutting feed
X Z W
1
2 4
3
Z
X
U
2
r
End point coordinate
Rapid
traverse feed
Cutting feed
Cutting
feed
Rapid
traverse feed

12.1.3.5 Compound Type Fixed Cycle for Turning Machining
The shape normally programmed in several blocks for rough cutting, etc., in the turning machining can be commanded in one block. This function is useful for machining program simplification.
Compound type fixed cycle for turning machining are as follows:
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
G code Function
G71 Longitudinal rough cutting cycle Compound type fixed cycle for turn G72 Face rough cutting cycle ing machining I
G73 Formed material rough cutting cycle
G70 Finish cycle
G74 End face cut-off cycle Compound type fixed cycle for turn G75 Longitudinal cut-off cycle ing machining II
G76 Compound type thread cutting cycle

The finish shape program is called, and straight rough cutting is performed while intermediate path is being calculated automatically.
The path to the cycle command point after roughing along finishing shape and whether or not to retract a tool after roughing along finishing shape can be selected by parameters.
Longitudinal rough cutting cycle (G71)
G71 Ud Re Hh ;
G71 Aa Pp Qq Uu Ww Ff Ss Tt ;
Ud Cut depth (modal) ..... Can also be set with the Reversible parameter.
Increment: m or 1/10000 inch (Radius value command)
Re Retract amount (modal) ... Can also be set with the Reversible parameter.
Increment: m or 1/10000 inch (Radius value command)
Hh Pocket machining (modal) ..... Can also be set with the Reversible parameter.
0: No pocket machining
1: Pocket machining
Aa Finished shape program No. (Program being executed when omitted)
A four-digit or eight-digit program No. starting with O No. can specify the finish shape program by the parameter.
Pp Finished shape start sequence No. (program head when omitted)
Qq Finished shape end sequence No. (To the end of the program when omitted)
However, if M99 precedes the Q command, up to M99.
Uu Finishing allowance in X axis direction (If omitted, finishing allowance in X axis direction is handled as "0".)
Increment: m or 1/10000 inch (Whether diameter value or radius value is commanded depends on the parameter setting.)
Ww Finishing allowance in Z axis direction (If omitted, finishing allowance in Z axis direction is handled as "0".)
Increment: m or 1/10000 inch (Radius value command)
Ff Cutting feedrate (If omitted, cutting feedrate (modal) before G71 is applied.)
Ss, Tt Spindle command, tool command
Example of a finished shape without pocket Example of a finished shape with pocket

With the beginning of the pockets, the tool is pulled up in the 45-de gree direction with each cycle, and finally roughing along finishing shape is performed.
By setting parameters, the tool can be moved to the cycle command point at rapid traverse without roughing along finishing shape.
A method that traces the finished shape with each cycle is used for the beginning of the pockets.
Roughing along finishing shape can be performed by setting parame ters.
S: Cycle command point
A: Rough cutting start point
(R) Rapid traverse
(f) Cutting feed
G71 Ud Re H0;
G71 Pp Qq ;
p
(R)
(R)
(R)
45
(f)
(f)
(f)
X
Z
q
w
u/2
A
d
(R/f)
e
S
G71 Ud Re H1;
G71 Pp Qq ;
(f)
q
w
p
u/2
(R)
(R)
A
d
(R/f)
(f) (R)
X
Z e
S

The finish shape program is called, and rough cutting is performed in the end face direction while intermediate path is being calculated automatically.
The path to the cycle command point after roughing along finishing shape and whether or not to retract a tool after roughing along finishing shape can be selected by parameters.
Face rough cutting cycle (G72)
G72 Wd Re Hh ;
G72 Aa Pp Qq Uu Ww Ff Ss Tt ;
Wd Cut depth (modal) ..... Can also be set with the Reversible parameter.
Unit: m/1/10000 inch (Radius value command)
Re Retract amount (modal) ... Can also be set with the Reversible parameter.
Unit: m/1/10000 inch (Radius value command)
Hh Pocket machining (modal) ..... Can also be set with the Reversible parameter.
0: No pocket machining
1: Pocket machining
Aa Finished shape program No. (Program being executed when omitted)
A four-digit or eight-digit program No. starting with O No. can specify the finish shape program by the parameter.
Pp Finished shape start sequence No. (program head when omitted)
Qq Finished shape end sequence No. (To the end of the program when omitted)
However, if M99 precedes the Q command, up to M99.
Uu Finishing allowance in X axis direction (If omitted, finishing allowance in X axis direction is handled as "0".)
Increment: m or 1/10000 inch (Whether diameter value or radius value is commanded depends on the parameter setting.)
Ww Finishing allowance in Z axis direction (If omitted, finishing allowance in Z axis direction is handled as "0".)
Increment: m or 1/10000 inch (Radius value command)
Ff Cutting feedrate (If omitted, cutting feedrate (modal) before G72 is applied.)
Ss, Tt Spindle command, tool command
Example of a finished shape without pocket Example of a finished shape with pocket
With the beginning of the pockets, the tool is pulled up in the 45-de gree direction with each cycle, and finally roughing along finishing shape is performed.
By setting parameters, the tool can be moved to the cycle command point at rapid traverse without roughing along finishing shape.
A method that traces the finished shape with each cycle is used for the beginning of the pockets.
Roughing along finishing shape can be executed by setting parame ters.
S: Cycle command point
A: Rough cutting start point
(R) Rapid traverse

(f) Cutting feed
G72 Wd Re H0;
G72 Pp Qq ;
d
P
(R)
(R)
45 (R)
(f)
(f)
(f)
e
(f)
X
Z
q
w
u/2
(R) S
(R/f) A
G72 Wd Re H1;
G72 Pp Qq ;
d
P
(R)
(R)
(R)
(R)
(f)
(f)
(f)
X
e
Z
q
S
(R/f) A
w
u/2

The finish shape program is called. Intermediate path is automatically calculated and rough cutting is performed conforming to
the finish shape.
Formed material rough cutting cycle (G73)
G73 Ui Wk Rd ;
G73 Aa Pp Qq Uu Ww Ff Ss Tt ;
Ui Cutting allowance in the X axis direction
"i"
Cutting allowance when P, Q command is not given.
Modal data
Sign is ignored.
Cutting allowance is given with a radius designation.
Wk Cutting allowance in the Z axis direction
"k"
Rd Split count "d"
Aa Finish shape program No. (If it is omitted, the program being executed is assumed to be designated.)
A file name can be designated instead of address A by enclosing the file name in an gle brackets < >. (The file name can have up to 32 characters, including the exten sion.)
Pp Finished shape start sequence No. (If it is omitted, the program top is assumed to be designated.)
Qq Finished shape end sequence No. (If it is omitted, the program end is assumed to be designated.)
However, if M99 precedes the Q command, up to M99.
Uu Finishing allowance in the X axis direc tion "u"
Finishing allowance for the finish shape commanded by the address P or Q.
Sign is ignored.
Diameter or radius is designated according to the parameter.
The shift direction is determined by the shape
Ww Finishing allowance in the Z axis direc tion "w"
Ff Cutting feedrate (F function) The F, S, and T commands in the finish shape program are ignored, and the value in
the rough cutting command or the preceding value becomes effective. Ss Spindle speed (S function)
Tt Tool command (T function)
k + w
X
Z
S1
S2
S3
S
i + u/2
u/2
w
A
E
2
3
4
5
6

7
8
9
10
11
12
13
14
15
16
17
18
19
1

After rough cutting is performed by using G71 to G73, finish cutting can be performed by using the G70 command.
The F, S, and T commands in the rough cutting cycle command G71 to G73 blocks are ignored, and the F, S, and T com mands in the finish shape program become effective.
The memory address of the finish shape program executed by G71 to G72 is not stored.
Whenever G70 is executed, a program search is made.
When the G70 cycle terminates, the tool returns to the start point at the rapid traverse feed rate and the next block is read.
[(Example 1) When a sequence No. is designated]
[(Example 2) When a program No. is designated]
In either example 1 or 2, after the N100 cycle is executed, the N110 block is executed.
Finish cycle (G70)
G70 Aa Pp Qq Hh;
Aa Finished shape program No. (Program being executed when omitted)
A file name can be designated instead of address A by enclosing the file name in angle brackets < >. (The file name can have up to 32 characters, including the extension.)
Pp Finished shape start sequence No. (program head when omitted)
Qq Finished shape end sequence No. (To the end of the program when omitted)
However, if M99 precedes the Q command, up to M99.
Hh Tool feed directions when the cutting-edge angle is compensated
0: Not compensate the cutting-edge angle
1: Compensate the cutting-edge angle in the longitudinal direction (same tool feed direction as G71/G73 command)
2: Compensate the cutting-edge angle in the end face direction (same tool feed direction as G72 command)
When H address is omitted, the cutting-edge is not compensated.
When the tool shape compensation for turning is disabled, H address is ignored.
N100 G70 P200 Q300 ;
N110
N120
N200
N300
N310
~
~
~~ ~
N200 . . . . . ;
N300 . . . . . ;
Finish shape program
N100 G70 A100 ;
G01 X100 Z50 F0.5 ;
M99 ;
~
~ ~
N110 . . . . . ;
N120 . . . . . ;
O100

12.1.3.6 Compound Type Fixed Cycle for Turning Machining (Type II)
When the slotting end point coordinates, cutting depth, cutting tool shift amount, and cutting tool relief amount at the cut bottom are commanded, automatic slotting is performed in the end face direction of a given bar by G74 fixed cycle.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
Face cutting-off cycle (G74)
G74 Re ;
G74 Xx1/(Uu1) Zz1/(Ww1) Pi Qk Rd Ff ;
Re Retract amount "e" (when X/U, Z/W command is not given) (Modal)
Xx1/Uu1 B point coordinate (absolute/incremental position)
Zz1/Ww1 B point coordinate (absolute/incremental position)
Pi Tool shift amount (radius designation, incremental position, sign not required)
Qk Cut depth "k" (radius designation, incremental position, sign not required)
Rd Escape amount "d" at cut bottom
(If sign is not provided, relief is made at the first cut bottom. If minus sign is provided, relief is made not at the first cut bottom but made at the second cut bottom and later.)
Ff Feedrate
9 and 12 just before the last cycle are
executed with the remaining distance.
2, 4, 6, 8, 10, 11 and 12 are executed

at the rapid traverse feed rate.
k k k k
x
u/2
1
2 4 3
5
6 7 8
9
10
11
12
i
d
e
z w
B
Start point

When the slotting end point coordinates, cutting depth, cutting tool shift amount, and cutting tool relief amount at the cut bottom are commanded, automatic slotting is performed in the longitudinal direction of a given bar by G75 fixed cycle.
Longitudinal cutting-off cycle (G75)
G75 Re ;
G75 Xx1/(Uu1) Zz1/(Ww1) Pi Qk Rd Ff ;
Re Retract amount "e" (when X/U, Z/W command is not given) (Modal)
Xx1/Uu1 B point coordinate (absolute/incremental position)
Zz1/Ww1 B point coordinate (absolute/incremental position)
Pi Cut depth "i" (radius designation, incremental position, sign not required)
Qk Tool shift amount "k" (radius designation, incremental position, sign not required)
Rd Escape amount "d" at cut bottom
(If sign is not provided, relief is made at the first cut bottom. If minus sign is provided, relief is made not at the first cut bottom but made at the second cut bottom and later.)
Ff Feedrate
9 and 12 just before the last cycle are
executed with the remaining distance.
2, 4, 6, 8, 10, 11 and 12 are executed
at the rapid traverse feed rate.
k x
u/2
1 2
3
4 5
6
7
8
9
10
11
12 i
d
e
z w
B
i
i
i
Start point

When the thread cutting start and end points are commanded, cutting at any desired angle can be made by automatic cutting so that the cutting cross section area (cutting torque) per time becomes constant in the G76 fixed cycle.
Various longitudinal threads can be cut by considering the thread cutting end point coordinate and taper height constituent command value.
Command format
Compound type thread cutting cycle (G76)
G76 Pmra Qdmin Rd ;
G76 Xx1/Uu1 Zz1/Ww1 Ri Pk Qd Fl ;
m Cutting count at finishing (01 to 99) (modal)
r Chamfering amount (00 to 99) (modal)
Set in 0.1-lead increments.
a Tool nose angle (thread angle) (00 to 99) (modal)
Set in 1-degree increments.
dmin Minimum cut amount
When the calculated cutting depth becomes smaller than dmin, the cutting depth is clamped at dmin.
d Finishing allowance (modal)
Xx1/Uu1 X-axis end point coordinates of thread part
Absolute/Incremental position
Zz1/Ww1 Z-axis end point coordinates of thread section
Absolute/Incremental position
Ri Taper height component (radius value) at thread section
When "i" is "0", straight screw is made.
Pk Thread height
Designate the thread height in a positive radius value.

Qd Cut depth
Designate the first cutting depth in a positive radius value.
Fl Thread lead

1 cycle configuration
In one cycle, 1, 2, 5, and 6 move at rapid traverse feed and 3 and 4 move at cutting feed designated in F command.
When "Ri" is negative
When "Ri" is positive
r x
k
z w
S
u/2
1
2
3
4
5
6
a /2
(- i)
r
x
i
k
z w
S
u/2
1
2
3 4
5
6
a /2
k

a
First time d
Second time
d 2
nth time d n
Finishing allowanced
(Cut "m" times at finishing)

12.1.3.7 Small-Diameter Deep-Hole Drilling Cycle
In deep hole drilling, cutting and retract are repeated and the workpiece is machined multiple times. In addition, when PLC signals are input during cutting, the cutting for the time concerned is skipped. In this way, this cycle reduces the load applied to the tool.
Command format
The small-diameter deep-hole drilling cycle mode is established by designating the M code command which was set in the parameter.
If the G83 command is designated in this mode, the small-diameter deep-hole drilling cycle is executed.
The mode is canceled by the following conditions.
Designation of a fixed cycle cancel command (G80, G commands in Group 1)
Reset
The signal is not output in respect to the M command which changes the mode to the small-diameter deep-hole drilling mode.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
G83 Xx1 Yy1 Zz1 Rr1 Qq1 Ff1 Ii1 Pp1 ;
Xx1, Yy1 Hole drilling position
Zz1 Hole bottom position
Rr1 R point position
Qq1 Depth of cutting in each pass (designated with incremental position)
Ff1 Cutting feedrate
Ii1 Feedrate from R point to the cutting start position, the speed (mm/min) for returning from hole bottom
Pp1 Dwell time at hole bottom position

12.1.3.8 Two-Dimensional Barcode Engraving Cycle
This function is used to machine a QR code that stores an arbitrary character string on the machined surface.
When the character string to be stored in the QR code is specified, the QR code that stores the character string can be machined on the cylindrical surface or plane.
In addition to the character string, the size of the QR code can be specified by commanding a specific address.
The QR code consists of a combination of white and black squares called cells.
In this function, the QR code is expressed as a collection of dots by performing a drilling operation in the black cell part.

Therefore, the size of the cell is determined by the tool diameter and depth.
Command format
Example of machining result
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
G136 X_ Y_ Z_ _ R_ D_ F_ L_ I_ P_ K_ E_ [_] ;
X, Y, Z, Command position
R Evacuation height
D Depth
F Feedrate in cutting feed
L QR code length
I Cell interval
P QR code position (0: Top right, 1: Bottom right, 2: Top left, 3: Bottom left, 4: Center)
K QR code angle
E Error correction level (0: 7%, 1: 15%, 2: 25%, 3: 30%)
[ ] The character string to be stored in the QR code (maximum 100 characters)

Open source software
The QR Code generator library, which is the MIT license, is used for this function.
The copyright notice and permission notice of the QR Code generator library are described below.
QR Code generator library
Copyright (c) 2019 Project Nayuki
Released under the MIT license
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THE SOFTWARE IS PROVIDED "AS IS", WITHOUT WARRANTY OF ANY KIND, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE AND NONINFRINGEMENT. IN NO EVENT SHALL THE AUTHORS OR COPYRIGHT HOLDERS BE LIABLE FOR ANY CLAIM, DAMAGES OR OTHER LIABILITY, WHETHER -26- IN AN ACTION OF CONTRACT, TORT OR OTHERWISE, ARISING FROM, OUT OF OR IN CONNECTION WITH THE SOFTWARE OR THE USE OR OTHER DEALINGS IN THE SOFTWARE.

12.1.3.9 Text Engraving Cycle
This function enables to engrave arbitrary text on the machining surface. The specified text can be engraved on the plane or cylindrical surface. The size and angle of the text can be specified using specific addresses. The text thickness is determined by the tool tip shape and the engraving depth.
(Machining example)
The lower left point of the workpiece is the zero point in the workpiece coordinate system.
Machining center system
Workpiece size: W200*D100*H20 (mm)
Tool radius: 2 (mm)
Retraction height R: 2.5 (mm)
Engraving depth D: 1 (mm)
Text height H: 20 (mm)
Text interval L: 5 (mm)
Text to be machined: [MITSUBISHI]
Program example
Machining result
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
G91 G28 Z0 ; Zero point return of Z axis
G91 G28 X0 Y0 ; Zero point return of X and Y axes
G90 G0 G54 G17 X0. Y0. ; Workpiece coordinates and X-Y plane designation
G0 G43 H1 Z50. F3000 ; Tool length compensation and approach to workpiece
G135 X20. Y50. Z0. R2.5 D1. H20. L5. [MITSUBISHI] ; Text engraving cycle
G91 G0 Z50. ; Tool retraction
G91 G28 Z0 ; Zero point return of Z axis
G91 G28 X0 Y0 ;
M30 ; End command

12.1.4 Mirror Image
12.1.4.1 Mirror Image by Parameter Setting
A parameter is used to designate the axis for which the mirror image function is to be executed before the machining program is run.
When mirror image is set to ON by the parameter, an operation which is symmetrical on the left and right or at the top or bottom is performed.
Each axis has its own parameter.
12.1.4.2 Mirror Image by External Input
Signals from an external device (PLC) to request the mirror image operation either while a machining program is running or

before it is run.
When ON has been set for mirror image from an external device, an operation which is symmetrical on the left and right or at the top or bottom is performed.
Each axis has its own request signal.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L

12.1.4.3 Mirror Image by G Code
Using a program for the left or right side of a shape, this function can machine the other side of the shape when a left/right symmetrical shape is to be cut.
Mirror image can be applied directly by a G code when preparing a machining program.
The program format for the G code mirror image is shown below.
With the local coordinate system, the mirror image is applied with the mirror positioned respectively at x1, y1 and z1.
The program format for the G code mirror image cancel is shown below.
The x1, y1 and z1 indicate the axes for which the mirror image function is to be canceled and the coordinate position is ignored.
[In the case of G51.1 Xx1 ;]
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
G code Function
G50.1
G51.1
G code mirror image cancel
G code mirror image ON
G51.1 Xx1 Yy1 Zz1 ;
G51.1
Xx1,Yy1,Zz1
: Mirror image on
: Command axes and command positions
G50.1 Xx1 Yy1 Zz1 ;
G50.1
Xx1,Yy1,Zz1
: Mirror image cancel
: Command axes
X
Y
Original shape (program) Shape achieved when machining
program for the left side has been
executed after the mirror command
Mirroring axis

12.1.4.4 Mirror Image for Facing Tool Posts
With machines in which the base tool post and facing tool post are integrated, this function enables the programs prepared for cutting at the base side to be executed by the tools on the facing side.
The distance between the two posts is set beforehand with the parameter.
The command format is as follows.
When the G68 command is issued, the subsequent program coordinate systems are shifted to the facing side and the movement direction of the X axis is made the opposite of that commanded by the program. When the G69 command is issued, the subsequent program coordinate systems are returned to the base side.
The facing tool post mirror image function can be set to ON or OFF automatically by means of T (tool) commands without assigning the G68 command.
A parameter is used to set ON or OFF for the facing tool post mirror image function corresponding to the T commands.
12.1.4.5 T Code Mirror Image for Facing Tool Posts
If, when tools that correspond to tool Nos. 1 to 64 are selected (T commands), these are tool Nos. for which the facing tool post mirror image function has already been designated with a parameter, the status equivalent to G68 (facing tool post mirror image ON) is established. When the commands apply to tool Nos. for which the facing tool post mirror image function is not designated, the status equivalent to G69 (facing tool post mirror image OFF) is established.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
G code Function
G68
G69
Facing tool post mirror image ON
Facing tool post mirror image OFF

M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
Z
X

(G69)
(G68)
Programmed path
Facing side path (mirror
image ON)
Base post
Parameter for distance
between posts (radial value,
X axis only)
Facing post

12.1.5 Coordinate System Operation
12.1.5.1 Coordinate Rotation by Program
Coordinate rotation by program is used to rotate the programmed shape by the specified angle and to machine it.
Even complex shapes can be easily machined in the rotated position.
[M system]
Example
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
G68 X__ Y__ R__ ; Coordinate rotation ON
G69 ; Coordinate rotation cancel
X,Y Rotation center coordinates
R Rotation angle
X'
X
Y'
Y
R
W
W'
Rotation center coordinate (Programmed
coordinate)
Actual machining
shape
Coordinate system
before rotation
Coordinate system after rotation

[L system]
(1) This function rotates the coordinate system and realizes mainly drilling and tapping.
Example
G68.1 X__ Z__ R__ ; Coordinate rotation ON
G69.1 ; Coordinate rotation
cancel Coordinate rotation cancel
X,Y Rotation center coordinates
R Rotation angle
Note
X
Z
X
Z
W
W
Coordinate system
after rotation
Actual
machining
shape
(Programmed coordinate)
Coordinate system
before rotation
Rotation
center
coordinate
Rotation
angle

12.1.5.2 Coordinate Rotation by Parameter

If a deviation occurs between the workpiece alignment line and machine coordinate system's coordinate axis when the workpiece is mounted, the machine can be controlled by rotating the machining program coordinates according to the workpiece alignment line deviation. The coordinate rotation amount and the center of the rotation can be set with the parameters. The coordinate rotation amount can also be set with the G10 command.

As for the rotation center coordinate position, designate the position on the machine coordinate system.

All workpiece coordinate systems from G54 to G59, G54.1 rotate with the rotation command.

The machine coordinate system does not rotate.

If the setting is made on the parameter screen, the setting value will be valid at the timing of the followings:

Automatic operation: The setting values become valid from the next block after parameter settings have been configured.

Manual operation: After the parameter is set, the setting value will be valid if the PLC signal (Coordinate rotation by parameter: Manual feed coordinate system) is ON.

M850VW M830VW M850VS M830VS M80VW M80V

TypeA

M80V

TypeB

M

L

Ym

Xm

G56

G54

G55

G57

W1'

W2'

W3'

W4'

M

W1

W2

Rotation center

Rotation angle

12.1.5.3 3-Dimensional Coordinate Conversion

With the 3-dimensional coordinate conversion function, a new coordinate system can be defined by rotating and moving in parallel the zero point in respect to the X, Y and Z axes of the currently set workpiece coordinate system. By using this function, an arbitrary spatial plane can be defined, and machining on that plane can be carried out with normal program commands.

When the G68 (M system)/G68.1 (L system) command is issued, the zero point is shifted by the command value (x, y, z) in respect to the current local coordinate system. A new G68/G68.1 program coordinate system rotated by the designated rotation angle r in respect to the commanded rotation center direction (i, j, k) is created.

The local coordinate system is the same as the workpiece coordinate system when the local coordinate system offset is not ON.

The program format is as follows.

[M system]

[L system]

M850VW M830VW M850VS M830VS M80VW M80V

TypeA

M80V

TypeB

M

L

G68 X__ Y__ Z__ I__ J__ K__ R__ ;

G68 : 3-dimensional coordinate conversion mode command

X, Y, Z : Rotation center coordinates

I,J,K : Rotation center axis direction

R : Rotation angle

G69 ;

G69 : 3-dimensional coordinate conversion mode cancel command

G68.1 X__ Y__ Z__ I__ J__ K__ R__ ,E__ ;

G68.1 : 3-dimensional coordinate conversion mode command

X, Y, Z : Rotation center coordinates

I,J,K : Rotation center axis direction

R : Rotation angle

,E : Command coordinate system selection

G69.1 ;

G69.1 : 3-dimensional coordinate conversion mode cancel command

Y

X

Z

X

Z

Y

G68/G68.1 program

coordinate system

Workpiece coordinate

system Machine coordinate

system

12.1.6 Dimension Input

12.1.6.1 Corner Chamfering/Corner R

This function executes corner processing by automatically inserting a straight line or an arc by the commanded amount between two consecutive movement blocks (G01/G02/G03).

The corner command is executed by assigning the ",C" or ",R" command for the block at whose end point the corner is inserted.

When ",C" or ",R" is commanded for linear interpolation, corner chamfering or corner R can be inserted between linear blocks.

(1) If a corner chamfering or corner R command is issued specifying a length longer than the N1 or N2 block, a program error occurs.

M850VW M830VW M850VS M830VS M80VW M80V

TypeA

M80V

TypeB

M

L

Corner chamfering I/ Corner R I

Corner chamfering I Corner R I

Example Example

N1 G01 Xx1 Zz1 ,Cc1 ;

N2 Zz2 ;

N1 G01 Xx1 Zz1 ,Rr1 ;

N2 Zz2 ;

N1 G01 Xx1 Zz1 ,Cc1 ;

N2 Zz2 ;

N 2

N 1

c 1

c 1

N1 G01 Xx1 Zz1 ,Rr1 ;

N2 Zz2 ;

N 2

r 1

N 1

Note

When ",C" or ",R" is commanded in a program between linear-circular, corner chamfering or corner R can be inserted between blocks.

When the parameters are set, "I_", "K_", "C_" can be used to command chamfering instead of ",C", and "R_" can be used to command rounding instead of ",R_". (L system only)

Corner chamfering II (Linear - circular)

Corner chamfering II (Circular - linear)

Corner chamfering II (Circular - circular)

Corner chamfering II/ corner R II

Cc1

1

2

Cc1

Example:G01 X_Z_ ,Cc1;

G02 X_Z_ Ii1 Kk1;

Hypothetical corner intersection

Chamfering end point

Chamfering start point

Cc1

2

1

Cc1

Example:G03 X_Z_ Ii1 Kk1 ,Cc1;

G01 X_Z_;

Hypothetical corner intersection

Chamfering end point

Chamfering start point

2

Cc1

1

Cc1

Example:G02 X_Z_ Ii1 Kk1 ,Cc1;

G02 X_Z_ Ii2 Kk2;

Hypothetical corner intersection

Chamfering

end point

Chamfering

start point

Corner R II (Linear - circular)

Corner R II (Circular - linear)

Corner R II (Circular - circular)

2

1

Rr1

Example:
G02 X_Z_ Ii1 Kk1;
G01 X_Z_ ,Rr1;
Hypothetical corner
intersection
Corner R start point
Corner R end point
2
1
Rr1
Example: G03 X_Z_ Ii1 Kk1 ,Rr1;
G01 X_Z_;
Corner R end point
Corner R start point
Hypothetical corner
intersection
2
1
Rr1
Example: G02 X_Z_ Ii1 Kk1 ,Rr1;
G02 X_Z_ Ii2 Kk2;
Corner R start point
Corner R
start point
Hypothetical corner intersection

An E address can be used to specify the speed for corner chamfering or corner R. This enables a corner to be cut to a correct shape.
(Example)
An E address is a modal It remains effective for feeding in next corner chamfering or corner R.
An E address has two separate modals: synchronous and asynchronous feed rate modals. The effective feed rate is determined by synchronous (G95) or asynchronous (G94) mode.
If an E address is specified in 0 or no E command has been specified, the feed rate specified by an F command is assumed as the feed rate for corner chamfering or corner R.
An E address modal is not cleared even if the reset button is pressed.
It is cleared when the power is turned OFF. (In the same manner as F commands.)
Specification of corner chamfering expansion/corner R expansion
F
F
F
F
E
E
X_Z_ ;
X_Z_ ;
X
Z
G01 X_Z_ ,Cc1 Ff1 Ee1 ;
G01 X_Z_ ,Rr1 Ff1 Ee1 ;

With this command format, by means of parameter settings, corners are chamfered using the "I", "K" or "C" address without a comma, and corners are rounded using the "R" address.
The ",C" and ",R" addresses with commas can also be used.
Corner chamfering (I, K designation)
Corners are chamfered using the "I_", "K_" or "C_" address without a comma, ",".
Corners can be chamfered to any angle.
Signs, if they are provided for the corner chamfering commands, are ignored.
[Command format]
If multiple "I", "K" or "C" addresses or duplicated addresses have been designated in the same block, the last address will take effect.
If both corner chamfering and corner R commands are present in the same block, the last address will take effect.
If "C" is used as the name of an axis, corner chamfering commands cannot be designated using the "C" address.
If "C" is used as a 2nd miscellaneous function, corner chamfering commands cannot be designated using the "C" address.
Corner chamfering commands using the "I" or "K" address cannot be designated in an arc command block. "I" and "K" are the arc center commands.
Corner chamfering/corner R (I, K designation) (L system only)
N100 Xx1/Uu1 Zz1/Ww1 Ii1/Kk1/Cc1 ;
N200 Xx1/Uu1 Zz1/Ww1 ;
Xx1/Uu1 X axis end point coordinate
Zz1/Ww1 Z axis end point coordinate
Ii1/Kk1/Cc1 The length from the hypothetical corner intersection to the chamfering start point or chamfering end point is designated using the "I", "K" or "C" address.
N100
0 Z
X
N200
i, k, c
i, k, c Chamfering start point
Chamfering end point
Hypothetical corner
intersection

Corner R ("I", "K" designation)
Corners are rounded using the "R_" address without a comma, ",".
Corners can be rounded to any angle.
Signs, if they are provided for the corner R commands, are ignored.
[Command format]
If both corner chamfering and corner R commands are present in the same block, the last address will take effect.
Corner R commands using the "R" address cannot be designated in an arc command block. "R" is regarded as the arc radius command in such a block.
N100 Xx1/Uu1 Zz1/Ww1 Rr1 ;
N200 Xx1/Uu1 Zz1/Ww1 ;
Xx1/Uu1 X axis end point coordinate
Zz1/Ww1 Z axis end point coordinate
Rr1 Radius of corner R arc
N100
0 Z
X
N200
r
Hypothetical corner
intersection
Corner R end point
Corner R start point

Shown below are the operations of manual interruption during corner chamfering or corner R.
With an absolute command and manual absolute switch ON:
With an incremental command or manual absolute switch OFF:
Interrupt during corner chamfering/Interrupt during corner R
N1 G28 XZ;
N2 G00 X40. Z120.;
N3 G03 X140.Z70. K-50. ,R20. F100 ;
N4 G01 X40. Z20.
:
Amount of interruption
Path with interruption
Path without interruption
N1 G28 XZ;
N2 G00 U40. W120.;
N3 G03 U100. W-50. K-50. ,R20. F100 ;
N4 G01 U-100.W-50. ;
:
Amount of interruption
Path with interruption
Path without interruption
X
140.
40.
20. 70.
N4
N3
120.
Z
(mm)
X
140.
40.
20. 70.
N4
N3
120.
Z
(mm)

12.1.6.2 Linear Angle Command
The end point coordinates are automatically calculated by assigning one element (one component of the selected plane) of the end point coordinates and the linear angle.
Example
(1) If the axis "A" or 2nd miscellaneous function "A" is used, address "A" is treated as the axis "A" command or the 2nd mis cellaneous function, respectively.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
G17 Xx1 Aa1 ;
G17 Yy1 Aa1 ;
G17 Plane selection
Xx1,Yy1 1 element of the end point coordinate
Aa1 Angle
X

Y
X
Y

End point (Automatically
calculated with operation)
Start point
Note

12.1.6.3 Geometric Command
Geometric I
When it is difficult to calculate the intersection point of two straight lines in a continuous linear interpolation command, the end point of the first straight line will be automatically calculated inside the CNC and the movement command will be controlled, provided that the slope of the first straight line as well as the end point coordinates and slope of the second straight line are commanded.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L

X
Z 1st straight line
Intersection point
(automatic calculation)
2nd straight line
Angle Angle
Horizontal axis
End point
Current position

Geometric IB
With the geometric IB function, the contact and intersection are calculated by commanding an arc center point or linear angle in the movement commands of two continuous blocks (only blocks with arc commands), instead of commanding the first block end point.
[Two-arc contact]
[Linear-arc (arc-linear) intersection]
[Linear-arc (arc-linear) contact]
X
Z 1st arc
Contact point
(automatic
calculation)
2nd arc
Radius
Radius
Arc center
End point
Current position
Arc center
X
Z
1st block (arc)
Intersection point
(automatic calculation)
2nd block (linear)
Arc center
End point Current position
Arc center
Current position
Intersection point
(automatic calculation)
End point
2nd block (arc)
1st block (linear)
X
Z
2nd block
(arc)
Contact point
(automatic calculation)
2nd block (linear)
Radius
End
point
Current
position
Current position
Contact point
End (automatic calculation)
point

1st block (arc) 1st block (linear)
Radius

12.1.6.4 Polar Coordinate Command
With this function, the end point position is commanded with the radius and angle.
Command format
Program example
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
G16 ; Polar coordinate command mode ON
G15 ; Polar coordinate command mode OFF
G1x ;
G16 ;
Plane selection for polar coordinate command (G17/G18/G19)
Polar coordinate command mode ON
G9x G01 Xx1 Yy1 F2000 ;
:
Polar coordinate command
G9x: Center selection for polar coordinate command (G90/G91))
G90: The workpiece coordinate system zero point is the polar coordinate center.
G91: The current position is the polar coordinate center.
x1: 1st axis for the planeThe radius commanded
y1: 2nd axis for the planeThe angle commanded

G15 ; Polar coordinate command mode OFF
y1
x1
X
Y
Commanded position
(end point)
For G90/G17(X-Y plane)
Plus
Minus Present posit

12.1.7 Axis Control
12.1.7.1 Chopping
12.1.7.1.1 Chopping
This function continuously raises and lowers the chopping axis independently of the program operation when workpiece contours are to be cut. It can be used for grinding operations using machining centers, for instance.
Which of the axes is to serve as the chopping axis is set by a parameter beforehand.
Chopping operation
(1) The upper dead point position, lower dead point position and number of cycles are set and the start and stop commands are designated by input signals from the user PLC.
(2) The setting for the number of cycles differs according to the motor, inertia and other factors.
The chopping operation is performed as follows.
The axis moves from the base position to the upper dead point by rapid traverse.
Next, the axis moves repeatedly from the upper dead point to the lower dead point and then from the lower dead point to the upper dead point. (Sinusoidal waveforms)
The feed rate is tailored to achieve the number of cycles set for the up/down motion.
[Chopping override]
Override in 1% increments from 0% to 100% can be applied to the chopping operation.
(1) Bear in mind that the override increment differs according to the machine specifications.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
The chopping operation is initiated by setting the upper dead point position, lower dead point position and number of cy cles (number of up/down movements per minute) and press ing the chopping start switch.
Grindstone
Chopping action
Workpiece
Base position
pper dead point
ower dead point
Start Stop
Rapid traverse Rapid
traverse
Note
Note

12.1.7.2 Normal Line Control
This function controls the swiveling of the C axis (rotary axis) so that the tool is always pointing in the normal line direction for

the X and Y axes movement commands during program operation. It can be used for machining hale, for sewing operations involving sewing machines, carpets, etc. It is valid for only one C axis (rotary axis).
At the block seams, the C axis turning is controlled so that the tool faces the normal line direction at the next block's start point.
During arc interpolation, the C axis turning is controlled in synchronization with the operation of arc interpolation.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
G code Function
G40.1
G41.1
G42.1
Normal line direction control cancel
Normal line direction control left ON
Normal line direction control right ON
C-axis center (rotary axis)
C axis swiveling
Tool tip position
C-axis center (rotary axis)
Tool
Tool end position

12.1.7.3 Circular Cutting
In circular cutting, a system of cutting steps are performed: first, the tool departs from the center of the circle, and by cutting along the inside circumference of the circle, it draws a complete circle, then it returns to the center of the circle. The position at which G12 or G13 has been programmed serves as the center of the circle.
Command format
When the G12 command is used (path of tool center)
0 -> 1 -> 2 -> 3 -> 4 -> 5 -> 6 -> 7 -> 0
When the G13 command is used (path of tool center)
0 -> 7 -> 6 -> 5 -> 4 -> 3 -> 2 -> 1 -> 0
(1) Circular cutting is carried out on the plane which has been currently selected (G17, G18 or G19).
(2) The (+) and (-) signs for the compensation amount denote reduction and expansion respectively.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
G12/(G13) Ii Dd Ff ;
G12
G13
Ii
Dd
Ff
: Circular cutting command CW (clockwise)
: Circular cutting command CCW (counter clockwise)
: Radius of complete circle
: Compensation No.
: Feed rate
Y
X
1
2
3
4
5
6
7
0
Radius
of circle
Compen sation
amount
Note

12.1.7.4 Vibration Cutting Control
While cutting machining is performed, the chips can be dispersed by applying vibration in synchronization with the spindle rotation to the feed axis so that an air-cutting zone is made. Difficult-to-cut workpieces such as stainless steel can be machined easily and at high speed. In addition, this function can reduce the heat generated by machining and extend tool life.
(1) The vibration cutting extension unit is required.
(2) The vibration axis is the only one in the commanded part system. (Only the specified single axis vibrates even for the cut ting command of two or more axes such as a taper.)
(3) This function may affect the surface quality of the workpiece as the axis vibration. Use it for the machining such as rough machining.
[Lathe system]
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB

M
L
Note
0 180 360 540 720
X
Z
The tool performs machining
while vibrating in the cutting
direction.
When an air-cutting zone is
made, granule-size chips are
dispersed.
Cutting is completed at the first rotation, thus this
zone is regarded as an "air-cutting zone" at the
second rotation.
Second rotation's
machining path
Cutting zone at the first rotation Zone that is cut at the first rotation
Air-cutting zone that is
made by cutting at the
second rotation
Zone that is cut at
the second rotation
and dropped as a
chip
Feed axis
position
Spindle rotation position (degree)

12.1.8 Multi-Part System Control
12.1.8.1 Timing Synchronization Between Part Systems
Multiple machining programs can be operated independently at same time for multi-axis and multi-part system mixed control
CNC. This function enables the timing synchronization between part systems or the operation of only one part system while
the machining programs are being operated independently for each part system.
Command format
Timing synchronization with ! code
Timing synchronization with ! code is also valid among three part systems and more.
Timing synchronization with M code
The range of M code for the timing synchronization is determined with the minimum and maximum values set with the
parameter beforehand.
(1) The timing synchronization can be disvalued with the parameter setting and "Timing synchronization between part sys tems ignored" signal. When a part system to be waited for a simultaneous operation is not operating, the currently operat ing part system will move on to the next block without executing timing synchronization. This function is useful when
conducting a program check on each part system.
(2) The timing synchronization command is normally assigned as a separate command. However, if a movement command
and M, S or T command have been assigned in the same block, a parameter is set to decide whether timing synchroniza tion is executed upon executing of the movement command and M, S or T command, or the movement command and M,
S or T command are executed upon completion of timing synchronization.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
!n (!m...)L ;
!n !m : Part system number for timing synchronization (Multiple command can be performed.)
Follows the parameter if the part system number is omitted.
L : Timing synchronization number (0 to 9999)
M*** ;
*** : M code for timing synchronization
Pi 1
Pi 1 Pi 2
Pn 1 Pn 2
Pm 1 Pm 2
Pn 1
Pm 1
Pi 2 Pi 2 Pi 2
!n !m L1;
!i !m L1;
!i !n L1; Simultaneously start after
timing synchronization block
Timing
synchronization
wait
wait
Part system i
program
Part system i
Part system n
Part system m
Simultaneously start
Part system n
program
Part system m
program
Timing

synchronization
Note

12.1.8.2 Start Point Designation Timing Synchronization
Multiple machining programs can be operated independently at same time for multi-axis and multi-part system mixed control CNC. This function enables the timing synchronization with the position in the movement block while the machining programs are being operated independently for each part system.
When a workpiece is being delivered from part system 1 to part system 2, the movement operation in part system 2 can be started in the middle of the part system 1 tool post movement with this function so that the machining time can be reduced.
A part system for start point designation timing synchronization can be designated by adding ! code on the command block G115 and G116.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L

Command format
The other part system starts first when timing synchronization is executed.
The own part system waits for the other part system to move and reach the designated start point, and then starts.
When the start point designated by G115 is not on the next block movement path of the other part system, the own part system starts once the other part system has reached each start point axis coordinate position.
Start point designation timing synchronization Type 1 (G115)
!n L G115 X Z C ;
!n : Part system number for timing synchronization
L : Timing synchronization number (0 to 9999)
G115 : G command
X Z C : Start point
(Designated with the axis and workpiece coordinate value of other part system.)
!1 G0 X_
!2 G115
!2 G115
!1 G0 X_
Part system 2
(Other part system)
Part system 1
(Own part system)
Part system 2
(Other part system)
Part system 1
(Own part system)
Designated start point
Designated start point
Timing synchronization
Timing synchronization
X
Z
Z passes through.
X also passes
through.
: Movement
: Command point
: Actual start point

Command format
The own part system starts first when timing synchronization is executed.
The other part system waits for the own part system to move and reach the designated start point, and then starts.
When the start point designated by G116 is not on the next block movement path of the own part system, the other part system starts once the own part system has reached each start point coordinate position.
Start point designation timing synchronization Type 2 (G116)
!n L G116 X Z C ;
!n : Part system number for timing synchronization
L : Timing synchronization number (0 to 9999)
G116 : G command
X Z C : Start point (Designated the axis and workpiece coordinate value of the own part system.)
!1
!2 G116
!2 G116
!1
G0 X_
G0 X_
Part system2
(Other part system)
Part system 1
(Own part system)
Part system2
(Other part system)
Part system1

(Own part system)
Designated start point
Designated start point
Timing synchronization
Timing
synchronization
X
Z
Z passes through.
X also passes
through.
: Movement
: Command point
: Actual start point

12.1.8.3 Mixed Control
12.1.8.3.1 Mixed Control (Cross Axis Control)
Performs the mixed control (cross axis control) by G command or PLC signal.
Any axis to be replaced by another axis between part systems.
This makes it possible to perform operations which are not possible with regular axis configurations; for instance, tools which are provided only on part system 1 can be used for machining on part system 2.
This function cannot be used with arbitrary axis exchange control.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
C1 C2
Z2
Z1
Z1
X1
X2
X1
X2
Z2
C1 C2
Mix X1 axis and
X2 axis.
1st part system
(X1, Z1, C1)
2nd part system
(X2, Z2, C2)
1st part system 2nd part system
(X1, Z2, C2)

12.1.8.3.2 Arbitrary Axis Exchange Control
An arbitrary axis can be exchanged freely between part systems in the multiple part systems.
The machining can be freer in the multiple part systems by exchanging an axis which can be commanded for machining programs in each part system.
This makes it possible to perform operations which are not possible with regular axis configurations; for instance, tools which are provided only on the 1st part system can be used for machining on the 2nd part system.
This function cannot be used with the mixed control (cross control).
[Using X1 axis in part system 2]
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
Before axis exchange After axis exchange
1st part system (X1, Z1, C1)
Machining with 1st spindle
2nd part system (X2, Z2, C2)
Machining with 2nd spindle
1st part system (Z1, C1)
Machining with 1st spindle
2nd part system (X1, Z2, C2)
Machining with 2nd spindle
2nd tool 2nd tool

1st tool 1st tool
C1 C2
Z2
Z1
X1
X2
X1
Z2
C1 C2

Command format
Arbitrary axis exchange command
Commands the arbitrary axis exchange by G140.
Arbitrary axis exchange return command
Returns the control right of the axis, exchanged by the previous arbitrary axis exchange command (G140) in the commanded part system, to the state before the axis exchange.
Reference axis arrange return command
Returns the control right of the axis, exchanged by the arbitrary axis exchange command (G140) in the commanded part system, to the power-on state.
(1) For G code list 6 and 7, replace G140, G141 and G142 with G165, G166 and G167.
G140 command address = axis address command address = axis address...;
Command ad dress
: Designate the command address used in commands such as the movement command with one al phabetical character set to the parameter after the arbitrary axis exchange command (G140).
Axis address : Designate the axis name for arbitrary axis exchange with two alphanumeric characters set to the pa rameter.
G141 ;
G142 ;
Note

12.1.8.4 Control Axis Superimposition
12.1.8.4.1 Control Axis Superimposition
In the multi-part system, an axis in a part system can be superimposed on an axis in another part system and can be controlled. This is effective when machining by the 1st part system (X1, Z1) and the 2nd part system (X2, Z2) are executed simultaneously for the machine configuration where a workpiece moves by a movement command to the Z axis direction. The machining of the reference axis part system (the 1st part system) and the superimposed axis (the 2nd part system) can be operated simultaneously with no need to fix the workpiece position for machining in the superimposed part system (the 2nd part system).
The control axis superimposition can be commanded with G code or PLC signal.
Command format
Superimposition start command
Superimposition end command
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
Reference
axis:
The basic in the control axis superimposition function (moves only by its own axis command)
Superim posed axis:
The axis which moves including the reference axis movement in the control axis superimposition function (moves by reference axis or/and own axis command).
G126 Superimposed axis name = Reference axis name ",P"__ ;
Superimposed
axis name
: Specify the superimposed axis name for the superimposition control with 2 alphanumeric characters set to the parameter.
Reference axis
name
: Specify the reference axis name for the superimposition control with 2 alphanumeric characters set to the parameter.
Put the symbol "-" at the beginning of the reference axis name for synchronizing the superimposed axis with the reference axis in the reverse direction.
, (comma) : Specify as delimiter when the address is needed to be assigned after "superimposed axis name = reference name".
P : Superimposed axis workpiece coordinate system designation (The command range of the coordinate value is mm/inch. The decimal point command is valid.)
G126 Superimposed axis name;
Superimposed
axis name
: Specify the name of the superimposed axis which is working for the superimposition control with 2 alphanumeric characters set to the parameter.

While using the control axis superimposition function, the workpiece zero point of the superimposed axis moves according to the movement amount of the reference axis. Because the superimposed axis tries to maintain the position in the workpiece coordinate system, it moves as much as the movement amount of the reference axis.
Superimposition control among 3 axes
Superimposition can be controlled among 3 axes.
3 axes tandem superimposition is the condition that an axis is the superimposed axis and becomes the reference axis for another superimposed axis at same time. The first superimposed axis is "1st superimposed axis" and the other axis is "2nd superimposed axis" for 3 axes tandem superimposition.
12.1.8.4.2 Arbitrary Axis Superimposition Control
The arbitrary control axis in other part system can be moved by superimposing on the movement command for the arbitrary control axis in own part system.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M

L
X1 G126 Z2 = Z1;
Z1
Z1
Z2
Z2
1st tool post
2nd tool post
Before
movement
After
movement
Command :
Reference axis :
Superimposed axis :
(Reference axis)
(Superimposed axis)
X1
G126 Z2 = Z1; Z1
:
G126 Z3 = Z2;
Z1
Z2
Z3
Z2
Z3
1st tool post
2nd tool post
(Reference axis)
(1st superimposed axis)
(2nd superimposed axis)
Before
movement
Command :
Reference axis :
1st superimposed axis :
2nd superimposed axis :
After
movement

12.1.8.5 Control Axis Synchronization Between Part Systems
Synchronization control enables an arbitrary control axis in the other part system to move in synchronization with the movement command assigned to an arbitrary control axis.
The direction in which the axis is to move synchronously can also be reversed using a parameter.
[Example of machining to synchronize Z2 axis to Z1 axis in the 1st part system (X1, Z1) and 2nd part system (Z2) (Lathe system)]
[Example of machining to synchronize X2 axis to X1 axis, Y2 axis to Y1 axis, and Z2 axis to Z1 axis in the 1st part system (X1, Y1, Z1) and 2nd part system (X2, Y2, Z2) (Machining center system)]
During synchronization, as the synchronized axis moves in synchronization with the reference axis regardless of automatic operation or manual operation, the movement command cannot be issued to the synchronized axis.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
X1
Part system 1 (X1, Z1) Part system 2 (Z2)
Z1 (Reference axis) Z2 (Synchronized axis)
Part system 1X1,Y1,Z1) Part system 2 X2,Y2,Z2)
Y1 (Reference axis) Y2 (Synchronized axis)
Z1
(Reference axis) Z2
(Synchronized axis)
X1 (Reference axis) X2 (Synchronized axis)

There are two types of control axis synchronization between part systems depending on the command method: Control axis synchronization between part systems I (G command) and control axis synchronization between part systems II (PLC signal).
The method is chosen depending on the parameter setting.
Command format (Control axis synchronization between part systems I)
Synchronization start command
Synchronization end command
G125 Synchronized axis name = Reference axis name ;
Synchronized
axis name
: Command the axis name to be operated as synchronized axis under the control axis synchronization between part systems with two alphanumeric characters set to the parameter.
Reference axis
name
: Command the axis name to be operated as reference axis under the control axis synchronization be tween part systems with two alphanumeric characters set to the parameter.
G125 Synchronized axis name ;
Synchronized

axis name
: Command the axis name to be operated as synchronized axis under the control axis synchronization between part systems with two alphanumeric characters set to the parameter.

12.1.8.6 Balance Cut
Multiple machining programs can be operated independently at same time for multi-axis and multi-part system mixed control CNC. This function enables the operation start timing synchronization between tool posts of two part systems.
When workpiece that is relatively long and thin is machined on a lathe, deflection may result, making it impossible for the workpiece to be machined with any accuracy. In cases like this, the deflection can be minimized by holding tools simultaneously from both sides of the workpiece and using them in synchronization to machine the workpiece (balance cutting). This method has an additional advantage: since the workpiece is machined by two tools, the machining time is reduced.
This function enables the movements belonging to two different part systems to be synchronized so that this kind of machining can easily be accomplished.
Command format
Balance cut command ON (modal)
* !n LI can be omitted.
Balance cut command OFF (modal)
(1) The G code varies depending on the G code list.
G14 and G15 are modal commands. When the G15 command is assigned, the timing synchronization is being executed in all of the cutting feed command blocks until the G14 command is assigned or until the modal information is cleared by the reset signal. The timing synchronization is possible in all blocks by the parameter.
Whereas synchronization is possible only with the next block when using the code "!" of timing synchronization between part systems, the balance cutting function provides synchronization (at the block start timing) with multiple consecutive blocks.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
!n L__ G15 ;
!n : Part system number for balance cut
Follows the parameter if the part system number is omitted.
L : Timing synchronization number (0 to 9999)
G14 ;
G code list other than 6 or 7 G code list 6, 7
Balance cut command ON G15 G68
Balance cut command OFF G14 G69
$1
$3
Note
:
:
:
:
T 0 1 01;
G00 X_ Z_;
!3G15;
G01 Z_ F0. 4;
T 0 1 0 2;
G00 X_ Z_;
!1G15
G01 Z_ F0. 4;
Part system 1 program Part system 3 program

12.1.8.7 Common Memory for Part Systems
For a machine with multiple part systems, the common variables and tool compensation memory which exist for each part system can be made common for all part systems by setting the parameters.
Common variable
In the multi-part system, normally the common variables #100 to #199 are used for each part system, and variables #500 to #999 are common for the part systems. When this function is valid, the common variables #500 to #999 also become variables for each part system.
To use part or all of the common variables #100 to #199 and #500 to #999 commonly for all part systems, set the number of parameters to be used commonly for the part systems in variables #100 to #199 and #500 to #999.
As for the variables designated to be common to part systems, the data for part system 1 is used.
Tool compensation memory
When this specification is valid, the tool compensation memory used for operation in the 2nd or following part system changes to be used with the part system 1 data. Thus, the 2nd part system and following data is not used when the common data is used for the part systems.
This function is only for the lathe system and supported up to 2 part systems.
(1) The setting (such as number of axes and axis names) for the tool compensation amount of part system 1 and part system 2 must be the same. If the settings differ, the setting of part system 1 will be applied.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
Note

12.1.8.8 Multi-Part System Simultaneous Thread Cutting
Multi-part system simultaneous thread cutting allows different part systems to perform thread cutting simultaneously on one spindle.
Multi-part system simultaneous thread cutting has two commands; the command (G76.1) for simultaneously cutting threads in multiple places, which is known as "multi-part system simultaneous thread cutting cycle I", and the command (G76.2) for simultaneously cutting a thread by two part systems, which is known as "two-part system simultaneous thread cutting cycle II".
Chamfering is available for multi-part system simultaneous thread cutting cycle I and two-part system simultaneous thread cutting cycle II.
Multi-part system simultaneous thread cutting cycle I (G76.1) 2-Part System Simultaneous Thread-Cutting Cycle II (G76.2)
1st part system
3rd part system
4th part system
1st part system
2nd part system

12.1.8.8.1 Two-Part System Simultaneous Thread Cutting
When G76.2 is issued in the 1st and 2nd part systems, waiting is done until G76.2 is issued in each part system.
The thread cutting cycle starts when the commands are aligned properly.
G76.2 assumes the same thread cutting, and deeply cuts in with the cutting amount using 1st part system and 2nd part system alternately.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
: :
:
:
: :
$1 $2
G00 X Z ;
G76.2 ; G00 X Z ;
G76.2 ;
K

a
Finishing allowance d
d
d2
dn
Cutting with 1st
part system
Cutting with
1st part
system
Cutting with
1st part system
Cutting with 2nd
part system
Cutting with 2nd
part system Cutting with
2nd part
system

Command format
(1) Two-part system simultaneous thread cutting cycle II (G76.2) can be commanded in part system 1 or 2 only. A program error will occur when issuing the command in the other part systems.
G76.2 X/U__ Z/W__ R__ P__ Q__ A__ F__ ;
X/U : X-axis end point coordinates of thread part
Z/W : Z-axis end point coordinates of thread section
R : Taper height component at thread section
P : Thread height
Q : Cut depth
A : Thread cutting start shift angle
F : Thread lead
Note

12.1.8.8.2 Multi-Part System Simultaneous Thread Cutting
If G76.1 is given to multiple part systems, each part system waits for G76.1 to be commanded.
The thread cutting cycle starts when the G76.1 commands are aligned properly.
[When "J134" is commanded in $1, $3 and $4]
Command format
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V

TypeB
M
L
G76.1 X/U__ Z/W__ R__ P__ Q__ J__ F__ ;
X/U : X-axis end point coordinates of thread part
Z/W : Z-axis end point coordinates of thread section
R : Taper height component at thread section
P : Thread height
Q : Cut depth
J : Part system for simultaneous thread cutting
Ones digit: Part system number for the 1st set
Tens digit: Part system number for the 2nd set
:
Ten-millions digit: Part system number for the 8th set
F : Thread lead
:::
: :
:
:
: :
: :
$1 $3 $4
G00 X Z ;
G76.1 J134;
G00 X Z ;
G76.1 J134;
G00 X Z ;
G76.1 J134;
Thread cutting will start simultaneously
after waiting for the 1st, 3rd and 4th part
systems.
Command for the 3rd part
system
Command for the 4th part system
Command for the 1st part system

12.1.8.9 Multi-Part System Program Management
In a system composed of multiple part systems, this function manages the program storage method, program search method and program input/output.
This facilitates the management of such machining programs that run simultaneously in multiple part systems.
This enables separate programs that run simultaneously in multiple part systems to be handled under one common name.
The parameter enables or disables this function.
NC memory (*1) or NC memory 2 is the only device compatible with this function. (*2)
(*1) MDI and machine tool builder's macro are included.
(*2) NC memory is a different device from NC memory 2, therefore the program on each device is handled separately even when the program number or program name is the same as that of the other device.
[Multi-part system program management INVALID]
[Multi-part system program management VALID]
$1: Part system 1
$2: Part system 2
$n: Part system n
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
100.PRG
200.PRG
300.PRG
M D I
Common for part
systems
Common for part systems
Machining programs
Program management
common for part systems
Program management
common for part systems
Programs are shared and
managed across part
systems.
Programs are shared and
managed across part
systems.
100.PRG
200.PRG
300.PRG
$1
100.PRG
200.PRG
300.PRG
$2
100.PRG
200.PRG

300.PRG
$n
M D I
$1 $2 $n
. . .
. . .
Program management for each part system Program management for each part system
Machining programs
Programs are managed for each part system separately.
Each part system can have its own program Nos.
Programs are managed for each part system separately.
Same program Nos. can be
managed across part systems
in batch

12.1.8.10 Synchronization Between Part Systems
12.1.8.10.1 Single Block Between Part Systems
Single block operation between part systems is the function for executing single block operation while maintaining the synchronization among the part systems when two or more part systems are operated in the multi-part system. When one part system has been stopped by single block stop, the other part systems pause in the cycle operation.
In the normal single block, the synchronization between the part systems differs from the synchronization during the continuous operation because the other part systems continue the operation without stop even a part system is stopped by single block stop, and the tool interference could occur in some cases. The synchronization between part systems can be maintained the same as the continuous operation by the single block operation between part systems.
Valid/invalid can be switched with the PLC signal.
[3 part systems lathe]
Stop: Single block stop
Pause: Cycle operation pause
$1: Part system 1
$2: Part system 2
$3: Part system 3
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
$1
$2
$3
(Single block operation valid)
Block separation
Stop Pause
(Single block operation valid)
(Single block operation valid)
Pause Stop Pause Pause
Stop
Stop Stop
Stop
Pause
Pause
Pause
Pause Pause
Pause Pause
Pause

12.1.8.10.2 Dwell/Miscellaneous Function Time Override
Override can be applied to dwell time and miscellaneous function finish wait time of all part systems. The synchronization between part systems can be maintained when the multiple machining programs are operated with override in the multi-axis and multi-part system mixed control CNC.
If a machining program that performs cutting-off machining in part system 2 ($2) after the completion of turning machining in part system 1 ($1) is executed with override when this function is invalid, part system 1 and part system 2 will be out of synchronization and the machining may not be operated properly.
The differences on the start timing for each command are shown in (1) to (3) when executing the machining with the part system 1 ($1) and part system 2 ($2) as shown in the figure below.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
G01 Z G01 X
T1000 G00 Z G01 X
G04
$1
$2
G01 X
G01 X
G01 Z
T1000 G00 Z
$1
$2

$1:
$2:
$1:
$2:
$1:
$2:
$2
$1
$1
$2
Time
(1) Override 100%
Turning machining
Tool exchange
Turning machining
Tool positioning
Standby
Cutting-off machining
Tool exchange
$1
$2 G00 Z
G01 Z G01 X G04
T1000 G01 X
(2) When this function is invalid
Override 50%
Only feed time doubled in the operation with override 50%.
Part systems are out of synchronization and the cutting-off
machining starts during turning machining.
$1
$2
G01 Z G01 X G04
T1000 G00 Z G01 X
(3) When this function is valid
Override 50% Feed time, dwell time and miscellaneous function finish wait time double in the
operation with override 50%.
The synchronization between part systems are maintained and the cutting-off
machining stars after the completion of the turning machining.

12.1.8.10.3 Synchronization Between Part Systems OFF
Synchronization between part systems and feedrate change are turned OFF in a part of a machining program to eliminate a synchronization relation between part systems by single block operation with part systems synchronized or variation of a machining program feedrate by dry run. This function is effective mainly in blocking the cycle operation pause or feedrate variation in only some of part systems when the sub part system control II function is being used. When loader control and ATC control which are operated independently of machining are performed with a sub program or sub part system control, this function enables a operation with synchronization between part systems in machining part systems and an independent operation in sub part systems.
ON/OFF can be switched with the system variable or the PLC signal.
The behaviors with synchronization between part systems OFF is as follows:
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
Single block function between part systems The pause is not made from other part systems.
The other part systems do not pause with block stop.
Dwell/miscellaneous function time override Override is invalid.
$1
P21 P22
SUB
P11 P12
$2
P11
G144
P12
! L10;
%
P21
P22
! L10;
%
SUB
M99
%
Waiting
Sub part system
Machining program
Part system 2 ($2)
Machining program
Part system 1 ($1)
Calling sub part
system
Simultaneous
machining
with $1 and $2

Simultaneous
machining
with $1 and $2
Loader control
Synchronization between
part systems ON
Synchronization between
part systems OFF
Synchronization between part systems OFF
Sub Part system
Machining program
Synchronization
relation between
part systems is
needed.
No synchronization
relation between
part systems is
needed.

12.1.8.11 Sub Part System Control I
This function activates and operates any non-operating part system (sub part system) in the multi-part system.
Sub part system control I can be used in the same manner as calling subprogram in a non-operating part system. An auxiliary axis machining program can be controlled in the sub part system by commanding Sub part system control I (G122) from the main part system.
In the usage example below, the tool positioning starts to the machining start point at the same time (time T1) as the start of gantry retract by using Sub part system control I (G145) in the flow from feeding the workpiece to moving to cut start position in order to reduce the cycle time.
Select whether main part system or sub part system for each part system in Sub part system control I. When using a part system as sub part system, by setting the operation mode to "Sub part system I operation mode" with the PLC signal and commanding Sub part system control I (G122) from an operating part system, it is possible to activate the part system in the sub part system I operation mode as sub part system.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
($1)
Z1
X3
Z3
X1
T1 T2
T1 T2
T2:
T1:
($2)
($1)
(1) Feed the workpiece
(1) Feed
workpiece
(1) Feed
workpiece
Wait for completion of sub part
system
(2) Clamp
workpiece
(2) Clamp
workpiece
(3) Retract gantry
(3) Retract gantry
(4) Move to cut start position
(4) Move to cut start
position
Machining process when Sub part system control is OFF
Machining process when Sub part system control is ON
Main part system
Tool
Workpiece
Gantry
Time when gantry retract is started
Time when gantry retract is completed
Sub part system
Main part system
Activate sub part system
(2) Clamp (3) Retract the gantry
the workpiece
(4) Move to
cut start position
Flow of machining
Time
Time

Command format
Activate sub part system
Command an activation of sub part systems by Sub part system control I with G122.
Complete sub part system
Command M99 in sub part system to complete an operation of sub part system.
Cancel the standby status for completion of sub part system
When a sub part system is activated in the completion wait method (D0 command), it is possible to cancel the standby status for completion of sub part system in a calling part system by commanding G145 in the sub part system program. G145 is ignored in a sub part system activated in the parallel control method (D1 command).
(1) For G code list 6 and 7, replace G122 with G153 and G145 with G155.
G122 A__ P__ Q__ K__ D__ B__ H__ Argument;
Or, G122 <File name> P__ Q__ K__D__ B__ H__ Argument;
A : Program No. (1 to 99999999 or 100010000 to 199999998)
<File name> : File name of program (up to 32 characters)
P : Start sequence number (Head of program if omitted.)
Q : End sequence number (To end of program (M99) if omitted.)
K : Number of repetitions (1 to 9999)
D : Synchronization control (0/1)
B : Sub part system identification number (1 to 7)
H : Sub part system reset type (0/1)
Argument : Argument of sub part system local variable (Setting rage of local variable (decimal point command is valid))
M99 ;
G145 ;
Note

12.1.8.12 Sub Part System Control II
This function activates and operates any non-operating part system (sub part system) in the multi-part system.
Using sub part systems enables parallel operation between an operating program in main part system and a program called with Sub part system control II (G144).
Sub part systems does not have any controllable axes soon after the activation. When an axis is needed to be controlled in sub part system, command the arbitrary axis exchange control (G140) to give sub part system authorization to control the axis.
In the machine configuration below, when performing the back drill machining (machining (a)) and the cutting by tool (machining (b)), machining (a) and (b) are operated in order only with main part system, however machining (a) and (b) can be operated simultaneously by using the sub part system in addition to the main part system. This results in a shorter cycle time. In the usage example below, T2 (time when machining (b) is completed) is shorter.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
X1
A1
Z1
Tool
Back drill
(a)
(b)
(a)
(b)
T2:
T1: T1 T2
T1 T2
Machining process when Sub part system control is OFF
Machining process when Sub part system control is ON
Back drill machining
Activation of
sub part system
Operating in main part system
Operating in sub part system
Operating in main part system
Cutting by tool Operating in main part system
Back drill machining
Cutting by tool
Time when back drill machining is completed
Time when cutting by the tool is completed
Time
Time

Command format
Activate sub part system
Command an activation of sub part systems by Sub part system control II with G144.
Complete sub part system
Command M99 in sub part system to complete an operation of sub part system.
Cancel the standby status for completion of sub part system
When a sub part system is activated in the completion wait method (D0 command), it is possible to cancel the standby status for completion of sub part system in a calling part system by commanding G145 in the sub part system program. G145 is ignored in a sub part system activated in the parallel control method (D1 command).

(1) For G code list 6 and 7, replace G144 with G154 and G145 with G155.
G144 A__ P__ Q__ K__ D__ B__ H__ Argument;
or, G144 <File name> P__ Q__ K__D__ B__ H__Argument;
A : Program No. (1 to 99999999 or 100010000 to 199999998)
<File name> : File name of program (up to 32 characters)
P : Start sequence number (Head of program if omitted.)
Q : End sequence number (To end of program (M99) if omitted.)
K : Number of repetitions (1 to 9999)
D : Synchronization control (0/1)
B : Sub part system identification number (1 to 9999)
H : Sub part system designation (1 to number of part system that can be used)
Argument : Argument of sub part system local variable (Setting rage of local variable (decimal point command is valid))
M99 ;
G145 ;
Note

12.1.8.13 Loader Control Part System
This function operates a part system which is dedicated to a carrier loader (hereinafter referred to as "loader") in the machining center system. This function can be used to isolate the loader system from other controls, allowing your machine to operate in automatic operation with CNC machining program.
Compared to when a loader is operated in a workpiece machining part system, the cycle time can be improved because the loader-specific process (such as placing the next workpiece and carrying the machined workpiece) is performed independently while a workpiece is being machined.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L

12.1.9 Data Input/Output by Program
12.1.9.1 Parameter Input by Program
The parameters set from the setting and display unit can be changed in the machining programs.
The command format is as follows.
(1) The sequence of addresses in a block must be as shown above.
When an address is commanded two or more times, the last command will be valid.
(2) The part system No. is set in the following manner: "1" for 1st part system, "2" for 2nd part system, and so forth.
If the address S is omitted, the part system of the executing program will be applied.
As for the parameters common to part systems, the command of part system No. will be ignored.
(3) The axis No. is set in the following manner: "1" for 1st axis, "2" for 2nd axis, and so forth.
If the address A is omitted, the 1st axis will be applied.
As for the parameters common to axes, the command of axis No. will be ignored.
(4) Address H is commanded with the combination of setting data (0 or 1) and the bit designation () (0 to 7).
(5) Only the decimal number can be commanded with the address D.
The value that is smaller than the input setting increment (#1003 iunit) will be round off to the nearest increment.
(6) The character string must be put in angled brackets "<" and ">".
If these angle brackets are not provided, the program error will occur.
Up to 63 characters can be set.
(7) G10L70 or G11 must be commanded alone in a block. A program error will occur if it is not commanded alone in a block.
(8) The settings of the parameters with (PR) in the parameter list will be enable after the power is turned OFF and ON.
Refer to the parameter list in your manual.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
G10 L70; Data setting start command
P__ S__ A__ H __ ; Bit parameter
P__ S__ A__ D__ ; Numerical value parameter
P__ S__ A__ <character
string> ; Character string parameter
G11 ; Data setting end command
P Parameter No.
S Part system No.
A Axis No.
H Bit type data
D Numeric type data
<character string> Character string data
Note

12.1.9.2 Compensation Data Input by Program
The value of the workpiece coordinate systems selected can be set or changed by program commands.
The tool offset amounts, which have been set from the setting and display unit, can be input by program commands.
[M system]
The position of the workpiece coordinate systems selected by the G54 to G59 commands can be set or changed by program commands.
During the absolute command (G90) mode, the commanded offset amount serves as the new offset, whereas during the

incremental command (G91) mode, the currently set offset plus the commanded offset serves as the new offset.
Command format
(1) L2 can be omitted. If the command P is omitted, the specified offset is treated as that of the currently selected workpiece coordinate system.
(2) L20 is used to designate the extended workpiece coordinate system.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
Workpiece coordinate system offset input
G code Function
G10 L2 P0 External workpiece coordinate system setting
G10 L2 P1 Workpiece coordinate system 1 setting (G54)
G10 L2 P2 Workpiece coordinate system 2 setting (G55)
G10 L2 P3 Workpiece coordinate system 3 setting (G56)
G10 L2 P4 Workpiece coordinate system 4 setting (G57)
G10 L2 P5 Workpiece coordinate system 5 setting (G58)
G10 L2 P6 Workpiece coordinate system 6 setting (G59)
G10 L20 Pn (n=1 to 300) Extended workpiece coordinate system setting (G54.1 P1 to P300)
G10 L2(L20) P__ X__ Y__ Z__ ;
G10 L2(L20) : Workpiece coordinate system setting command
P : Workpiece coordinate system No.
X, Y, Z : Setting value
Note

[L system]
When the command is given with absolute positions (X, Z and R), the offset is updated with the values. On the other hand, when the command is given with incremental positions (U, W and C), the currently set offset plus the commanded offset serves as the new offset.
Command format
(1) L2 can be omitted. If the command P is omitted, the specified offset is treated as that of the currently selected workpiece coordinate system.
(2) L20 is used to designate the extended workpiece coordinate system.
G code Function
G10 L2 P0 External workpiece coordinate system setting
G10 L2 P1 Workpiece coordinate system 1 setting (G54)
G10 L2 P2 Workpiece coordinate system 2 setting (G55)
G10 L2 P3 Workpiece coordinate system 3 setting (G56)
G10 L2 P4 Workpiece coordinate system 4 setting (G57)
G10 L2 P5 Workpiece coordinate system 5 setting (G58)
G10 L2 P6 Workpiece coordinate system 6 setting (G59)
G10 L20 Pn (n=1 to 48) Extended workpiece coordinate system setting (G54.1 P1 to P48)
G10 L2(L20) P__ X__ (U__) Z__ (W__) ;
G10 L2(L20) : Workpiece coordinate system setting command
P : Compensation No.
X,Z : Compensation amount for each axis (absolute)
U,W : Compensation amount for each axis (incremental)
Note

The tool compensation amounts, which have been set from the setting and display unit, can be input by program commands.
The command format differs between the [M system] and the [L system].
[M system]
Type I
Type II
Command format
[L system]
Command format
(1) L11 can be omitted.
Tool compensation input
G code Function
G10 L10 Tool compensation amount
G code Function
G10 L10 Tool length shape compensation amount
G10 L11 Tool length wear compensation amount
G10 L12 Tool radius shape compensation amount
G10 L13 Tool radius wear compensation amount
G10 L__ P__ R__ ;
G10 L : Command for setting compensation amount
P : Compensation No.
R : Compensation amount
G code Function
G10 L10 Tool length compensation amount
G10 L11 Tool wear compensation amount
G10 L10(L11) P__ X__ (U__) Z__ (W__) [Additional axis]__ [2nd additional axis]_R__
(C__) Q__ ;
G10 L10(L11) : Command for setting compensation amount
P : Compensation No.
X,Z : Compensation amount for each axis (absolute)
U,W : Compensation amount for each axis (incremental)
Additional axis : Additional axis compensation amount (absolute)

2nd additional
axis : 2nd additional axis compensation amount (absolute)
R : Nose R compensation amount (absolute)
C : Nose R compensation amount (incremental)
Q : Hypothetical tool nose point
Note

By setting the parameter in M system, the compensation amount, Nose R compensation amount and tool nose point for three basic axes can be written with the following G10 format. In the absolute command (G90) mode, the commanded compensation amount is new compensation amount. In the incremental command (G91) mode, new compensation amount is obtained by adding the commanded compensation amount to the currently set compensation amount.
Command format
Shape compensation
Wear compensation
Command format
M system turning tool compensation input
G10 L12 P__ X__ Y__ Z__ R__ Q__ ;
P : Tool shape compensation number (1 to the number of tool offset sets)
X : X axis compensation amount
Y : Y axis compensation amount
Z : Z axis compensation amount
R : Tool nose radius compensation amount
Q : Hypothetical tool nose point number
G10 L13 P__ X__ Y__ Z__ R__ Q__ ;
P : Wear compensation number (1 to the number of tool offset sets)
X : X axis compensation amount
Y : Y axis compensation amount
Z : Z axis compensation amount
R : Tool nose radius compensation amount
Q : Hypothetical tool nose point number
Cancelling the compensation input
G11 ;

12.1.9.3 Tool/Material Shape Input by Program
Tool shape data on the tool management screen (M system) and workpiece shape data (L system) of the 3D solid program check (hereinafter referred to as 3D check) can be set with the machining program. There is no need to input the tool/ workpiece shape on the screen for 3D check.
L100 command format
Tool shape data on the tool management screen can be set by the machining program with this function.
(1) Omitted addresses cannot be set.
(2) Omitting address P or T causes the program error.
(3) On graphic check of M80V Series, tool shape data of tool management screen will be rewritten.
(4) On graphic check of M800V and M80VW Series, the specified data is reflected only in the drawing on the graphic check screen. Tool shape data will not be rewritten.
(5) This function can be used only with the M system.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
G10 L100; Data setting start command
P__ T__ K__ D__ H__ I__ J__ C__ ; Data setting command
G11 Data setting end command
P Data number (The maximum number varies depending on the number of tool management data sets.)
T Tool number (0 to 99999999)
K Type
D Shape data 1 (decimal point allowed)
H Shape data 2 (decimal point allowed)
I Shape data 3 (decimal point allowed)
J Shape data 4 (decimal point allowed)
C Tool color
Note

L101 command format
Workpiece shape data can be set by the machining program for 3D solid program check with this function.
(1) Omitted addresses cannot be set.
(2) Omitting address C causes the program error.
(3) On graphic check of M80V Series, workpiece shape data of tool management screen will be rewritten.
(4) On graphic check of M800V and M80VW Series, the specified data is reflected only in the drawing on the graphic check screen. Workpiece shape data will not be rewritten.
(5) This function can be used only with the L system.
G10 L101; Data setting start command
C__ R__ D__ E__ L__ A__ K__ W__ F__ P__ H__ I__ J__ ; Data setting command
G11 Data setting end command
C Workpiece shape
R Number of angles (3 to 99)
D Outside diameter of workpiece (0.001 to 99999.999 mm, 0.0001 to 9999.9999 inch)

E Inside diameter of workpiece (0.001 to 99999.999 mm, 0.0001 to 9999.9999 inch)
L Workpiece length (0.001 to 99999.999 mm, 0.0001 to 9999.9999 inch)
A Installation angle (0.000 to 359.999)
K Front face workpiece zero point position Z (-1 or 0.000 to 99999.999 mm, -1 or 0.0000 to 9999.9999 inch)
W Back face workpiece zero point position Z (-1 or 0.000 to 99999.999 mm, -1 or 0.0000 to 9999.9999 inch)
F Workpiece color
P Machining surface color
H Tapping/Thread machining surface color
I Interference surface color
J Cross-section color
Note

12.1.9.5 API Section and Sub-Section Nos. Input/Output by Program
NC internal data can be read/written by specifying the section number, sub-section number, part system number and axis number using system variables.
12.1.9.6 R-Navi Data Input by Program
This function enables the R-Navi setup parameters to be configured from a machining program.
After the parameters have been configured from the program, you can check the values or select the machining surface from the setup screen.
Command format
For details on R-Navi, refer to " 17.2.17 R-Navi".
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
G10 L110 ; Workpiece data setting
G10 L111 ; Machining surface data setting

12.1.10 Machining Modal
12.1.10.1 Tapping Mode
When tapping mode commands are issued, the NC system is set to the following internal control modes required for tapping.
Cutting override is fixed at 100%.
Deceleration commands at joints between blocks are invalid.
Feed hold is invalid.
Single block is invalid.
"In tapping mode" signal is output.
The tapping mode command will be canceled with the following commands:
Exact stop check mode (G61)
Automatic corner override (G62)
Cutting mode (G64)
High-accuracy control mode command (G61.1/G08P1) [M system]
The machine is in the cutting mode status when its power is turned ON.
12.1.10.2 Cutting Mode
When a cutting mode command is issued, the NC system is set to the cutting mode that enables smooth cutting surface to be achieved. In this mode, the next block is executed continuously without the machine having to decelerate and stop between the cutting feed blocks: this is the opposite of what happens in the exact stop check mode (G61).
The cutting mode command will be canceled with the following commands:
Exact stop check mode (G61)
Automatic corner override (G62)
Tapping mode (G63)
High-accuracy control mode command (G61.1) [M system]
The machine is in the cutting mode status when its power is turned ON.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
G code Function
G63 Tapping mode ON
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
G code Function
G64 Cutting mode ON

12.1.11 High-Speed Parts Machining
12.1.11.1 Rapid Traverse Block Overlap

This function enables the next block to start (overlap) without waiting for positioning (G00) or reference position return (G28/G30).
Consequently, cycle time of machining including operation of positioning (G00) or reference position return (G28/G30) can be reduced.
Adjust the overlap amount with command by machining program or with the parameter, and specify it as in-position width for rapid traverse block overlap.
Also, the operation does not decelerate between blocks if the movement command continues in same direction.
The overlap is also valid when the block after G00 is G01 instead of G00 or G28/G30.
It is invalid when G00 or G28/G30 is commanded after G28 continuously.
This function has two modes. The modes can be selected with the parameter.
Mode 1: The cycle time can be reduced in normal acceleration/deceleration control.
Mode 2: It is also effective to reduce the cycle time in pre-interpolation acceleration/deceleration control. (Recommended)
[Example of application of rapid traverse block overlap in tool exchange operation]
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
N2(G28)
N2(G28)
N1(G00)
N1
N1 N2 N3
N2
Program path
Command path from NC
Interim point
In-position width
Speed
Speed
Time
Time
Cycle time is reduced

[Example of application of rapid traverse block overlap in continuous drilling operation]
Command format
The command format to switch the rapid traverse block overlap function for G00 to valid/invalid is as follows:
G0.5 P1 J__ K__ ; Rapid traverse block overlap for G00 is valid
J Liner axis in-position width (0.000 to 1000.000 (mm))
K Rotary axis in-position width (0.000 to 1000.000 ())
G0.5 P0 ; Rapid traverse block overlap for G00 is invalid
N3(G00)
N4(G00)
N5(G01)
N2(G00)
N1(G01)
N1
N1 N2 N3 N4 N5
N2 N3 N4 N5
Program path
Command path from NC
In-position width
Speed
Speed
Time
Time
Cycle time is reduced

12.2 Machining Accuracy Support Functions
12.2.1 Automatic Corner Override
When cutting with tool radius compensation, this function applies feedrate override automatically to decrease cutting load at the inside corner cutting or the inside cutting of corner R.
There are automatic corner override (G62) and inside arc override as the automatic corner override.
Automatic corner override (G62) is valid until the tool radius compensation cancel (G40), exact stop check mode (G61), high accuracy control mode (G61.1), tapping mode (G63), or cutting mode (G64) command is issued.
Inside arc override is valid without automatic corner override (G62) during tool radius compensation mode (G41/G42). This can also be enabled with the parameter setting when the tool radius compensation mode (G41/G42) and the automatic corner override mode (G62) are active.
[Automatic corner override (G62) inside corner]
: Maximum angle at inside corner
Ci : Deceleration range (IN)
Operation
When G62 command is not given:
When the tool moves in the order of (1) -> (2) -> (3) in the figure above, the machining allowance at (3) is larger than that at (2) by an amount equivalent to the area of shaded section S and so the tool load increases.
When G62 command is given :
When the inside corner angle in the figure above is less than the angle set in the parameter, the override set into the parameter is automatically applied in the deceleration range Ci.
Command format
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V

TypeB
M
L
G62; Automatic corner override

(1)
(2) (3)
S

Ci
workpiece Machining allowance
Tool
Programmed path
(finished shape)
Workpiece surface
shape
Tool center path
Machining
allowance

12.2.2 Deceleration Check
This function leads the machine to decelerate and stop at the join between axis movement blocks before executing the next block. This is effective to alleviate the machine shock and prevent the corner rounding when the feed rate of the control axis changes suddenly.
There are three methods for deceleration check: command deceleration check method, smoothing check method and in position check method.
The conditions for executing deceleration check are described below.
[Deceleration check in the rapid traverse mode]
In the rapid traverse mode, the deceleration check is always performed when block movement is completed before executing the next block.
[Deceleration check in the cutting feed mode]
In the cutting feed mode, the deceleration check is performed at the end of block when any of the conditions below is applicable before executing the next block.
When the G61 (exact stop check mode) command has been selected.
When the G09 (exact stop check) is issued in the same block.
When the error detect switch (PLC signal) is ON.
Without deceleration check With deceleration check
N010 G01 X100 ;
N011 G01 Y-50 ;
Corner rounding occurs because the N011 block is started before the N010 command is completely finished.
N010 G09 G01 X100 ;
N011 G01 Y-50 ;
A sharp edge is formed because the N011 block is started after the N010 command is decelerated and stopped.

The following deceleration check methods can be selected with the parameter to each feed command during rapid traverse command and cutting feed command.
Command deceleration check method
Deceleration is completed after the deceleration check time(*1) has passed after the interpolation.
Smoothing check method
Deceleration is completed after the deceleration check time(*1) has passed after the interpolation and all axes smoothing has become zero.
In-position check method
Deceleration is completed after the deceleration check time(*1) had passed after the interpolation, all axes smoothing has become zero and all axes have become in-position.
(*1) Deceleration check time: automatically calculated from the acceleration/deceleration mode and time constant.
NC command speed Deceleration check time
Interpolation is completed Block is completed
Speed
Block is completed
NC command speed Deceleration check time
Interpolation is completed
Speed
NC command speed
Actual motor
rotation speed
Deceleration check time
Interpolation is completed
Speed
Block is completed

12.2.2.1 Exact Stop Check Mode
A deceleration check is performed when the G61 (exact stop check mode) command has been selected.
G61 is a modal command. The deceleration is applied at the end points of each block to all the cutting commands (G01 to G03) subsequent to G61 and the in-position status is checked.
For details on the deceleration check, refer to " 12.2.2 Deceleration Check".
12.2.2.2 Exact Stop Check
A deceleration check is performed when the G09 (exact stop check) command has been designated in the same block.
The G09 command should be issued in the same block as the cutting command. It is an non-modal command.
For details on the deceleration check, refer to " 12.2.2 Deceleration Check".
12.2.2.3 Error Detection
To prevent rounding of a corner during cutting feed, the operation can be changed by turning an external signal switch ON so that the axis decelerates and stops once at the end of the block and then the next block is executed.
The deceleration stop at the end of the cutting feed block can also be commanded with a G code.
For details on the deceleration check, refer to " 12.2.2 Deceleration Check".
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L

12.2.2.4 Programmable In-Position Check
,I address is used to designate the in-position width for a linear interpolation command from the machining program.
The in-position width designated with a linear interpolation command is valid only in cases when the deceleration check is performed, such as:
When the error detect switch is ON.
When the G09 (exact stop check) is issued in the same block.
When the G61 (exact stop check mode) command has been selected.
As with linear interpolation, ",I" address is used to designate the in-position width for a positioning command from the machining program.
[In-position check operation]
After it is verified that the position error of the block in which the deceleration check is performed by the positioning command (G00: rapid traverse) and the linear interpolation command (G01) is less than the in-position width of this command, the execution of the next block is commenced.
12.2.2.5 Automatic Error Detection
This function is effective to reduce the extension of cycle time for the cutting at the corner and realize the high edge accurate machining.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
G01 Xx1 Zz1 Ff1 ,Ii1 ;
Xx1, Zz1
Ff1
,Ii1
: Linear interpolation coordinate position of each axis
: Feed rate
: In-position width
G00 Xx1 Zz1 ,Ii1 ;
Xx1, Zz1
,Ii1
: Positioning coordinate position of each axis
: In-position width
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L

12.3 High-Speed and High-Accuracy Functions [kBPM: k Block per Minute]
12.3.1 High-Speed Machining Mode
12.3.1.1 High-Speed Machining Mode I (G05P1) Maximum [kBPM]
This function runs a machining program that approximates a free curve with micro segments at a high speed.
This is effective in increasing the speed of machining dies with a free curve.

Command format
In addition to the G05P0 command, the high-speed machining mode I is canceled with the following commands.
High-speed machining mode II (G05P2)
High-speed High-accuracy control I (G05.1Q1)
High-speed High-accuracy control II (G05P10000)
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M 33.7 33.7 33.7 33.7 33.7 33.7 16.8
L 33.7 33.7 33.7 33.7 33.7 33.7
G05 P1 ; High-speed machining mode I start
G05 P0 ; High-speed machining mode I cancel

Micro segment capacity
G1 block micro segment capacity (unit: kBPM)
The above performance applies under the following conditions.
6-axis system (including spindle) or less
1-part system
Three axes or less commanded simultaneously in G01
Block containing only axis name and movement amount (Does not contain macro or variable command)
During G61.1 high-accuracy control mode or during cutting mode (G64)
It may not be possible to attain the specified feed rate if deviated from the above conditions.
During the high-speed machining mode I, the blocks are pre-read. If the length of the block is sufficiently short in respect to the command speed, and enough to be completed with one interpolation calculation, several blocks may be combined and converted into a block length that can be completed with one interpolation.
Override, maximum cutting speed clamp, single block operation, dry run, manual interruption, graphic trace and high-accu racy control mode are valid even during the high-speed machining mode I.
Mode Command Maximum feed rate when G1 block is executed
High-speed machining mode G05 P1 33.7 (M800VW/M80VW/M800VS/M80V TypeA)
16.8 (M80V TypeB)
: Program command
: Command when program commands are com
Command in high-speed machining mode I

12.3.1.2 High-Speed Machining Mode II (G05P2) Maximum [kBPM]
This function runs a machining program that approximates a free curve with micro segments at a high speed.
Higher micro segment processing capacity can make the cutting speed faster, resulting in reducing the cycle time and improving the quality of the machining surface.
This function can be used simultaneously in up to two part systems.
Command format
In addition to the G05P0 command, the high-speed machining mode II is canceled with the following commands.
High-speed machining mode I (G05P1)
High-speed High-accuracy control I (G05.1Q1)
High-speed High-accuracy control II (G05P10000)
High-speed High-accuracy control II (G05P20000)
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M 168 168 168 168 101 101 67.5
L 168 168 168 168 101 101
G05 P2 ; High-speed machining mode II start
G05 P0 ; High-speed machining mode II cancel

Micro segment capacity
The following is the micro segment capacity while high-speed machining mode II is valid.
Micro segment processing capacity (unit: kBPM)
(*1) This value indicates the micro segment processing capacity in the time constant expansion system or in the following modes.
Tool center point control (G43.4/G43.5)
Inclined surface machining (G68.2/G68.3)
Workpiece installation error compensation (G54.4P1 to 7)
3-dimensional tool radius compensation (G41.2/G42.2)
Spatial error compensation
Variable-acceleration pre-interpolation acceleration/deceleration
Spline interpolation 2
3D machine interference check
Tool cutting point control (G43.8/G43.9)
Real-time 3D machine interference check
(*2) This value indicates the micro segment processing capacity when Smooth fairing is ON.
(*3) This value indicates the micro segment processing capacity in tolerance control mode.
(*4) When Smooth fairing is ON and the control cycle is twice the standard cycle, a program error occurs.
(1) The above performance applies under the following conditions.
Three axes or less commanded simultaneously in G01
Block containing only axis name and movement amount (Does not contain macro or variable command)
During tool radius compensation OFF (G40)
It may not be possible to attain the specified feed rate if deviated from the above conditions.
Number of part systems/
Number of axes

Number of high-speed high accuracy control-enabled
part systems
M850V / M830V M80VW / M80V Type-A M80V Type-B
M L M L M L
1-part system
(8 axes or less)
1 part system 168
135 (*3)
101 (*1)
67.5 (*2)(*4)
168
135 (*3)
101 (*1)
101
67.5 (*1)
33.7 (*2)(*4)
101
67.5 (*1)
67.5
1-part system
(9 axes or more)
2-part system
1 part system 135
101 (*3)
67.5 (*1)
33.7 (*2)(*4)
135
101 (*3)
67.5 (*1)
101
67.5 (*1)
33.7 (*2)(*4)
101
67.5 (*1)

2 part systems 67.5
33.7 (*2)
67.5 33.7 33.7
3-part system 1 part system 33.7 33.7
2 part systems 33.7 33.7
4-part system
(16 axes or less)
1 part system 33.7 33.7
2 part systems 33.7 33.7
4-part system
(17 axes or more)
5-part system or more
1 part system 16.8
2 part systems 16.8
Note
M800V/M80V Series Specifications Manual (Function)
12 Program Support Functions
12.3 High-Speed and High-Accuracy Functions [kBPM: k Block per Minute]
355 IB-1501610-G
12.3.2 High-Accuracy Control
12.3.2.1 High-Accuracy Control (G61.1/G08)
Machining errors caused by delays in control systems can be inhibited. This function is useful for machining which needs to make an edge at a corner or reduce an error from an inner route of curved shape. In high-accuracy control, acceleration/deceleration is performed not to cause machining error by pre-reading blocks and acceleration/deceleration is automatically performed according to a machining shape so that the machining error is inhibited with minimizing an extension of machining time.
High-accuracy control is valid in High-accuracy control command (G08P1/G61.1), High-speed high-accuracy control I command (G05.1Q1), High-speed high-accuracy control II command (G05P10000), High-speed high-accuracy control III command (G05P20000) and Spline interpolation command (G61.2).
One or more of the functions in the table below must be ON. Program error occurs if the high-accuracy control is commanded with all of functions OFF status.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
Function name Details
High-accuracy control This function enables High-accuracy control.
High-speed high-accuracy control I This function enables High-speed high-accuracy control I.
High-speed high-accuracy control II This function enables High-speed high-accuracy control II.
High-speed high-accuracy control III This function enables High-speed high-accuracy control III.
Spline interpolation This function enables Spline interpolation.
High-accuracy control OFF
NC command NC command
Machining program
commanded shape
Machining program
commanded shape
Machining program
commanded shape
Machining program
commanded shape

Corner shape
Curve shape
High-accuracy control ON
NC
command
NC
command

Command format
High-accuracy control ON
High-accuracy control OFF
High-accuracy control can be cancelled with either command regardless of enabled high-accuracy control.
High-accuracy control inhibits machining errors with minimizing an extension of machining time using the following functions.
Acceleration/deceleration before interpolation
Optimum speed control
Vector accuracy interpolation
Feed forward control
S-pattern filter control
Velocity waveform is smoothed by performing acceleration/deceleration control on movement commands to inhibit shocks caused by rapid acceleration at the machine movement start/stop. However, if the high-accuracy control is OFF, a corner rounding may occur at the joint between blocks or a path error may occur for the commanded shape which has been described in machining program because the acceleration/deceleration process is performed after the interpolation.
If the high-accuracy control is ON, the acceleration/deceleration process is performed before the interpolation to solve the problems mentioned above. This acceleration/deceleration before interpolation enables machining with a faithful path to the commanded shape of machining program. Furthermore, the acceleration/deceleration time can be reduced because the constant-gradient acceleration/deceleration is performed for the acceleration/deceleration before interpolation.
When the moving direction is changed on the corner, arc, etc., acceleration corresponding to the amount of change and the feedrate is generated. When the acceleration is large, there is a possibility of machine vibration and it may remain stripes on the machining surface.
In the high-accuracy control mode, the deceleration control (optimum speed control) is performed to keep the generated acceleration under the allowance which has been designed with the parameter so that the problem mentioned above can be solved. The optimum speed control suppresses the machine vibration and enables highly accurate machining while minimizing the extension of cycle time.
When a micro segment is commanded and the angle between the blocks is extremely small (when not using corner deceleration), interpolation can be carried out more smoothly using the vector accuracy interpolation.
G61.1 ;
G08 P1;
G08 PO ;
G command in G code group 13 expect G61.1
Acceleration/deceleration before interpolation
Optimum speed control
Vector accuracy interpolation
Commanded path
Vector accuracy interpolation

This function reduces path errors caused by delay of servo systems. Path errors caused by acceleration/deceleration of NC can be eliminated by acceleration/deceleration before interpolation, however errors caused by delay of servo systems cannot be eliminated by acceleration/deceleration before interpolation. Therefore, when the arc shape of radius R (mm) is machined at speed F (mm/min) as the figure (a) below, for instance, the lag time occurs between the NC commanded speed and the actual tool speed in amount of the servo system time constant and the path error R (mm) occurs. Feed forward control generates the command value taking the delay of servo systems as shown in figure (b) below so that the path error caused by delay of servo systems can be inhibited.
NC command and actual tool movement during Feed forward control OFF
NC command and actual tool movement during Feed forward control ON
Feed forward control
R R
F
NC commanded speed
NC commanded shape
Actual tool path
Actual tool speed
Delay of servo
Time
Speed
NC commanded
shape
Actual tool speed
(corresponding to original NC commanded speed)
Actual tool path
NC commanded speed is set forward
according to a expected delay.
(Feed forward control)
Time
Speed

S-pattern filter (soft acceleration/deceleration filter) is the function that inhibits the machine vibration by smoothing a velocity waveform. There are types of filters as follows:
G1/G0 S-pattern filter
Jerk filter

S-pattern filter 2
S-pattern filter control
Time
S-pattern
filter 2
Interpolation
(axis distribution)
inclination-constant
linear acceleration/
deceleration
Resultant
state
Resultant
state
Resultant
state
Time Time Time
Axis
speed
Time
Time
Axis
speed
Time
Axis
speed
Axis
speed
Jerk filter
Smoothing velocity waveform of
inclination-constant linear
acceleration/deceleration
Making velocity waveform of
S-pattern filter even smoother
Smoothing each axis speed
after interpolation
S-pattern
filter

12.3.2.2 Multi-Part System Simultaneous High-Accuracy Control
Up to two part systems.
High-accuracy control and high-speed machining mode are available respectively in all part systems, however, the simultaneous usage of high-accuracy control and high-speed machining mode (including High-speed high-accuracy control I/II/III) are available only in part systems which are limited by the parameter "High-speed high-accuracy enabled part system". The high-accuracy control and high-speed machining mode can be used simultaneously in the part system which is set to "1" for "High-speed high-accuracy enabled part system". The program error (P129) occurs when the high-accuracy control and high-speed machining mode are used simultaneously in the part system which is set to "0" for "High-speed high-accuracy enabled part system".
Note that up to 2 part systems can be set to "1" for "High-speed high-accuracy enabled part system". If 3 or more part systems are set to "1", MCP alarm (Y51) occurs. If all part systems are set to "0" for "High-speed high-accuracy enabled part system", only the first part system is handled as the one with the parameter set to "1".
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
G28 X0 Y0;
G08 P1;
G05 P2;
G91 G01 F3000;
:
:
:
:
G05P0;
G08 P0;
M02;
G08P0
G08P1
G08P0
$1 $2
$3 $4
G05P0
G05P2
G05P0
G28 X0 Y0;
G08 P1;
:
G08 P0;
G05 P2;
:
G08 P1;
:
G08 P0;

```
G05 P0;
M02;
G08P0
G08P1
G08P0
G08P1
G05P0
G05P2
G28 X0 Y0;
G05 P10000;
G91 G01 F3000;
X1.;
:
:
:
:
:
G05P0;
M02;
G08P0
G08P1
G08P0
G05P0
G05P2
G05P0
G28 X0 Y0;
G05 P10000;
G91 G01 F3000;
X1.;
:
:
:
:
:
G05P0;
M02;
G08P0
G08P1
G05P0
G05P2
```

Up to 2 part systems can be set to "1"
High-speed high-accuracy enabled
part system = 1
High-speed high-accuracy enabled
part system = 1
High-speed high-accuracy enabled
part system = 0
High-speed
high-accuracy
High-speed
high-accuracy
High-speed high-accuracy enabled
part system = 0
(Note) It is limited also in G61.1 command.
Alarm
Alarm

12.3.2.3 SSS Control

A machining program that approximates a freely curved surface with micro segments can be run at high speed and with high accuracy. This function enables machining with less scratches and streaks on the cutting surface compared to the conventional high-accuracy control function.

When the speed control with reference to the angle between two blocks, such as the conventional high-accuracy control "Optimum corner deceleration", is applied, the acceleration and deceleration may be frequently repeated for local steps and errors, resulting in scratches and streaks on the cutting surface.

The SSS (Super Smooth Surface) control uses the global paths information in addition to the angle information between two blocks. Thus, optimum speed control that is not adversely affected by minute steps or waviness is possible. This reduces the parts which get scratch like marks and streaks on the cutting surface.

Multiple part systems simultaneous high-accuracy function is required to conduct the SSS control in the second or following part systems.

[Features of SSS control]

This is valid for machining a mold with a smooth shape using a micro segment program.

This speed control is not easily affected by the error found in the path.

Even if corner deceleration is not required, the speed is clamped if the predicted acceleration is high.

(The clamp speed can be adjusted with the parameter "Clamp speed coefficient".)

The length of the path direction recognized with SSS control can be adjusted with the parameter. The range is increased as the setting value increases, and the effect of the error is reduced.

(1) When using this function, one of the following SSS-controlled high-accuracy control functions is required, as well.

High-accuracy control (G61.1)

High-accuracy control (G08P1)

High-speed high-accuracy control I (G05.1Q1)

High-speed high-accuracy control II (G05P10000)

High-speed high-accuracy control III (G05P20000)

(2) The performance of micro-segment execution during SSS control differs depending on the type of high-accuracy control mode and machine model to be combined.

M850VW M830VW M850VS M830VS M80VW M80V

TypeA
M80V
TypeB
M
L
Note

12.3.2.4 Tolerance Control
This function obtains the optimum clamp speed for corners or curves based on the designated tolerance to perform operations. It also ensures smooth passing in corner sections within the tolerance range, which suppresses machine vibrations. This function allows the machine to operate with the optimum tool path and speed, simply by specifying the tolerance, so an operator can easily carry out high quality machining.
The tolerance refers to the allowable error amount between the path commanded in the machining program and the path output by NC.
This function requires the SSS control specifications because it can only be used under SSS control.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
Program command path
Path commanded by NC to drive unit
Tool path
Tolerance control: Invalid Tolerance control: Valid

12.3.2.5 Variable-Acceleration Pre-Interpolation Acceleration/Deceleration
This function is useful when each axis differs in the characteristics (responsiveness) during SSS control (4-axis/5-axis machine, etc.).
The normal acceleration/deceleration before interpolation performs the acceleration/deceleration by setting acceleration common to all axes. Therefore, if the high responsiveness and low responsiveness coexist in axes, the acceleration needs to be set to suit the axis with low responsiveness.
On the other hand, the variable-acceleration pre-interpolation acceleration/deceleration can perform the acceleration/ deceleration by setting diverse acceleration to each axis. This means that it is possible to set a higher acceleration for axes with high responsiveness than before. Therefore, the cycle time can be reduced especially in the indexing machining.
[Shortening indexing machining time (when responsiveness of linear axis is higher than responsiveness of rotary axis)]
12.3.2.6 High-Accuracy Acceleration/Deceleration Time Constant Extension
The first part system only.
This extends the upper limit of cutting feed time constant from 5,000 [ms] to 30,000 [ms] for acceleration/ deceleration before interpolation.
In the multi-part system, this function cannot be used together as an alarm will occur.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
Variable-acceleration pre-interpolation
acceleration/deceleration
Acceleration/deceleration before interpolation
Time
Rotary axis
Shortened
Resultant
state
Linear axis

12.3.2.7 Axis-Specific Acceleration Tolerance Control
The first part system only.
The acceleration to be generated at a seam between blocks is evaluated for each axis to control deceleration so that the seam is passed at the optimum speed. This enables highly accurate edge machining. The optimum deceleration speed is calculated so that the acceleration of each axis to be generated at the seam is equal to or less than the tolerable acceleration for each axis, which is determined by maximum speed for each axis, time constant for each axis, and the accuracy coefficient. The machine decelerates to the speed in advance, and then accelerates back to the command speed after passing the corner.
This control enables deceleration at an appropriate speed for the characteristics of each axis even when machine vibrations may easily occur due to a low tolerable acceleration for a specific axis (rotary axis). This means that the deceleration speed can be raised at a corner where acceleration is generated only for an axis with a high tolerable acceleration, leading to a reduced cycle time.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V

TypeB
M
L

12.3.3 High-Speed High-Accuracy Control
A machining program that approximates a freely curved surface with micro segments can be run at high speed and with high accuracy. This function is effective in decreasing the cycle time of machining dies with free curves. This function is also useful in machining which needs to make an edge at a corner or reduce a path error from inner route of curved shape because the high-accuracy control mode is turned ON automatically.
12.3.3.1 High-Speed High-Accuracy Control I (G05.1Q1) Maximum [kBPM]
Command format
Micro segment capacity
The following is the micro segment capacity while high-speed high-accuracy control I is valid.
Micro segment processing capacity (unit: kBPM)
(1) The above performance applies under the following conditions.
3 axes or less commanded simultaneously in G01
Block containing only axis name and movement amount (Does not contain macro or variable command)
During tool radius compensation OFF (G40)
It may not be possible to attain the specified feed rate if deviated from the above conditions.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M 67.5 67.5 67.5 67.5 33.7 33.7 33.7
L 67.5 67.5 67.5 67.5 33.7 33.7
G05.1 Q1 ; High-speed high-accuracy control I ON
G05.1 Q0 ; High-speed high-accuracy control I OFF
Number of part systems/
Number of axes
Number of high-speed high accuracy control-enabled
part systems
M850V / M830V M80VW / M80V Type-A M80V Type-B
M L M L M L
1-part system
(8 axes or less)
1 part system 67.5 67.5 33.7 33.7 33.7
1-part system
(9 axes or more)
2-part system
1 part system 67.5 67.5 33.7 33.7
2 part systems 33.7 33.7 16.8 16.8
3-part system 1 part system 33.7 33.7 16.8
2 part systems 33.7 33.7 16.8
4-part system
(16 axes or less)
1 part system 33.7 16.8
2 part systems 33.7 16.8
4-part system
(17 axes or more)
5-part system or more
1 part system 16.8
2 part systems 16.8
Note

12.3.3.2 High-Speed High-Accuracy Control II (G05P10000) Maximum [kBPM]
Command format
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M 168 168 168 168 101 101 67.5
L 168 168 168 168 101 101
G05 P10000 ; High-speed high-accuracy control II ON
G05 P0 ; High-speed high-accuracy control II OFF

Micro segment capacity
The following is the micro segment capacity while high-speed high-accuracy control II is valid.
Micro segment processing capacity (unit: kBPM)
(*1) This value indicates the micro segment processing capacity in the time constant expansion system or in the following modes.
Tool center point control (G43.4/G43.5)
Inclined surface machining (G68.2/G68.3)
Workpiece installation error compensation (G54.4P1 to 7)
3-dimensional tool radius compensation (G41.2/G42.2)
Spatial error compensation
Variable-acceleration pre-interpolation acceleration/deceleration
Spline interpolation 2
3D machine interference check
Tool cutting point control (G43.8/G43.9)

Rotation center error compensation
Real-time 3D machine interference check
(*2) This value indicates the micro segment processing capacity when Smooth fairing is ON.
(*3) This value indicates the micro segment processing capacity when Tolerance ctrl is ON.
(*4) When Smooth fairing is ON and the control cycle is twice the standard cycle, a program error occurs.
(1) The above performance applies under the following conditions.
3 axes or less commanded simultaneously in G01
Block containing only axis name and movement amount (Does not contain macro or variable command)
During tool radius compensation OFF (G40)
It may not be possible to attain the specified feed rate if deviated from the above conditions.
Number of part systems/
Number of axes
Number of high-speed high accuracy control-enabled
part systems
M850V / M830V M80VW / M80V Type-A M80V Type-B
M L M L M L
1-part system
(8 axes or less)
1 part system 168
135 (*3)
101 (*1)
67.5 (*2)(*4)
168
135 (*3)
101 (*1)
101
67.5 (*1)
33.7 (*2)(*4)
101
67.5 (*1)
67.5
1-part system
(9 axes or more)
2-part system
1 part system 135
101 (*3)
67.5 (*1)
33.7 (*2)(*4)
135
101 (*3)
67.5 (*1)
101
67.5 (*1)
33.7 (*2)(*4)
101
67.5 (*1)

2 part systems 67.5
33.7 (*2)
67.5 33.7 33.7
3-part system 1 part system 33.7 33.7 33.7
2 part systems 33.7 33.7 33.7
4-part system
(16 axes or less)
1 part system 33.7 33.7
2 part systems 33.7 33.7
4-part system
(17 axes or more)
5-part system or more
1 part system 16.8
2 part systems 16.8
Note
M800V/M80V Series Specifications Manual (Function)
12 Program Support Functions
12.3 High-Speed and High-Accuracy Functions [kBPM: k Block per Minute]
367 IB-1501610-G
Additional functions when high-speed high-accuracy control II/III mode is ON
If the protruding path (zigzagging path) is shorter than the parameter setting values in the machining program generated with a CAM, etc., this function can be used to eliminate the protruding paths smaller than the setting value so that the front and back paths are smoothly connected.
This function is valid only for continuous linear commands (G1).
If there is any protruding path after fairing, fairing is repeated.
There is the smooth fairing function in addition to the fairing function.
When a minute step exists on a commanded path, for instance, the path after compensation differs between fairing and smooth fairing as follows:
Fairing
G1
G1
G1
Before fairing After fairing
Before fairing After first fairing After final fairing
G90 G00 X0 Y0;
G01;
N01 X0.100 Y0.000;
N02 X0.200 Y0.000;
N03 X0.300 Y0.000;
N04 X0.400 Y0.000;
N05 X0.500 Y0.000;

N06 X0.500 Y0.010;
N07 X0.600 Y0.010;
N08 X0.700 Y0.010;
N09 X0.800 Y0.010;
N10 X0.900 Y0.010;
N01 N02 N03 N04 N05
N07 N08 N09 N10
N06
Commanded position
Path after
compensation
Eliminating blocks shorter
than designated length
Compensating commanded
positions in blocks around a step
Commanded path
Path after compensation by fairing
Path after compensation by smooth fairing

This function interpolates the command position of machining program so that the movement path becomes smooth. This function is useful when executing a micro segment program to machine smoothly at low speed or a rough machining program with long segment to machine smoothly.
For details, refer to " 12.3.3.4 Smooth Fairing".
With the cutting feed clamp speed during the high-speed high-accuracy control II mode, when the parameter is set, the speed is clamped so that the acceleration generated by each block movement does not exceed the tolerable value. This function clamps the speed optimally even at a section where "angle change at each block is small but entire curvature is large" such as shown below. The tolerable acceleration value is calculated from the parameter setting values.
Conventionally during high-accuracy control, if the angle is large between the adjacent blocks in the machining program, this function automatically decelerates so that the acceleration generated when passing through the corner is within the tolerable value.
If a small block is inserted at the corner section with the machining program generated with the CAM, etc., the corner passing speed will not match the periphery. This can affect the machining surface.
If this type of small block is inserted when using high-speed mode corner deceleration, the corner will be largely judged by the parameter settings.
The small block is excluded when the angle is judged, but it not excluded from the actual movement command.
Smooth fairing
Acceleration clamp speed
High-speed mode corner deceleration
R If the tool moves along the large curvature
section without deceleration, a large
acceleration is generated resulting in a path
error from the inner route.
If this function is valid, the axis
decelerates at the corner without being
affected by the small block.

12.3.3.3 High-Speed High-Accuracy Control III (G05P20000) Maximum [kBPM]
Command format
[Setting to enable the function by G code]
High-speed high-accuracy control III can be enabled by the following G code command. If the following G code is commanded, the high-speed high-accuracy control III mode will be ON even the parameter "High speed/accu 3" is OFF.
[Setting to enable the function by parameter]
The high-speed high-accuracy control II command can be treated as the high-speed high-accuracy control III command by enabling the parameter "High speed/accu 3".
G05P2 command in high-accuracy control mode can also be treated as the high-speed high-accuracy control III command.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M 540 540 540 540 202 202
L
G05 P20000 ; High-speed high-accuracy control III ON
G05 P0 ; High-speed high-accuracy control III OFF
G05 P10000 ; High-speed high-accuracy control III ON
G05 P0 ; High-speed high-accuracy control III OFF

Micro segment capacity
The following is the micro segment capacity while high-speed high-accuracy control III is valid.
Micro segment processing capacity (unit: kBPM)
(*1) If the control cycle is twice of the standard cycle, the processing capacity will be 540 kBPM.
(*2) This value indicates the micro segment processing capacity in the time constant expansion system or in the following modes.
Tool center point control (G43.4/G43.5)
Inclined surface machining (G68.2/G68.3)
Workpiece installation error compensation (G54.4P1 to 7)
3-dimensional tool radius compensation (G41.2/G42.2)
Spline interpolation 2
Tool cutting point control (G43.8/G43.9)
(*3) This is the micro segment processing capacity in the following modes when the control cycle is twice the standard cycle.

Spatial error compensation
Variable-acceleration pre-interpolation acceleration/deceleration
3D machine interference check
Rotation center error compensation
(*4) This value indicates the micro segment processing capacity when Smooth fairing is ON.
(*5) When Smooth fairing is ON and the control cycle is twice the standard cycle, a program error occurs.
(1) The above performance applies under the following conditions.
3 axes or less commanded simultaneously in G01
Block containing only axis name and movement amount (Does not contain macro or variable command)
During tool radius compensation OFF (G40)
It may not be possible to attain the specified feed rate if deviated from the above conditions.
Number of part systems/
Number of axes
Number of high-speed high accuracy control-enabled
part systems
M850V / M830V M80VW / M80V Type-A M80V Type-B
M L M L M L
1-part system
(8 axes or less)
1 part system 540 (*1)
404 (*3)
270
101 (*2)
67.5 (*4)(*5)
202
67.5 (*2)
33.7 (*4)(*5)

1-part system
(9 axes or more)
2-part system
1 part system 168
67.5 (*2)
33.7 (*4)(*5)
135
67.5 (*2)
33.7 (*4)(*5)

2 part systems 101
67.5 (*2)
33.7 (*4)
67.5
33.7 (*2)(*4)

3-part system 1 part system 33.7
2 part systems 33.7
4-part system
(16 axes or less)
1 part system
2 part systems
4-part system
(17 axes or more)
5-part system or more
1 part system
2 part systems
Note

12.3.3.4 Smooth Fairing
This function interpolates the command position of machining program so that the movement path becomes smooth. This function is useful when executing a micro segment program to machine smoothly at low speed or a rough machining program with long segment to machine smoothly.
This function is enabled while high-speed high-accuracy control II is ON or while high-accuracy control is ON in high-speed machining mode II/III, and performs compensation in consecutive G01 command during the time.
Refer to " 12.3.3.2 High-Speed High-Accuracy Control II (G05P10000) Maximum [kBPM]" for the differences between fairing and smooth fairing.
(1) While smooth fairing is valid, the high-speed high-accuracy control III operates as high-speed high-accuracy control II.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
G90 G00 X0.271 Y0.161;
G01;
N01 X0.319 Y0.249;
N02 X0.415 Y0.220;
N03 X0.475 Y0.299;
N04 X0.566 Y0.256;
N05 X0.638 Y0.325;
N06 X0.720 Y0.268;
N07 X0.803 Y0.325;
N08 X0.875 Y0.256;
N09 X0.965 Y0.299;
N10 X1.026 Y0.220;
N11 X1.122 Y0.249;

N12 X1.169 Y0.161;
N01
N03
N11
N05 N09 N07
N02
N04 N06 N08
N10
N12
Commanded position
Commanded position
Tool path Tool path Commanded position
Compensated position
Commanded path
Smooth fairing OFF Smooth fairing ON
Note

12.3.4 Machining Condition Selection I
The machining condition parameter group which is consists of parameters related to the high-accuracy control can be configured in advance for each machining application (such as part machining or die machining) or machining process (such as rough or finishing), and it can be switched according to the purpose.
This can easily perform the machining which meets the conditions for the intended machining.
The machining condition parameter group can be switched by the following methods.
Screen setting
G code
PLC signal
Multiple part systems simultaneous high-accuracy function is required to apply the machining conditions to the second or following part systems.
The machine condition commanded by G code command will reflect only to commanded part system.
12.3.5 Direct Command Mode
This function reduces the loads of NC machining program analysis and interpolations as much as possible so that machining programs composed of micro segments are executed at high-speed with a processing speed.
Compared to normal machining modes, this function is effective for accelerating 3-dimensional machining of curved surface such as variable cam machining.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L

12.4 Programming Support Functions
12.4.1 Playback
This function enables creation of a program while proceeding with sample machining by manual (handle or job) feed or mechanical handle feed. A machining program can be edited by using the playback movement amount obtained by manual operation as the program command values.
Playback edit is disabled for the machining program in the mass-editing mode.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L

12.4.3 Interactive Cycle Insertion
This function enables to interactively insert a cycle to assist in the machining and setup for the program opening on the edit screen.
The programming time can be reduced by using this function.
The cycle can easily be inserted by editing data in an interactive window.
[Operation image to insert a cycle]
The program of the cycle block inserted once can directly be edited on the edit screen, and can be re-edited in the cycle edit window if the cycle format is not changed.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
Move the cursor to
the position to insert
the cycle.
Select the cycle to be
inserted in the cycle list.

Edit the cycle data
interactively.
The cycle is inserted to
the cursor position.
Edit screen Cycle list window Cycle edit window Edit screen
Press the
menu
Press the
menu

;
1
100.000
200.000
100
200
G1 Z-100.000;
G1 Z-200.000;
Cycle edit window Program
Modification
Cycle edit window
Machining width
Machining width
Insert a new cycle by
setting a data
Reflect the modification Re-edit
Behavior of cycle
Behavior of the cycle changes
according to the modification
After the
modification
Before the
modification
New
insertion
G180 P1 A_ (turning - front face - rough);
G180 P1 A_ (turning - front face - rough);
Opera
tion

[Types of cycle]
Machining cycle can be inserted.
In accordance with the NC system set by the parameter, either cycle for lathe or cycle for machining center can be selected.
For cycle types, there are "Standard type" and "Extend type" of MITSUBISHI cycle and arbitrary cycle type "Custom type"
prepared by MTB.
For "Standard type", there are normal format and special format, which is set with the parameter.
Press the menu [Standard type], [Extend type] or [Custom type] to be selected on the interactive cycle screen. Select a cycle
type to be changed on the displayed cycle list window to switch the cycle.
[Cycle for Lathe system]
(1) For standard type, there are conventional format and Mitsubishi CNC special format. Which format to be used depends
on the setting of the parameter.
(2) Fixed cycle is used for "Tapping" and "Deep-hole tapping" of "Extend type". The format to be used is the same as "Stan dard type", which depends on the setting of the parameter.
: Cycle insertion available - : No specification
Hierarchy 1 Hierarchy 2 Hierarchy 3 Standard type Extend type Cycle type Machining cycle Machining portion
Turning hole Drilling Front
Back

Deep-hole drilling
Tapping
Deep-hole tapping
Reaming
Boring
Turning Turning Outer diameter
Inner diameter
Front
Back

Turning (compound)
Copying
Grooving
Cutting-off
Thread cutting Outer diameter
Inner diameter

Thread cutting (compound)
Thread recutting
Thread recutting (compound)
Milling hole Drilling Periphery
Side
Front
Back

Deep-hole drilling
Step drilling
Tapping
Deep-hole tapping
Reaming
Boring
Milling Pocketing Side
Front
Back

Grooving
Note

[Cycle for Machining center system]
(1) Fixed cycle is used for "Tapping" and "Deep-hole tapping" of "Extend type".
[Display of cycle list window]
The cycle list window is displayed in the area opposite to the editing area. There are two display types for cycle list window, "image display type" and "tree display type", which can be switched Change list button.
: Cycle insertion available - : No specification
Hierarchy 1 Hierarchy 2 Standard type Extend type Cycle type Machining cycle
Hole Drilling
Deep-hole drilling
Step drilling
Tapping
Deep-hole tapping
Reaming
Boring
Milling Plane
Pocketing
Grooving
Contour
Image display type Tree display type
Change list button
Note

12.4.4 Simple Programming (NAVI MILL/LATHE)
Create a part program by using NAVI MILL (for machining center system) or NAVI LATHE (for lathe system).
The following machining processes can be edited.
Cutting conditions are automatically determined from tool management data and cutting condition file.
The operation screen consists of the list view area and the operation view area. In the list view area, the entire part program can be seen at all time. In the operation view area, there are guide drawings related to each input item, which allows an easy data input.
Program Checker enables the tool paths of a part program to be graphically traced. With this function, an input error can be detected at an earlier stage.
Guidance function provides an operator with error recovery information.
Part program is a macro-program-based NC program. Process commands can be added in the edit screen.
The macro program above can be customized by the machine tool builder.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
M system L system
Hole drilling (Drilling, deep hole drilling, step, boring, tapping)
Surface cutting (Circle, square)
Contour cutting (Circle, square, arbitrary shape)
Pocket machining (Circle, square, L pattern, U pattern)
EIA
<Turning machining>
Turning (Outside dia., inside dia., front face) Copying (Outside dia., inside dia., front face)
Threading (Outside dia., inside dia., front face)
Grooving (Outside dia., inside dia., front face)
Trapezoid Grooving (Outside dia., inside dia., front face)
Hole drilling (Drilling, deep hole drilling, step, tapping)
EIA
Cutting-off
<Milling machining>
Milling hole machining (Drilling, deep hole drilling, boring, tapping)
[Hole pattern]
- Random (Front face, outer periphery, side face)
- Line (Front face, outer periphery, side face)
- Arc (Front face, side face)
- Circle (Front face, side face)
- Square (Front face, side face)
- Lattice (Front face, side face)
- Key groove (Front face, outer periphery, side face)
Contour machining (Front face, outer periphery, side face)
<Auxiliary operation>
Delivery
<Balance cut>

Turning balance cut
Copying balance cut
Two-part system simultaneous thread cutting

12.4.5 G Code Guidance
G code guidance is a function to display illustration of the contents or movements of the commanded format for the G code currently under editing. This is used when creating or editing a machining program.
With this function, the G code contents under the editing process can be checked on the spot.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L

12.4.7 DXF Data Input
This function is a support for the interactive cycle insert function.
This function allows you to import a DXF drawing file from an external I/O device through DXF data input window, and the figure element data is extracted from the drawing. You can add them as arbitrary shape data or as hole position data to the cycle being edited using the interactive cycle insertion function.
The supported devices are as follows:
- HD
- Memory card (front-side SD card)
- DS (back-side SD card)
- USB memory
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
Use CAD software on an external PC to create a
drawing file in the DXF format.
Load the drawing file from
HD, SD or USB memory.
By determining the selected figure element, you set the element type and
coordinate value of the extracted element directly as arbitrary shape data.
You can add each element and input the coordinate values through the
drawing operation.
DXF format
drawing file

13
Machine Accuracy Compensation

13.1 Static Accuracy Compensation
13.1.1 Backlash Compensation
This function compensates for the error (backlash) produced when the direction of the machine system is reversed.
The backlash compensation can be set in the cutting feed mode or rapid traverse mode.
The amount of backlash compensation can be set separately for each axis. It is set using a number of pulses in increments of one-half of the least command increments. The output follows the output unit system. The "output unit system" is the unit system of the machine system (ball screw unit system).
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L

13.1.2 Memory-Type Pitch Error Compensation [Sets]
With the reference position defined as the base, set the compensation amount in the division points obtained by equally dividing the machine coordinates.
According to the specified parameters, this method compensates an axis feed error caused by a ball screw pitch error, etc.
The compensation amount can be set by either the absolute or incremental system. Select the desired method with the parameter.
Between the division point n and the division point n + 1, the compensation amount of both division points is smoothly compensated by linear approximation.
Up to 32 sets of axes can be set for the compensation for M800V Series, or up to 16 sets of axes for M80V Series.
Up to 1899 points can be set for the compensation.
PLC axes and PLC indexing axes can be also compensated.
[Relationship between the compensation amount and machine position]
(1) Compensation points 1899 is a total including the points for memory-type relative position error compensation.

(2) A scale of 0 to 99-fold is applied on the compensation amount.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M 32 32 32 32 16 16 16
L 32 32 32 32 16 16 16
n n+1 n+2
:

Command machine
position
Division point
Command machine
position
Actual machine
position for which
no compensation
has been made
Ideal machine
position
Actual machine
position
Compensation
amount
Reference position Compensation
amount
between
division points
Note

13.1.3 Memory-Type Relative Position Error Compensation
This method, according to the parameters specified in advance, compensates the relative position error between two orthogonal axes caused by deflection of the moving stand.
Specify the compensation amount in the compensation axis direction in the division points obtained by equally dividing the machine coordinates of the base axis.
The base axis is one of the two orthogonal axes to which relative position compensation applies. This axis is used as the criterion for relative-error measurement. The compensation axis is the coordinate axis that is orthogonal to the base axis. The compensation is actually made for this coordinate axis.
Machine position between division points n and n+1 is smoothly compensated by the linear approximation of the compensation amount.
Up to 32 sets of axes can be set for the compensation for M800V Series, or up to 16 sets of axes for M80V Series.
Up to 1899 points can be set for the compensation.
PLC axes and PLC indexing axes can be also compensated.
[Relationship between the compensation amount and machine position]
(1) Compensation points 1899 is a total including the points for memory-type pitch error compensation.
(2) A scale of 0 to 99-fold is applied on the compensation amount.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
n n+1 n+2
:

Actual machine
position of
compensation axis
Compensation
amount
Reference position
Actual machine position for
which no compensation has
been made
Division point
Command machine
position along base
axis
Command machine
position
Compensation
amount between
division points
Note

13.1.4 External Machine Coordinate System Compensation
The coordinate system can be shifted by inputting a compensation amount from the PLC. This compensation amount will not appear on the counter (all counters including machine position). If the machine's displacement value caused by heat is input for example, this can be used for thermal displacement compensation.
13.1.5 Circular Radius Error Compensation

With commands designated during arc cutting, this function compensates for movement toward the inside of the arcs caused by a factor such as servo delay.

M850VW M830VW M850VS M830VS M80VW M80V

TypeA

M80V

TypeB

M

L

M850VW M830VW M850VS M830VS M80VW M80V

TypeA

M80V

TypeB

M

L

Compensation vector according to external machine coordinate

Machine coordinate zero point when the external machine

coordinate system offset amount is 0.

Machine coordinate zero point

13.1.6 Ball Screw Thermal Expansion Compensation

This compensates the axis feed error caused by the ball screw thermal expansion, etc. using the values set in the R register's thermal displacement compensation parameter.

The compensation amount at the end of the machine error compensation range (mdvno to pdvno) is set. The compensation line is obtained from the set compensation amount, and is linearly distributed in the machine error compensation range to attain smooth compensation. A compensation amount that changes during operation can also be compensated.

Conditions under which thermal displacement compensation is valid

When function is valid.

When axis No. and parameter (offset, maxcmp) is set in R register.

When pitch error compensation parameter is set correctly.

Compensation operation

The machine error compensation range is compensated with the thermal displacement compensation amount (absolute position compensation amount) obtained with the compensation line.

The compensation amount is immediately calculated when thermal displacement compensation is validated.

When the compensation amount is changed, the new compensation line is immediately obtained, and the range is compen sated again with that compensation amount.

Thermal displacement compensation can be used with machine error compensation. In this case, the sum of the machine error compensation amount and the thermal displacement compensation amount is added to the machine position and issued as the NC command.

M850VW M830VW M850VS M830VS M80VW M80V

TypeA

M80V

TypeB

M

L

mdvno pdvno

offset (with sign)

Motor Hold

Compensation amount

Ball screw

maxcmp (with sign)

Referring to "offset" position

Compensation line

Compensa tion amount

(legcmp)

Machine position

Machine error compensation range

(= thermal expansion compensation

range)

Reference position

13.1.7 Rotation Center Error Compensation

In the machine having a rotary axis, the rotation center deviates due to the assembly error of the rotary axis. Thus, if a machining is carried out with the rotary axis, the machining accuracy is impaired because an error is caused in the relative position between the tool and workpiece.

There are two types of rotation center deviation. One is "position deviation", in which the rotation center is shifted in the planar direction, and the other is "angle deviation", in which the rotation center inclines.

Higher-accuracy machining is realized by compensating for these two types of deviation.

The deviation can be calculated and set to the parameter by using the rotation center error measurement function.

[Position deviation and angle deviation]

[Compensation for the deviation of the rotation center]

M850VW M830VW M850VS M830VS M80VW M80V

TypeA

M80V

TypeB

M

L

Position deviation

Angle deviation Machine design rotation center line

Actual rotation center line

X

Y

: Machine design rotation center

: Actual rotation center

C axis
rotation Error
Compensation
enabled
Compensation
amount
<No deviation> <With deviation> <When this function is enabled>
Machining accuracy is
impaired because an error
is caused in the position
between the tool and
workpiece.
C axis
rotation
C axis
rotation
The error between the tool
and workpiece is compen sated for by using the
measurement result
(parameter) of the deviation.

This function can be used on the machine whose rotary axis is installed with ISO polarity and the machine whose axis is
installed with non-ISO polarity. However, the orthogonal axis needs to be installed with ISO polarity.(*1)
(*1) In the machine coordinate system (right-hand orthogonal coordinate system) defined in ISO standard, the rotation turn ing to the right-handed screw is handled as ISO polarity and the one turning to the left-handed screw is handled as non ISO polarity.
This function is compatible with the following axis configurations of the machines.
Machine Machine type Axis configuration
M system
4-axis machine Table tilt type Configured in right-handed orthogonal coordinate sys Tool tilt type tem + one rotary axis
5-axis machine
Table tilt type
Configured in right-handed orthogonal coordinate sys tem + two rotary axes Combined type
Tool tilt type
L system
4-axis machine Table tilt type Configured in right-handed orthogonal coordinate sys Tool tilt type tem + one rotary axis
5-axis machine Combined type Configured in right-handed orthogonal coordinate sys Tool tilt type tem + two rotary axes

13.1.8 Position-Dependent Gradually Increasing-Type Backlash Compensation
Usually, minute bumps are generated when the machine movement direction is reversed. (Lost motion) However, due to
various mechanical system factors, there may be cases where the bumps do not change in steps but gradually change after
the direction reversal. (Gradually increasing-type lost motion)
Depending on the mechanical structure, the gradually increasing-type lost motion includes the type where the bump amount
depends on "duration of time" from when the machine movement direction is reversed and the type where the bump amount
depends on "distance". When the bump amount depends on "duration of time", compensation is possible with the OMR-II
function. (" 13.2.4 OMR II (Backlash with Filter)").
With this function, the gradually increasing-type lost motion which depends on the distance from the point where the machine
movement direction is reversed can be compensated by controlling the variation of backlash compensation amount according
to the distance from the direction reversal point.
[When the bump amount changes according to speed]
[When the bump amount does not change according to speed]
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
F500
F1000
F2000
F5000
Shapes at rising edge of bumps are steep when
the speed is low. Bumps depend on time.
Compensation with OMR-II function
Basic circle
Measurement
result
F500
F1000
F2000
F5000
Shapes at rising edge of bumps do not change even
when the speed changes. Bumps depend on
position
Compensation with this function
Basic circle
Measurement
result

13.1.9 Bidirectional Pitch Error Compensation

Bidirectional pitch error compensation function is used to compensate the pitch error in each direction by setting the pitch error compensation amount when moving in the positive and negative direction. This function reduces the difference of tool path between the positive and negative direction.

13.1.10 Cyclic Error Compensation

When the machine operation induces certain cyclic errors, this function compensates a series of cyclic errors by setting the compensation amount for a single cycle.

Short-pitched compensation is possible for the errors occurring due to the gear shape of the encoder.

You can set the period of the error cycle, the number of steps in the cycle (maximum 128 points), and the compensation amount at each step by the parameter.

M850VW M830VW M850VS M830VS M80VW M80V

TypeA

M80V

TypeB

M

L

M850VW M830VW M850VS M830VS M80VW M80V

TypeA

M80V

TypeB

M

L

0.005

- 0.005

0.005

- 0.005

Repeats the compensation cycle

Sets the compensation

amount for one cycle in

each step

1st cycle 2nd cycle 3rd cycle

1st cycle 2nd cycle 3rd cycle

1 cycle

Tooth shape

Tooth shape

Error amount

Errors after applying

compensation

Encoder tooth

Errors occur in cycles.

13.1.11 Spatial Error Compensation

This function can compensate for three-dimensional errors of a machine tool due to its linear and rotary axes. This measures the spatial errors caused by the linear and rotary axes with a measuring device, and inputs the measurement results to the NC to make an error data file. The function calculates the compensation amount based on the error data file and adds the calculated compensation amount of the linear and rotary axes to the drive command position to perform the compensation.

The function can reduce deterioration of machining accuracy due to mechanical errors, which will lead to high-accuracy machining.

This function is enabled for a machine where three linear axes form a right-handed orthogonal coordinate system.

This function is compatible with the following axis configurations of the machines.

M850VW M830VW M850VS M830VS M80VW M80V

TypeA

M80V

TypeB

M

L

Machine Machine type Axis configuration

3-axis machine 3 orthogonal axes Configured in right-handed orthogonal coordinate system

4-axis machine Table tilt type Configured in right-handed orthogonal coordinate system +

Tool tilt type one rotary axis

5-axis machine

Table tilt type

Configured in right-handed orthogonal coordinate system +

two rotary axes Combined type

Tool tilt type

Error due to linear axis

Error resulting from rotary axis motion

Rotary-axis angle deviation

Measurement result

Measuring device:

Laser tracker, etc.

Measures error

File input/output

screen

NC

Error data file

Compensation

amount

Calculates

compensation

amount

Position command to drive

Commanded position

Adds compensation

amount

13.1.12 Backlash Compensation II
This function reduces quadrant error caused by the backlash when the traversing direction is reversed in machines where semi-closed loop control is implemented.
Compensation based on the acceleration rate at a direction reversal improves machining accuracy. For the range between the acceleration rates defined in parameters, the error is compensated using the compensation amount obtained through linear interpolation.
Backlash compensation II allows up to four compensation amounts for different acceleration rates to be set for each axis.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
[Before the compensation] [After the compensation]
Compensation amount
"c"
Compensation amount
"d"
d
a b
c
Compensation amount
according to acceleration rate
Compensation amount
Acceleration rate
Preset compensation
amount/acceleration rate
a
b

13.2 Dynamic Accuracy Compensation
13.2.1 Smooth High-Gain (SHG) Control
This is a high-response and stable position control method using the servo system. This SHG control achieves an approximately three-fold position loop gain equally compared to the conventional control method.
The features of the SHG control are as follows.
The acceleration/deceleration becomes smoother, and the mechanical vibration can be suppressed (approximately 1/2) during acceleration/deceleration.
(In other words, the acceleration/deceleration time constant can be shortened.)
The shape error is approximately 1/9 of the conventional control.
The positioning time is approximately 1/3 of the conventional control.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
6.0
3.0
Conventional control (position loop gain
= 33 rad/S)
SHG control (position loop gain = 50 rad/S)
Speed
Current
Machine
vibration
Step response
Time Time
Conventional
control
SHG control
Machine vibration
amount (m)
Y
X
22.5
2.5
1.0
Feed rate 3000 mm/min.
Radius 50 mm
Conventional
control
SHG control
SHG control + FF (Feed forward)
Conventional
control
SHG control
SHG control
+ FF
Roundness error (m)
200

60
70
Conventional control
SHG control
SHG control + FF (Feed forward)
Time
Droop
Droop during rapid traverse deceleration
Conventional
control
SHG control
SHG control +
FF (Feed
forward)
Positioning time (ms)

13.2.2 Dual Feedback
If the motor and machine coupling or machine system's rigidity is low when a closed loop system such as a large machine is used, the position loop gain may not increase due to overshoot caused by the vibrational response during acceleration/ deceleration. The dual feedback function is effective in this case.
To validate the dual feedback function, use position feedback with a motor side detector in ranges with high acceleration to enable stable control. In ranges with low acceleration, use position feedback with the machine side detector (scale). This will make it possible to increase the position loop gain.
The machine side detector (scale) is required separately.
The state will approach the semi-closed loop system as the primary delay filter's time constant increases, so the position loop gain limit will increase. Note that the limit of the position loop gain increased with the dual feedback function is the same as the position loop gain limit for a semi-closed system that does not use a machine side detector (scale, etc.). In addition, the positioning time will increase as the primary delay filter time constant increases.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
+
-
+
-
- +
ENC
Dual feedback control
Position
command Position control
Position droop Servo
motor
Linear scale
Table
Speed command
Position FB
Position FB
Primary
delay filter
High frequency FB element
Low frequency
FB element
dead band

13.2.3 Lost Motion Compensation
This function compensates the error in the protrusion shape caused by lost motion at the arc quadrant changeover section during circular cutting.
13.2.4 OMR II (Backlash with Filter)
The OMR (Optimal Machine Response) control function estimates the machine or motor model (moment of inertia, clone friction, viscosity coefficient, etc.) that can cause a path error (error in actual tool path in respect to the path commanded with the program). High-accuracy machining is achieved by carrying out feed forward control based on that model. This allows error cased by quadrant protrusions during circular interpolation or quadrants on the inner side of the path to be greatly reduced.
OMR-II is a function that focuses on the quadrant protrusions, and improves the path error with this. Quadrant path compensation is included in OMR-II.
The quadrant protrusion compensation function improves quadrant protrusions by issuing compensation to the backlash compensation amount to compensate the error when the machine system direction is reversed.
By adding the compensated backlash compensation amount to the position command and sending it to the servo, the gradually increasing-type lost motion which occurs at quadrant changeover can be compensated.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB

M
L
+
+
Servo
Position command (Fdt)
Backlash compensation
amount
Interpolation
process
Machine error
compensation
Quadrant
protrusion
compensation

13.2.6 OMR-FF
The OMR (Optimal Machine Response) control estimates the causes (moment of inertia, clone friction, viscosity coefficient, etc.) of the path error (error in actual tool path in respect to the path commanded with the program) by making a model of the control target. Feed forward control is carried out based on that model.
With the OMR-FF control method, highly accurate machining can be achieved by using the command filter function to suppress vibration in addition to the reverse model feed forward function.
The reverse model feed forward function estimates the control target's vibration characteristics using a reverse model. The feed forward command for the appropriate position, speed and current can be obtained from this estimation. This allows the machine position to be tracked to the commanded position without causing vibration when using machine tools with low rigidity.
When the command filter function is also used, the high-range vibration elements in the command can also be suppressed.
New control method to bring out the full potential of a high-speed high-acceleration machine
High tracking ability for the command (Smaller path error)
Suppression of the machine vibration (Suppress low-range vibration without losing tracking ability)
[Setting parameters]
Scale model time constant
Machine system resonance frequency p, anti-resonance frequency z, attenuation rate , inertia J
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
s
J . s2
Target
path Scale
model
Scale model
position
Determine response
characteristics of
machine end position
Trace load position to scale
model position without causing
vibration
OMR-FF control
Machine system
reverse model
Notch
filter
Torque FF
Speed FF
Position
command
F/B controller
Motor
torque
Motor position
Machine
system
Machine end
position

13.2.7 Distance-Coded Reference Position Detection
This is the function where the scale with absolute address reference mark is used to establish the reference point in the relative position detection system.
When the reference point has not been established, it is necessary to move the axis to the reference point. On the other hand, with this function, the reference point is established by moving the axis only for several reference marks, resulting in a significant reduction of the axis movement amount.
No dog is used as the position is calculated using reference marks.
[Reference point establishment process]
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB

M
L
R

Ordinary method
This function
Reference mark Dog
Reference point established
Reference point established

13.2.8 OMR-CC (Optimum Machine Response - Contour Control)
OMR-CC (optimum machine response - contour control) is a function that improves the passing speed in curved parts such as arcs and free curved surfaces without increasing the path error (difference between the program path and the tool path) caused by the delay of the servo system. By enabling this function, the machining time can be shortened while maintaining the machining accuracy.
The path and feedrate when OMR-CC is enabled and when OMR-CC is disabled (OMR-FF is enabled) are outlined below.
[Operation example (Path and speed waveform of an arc-shaped machining)]
Path to pass the curved parts when OMR-CC is enabled/disabled
Resultant speed to pass the curved parts when OMR-CC is enabled/disabled
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
Path commanded with the program
Actual tool path (OMR-CC enabled)
Actual tool path (OMR-CC disabled)
Feedrate
Time
The machining time is shortened by OMR-CC
enabled.
Resultant speed when OMR-C is
enabled
Resultant speed when OMR-C is
disabled

13.2.9 Variable Torsion Compensation
When the direction of the machine movement is reversed, a response delay (*1) causes protrusion on the path.
(*1) The response delay occurs due to dead band, such as friction, torsion, and backlash.
The lost motion compensation and OMR-II provide uniform compensation using the set compensation parameters regardless of the acceleration rate at the direction reversal to suppress the protrusion. However, the characteristics of the response delay at the reversal differs depending on the acceleration rate at the reversal; therefore, when the arc radius or command speed is changed, the compensation cannot be performed sufficiently.
The variable torsion compensation enables compensation based on the acceleration rate at the reversal and machining with high accuracy by setting the compensation parameters for each acceleration rate at the reversal.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
The compensation parameters are adjusted to provide uniform compensation.
When the arc
radius or
command speed
is changed
Quadrant protrusion
can be reduced.
Quadrant protrusion
may not be reduced
completely.
The compensation parameters are adjusted for each acceleration rate at the
reversal to provide compensation based on the acceleration rate.
Variable torsion compensation
Lost motion compensation, OMR-II
Quadrant protrusion
can be reduced.
Circular command
Position FB
Quadrant protrusion can be
reduced even when the arc
radius or command speed is
changed.

13.2.10 Cogging Torque Compensation
This function compensates the torque ripple (cogging torque).
Ensure to adjust this function before adjusting the machine.
As cogging torque varies with the characteristics of the motors used, machines need to be adjusted individually.

This function is designed for servo motors. The function cannot be used for spindle motors.
This function is valid for the axes in the rotary axis spindle mode during spindle-mode rotary axis control.
This function is invalid for the axes under spindle-mode servo motor control.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L

14.1.1 Skip
14.1.1.1 Skip
When the external skip signal is input during linear interpolation with the G31 command, the machine feed is stopped immediately, the remaining distance is discarded and the commands in the next block are executed.
[M system]
[L system]
The cutting feed override and dry run are enabled or disabled by the respective parameters.
The feedrate switches as follows according to the parameter setting.
- The value of address F given in the G31 block, or if F is not commanded, the value set by the parameter.
- The F Modal value commanded in the program.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
G31 X__ Y__ Z__ __ R__ F__ ; (is the additional axis.)
X,Y,Z, Axis coordinate value; Use absolute or incremental command.
R Acceleration/deceleration command
F Feedrate (mm/min)
G31 X/U__ Z/W__ R__ F__ ;
X, Z, U, W Commanded value
R Acceleration/deceleration command
F Feedrate (mm/min)
Position
Programmed end
point
Feed rate
Skip signal input
Remaining
Actual movement distance distance
Command value

Command by G31 command basis for acceleration/deceleration command (R0/R1).
When R0 command is issued or R command is omitted, automatic acceleration/deceleration is not performed but step acceleration/deceleration is performed after interpolation in G31 block.
If R1 command is issued, automatic acceleration/deceleration is performed after interpolation even when skip signal is input.
A command is not issued or a command other than R0/R1 is issued, it will be the operation of acceleration/deceleration time constant=0(R0) and automatic acceleration/deceleration is not performed after interpolation.
The approximate coasting distance up to feed stop based on the detection delay in the skip signal input is calculated as below.
: Coasting distance (mm)
F: G31 rate (mm/min)
Tp: Position loop time constant (s) = (position loop gain)-1
t1: Response delay time (s) = (A period of time from when the skip signal is detected until it reaches the control device.)
t2: Response error time 0.001 (s)
(1) Skipping during machine lock is not valid.
F
F
Changeover of acceleration/deceleration type with R command
Skip time constant
Acceleration/deceleration when R1 command is issued Skip signal
Skip time constant
Time
Time
Speed
Speed
Skip signal
Acceleration/deceleration when R0 command is issued or R command is omitted
0 = Tp+ (t1 t2) 60
F
60
F
60
F
60
F = (Tp+t1) t2

1 2
Note

14.1.1.2 Multiple-Step Skip
This function realizes skipping by designating a combination of skip signals for each skip command.
G31.n method
This function carries out skipping by designating a combination of skip signals for each skip command (G31.1, G31.2, G31.3).
The combination of the skip signals are designated with parameters for each G code (G31.1, 31.2, 31.3), and the skip operation is executed when all signals in the combination are input.
G31Pn method
As with the G31.n method, the valid skip signal is designated and skip is executed. However, the method of designating the valid skip signal differs.
The skip signals that can be used are 1 to 8. Which is to be used is designated with P in the program. Refer to Table 1 for the relation of the P values and valid signals.
Skip can be executed on dwell, allowing the remaining dwell time to be canceled during the dwell command (G04) and the next block executed under the skip conditions (to distinguish external skip signals 1 to 8) set with the parameters.
Specify the skip rate in command feedrate F. However, F modal is not updated.
Specify skip signal command in skip signal command P. Specify the P value in the range of 1 to 255. If it exceeds the spec ified range, a program error occurs.
When the skip signals are commanded in combination, the skip operation takes place with OR result of those signals.
Table 1 Valid skip signals
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
G31.n Xx1 Yy1 Zz1 Ff1 ;
G31.n
Xx1,Yy1,Zz1
Ff1
: Skip command (n=1, 2, 3)
: Axis address and target position
: Feedrate (mm/min)
G31 Xx1 Yy1 Zz1 Pp Ff1 ;
G31
Xx1,Yy1,Zz1
Pp
Ff1
: Skip command
: Axis address and target position
: Skip signal command
: Feedrate (mm/min)
Skip signal command P Valid skip signal
87654321
1
2
3
4
5
: ::::::::
253
254
255

14.1.1.4 PLC Skip
This function enables skip operations to be performed by signals which are input from the user PLC.
14.1.1.5 Speed Change Skip
This function is used to change the feed rate or to stop the movement by inputting the skip signal during the linear interpolation.
After stopping the movement with skipping, the remaining movement command is canceled and the next block is executed.
In addition to the speed change skip function, the high-speed skip option and multiple-step skip function are required to use this function.
Operation example
G31 X100. Ff F1 = 0 F2 = f2 F3 = f3 F4 = f4 ;
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
G31 Xx Yy Zz Ff F1 = f1 ... Fn = fn ; ("n" indicates skip signals 1 to 8.)
G31 Skip command
Xx, Yy, Zz Command position
Ff Feedrate when starting the cutting feed (mm/min)
fn Feedrate after detecting the skip signal (mm/min)
fn = 0 : Movement stop

fn 0 : Changing the feed rate to fn
F1 = Feed rate after inputting the skip signal 1
:
F8 = Feedrate after inputting the skip signal 8
f4
f
f3
f2
0
f1
Time
Skip time constant
Skip signal 4
Skip signal 3
Skip signal 2
Skip signal 1
Position loop time constant
(position loop gain-1)
Speed

14.1.1.6 Torque Limitation Skip
Axis movement is performed in the torque limited status, and the axis movement command is suspended to proceed to the next block when the current command value reaches the designated torque skip value and the torque skip turns ON.
In addition to the torque, the droop value can be add to the condition of the skip ON. (Droop skip)
This function enables measurement without a sensor.
Command format
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
Workpiece radius measurement tool
:
G0 X50. Z100. T0101; Tool selection for measurement
G160 X40. Q80 F20; Torque skip command
#100=#5061; : Coordinate position (workpiece value) read
:
G160 X/U/Z/W/ Q D F ;
X/U/Z/W/ :
Axis address (range of coordinate position command (mm, inch), decimal point command is possible)
Q : Torque skip value (0 to 500 (%))
D : Droop skip value (0 to 99999.999 (mm, inch))
F : Skip speed (range of feedrate (mm/min, inch/min, mm/rev, inch/rev))
G0 X50. Z100. T0101;
G160 X40. Q80 F20;

14.1.2 Automatic Tool Length Measurement
This function moves the tool in the direction of the tool measurement position by assigning a distance between the measurement start position to the measurement position. The machine stops when the tool reaches the sensor and automatically calculates the difference between the coordinate position where the tool stopped and measurement position. It registers this difference as the tool length compensation amount for that tool.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L

This function moves the tool in the direction of the tool measurement position by commanding a distance between the measurement start position to the measurement position, it stops the tool as soon as it contacts the sensor and calculates the difference between the coordinate position when the tool has stopped and commanded coordinate position. It registers this difference as the tool length compensation amount for that tool.
If compensation has already been applied to the tool, it is moved in the direction of the measurement position with the compensation still applied, and when the measurement and calculation results are such that a further compensation amount is to be provided, the current compensation amount is further corrected.
If the compensation amount at this time is one type, the compensation amount is automatically corrected; if there is a distinction between the tool length compensation amount and wear compensation amount, the wear amount is automatically corrected.
Automatic tool length measurement (M system)
G37 Zz1 Rr1 Dd1 Ff1 ;
G37 ;
Zz1
Rr1
Dd1
Ff1
: Measurement command
: Measurement axis address and measurement position X, Y, Z, (= optional axis)

: The distance between the point at which tool movement is to start at the measurement speed
and the measurement position
: The range in which the tool is to stop
: The measurement rate
When Rr1_, Dd1_ and Ff1_ have been omitted, the values set in the parameters are used.
At this time, the tool length compensation
amount has a minus ("-") value.
Program example
G28 Z0 ;
T01 ;
M06 T02 ;
G43 G00 Z0 H01 ;
G37 Z-300. R10. D2. F10 ;
:
In this case, the distance (H01 = Za1 - z0)
from the tool T01 tip to the top of the mea surement sensor is calculated as the tool
length compensation amount which is then
registered in the tool compensation table.
Area A: Moves with rapid traverse feed rate.
Areas B1 and B2: Moves with the measurement speed. (f1 or
parameter setting)
If a sensor signal is input in area B1, an error will occur.
If a sensor signal is not input in the area B2, an error will occur.
Tool change position
Tool
Sensor
Reference position (In
case of machine
coordinate system zero
point.)
Amount of movement
based on tool length
measurement
Tool length measurement
position (Za1)
A
B1
r 1
d 1
d 1
B 2 z1
Start point
Measurement
position
r1, d1, and f1 can also be
set in parameters.

This function moves the tool in the direction of the tool measurement position by commanding a distance between the measurement start position to the measurement position, it stops the tool as soon as it contacts the sensor and calculates the difference between the coordinate position when the tool has stopped and commanded coordinate position. It registers this difference as the tool length compensation amount for that tool.
If compensation has already been applied to the tool, it is moved in the direction of the measurement position with the compensation still applied, and when the measurement and calculation results are such that a further compensation amount is to be provided, the current wear compensation amount is further corrected.
When the tool moves from the measurement start position to the measurement position specified in G37 x1 (z1), it passes through the A area at rapid traverse. Then, it moves at the measurement rate set in F command or parameter from the position specified in r1. If the measurement position arrival signal (sensor signal) turns ON during the tool is moving in the B area, an error occurs. If the measurement position arrival signal (sensor signal) does not turn ON although the tool passes through the measurement position x1 (z1) and moves by d1, an error occurs.
Automatic tool length measurement (L system)
G37 1 Rr1 Dd1 Ff1 ;
G37
1
: Measurement command
: Measurement axis address and measurement position coordinate (X, Z)
Rr1
Dd1
Ff1
: The distance between the point at which tool movement is to start at the measurement speed and the
measurement position (Radial value fixed/incremental position)
: The range in which the tool is to stop (Radial value fixed: incremental position)
: The measurement rate
When Rr1_, Dd1_ and Ff1_ have been omitted, the values set in the parameters are used.
d1
d1
B
r1
A
F feed
Measuring
instrument
Measurement position
Start position
r1, d1, and f1 can also be
set in parameters.

Compensation
amount Sensor ON
Rapid traverse feed

14.1.3 Manual Tool Length Measurement 1
Simple measurement of the tool length is done without a sensor.
When the tool is at the reference position, this function enables the distance from the tool tip to the measurement position (top of workpiece) to be measured and registered as the tool length compensation amount.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
Manual tool length measurement 1 [M system]
M
Manual movement
amount
(tool length
compensation
amount)
Workpiece
Table

This is the function to calculate the tool length compensation amount automatically by moving the tool to the measurement point with manual feed. There are three measurement methods in manual tool length measurement 1, and the value to be specified as measurement zero point differs. The method is selected depending on the parameter settings.
For key operation there are normal operation mode/simple operation mode.
Machine zero point designation method
In this method, the measurement zero point is the machine coordinate system zero point.
The tool is moved to the end face or side face, and the tool compensation amount is obtained from the measurement position (machine position) and the program zero point offset (L).
The tool length is automatically calculated by the equation below.
Tool length = Measurement position - Program zero point offset (L)
Parameter designation method
In this method, the measurement zero point is the coordinate set to "#2015 tlml-". The offset amount from the machine coordinate zero point to the measurement zero point is set to "#2015 tlml-".
The tool is moved to the end face or side face, and the tool compensation amount is obtained from the measurement position (machine position - measurement zero point (#2015 tlml-)) and the program zero point offset (L).
The tool length is automatically calculated by the equation below.
Tool length = Measurement position (Machine coordinate value - Measurement zero point (#2015 tlml-)) - Program zero point offset (L)
Manual tool length measurement 1 [L system]
Workpiece Workpiece
X axis tool length
X axis measurement
position
Tool length basic point
Program zero point offset (L)
Program zero point
Tool length basic point
Machine coordinate
zero point
(Measurement zero
point)
Program zero point X axis measurement position
(= X axis tool length)
Machine coordinate
zero point
(Measurement zero
point)
Tool length basic point
Machine
coordinate
zero point
X axis tool length
X axis measurement
position
2015 tlml Program zero point
offset (L)
Z axis tool length
Measurement zero point
2015 tlml Program zero point offset (L)
Workpiece
Workpiece
Tool length basic point
Measurement zero point
Z axis measurement
position
Machine
coordinate
zero point

Workpiece coordinate offset designation method
In this method, the measurement zero point can be selected from the following depending on the parameter setting.
(1) The measurement zero point is the position shifted by the amount of the selected workpiece coordinate system offset from the machine coordinate zero point.
(2) The measurement zero point is the position shifted by the total amount of the following offsets from the machine coordi nate zero point.
Selected workpiece coordinate system offset
External workpiece coordinate offset
Workpiece coordinate system shift
Workpiece base point offset
The tool is moved to the end face or side face, and the tool compensation amount is obtained from the measurement position (workpiece coordinate position) and the program zero point offset (L).
(*1) In the above (2), it is the total amount of workpiece coordinate system offset, external workpiece coordinate offset, work piece coordinate system shift and workpiece base point offset.
The tool length is automatically calculated by the equation below.
Tool length = Measurement position (Machine coordinate value - Measurement zero point) - Program zero point offset (L)
Tool length basic point
X axis tool length
X axis measurement
position
Program zero point
offset (L)
X axis tool length
Measurement zero point
Program zero point offset (L)
Workpiece
Workpiece
Tool length basic point
Measurement zero point
Z axis measurement
position
Workpiece coordinate
system offset (*1)
Machine
coordinate
zero point
Machine
coordinate
Workpiece coordinate zero point
system offset (*1)

14.1.4 Manual Tool Length Measurement 2
When the tool is positioned at the reference position, this function enables the distance from the reference position to the tool tip to be measured and registered as the tool length compensation amount. In this case, the position of the gauge block used as a reference must be set as the basic height.
If the height axis designation parameter is ON, the axis designated for plane selection basic axis K is the axis targeted for measurement as the height axis.
Furthermore, if the tool length measurement check parameter is ON, an input OK/cancel confirmation message appears after input key has been pressed.
A device in which a touch probe is built is used. Simply by causing the tool nose to touch the touch probe in manual feed, the tool compensation amount can be calculated and stored in tool length compensation amount memory. If you set the tool compensation values of each tool, cut the workpiece end face manually, and then input the "Workpiece measurement" signal, you can set the external workpiece coordinate offset data of Z axis.
Preset the machine coordinate position of the touch probe touch face in parameter as the measurement basic position.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
Manual tool length measurement 2 [M system]
Manual tool length measurement 2 [L system]
M Tool length
compensation
Manual movement
amount
Basic height
Table
Gauge block
TLM basic length
(setup parameter)
X
Z
X
Z Z
X
M
Tool length
Tool length
- touch face
+ touch face - touch face
+ touch face

14.1.5 Workpiece Coordinate Offset Measurement
The external workpiece coordinate offset data for the Z axis can be set by cutting the workpiece face by means of manual operations and inputting the "Workpiece measurement" signal.
By pressing the menu key, data can be set in the Z axis of an arbitrary coordinate offset.
Coordinate offset setting for the Z axis (2nd axis) of the part system 1 to 4 is possible.
Note that the workpiece coordinate offsets for multiple part systems cannot be measured at the same time.
(1) Measurement is disabled for the part system with one-axis structure.
Example of measurement of external workpiece coordinate offset data for Z axis
[Measurement method with "Workpiece measurement" signal]
Select a tool, and cut the workpiece face.
When the "Workpiece measurement" signal is input, the external workpiece coordinate offset data for the Z axis is calcu lated from the machine coordinate position, length of the tool used and tool nose wear compensation amount, and stored in
the memory.
[Measurement method with "MeasVal take in" menu]
Select a tool, and cut the workpiece face.
When the "MeasVal take in" menu is pressed, workpiece coordinate offset data is calculated from the machine coordinate position, tool length and tool nose wear compensation amount of a used tool, and external workpiece coordinate offset. The workpiece coordinate offset data is stored in the Z-axis of the selected coordinate system offset.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
Note
Z
X
Machine zero point
Tool post
Workpiece
Workpiece coordinate zero point

14.1.6 Workpiece Position Measurement
The workpiece position measurement function is used to measure each axis' coordinate point by installing a sensor on the spindle and the sensor contacting the workpiece with the manual feed or handle feed.
The surface, hole center and width center coordinates are calculated from the measured coordinates, and those calculated results are set in the workpiece coordinate offset.
The axis to be measured is designated with parameter.
The workpiece position measurement is available for all the part systems.
Here the measurement axes are explained as "X", "Y" and "Z".
The workpiece position measurement coordinates are calculated from the skip machine position of the X, Y and Z axes.
Measurement position coordinate X = X axis' skip machine position + sensor diameter/2 center compensation amount (horizontal) skip flow amount (horizontal)
Measurement position coordinate Y = Y axis' skip machine position + sensor diameter/2 center compensation amount (vertical) skip flow amount (vertical)
Measurement position coordinate Z = Z axis' skip machine position - sensor length
The sensor diameter/2 and skip flow amount change between +/- with the tool movement direction during the measurement.
The X and Y axes use the sensor diameter, center compensation amount (horizontal/vertical) and skip flow amount (horizontal/vertical).
The Z axis uses the sensor length.
The measurement position coordinate of the X axis, Y axis or Z axis is set in the specified workpiece coordinate offset.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
Surface workpiece offset measurement
To set the workpiece coordinate offset, the X axis
is measured and the X axis' offset coordinate is
set.
Then, the Y axis' offset is measured and set.
Finally, the Z axis' offset is measured and set.
X
Y
Workpiece coordinate
zero point
Y axis measurement
constant position
X axis measur
ment constant
position

The measurement position coordinates of two axes (X, Y) are measured at three points, and the hole center is calculated. The calculated result is set in the specified workpiece coordinate offset.
The workpiece position measurement coordinates are calculated from the skip machine position of the X and Y axes.
Measurement position coordinate X = X axis' skip machine position + center compensation amount (horizontal) skip flow amount (horizontal)
Measurement position coordinate Y = Y axis' skip machine position + center compensation amount (vertical) skip flow

amount (vertical)
The +/- of the skip flow amount changes according to the tool movement amount during measurement.
The two points among the measurement position coordinate of the X axis, Y axis or Z axis are measured, and each axis' groove center is calculated. The calculated result is set in the specified workpiece coordinate offset.
The workpiece position measurement coordinates are calculated from the skip machine position of the X, Y and Z axes.
Measurement position coordinate X = X axis' skip machine position + center compensation amount (horizontal) skip flow amount (horizontal)
Measurement position coordinate Y = Y axis' skip machine position + center compensation amount (vertical) skip flow amount (vertical)
Measurement position coordinate Z = Z axis' skip machine position - sensor length
The +/- of the skip flow amount changes according to the tool movement amount during measurement.
Hole center workpiece offset measurement
To set the workpiece coordinate offset, the position
X and Y of the measurement A point are mea sured, and the measured values are set in the
measurement A point. In the same manner as the
measurement A point, the measurement B point
and then C point are measured and set. The hole
center coordinate is calculated by setting the work piece coordinate system after setting three points,
and the calculated result is set in the workpiece co ordinate offset.
Width center workpiece offset measurement
To set the workpiece coordinate offset, the position
X (position Y, position Z) of the measurement A
point is measured, and the measured value is set in
the measurement A point. In the same manner as
the measurement A point, the measurement B point
is measured and set.
The groove width center coordinate of the X axis (Y
axis, Z axis) is calculated by setting the workpiece
coordinate system after setting two points, and the
calculated result is set in the workpiece coordinate
offset
X
Y
Workpiece coordinate
zero point
Measure ment A poin
Measure ment B poi
Measurement C point
X
Y
Measure ment A
point
Measurement B point

14.1.7 Rotation Measurement
The offset (rotation center and rotation angle) of the rotary coordinate system is measured, and the results are set to the workpiece coordinate system offset (rotation center) and the parameters.
[Measurement using touch probe]
Measurement counter X = X axis skip position (Machine position)
Measurement counter Y = Y axis skip position (Machine position)
[Simple measurement (measurement without using touch probe)]
Measurement counter X = X axis machine position + OFFSET X + Skip past amount(H) (*1)
Measurement counter Y = Y axis machine position + OFFSET Y + Skip past amount(V) (*1)
(*1) The skip past amount is added for only the axis that moved last.
The sign (+ or -) of the skip past amount depends on the movement direction of the axis.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L

14.1.8 Rotation Center Error Measurement
This function executes automatic measurement with the touch probe on the reference sphere to calculate the rotation center error compensation amount.
A reference sphere and a touch probe which can input skip signals to the CNC are required to use this function.
As the movement of the touch probe, the rotation of the axis, the reading of the coordinate and the calculation of the error are performed automatically, the rotation center error compensation amount can be easily calculated. The calculated error compensation amount can be confirmed on the rotation center error measurement screen and set to the parameter.
In order to perform the rotation center error measurement, you need to execute the rotation center error macro initialization in advance and input the rotation center error measurement macro program to the memory.
This function supports the following machine configurations only:
Table tilt type (A-C axes)
Table tilt type (B-C axes)
Combined type (A-C axes)
Combined type (B-C axes)
Table tilt type: A machine with two rotary axes on table side
Combined type: A machine with a rotary axis each on tool head side and table side
If the rotation center error measurement is attempted with the configuration which is not subject, the alarm occurs when the automatic start button is pressed.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA

M80V
TypeB
M
L

14.1.9 Workpiece Installation Error Measurement
This function executes automatic measurement with the touch probe to calculate the workpiece installation error compensation amount.
As the movement of the touch probe, the reading of the coordinate and the calculation of the error are performed automatically, the workpiece installation error compensation amount can be easily calculated. The calculated error compensation amount can be confirmed on the workpiece installation error measurement screen and set to the error compensation amount.
In order to perform the workpiece installation error measurement, you need to execute the workpiece installation error macro initialization in advance and input the workpiece installation error measurement macro program to the memory.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
X(+)
Y(+)
Z(+)
Touch probe
Workpiece

14.2 Tool Life Management
14.2.1 Tool Life Management
Tool life management is a function to monitor the usage of the programmed tool based on the cumulative cutting hours or the cumulative number of cuttings.
The function enables appropriate exchange of tools, which leads to consistent quality of machining.
For multi-part system, the number of tools for tool life management can be set individually for each part system.
14.2.1.1 Tool Life Management I
The following two method can be selected.
Management by the cutting hours
The cutting time (such as G01, G02, or G33) after tool selection (T) command is added to the cumulative cutting hours for the specified tool.
Management by the number of cuttings
The cumulative number of cuttings of the specified tool is incremented each time a tool selection (T) command is issued for the tool.
The number of times of hole drilling in fixed cycle for drilling can be counted by setting the parameter.
[M system]
The "Tool life over" signal will turn ON when the cumulative tool usage data has reached the end of tool life.
[L system]
The "Tool life over" signal will turn ON when a T command is issued after the cumulative tool usage data has reached the end of tool life.
14.2.1.2 Tool Life Management II
[M system]
A spare tool change function is added to tool life management I. This function selects a usable tool out of the spare tools of the group determined by the value specified by the user PLC, then outputs data of such usable spare tool. The spare tool can be selected in two ways: the tools are selected in order they were registered in the group, or the tool whose remaining period of the tool life is the longest of all in the group is selected.
[L system]
The tool life of each tool (cutting hours or number of cuttings) is controlled, and when the usage data has reached the end of tool life, a spare tool of the same type is selected from the group where the tool belongs to.
By setting the remaining tool life value prediction value (hours or the number of times) in advance, when the remaining tool life of the tool in use is below the set value, the "Tool life prediction" signal can be output. (Tool life prediction function)
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L

14.2.1.3 Tool Life Management III
For the tools designated by user PLC, tools' cumulative cutting hours (0 to 4000 minutes) or cumulative number of cuttings (0 to 65000 times) is accumulated, and the tool usage state is monitored. The tool life data for up to 1000 tools can be managed.
This function does not support the management by the group No.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M

L

14.2.2 Number of Tool Life Management Sets
[M system]
[L system]
The number of tools that can be managed for their lives in the case of fixed allocation are shown below. For details on the arbitrary allocation, refer to " 14.2.3 Tool Life Management Set Allocation to Part Systems".
[M system]
[L system]
Number of tool life manage ment sets M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
Number of tool life manage ment tools (99 sets)
Number of tool life manage ment tools (128 sets)
Number of tool life manage ment tools (200 sets)
Number of tool life manage ment tools (256 sets)
Number of tool life manage ment tools (400 sets)
Number of tool life manage ment tools (999 sets)
Number of tool life manage ment sets M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
Number of tool life manage ment tools (99 sets)
Number of tool life manage ment tools (128 sets)
Number of tool life manage ment tools (200 sets)
Number of tool life manage ment tools (256 sets)
Number of tool life manage ment tools (400 sets)
Number of tool life manage ment tools (999 sets)
Function name Common for part systems or
1-part system
Independent to each part system and multi-part sys tem
Number of tool life management tools (200 sets) 200 tools Divide the number of tools in the system by the number of part systems to calculate the number of tools in each part system(If there is the remainder, the remainder is allocated to the first part system.)
Number of tool life management tools (400 sets) 400 tools
Number of tool life management tools (999 sets) 999 tools
Function name Common for part systems or
1-part system
Independent to each part system and multi-part sys tem
Number of tool life management tools (99 sets) 99 tools
Divide the number of tools in the system by the number of part systems to calculate the number of tools in each part system(If there is the remainder, the remainder is allocated to the first part system.)
Number of tool life management tools (128 sets) 128 tools
Number of tool life management tools (256 sets) 256 tools
Number of tool life management tools (400 sets) 400 tools
Number of tool life management tools (999 sets) 999 tools

14.2.3 Tool Life Management Set Allocation to Part Systems
(*) Variable number of management tools
The number of tool life management tools can be set per part system.
There are two types of the allocation: "Arbitrary allocation" which allocates the number of tool life management tools to each part system arbitrarily and "Fixed allocation" which automatically allocates the number of tool life management tools to each part system equally, and the type can be selected using the parameter.
The arbitrary allocation enables the efficient allocation because when a certain part system needs only a small number of tool life management tools, the rest can be allocated to another part system. If an auxiliary-axis part system does not need the tool life management at all, the number of tool life management tools can be set 0 in the auxiliary-axis part system.
Number of tool life management tools in system is the total number of tool life management tools of all part systems.
Arbitrary allocation
[When the number of tool life management tools is increased in the 1st part system of 4-part system]
[When the number of tool life management tools is set "0" to the 3rd part system of 3-part system for use of the 3rd part system as auxiliary-axis part system]
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
Number of tool life management tools in system [1000 tools]
Number of tool life management tools in system [1000 tools]
Number of tool life management tools in system [1000 tools]
Number of tool life management tools in system [1000 tools]
250
250
250

250
200
200
200
400
1st part system
2nd part system
3rd part system
4th part system
1st part system
2nd part system
3rd part system
4th part system
334
333
333 500
0
500
1st part system 1st part system
2nd part system
3rd part system
2nd part system
3rd part system

Fixed allocation
Number of tool life management tools in system [1000 tools]
(*1) The maximum number of tool life management tools for each part system is 999.
(*2) If there is any remainder, the remainder is allocated to the 1st part system.
1-part system 2-part system 3-part system 4-part system
250
250
250
250
1st part
system
2nd part
system
3rd part
system
4th part
system
999
(*1)
1st part
system
500
500
1st part
system
2nd part
system
333
333
334
(*2)
1st part
system
2nd part
system
3rd part
system

14.3 Others
14.3.1 Programmable Current Limitation
This function allows the current limit value of the NC axis to be changed to a desired value in the program, and is used for the workpiece stopper, etc.
The commanded current limit value is designated with a ratio of the limit current to the rated current. The current limit value can also be set from the setting and display unit.
The validity of the current limit can be selected with the external signal input.
However, the current limit value of the PLC axis cannot be rewritten.
If the current limit is reached when the current limit is valid, the "Current limit reached" signal is output.
The following two modes can be used with external signals as the operation after the current limit is reached.
- Normal mode
The movement command is executed in the current state.
During automatic operation, the movement command is executed to the end, and then the next block is moved to with the droops still accumulated.
- Interlock mode
The movement command is blocked (internal interlock).
During automatic operation, the operation stops at the corresponding block, and the next block is not moved to.
During manual operation, the following same direction commands are ignored.
During the current limit, the droop generated by the current limit can be canceled with external signals.
(Note that the axis must not be moving.)

The setting range of the current limit value is 1% to 999%. Commands that exceed this range will cause a program error.
If a decimal point is designated with the G10 command, only the integer will be valid.
(Example) G10 L14 X10.123 ; The current limit value will be set to 10%.
For the axis name "C", the current limit value cannot be set from the program (G10 command).
To set from the program, set the axis address with an incremental axis name, or set the axis name to one other than "C".
14.3.2 Auto Power OFF
This can notify that the control unit's power can be turned OFF after shutting the display unit down (Do not turn the power
OFF.) by entering "Automatic power OFF request" signal from user PLC to NC.
(1) The Mitsubishi Electric-supplied display unit is required.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
G10 L14 X dn ;
G10
L14
X
dn
: Current limit input command
: Current limit value setting (+ side/- side)
: Axis address
: Current limit value 1 % to 999 %
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
Note
M800V/M80V Series Specifications Manual (Function)
14 Automation Support Functions
14.3 Others
IB-1501610-G 426
14.3.4 Load Monitoring I
This function aims at detecting tool wear or degradation by detecting and monitoring the actual load (current value) on spindle
and NC axes on a real time basis.
The effective torques and estimated disturbance torques on the spindle and NC axes are output to the predetermined R
registers in real time. Sampling of the estimated disturbance torque can be performed with this function.
Up to 8 servo axes in each part system (maximum 4 part systems) are supported with this function.
14.3.5 Power ON/OFF Sequence
This function turns the power supply ON/OFF, synchronizing the NC control unit and the HMI screen.
This enables the following:
The relay which synchronizes the control unit and the personal computer unit when the power supply is turned ON
becomes unnecessary.
The control unit and the personal computer unit are configured with the same power supply and can be started up at opti mum timing even when they are turned ON at the same time.
By using the power ON/OFF button of the operation panel side, both the control unit and the personal computer unit can be
started up and their power supply can be turned ON again.
When the automatic power OFF is performed, NC starts the end processing right after the end processing of the personal
computer unit is completed to reduce the wasteful standby time.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
M800V/M80V Series Specifications Manual (Function)
14 Automation Support Functions
14.3 Others
427 IB-1501610-G
14.3.7 Direct Robot Control
This function enables a robot to be connected to and directly operated by an NC.
A robot-dedicated screen is provided to display the status of the robot on the NC screen. Some of the possible operations are
as follows:
Automatic operation using robot-dedicated G code commands in NC machining programs
Manual operation of the robot using a handle on the NC
Digital I/O control to open and close the robot hand
As in the following example, this function enables the NC to control the machining of workpieces with the robot loading and
unloading workpieces in coordination with the machining, as well as deburring through the robot concurrent with the
machining of workpieces.
[Example of system configuration]
1st part system ($1) : X, Z
2nd part system ($2) : - (The part system has no axes because only a robot is controlled.)
A part system to be used exclusively for robot operation (robot-dedicated part system) can be set. Even when the robot dedicated part system is not used, robot operation is possible; however, when the robot-dedicated part system is used, robot
operation is possible with the same command (program) as the NC axis control.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M

L
Robot Robot controller
Deburring tool
(External tool)
Temporal
depot
Finished products
(4) Deburring
$1
$2
Machine tool
(1) Loading workpiece
Unmachined workpieces
(3)Unloading
workpiece
(2) Machining by NC

14.3.8 Cutting Load Control
This function automatically changes the feedrate so that the cutting load reaches the set target load. For machining with a low cutting load, the feedrate can be increased and the cycle time can be shortened. On the other hand, for machining with a high cutting load, the tool can be protected by reducing the feedrate and reducing the load on the tool.
This function may affect the surface quality of the workpiece as the feedrate increase or decrease; therefore, use it for the machining such as rough machining.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
Tool
Program path
Cutting load control: Invalid
Cutting load
Cutting load
Cutting load control: Valid
Time
Time
Time
Time
Feedrate
Feedrate
Command speed
Command speed
Target load
Low load High load
Acceleration
section
Deceleration
section

15.1 Safety Switches
15.1.1 Emergency Stop
All operations are stopped by the emergency stop signal input and, at the same time, the drive section is stopped and the movement of the machine is stopped.
At this time, the READY lamp on the setting and display unit goes OFF and the "Servo ready completion" signal is turned OFF.
When the emergency stop is cancelled, the reset will be performed. The reset type can be selected in the parameter.
15.1.2 Data Protection Key
The editing functions such as setting and deleting of data can be prohibited by the data protection key. There are 5 types of data protection keys, and each data protection key and the data to be protected are as follows:
The data protection keys prohibit the editing functions such as setting and deleting when the keys are OFF (0).
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
Data protection key type Details
Data protection key 1 For protecting the overall tool data and the coordinate system presettings as based on origin setting.
Data protection key 2 For protecting the user parameters and common variables.
Data protection key 3 For protecting the machining programs of NC memory and NC memory 2.
Data protection key (memory card) For protecting the data on the front-side SD (memory card).

Data protection key (DS) For protecting the data on the back-side SD (DS).

15.2 Display for Ensuring Safety
15.2.1 NC Warning
The warnings which are output by the NC system are listed below. When one of these warnings has occurred, a warning number is output to the PLC and a description of the warning appears on the screen. Operation can be continued without taking further action.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
Type of warning Outline
Servo warning The servo warning is displayed.
Spindle warning The spindle warning is displayed.
System warning The system warning is displayed. (State such as temperature rise, battery voltage low, etc.)
Absolute position warn ing A warning in the absolute position detection system is displayed.
Auxiliary axis warning The auxiliary axis warning is displayed.

15.2.2 NC Alarm
When an alarm has occurred, an alarm number is output to the PLC, and a description of the alarm appears on the screen. Operation cannot be continued without taking remedial action.
For NC alarm display and alarm signals, refer to "Alarm/Parameter Manual" and "PLC Interface Manual" for details.
In addition, the NC alarm has the following functions.
Display delay function of an operation alarm
This function can be used to postpone only alarm display (including alarm signal ON and alarm history record) when an operation error has occurred.
By removing the causes of the operation error while alarm display is being postponed, unnecessary alarm display is not displayed and also unnecessary alarm history is not recorded.
7-segment LED alarm/status display
The 7-segment LED mounted on the operation board I/O can display NC status.
When alarms occur, an alarm with the highest priority within each part system is displayed.
Alarm/warning on PLC output of servo/spindle drive unit
When an alarm or a warning has occurred in the servo drive unit or spindle drive unit, alarm No. and warning No. of each drive unit is output to the R register.
When a warning has occurred in the servo drive unit or spindle drive unit, the signal is output to indicate that a warning has occurred.
Multiple keys cannot be input
This function is used to display an operation error when multiple keys are input with the keyboard or the menu buttons on the display unit.
15.2.3 Operation Stop Cause
The stop cause of automatic operation is displayed on the setting and display unit.
15.2.4 Emergency Stop Cause
When "EMG" (emergency stop) message is displayed in the operation status display area of the setting and display unit, the emergency stop cause can be confirmed.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L

15.2.5 Thermal Detection
When overheating is detected in the control unit, an overheat signal is output at the same time as the alarm is displayed. If the system is in automatic run at the time, run is continued, but it cannot be started after reset or completion by M02/M30. (It can be started after block stop or feed hold.)
When the temperature falls below the specified temperature, the alarm is released and the overheat signal is turned OFF.
(1) If the temperature rise detection function is invalidated with the parameters, the control could be disabled when the tem perature is excessive. This could result in machine damage or personal injuries due to runaway axis, and could damage
the device. Enable the detection function for normal use.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L

Overheat detection
Control unit
Parameter
Temperature
alarm
User PLC
Message display
Cooling fan rotation
Lamp alarm
Emergency stop
Others
Bit device
(Default: valid)
Note

15.2.6 Battery Alarm/Warning
When it is time for changing batteries, alarm or warning is displayed.
When a warning is displayed, immediately backup all the necessary data and change batteries.
When an alarm is displayed, there is a possibility that memory has been lost.
The target control devices are as follows.
Control unit
Personal computer unit
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
0
Nominal voltage Battery warning output
Battery warning detection level
Battery alarm detection level
Battery alarm output

15.3 Protection
15.3.1 Stroke End (Over Travel)
When limit switches and dogs have been attached to the machine and a limit switch has kicked a dog, the movement of the machine is stopped by the signal input from the limit switch.
At the same time, the alarm output is sent to the machine.
The stroke end state is maintained and the alarm state is released by feeding the machine in the reverse direction in the manual mode to disengage the dog.
15.3.2 Stored Stroke Limit
The axis can be stopped before entering the prohibited area by setting the axis entry prohibited area.
The inside or outside of the specified area can be set as the entry prohibited area.
There are "stored stroke limit I/II" where the outside of the specified area is the prohibited area, "stored stroke limit IB/IIB" where the inside of the specified range is the prohibited area, and "stored stroke limit IC" where the movable area is specified in the prohibited area.
Up to five entry prohibited areas can be set by combining them.
[Usage example 1]
[Usage example 2]
The axis decelerates to a stop before entering the prohibited area, and an alarm occurs.
The axis that caused the alarm can move only in the opposite direction in which it has just moved.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
Stored stroke limit I
Stored stroke limit IIB
Stored stroke limit IB
Entry prohibited
area
Movable area
Stored stroke limit I
Stored stroke limit IIB
Stored stroke limit IC

[Enabling conditions of stored stroke limit]
When the relative position detection system is used, the stored stroke limit is disabled until the reference position return is completed after the power is turned ON.
If the absolute position detection method is set to the simple absolute position detection, the stored stroke limit can be enabled even when the reference position return has not been completed.
(1) If the absolute position detection is enabled when using the absolute position detection system, the stored stroke limit will be enabled immediately after the power is turned ON.
(2) The stored stroke limit is disabled for a sub axis during simple synchronous control.
[Stored stroke limit coordinates]
The stored stroke limit check is carried out in the basic machine coordinate system after the reference position return is established.

When the stored stroke limit is enabled with the reference position return not been completed, the stored stroke limit check is executed with the basic machine coordinate system at the time of last power-OFF as temporary one.
When the 1st dog-type reference position return is completed after the power is turned ON, the proper coordinate system is established.
The stored stroke limits I, II, IIB, IB and IC are handled as follows.
(1) The stored stroke limit is disabled for axis where the reference point is not established.
(2) For stored stroke limit I/II, it is disabled for axis where the same values (other than "0") are set to the upper and lower lim its of the area setting parameters. The axis where "0" is set to the upper and lower limits of the area setting parameters
cannot be moved.
(3) For stored stroke limit IB/IC, the stored stroke limit is disabled for axis where the same values are set to the upper and lower limits of the range setting parameters.
(4) When the stored stroke limit I and II are used together, the overlap of the areas designated by them (I and II) is the mov able area.
(5) The stored stroke limit IB and IC cannot be used together.
Type Area Details
I Outside prohibited Set by the machine tool builder.
II Outside prohibited Set by the user.
By using the program command, the parameter can be changed and the function can be switched to ON/OFF.
Select II or IIB with the parameters.
IIB
Inside prohibited
IB Inside prohibited Set by the machine tool builder.
IC Inside allowed Set by the machine tool builder.
Note
Note

15.3.2.1 Stored Stroke Limit I/II
This is the stroke limit function used by the machine tool builder, and the outside of the boundary is defined as the entrance prohibited area.
The maximum and minimum values for each axis can be set by parameters. The function itself is used together with the stored stroke limit II function described in the following section, and the tolerable area by both functions is the movable area.
The setting range is -99999.999 to +99999.999 mm.
The area of the stored stroke limit I can be changed to the value set to R register for each axis.
When "Stored stroke limit I change request" signal is turned ON, the area of stored stroke limit changes. Changing the area for the stored stroke limit I is also possible during automatic operation. Also, the current settings for the stored stroke limit I can be checked with the R register values.
This feature allows an operator to switch the area of the stored stroke limit I during axis movement for the purpose of tool exchange, for example.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
Stored stroke limit I
The position of points 1 and 2 are set using the basic machine coordinate.
Prohibited area
M
P2
P1
Machine movable area
Basic machine coordinate system
"-" setting "+" setting

This is the stroke limit function which can be set by the user, and the area outside the set limits is the prohibited area.
The limits for each axis can be set by parameters or with program commands. When this function is used together with the stored stroke limit I function described in the foregoing section, the tolerable area by both functions is the movable area.
The setting range is -99999.999 to +99999.999 mm.
The stored stroke limit (II) function can also be disabled for each axis with the parameter settings.
Stored stroke limit II
The position of points 3 and 4 are set using the basic machine coordinate.
The area determined by points 1 and 2 is the pro hibited area set by stored stroke limit I.
Prohibited area
M
P2
P4
P3
P1
Machine movable area
Area prohibited by stored stroke limit function II
Basic machine coordinate system
"-" setting "+" setting

15.3.2.2 Stored Stroke Limit IB
The boundary is set for each axis with parameters. The inside of the set boundary is defined as the prohibited area.
When the stored stroke limit IB is enabled, up to two prohibited areas can be set.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
Point 3: #2062 OT_1B+
Point 4: #2061 OT_1B Point 5: #2707 OT_1B[2]+
Point 6: #2706 OT_1B[2]-
These values are set with the coordinate position
in the basic machine coordinate system.
The area determined by points 1 and 2 is the pro hibited area set by stored stroke limit I.
#2706 #2707
#2062
#2061
Machine movable area
Basic machine
coordinate system
Point 1
Point 2
Point 3
Point 4
Point 5
Point 6
Area prohibited by
stored stroke limit IB
Area prohibited
by stored
stroke limit IB
Prohibited area

15.3.2.3 Stored Stroke Limit IIB
A parameter is used to switch between this function and stored stroke limit II.
With stored stroke limit IIB, the inside of the set boundary is defined as the prohibited area.
When the stored stroke limit IIB is enabled, up to two prohibited areas can be set.
The limits for each axis can be set by parameters or with program commands. However, "#8231 OT-CHECK[2]-N" and
"#8232 OT-CHECK[2]-P" cannot be set with program commands.
When the stored stroke limit II is selected, the stored stroke limit IIB is disabled.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
Point 3: #8205 OT-CHECK-P
Point 4: #8204 OT-CHECK-N
Point 5: #8232 OT-CHECK[2]-P
Point 6: #8231 OT-CHECK[2]-N
These values are set with the coordinate position
in the basic machine coordinate system.
The area determined by points 1 and 2 is the pro hibited area set by stored stroke limit I.
#8231 #8232
#8205
#8204
Machine movable area
Basic machine
coordinate system
Point 1
Point 2
Point 3
Point 4
Point 5
Point 6
Prohibited area
Area prohibited by
stored stroke limit IIB
Area prohibited
by stored
stroke limit IIB

15.3.2.4 Stored Stroke Limit IC
The boundary is set for each axis with parameters. The inside of the set boundary is the additional movement range.
This cannot be used with stored stroke limit IB.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M

L
The values of points 3 and 4 are set with the co ordinate position in the basic machine coordinate system.
The area determined by points 1 and 2 is the pro hibited area set by stored stroke limit I.
Prohibited area
M
P2
P1
P4
P3
"-" setting "+" setting
Machine movable area
Additional
movable area
Basic machine coordinate
system

15.3.3 Stroke Check Before Travel
This function detects an error of the program command which causes the machine to enter the prohibited area where machine entry is prohibited.
Whereas normal stored stroke limit stops the machine just before the set prohibited area, this function causes the program error to occur in a block where the said command is given, and stops the machine before movement. This facilitates review of program paths as well as continuous operation.
There are two methods for stroke check before travel, which can be selected with a parameter.
G22 allows you to set the entry prohibited area (X, Y and Z) and enable the stroke check before travel.
The program error occurs in a command block whose start or end point of travel, or linear or circular path enters the prohibited area.
G23 turns OFF the check function.
This method can be used for machining center specification only.
Command format
Stroke check before travel ON
(*1) In the command format, the basic axes are X, Y and Z. Command the basic axis set in the parameter.
Stroke check before travel cancel
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
Stroke check before travel (G22/G23)
G22 X__ Y__ Z__ I__ J__ K__ ;
X, Y, Z (*1) Coordinates of upper point (basic axis name and its coordinate position)
I,J,K Coordinates of lower point (I, J, K address and its coordinate position)
G23 ;
Y
0 X
The program error stops
the operation before start
of the travel command
block.
Traveling path enters
the prohibited area.
Entry prohibited area specified by G22
Basic machine
coordinate system

The block in which the end point of the movement command enters the entrance prohibited area set with the stored stroke limit I, IB, IC, II or IIB function becomes a program error.
Stroke check before travel in the stored stroke limit area
Y
0 X
End point enters the
prohibited area.
The program error stops the
operation before start of the
travel command block.
Basic machine
coordinate system
Entry prohibited area specified by stored stroke limit I

15.3.4 Chuck/Tailstock Barrier Check
By limiting the tool nose point move range, this function prevents the tool from colliding with the chuck or tailstock because of a programming error. When a move command exceeding the area set in a given parameter is programmed, the tool is stopped at the barrier boundaries.
Command format
When the machine is about to exceed the area, the machine is stopped and an alarm is displayed.
To cancel the alarm, execute reset.
The function is also effective when the machine is locked.
This function is valid when all axes for which a barrier has been set have completed reference position return.

The chuck barrier/tailstock barrier can be set per each part system.

Chuck barrier/tailstock barrier setting.

The chuck barrier and tailstock barrier are both set with the machine coordinate by inputting one set of three-point data in the parameter.

Points P1, P2 and P3 are the chuck barrier, and points P4, P5 and P6 are the tailstock barrier. The X axis is set with the coordinate position (radius value) from the workpiece center, and the Z axis is set with the basic machine coordinate system coordinate.

Point P0 is the chuck barrier and tailstock barrier's basic X coordinates, and the workpiece center coordinate in the basic machine coordinate system is set.

The barrier area is assumed to be symmetrical for the Z axis, and if the X axis coordinate of barrier point P_ is minus, the sign is inverted to plus and the coordinate is converted for a check.

Set the absolute values of the X axis coordinates of the barrier points as shown below:

P1 >= P2 >= P3, P4 >= P5 >= P6

(However, this need not apply to the Z axis coordinates.)

M850VW M830VW M850VS M830VS M80VW M80V

TypeA

M80V

TypeB

M

L

G22 ; Barrier ON

G23 ; Barrier OFF (cancel)

P6

P5

Z

P4

(P0)

P0

P3

P2

P1

X

(Form 1)

P6

P5

Z

P4

(P0)

P0

P3

P2

P1

X

(Form 2)

15.3.5 Interlock

The machine movement will decelerate and stop as soon as the interlock signal, serving as the external input, is turned ON. When the interlock signal is turned OFF, the machine starts moving again.

In the manual mode, only that axis for which the interlock signal is input will stop.

In the automatic mode, all axes will stop when the interlock signal is input to even one axis which coincides with the moving axis.

Block start interlock

While the "Block start interlock" signal (*BSL) is OFF (valid), the execution of the next block during automatic operation will not be started. The block whose execution has already commenced is executed until its end. Automatic operation is not suspended. The commands in the next block are placed on standby, and their execution is started as soon as the signal is turned ON.

(1) This signal is valid for all blocks including internal operation blocks such as fixed cycles.

(2) This signal (*BSL) is set ON (invalid) when the power is turned ON. If it is not used, there is no need to make a pro gram with the PLC.

Cutting start interlock

While the cutting start interlock signal (*CSL) is OFF (valid), the execution of all movement command blocks except positioning during automatic operation will not be started. The block whose execution has already commenced is executed until its end. Automatic operation is not suspended. The commands in the next block are placed on standby, and their execution is started as soon as the signal is turned ON.

(1) The signal is valid for all blocks including internal operation block such as fixed cycles.

(2) This signal (*CSL) is set ON (invalid) when the power is turned ON. If it is not used, there is no need to make a pro gram with the PLC.

15.3.6 External Deceleration

This function reduces the feed rate to the deceleration speed set by the parameter when the external deceleration input signal, which is the external input from the user PLC, has been set to ON. External deceleration input signals are provided for each axis and for each movement direction ("+" and "-"), and a signal is valid when the signal in the direction coinciding with the direction of the current movement has been input. When an axis is to be returned in the opposite direction, its speed is returned immediately to the regular speed assigned by the command.

When non-interpolation positioning is performed during manual operation or automatic operation, only the axis for which the signal that coincides with the direction of the current movement has been input will decelerate. However, with interpolation during automatic operation, the feed rate of the axis will be reduced to the deceleration rate if there is even one axis for which the signal that coincides with the direction of current movement has been input.

The external deceleration input signal can be canceled using a parameter for the cutting feed only.

M850VW M830VW M850VS M830VS M80VW M80V

TypeA

M80V

TypeB

M

L

M850VW M830VW M850VS M830VS M80VW M80V

TypeA

M80V

TypeB
M
L
Note
Note

15.3.7 Interference Check III
By checking the relative relation between interference objects, the interference can be prevented from occurring.
One interference object is defined by one to sixteen tridimensional objects.
The maximum definable number is 128 for the interference objects and is 256 for the tridimensional objects.
Up to 16 interference objects out of 128 can be selected for the interference check.
The number of solids which can be used in the selected interference object is 42 in total.
Select 16 interference objects to be checked by the R register or the system variable.
For the solids, two kinds of shapes, cuboids and cylinders, can be defined.
It is also possible to define the rotated solid for one of the I J K axes of the solid.
For the interfering object, up to 2 axes can be defined as rotary axes.
You are able to define more than one interfering object with one-rotary axis, and one interfering object with two-rotary axis within 16 interfering objects to perform the interference check.
You are not able to define the interfering object with one-rotary axis and interfering object with two-rotary axis at the same time.
2 kinds of areas can be defined for an interference area defined as the interfering object: an area where interference must be avoided surely (interference alarm area) and an area where interference should be mitigated (interference warning area)
[Schematic view of interfering object definition]
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
Solids/interference objects Number of pieces
Solid interference objects 256 pieces
The number of interfering object definitions 128 pieces
Number of solids which can be used for one interference object 16 pieces
Solids/interference objects to be checked Number of pieces
Number of interference objects which can be checked 16 pieces
The total of solids which can be used in the interference object to be checked 42 pieces
2nd interfering object I axis 2nd part system
Configured solid
offset
1st interfering object
1st part system
Configured solid
offset
Solid
dimension
Solid
dimension
I axis
J axis
K axis K axis
Rotation
2nd interfering center offset
model
Coordinate system
offset
1st interfering model
Coordinate system
offset
J axis
2nd part system
machine coordinate 1st part system
machine coordinate
2nd part system
Machine coordinate
system zero point
1st part system
Machine coordinate
system zero point
2nd part system
Machine coordinate system
zero point offset
1st part system
Machine coordinate system
zero point offset
Base machine coordinate zero point

15.3.8 3D Machine Interference Check
The CNC pre-reads the position where the machine is to be moved, during automatic operation, and checks the interference by the 3D model (machine, tool and jig) registered in advance. When an interference is predicted, an alarm will be displayed immediately and all the axes will be decelerated to stop.
[The actual positional relation between the tool position and the interference check position]
Also, since the 3D model is displayed on the 3D monitor screen in real time, the actual positional relation of the machine can

be figured out. When the interference occurs, the interference part in the 3D model will be shown in yellow or red.
The interference check is performed between the following:
machine and machine
machine and tool
machine and jig
tool and jig
The interference check is not performed between the machine and the workpiece. This function is dedicated to the machining center in single part system.
(1) The software sold separately is required to create the 3D model.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
Before machine
interference
Movement direction
Current tool position
Pre-read position
Interference
Decelerate and stop
Pre-read position
Movement direction
At the time of machine Current tool position interference
Note

15.3.9 Door Interlock
15.3.9.1 Door Interlock I
Outline
Under the CE marking scheme of the European safety standards (machine directive), the opening of any protection doors while a machine is actually moving is prohibited.
When the "Door open" signal is input from the PLC, this function first decelerates and stops all the control axes, establishes the ready OFF status, and then shuts off the drive power inside the servo drive unit so that the motors are no longer driven.
When the "Door open" signal has been input during automatic operation, the suspended machining can be resumed by first closing the door concerned and then initiating cycle start again.
Description of operation
[When a door is open]
The NC system operates as follows when the "Door open" signal is input:
It stops operations.
When automatic operation was underway
The machine is set to the feed hold mode, and all the axes decelerate and stop.
The spindle also stops.
When manual operation was underway
All the axes decelerate and stop immediately.
The spindle also stops.
The complete standby status is established.
After all the NC axes and the spindle have stopped, the ready OFF status is established.
The "Door open enable" signal is output.
Release the door lock using this signals at the PLC.
[When a door is closed]
After the PLC has confirmed that the door has been closed and locked, the NC system operates as follows when the "Door open" signal is set to OFF.
All the axes are set to ready ON.
The "Door open enable" signal is set to OFF.
[Resuming operation]
When automatic operation was underway
Press the cycle start button.
Operation now resumes from the block in which machining was suspended when the "Door open" signal was input.
When manual operation was underway
Axis movement is commenced when the axis movement signals are input again.
Spindle rotation
Restore the spindle rotation by inputting the forward rotation or reverse rotation signal again: this can be done either by operations performed by the operator or by using the user PLC.
Chopping operation
Input the "Chopping" signal again after returning the chopping axis to the basic point.
If the axis is not returned to the basic point, chopping operation will be resumed from the position where the "Chopping" signal is input again.
When spindle position control (Spindle/C axis control) is enabled.
If the switching method of the spindle/C axis is PLC signal method and the "Door open" signal is input in the C axis mode, the mode shifts to the spindle mode. Operations when the "Door open" signal is set to OFF differ depending on the parameter setting value.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L

15.3.9.2 Door Interlock II
Outline
Under the CE marking scheme of the European safety standards (machine directive), the opening of any protection doors

while a machine is actually moving is prohibited.
When the "Door open" signal is input from the PLC, this function first decelerates and stops all the control axes, establishes the ready OFF status, and then shuts off the drive power inside the servo amplifiers so that the motors are no longer driven.
With the door interlock function established by the "Door open II" signal, cycle start can be enabled even when the "Door open" signal has been input. However, the axes will be set to the interlock status.
Description of operation
[When a door is open]
The NC system operates as follows when the "Door open II" signal is input:
It stops operations.
All the axes decelerate and stop.
The spindle also stops.
The complete standby status is established.
After all the NC axes and the spindle have stopped, the ready OFF status is established.
However, the "Servo ready completion" signal (SA) is not set to OFF.
[When a door is closed]
After the PLC has confirmed that the door has been closed and locked, the NC system operates as follows when the "Door open" signal is set to OFF.
All the axes are set to ready ON.
The "Door open enable" signal is set to OFF.
[Resuming operation]
When automatic operation was underway
The "Door open" signal is set to OFF, and after the ready ON status has been established for all the axes, operation is resumed.
When manual operation was underway
Axis movement is commenced when the axis movement signals are input again.
Spindle rotation
Restore the spindle rotation by inputting the forward rotation or reverse rotation signal again: this can be done either by operations performed by the operator or by using the user PLC.
(a) Concerning the handling of an analog spindle
The signals described in this section are valid in a system with bus connections for the NC control unit and drive units.
When an analog spindle is connected, the NC system cannot verify that the spindle has come to a complete stop.
This means that the door should be opened after the PLC has verified that the spindle has come to a complete stop.
Since the spindle may resume its rotation immediately after the door has been closed, set the forward and reverse rotation signals to OFF when opening the door so as to ensure safety.
Chopping operation
The "Door open" signal is turned OFF, and after the ready ON status has been established, operation is resumed. The basic point when resuming the operation is the same as where the "Chopping" signal is turned ON.
Case in which the spindle/C axis exists
If the switching method of the Spindle/C axis is PLC signal method and the "Door open II" signal is input in the C axis mode, the mode shifts to the spindle mode. Operations when the "Door open II" signal is set to OFF differ depending on the parameter setting value.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
Note

(a) When emergency stop occurs with the "Spindle forward run start" signal or "Spindle reverse run start" signal ON, the spindle rotation does not restart even if the emergency stop is cancelled. Note, however, that if you turn ON the "Door open II" signal during emergency stop (or if emergency stop occurs with the "Door open II" signal ON), and then you cancel the emergency stop before turning OFF the said signal, the spindle rotation restarts. (When the "Door open II" signal is turned OFF first, the rotation does not restart.)
[Differences from door interlock I]
The method used to stop the machine during automatic operation is the same as with the axis interlock function.
The "Servo ready completion" signal (SA) is not set to OFF.
Cycle start is valid during door interlock. However, the interlock takes effect for the axis movements.
When the door interlock function ("Door open" signal ON) is initiated during axis movement, the axes decelerate and stop.
When the door interlock function ("Door open" signal) is set to OFF, the axis movement resumes.
When the door interlock function ("Door open" signal) is set to ON and OFF in the chopping operation, the chopping opera tion resumes.
Note

15.3.10 Parameter Lock
This function is used to prohibit changing the machine parameter.
15.3.11 Program Protection (Edit Lock B, C)
The edit lock function B or C inhibits machining program B or C (group with machining program numbers) from being edited or erased when these programs require to be protected.
15.3.12 Program Display Lock
This function allows the display of only a target program (label address 9000) to be invalidated for the program display in the monitor screen, etc.
The operation search of a target program can also be invalidated.
The validity of the display is selected with the parameters. The setting will be handled as follows according to the value.
0: Display and search are possible.
1: Display of the program details is prohibited.
2: Display and operation search of the program details are prohibited.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L

M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L

Machining program A
Machining program B
(User-prepared standard subprogram)
Machining program C
(Machine tool builder customized program)
Machining program A
Editing is inhibited
by edit lock C.
Editing is inhibited
by edit lock B.
Editing is inhibited by data
protect.
1 to 7999
8000 to 8999
9000 to 9999
10000 to 99999999

15.3.13 Data Protection by User's Level
Up to 8 levels of access permission helps to prevent you from dispatching defective works.
On the protection setting screen, the current operation level can be displayed and changed, and the password for the operation level and the protection level for each data can be changed.
15.3.15 Vertical Axis Pull-Up
When emergency stop or power interruption occurs, motor brake and vertical axis drop prevention function is supposed to work to prevent vertical axis (such as Z axis of vertical machining center) from dropping. However, there might be a case that the vertical axis drops by several m because of decrepitude of motor brake.
Therefore, emergency stop or the power interruption during finish machining at low speed might cause damage to the cutting tool in operation.
Vertical axis pull-up function prevents the tool from breakage, through pulling up the cutting tool during emergency stop or instantaneous power interruption at low cutting speed.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L

15.3.16 Machine Group-Based Alarm Stop
When an alarm occurs for an axis, this function performs an alarm stop only for the axes in a machine group to which the axis belongs. When this function is used in a lathe system, even though an alarm occurs for the loader axis, the operation can be continued if the servo axis and the spindle have been set in a different machine group from the loader axis as illustrated below. Without this function, the alarm stop is performed for all the axes when an alarm occurs.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
Group 1
Without
this
function
With
this
function
Group 2
NC Servo axis Spindle Loader
Group 1 Group 2
NC Servo axis Spindle Loader
Alarm
Alarm
Stop Stop
Stop
Stop

Likewise, when this function is used in a machining center system, the axes belonging to a different machine group from the axis for which an alarm has occurred can continue the operation as illustrated below. Without this function, the alarm stop is performed for all the axes when an alarm occurs.
(1) The machining group number can be set for each servo axis and spindle in this function, and incorrect setting may lead to accidents. Set the machine group number with enough care.
Group 1 Group 2
NC Servo axis Spindle Servo axis Spindle
Group 1 Group 2
NC Servo axis Spindle Servo axis Spindle
Alarm
Alarm
Stop
Stop
Stop
Stop
Stop
Stop
Without
this
function
With
this
function
Note

15.3.17 Interference Check Between Part Systems
Maximum 4 part systems
This function checks the relative position of up to six cuboids (referred to as interfering objects) all the time, and if a command which causes the interfering objects to collide with each other is issued, the function stops the axis movement to prevent the interference in advance.
Such interference can be prevented by covering the tool post, etc. with cuboids. Because the check is performed for axis movement of all part systems, interference between tool posts which are positioned in difference part systems can be prevented.
This is valid for the L-system configured with two or more part systems.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
<Interference check between part systems OFF> <Interference check between part systems ON>
Collision
1st interfering object
2nd interfering object
Detects interfering movement
Stops the axis movement

15.3.18 Spindle Protection
By setting the temperature to start/cancel the spindle protection, acceleration/deceleration time constant of the spindle is changed automatically when the spindle is overloaded and the operation is continued while suppressing overheating of the spindle.
This is effective in protecting the spindle when the spindle is overloaded by repeated acceleration/deceleration of the spindle.
Protection state of the spindle is output to the "Spindle protection is active" signal (for each spindle). When acceleration/deceleration time constant of the spindle has been changed to protect the spindle, this signal can be used to notify users that the spindle is protected.
The equivalent load ratio of spindle motor is determined by calculating the average output of spindle motor from the start of cycle operation to the next cycle operation and showing the average output as a percentage of the continuous rated output.
The ratio is output to the ZR register and the drive monitor (item name: Duty value).
The equivalent load ratio and temperature of spindle motor can be output to a log file.
The log file can be used to analyze the operating environment of spindle motor and to detect a decrease in cooling capacity caused by dirt or clogging of spindle motor cooling fan.
While the same machining program is operated continuously, if the equivalent load ratio of last operation exceeds the threshold at the start of cycle operation, a warning is displayed.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L

15.3.19 Real-Time 3D Machine Interference Check
The CNC pre-reads the position where the machine is to be moved, during automatic operation, and checks the interference by the 3D model (machine, tool and jig) registered in advance. When an interference is predicted, an alarm will be displayed immediately and all the axes will be decelerated to stop. Since the 3D model is displayed on the 3D monitor screen in real time, the actual positional relation of the machine can be figured out.

M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L

15.4 Maintenance and Troubleshooting
15.4.1 Operation History
This is a maintenance function which is useful for tracing down the history and NC operation information and analyzing trouble, etc. This information is saved in the history data file, and can be displayed on the screen and output to a file.
The machine tool builder password is required to use this function.
The following of history data files are used.
The data above can be viewed on the edit screen.
(*1) This information can be viewed on the setting change history screen. Note that it is not output to the history data files.
The data sorting order of the all history data files can be changed by the parameter.
In chronologically ascending order for each log type
In chronologically ascending order for all the log types
(1) If the date and time are the same, the history will be displayed in the following order.
Key history
Touchscreen history
Alarm history
PLC signal history
Tool offset change history
Workpiece offset change history
AC input power OFF history
Parameter change history
Common variable change history
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
All history The key history, touchscreen history, alarm/warning history, PLC signal history, tool offset change history, workpiece offset change history, AC input power OFF history, parameter change history (*1), and common variable change history (*1) are recorded in date/time order.
Key history Only the key history is recorded in date/time order.
Key touchscreen history Only the touchscreen history is recorded in date/time order.
Detailed alarm history information Separately from the existing alarm history, the alarm information, modal information and coordi nate information at the time of the alarm occurrence are recorded in date/time order.
Note

15.4.2 Data Sampling
The NC internal data (speed output from NC to drive unit, feedback data from the drive unit, etc.) can be sampled and the data can be output as text data.
The type of sampling NC internal data and sampling conditions are input on the screen as the sampling parameter. The sampling parameter can be input/output with the sampling data as the header information of the sampling data.
The parameter can be used to set whether the sampling starts when the power is turned ON.
Sampling data can be displayed in waveform by channel.
15.4.3 NC Data Backup
The NC data back up function backs up the NC parameters, etc., on a built-in disk of display (HD) unit or SD card.
The data can also be restored.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
Item Specifications
Sampling cycle 1.776 ms x setting value
Number of sampled axes NC axis: The maximum number of axes usable for specifications
Spindle: The maximum number of spindles usable for specifications
Number of sampled channels 1 to 16 points
1 to 8 points for waveform display
Sampling data size
M800V Maximum 2,620,416 points
M80V Maximum 655,360 points
<Note>
This is the entire data size. The data size per channel will decrease when the number of sampled channels increases.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L

15.4.4 Servo Tuning Support
15.4.4.1 NC Analyzer2

(1) The software sold separately is necessary.
Servo parameters can be automatically adjusted by measuring/analyzing the machine characteristics. The measurement/
analysis is conducted by activating the motor using machining programs for adjustment or vibration signals. Various data can
be sampled.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
Note
NC Analyzer2
Control unit Drive unit

Function
(*1) For the measurement, create a program by the program creation function or use an arbitrary machining program.
(*2) Two or more NC axes in the same system are needed.
Adjustment wizard Description
Velocity loop gain adjustment Automatically adjusts velocity loop gain and resonance filters.
Lost motion adjustment Adjusts the lost motion automatically for the delay in response caused when the direction of the
machine rotates is reversed.
Measurement and adjustment Description
Frequency response measurement Measures the frequency response of speed loop for the designated axis. The result will be output
as frequency response waveform.
Reciprocation acceleration/deceler ation measurement
Measures the reciprocation acceleration/deceleration for the designated axis. The result will be
output as time-series waveform.(*1)
Roundness measurement Measures the roundness for the designated axis. The result will be output as roundness wave form.(*1)
Synch tap error measurement Measures the synchronous tap error for the designated axis. The result will be output as time series waveform.(*1)
Spindle acceleration/deceleration
measurement
Measures the spindle acceleration/deceleration for the designated axis. The result will be output
as time-series waveform.(*1)
Spindle orientation measurement Measures the spindle orientation for the designated axis. The result will be output as time-series
waveform. (*1)
Spindle C-axis measurement Executes the reciprocation acceleration/deceleration measurement of spindle C axis with speci fied axis. The result will be output as time-series waveform. (*1)
Spindle synchronization measure ment
Executes an arbitrary machining program with specified axis, and measures spindle synchroni zation by using that data. The result will be output as time-series waveform.
PLC axis acceleration/deceleration
measurement
Executes an arbitrary machining program with specified axis, and measures PLC axis accelera tion/deceleration by using that data. The result will be output as time-series waveform.
Arbitrary path measurement (*2) Executes an arbitrary machining program with specified two axes. The result will be output as ar bitrary path measurement waveform. (*1)

15.4.5 Automatic Backup
With this function, system data, ladder program and custom software can be automatically backed up in case of system
failure. Up to the three most recent backup data can be stored.
The backup execution timing can be set with parameters.
15.4.8 Application Error Detection
Application error detection function observes applications such as the CNC standard screen or custom screen. When an error
such as screen lock is detected, this function saves information and data in the log to investigate the causes easily.
Response from the application and a change of I/O is observed on a periodical basis.
When an application with no response and no change of I/O for a certain period is detected, it is determined that there is an
error.
When an error is detected, the log which is useful for the investigation of the causes will be saved.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
1. The application name which
an error is detected
2. Error occurrence time
3. The communication state
between the PC and NC
4. Key and touch panel history
(3) Saving the log which is useful
for the investigation of the causes
Application error
detection function
(1) Response and
I/O observation (2) Error detection
CNC
standard
screen
Custom screen

Application
Control unit
Custom API library
Some
cause

15.4.9 Email Notification to Operator
This function enables NC to transmit emails to network-connected email servers (SMTP servers). The transmitted emails can be received by means of email software in PC or mobile phone via email servers. With this function, the NC can send emails to PCs and mobile terminals away from machines. You are able to know machining conditions (such as machining completion, stop and failure) even if you are in remote places.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
NC E-mail server E-mail server Terminals that receive emails

15.4.10 NC Configurator2
NC Configurator2 achieves the following functions for the multiple NCs connected to the network, or a file in the SD card or the local disk. Data from up to 8 machines can be handled at a time.
Please contact us to purchase a full function version. A limited function version is also available free of charge.
15.4.11 Diagnosis Data Output
With this function, the information indicating the replacement cycle of the service parts used in NC, drive or motor can be output to the ZR registers. The information, which is output to ZR registers, can be used for preventive maintenance, including lifetime prediction.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
NC Data Transmit, display, edit and control the data related to the NC machine and parameters for NC control module side, and transmit, display the machining programs, tools and work.
Function parameter Support of parameter settings for individual NC function for the users.
RS232C communication
function:
Offer various functions using the tape mode and serial communication.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L

15.4.13 Security Feature for Windows Display
This function only activates applications that have been allowed to work when the TRELLIX Embedded Control software is installed on the display unit. This software restricts the operations of the application. To allow the application to work, the TRELLIX Embedded Control software must be registered in the list of applications which is allowed to start.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
melhmi.exe
notepad.exe
XXXX.exe

Display unit (Windows display)
Control unit
Registered as an application
allowed to operate
TRELLIX Embedded
Control software
(application software)
Cannot be executed
because it is not
registered

15.4.14 Field Network Diagnostics
This function displays the statistical information of packet transmission and reception (transmission/reception frequency, number of errors, etc.), which is necessary when the communication status of the function expansion unit (the field network

expansion unit) is diagnosed.
The function is useful to figure out the causes, for example, in the following cases.
Communication is disconnected
Communication is not carried out properly
The function expansion units in the table below are available with this function.
The statistical information of communication packets can be checked on the I/F diagnostic screen of NC.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
Unit No. Protocol
FCU8-EX564 CC-Link IE Field
FCU8-EX565 EtherNet/IP
FCU8-EX568 FL-net

15.4.15 Remote service iQ Care Remote4U
This function is a remote service to support remote maintenance of machine tools using IoT technology. Operation monitoring of machine tools and remote diagnostics of CNC are available.
(1) The license agreement is required.
15.4.15.1 Connection with RGU
A remote service gateway unit is required separately.
Connection with RGU connects the remote service via a remote service gateway unit (RGU).
15.4.15.2 Connection with no RGU
Connection with no RGU uses only CNC to connect the remote service without using the remote service gateway unit (RGU).
(1) If the data needs to be retrieved at a 1-second interval, use the remote service gateway unit. (When connection with no RGU is used, the data is retrieved at a 30-second interval.)
(2) Connection with no RGU can be used in the configuration where there are 3 or less part systems and the total number of axes of the NC is 12 or less. If there are more part systems or axes, use the remote service gateway unit.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
Note
Connection with RGU
Remote service
gateway unit
Connection with
no RGU
Transmit NC
operation
status and data for
machine diagnosis
Note

15.4.16 Brake Wear Diagnostics
This function diagnoses the wear state of a brake installed on each axis of the machine tool.
When a machine runs for a long time, the brake body and the fitting hub are gradually worn. The degree of brake wear is diagnosed by measuring the amounts of rattling and slipping which increase as the wear progresses.
The three levels of Normal, Caution and Warning are output as the diagnosis result.
By executing this function periodically, the amounts of rattling and slipping caused by the brake wear can be maintained within the proper range.
All the diagnosis results are output to PLC. By combination with PLC program, it is possible to inform users of the time to change the brake before it is broken.
This function has a timer function. After a certain period of time has passed since the diagnosis, a signal prompting the next diagnosis is output to PLC. This makes periodic brake wear diagnosis by combination with PLC program.
[Wear state and diagnosis result of brake fitting hub]
[Wear state and diagnosis result of brake rotor and armature]
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
Normal state The rattling of the brake is within the normal range.
Caution state PLC is informed that the brake is in the caution state. Automatic operation is possible.
Warning state PLC is informed that the brake is in the warning state. Automatic operation is not possible.
Normal state Caution state Warning state
Normal state Caution state Warning state
Brake hub Rotary hub
Rattling The corners are rounded, and
the hubs are almost slipping.
Armature Brake rotor

The surface is
worn and
slippery.
The surface is
more worn and
the amount of
slipping exceeds
the allowable
range.

15.5 Functional Safety
15.5.1 Safety Observation
This function can be available in the system consisting of the NC control unit and drive unit, and various communication cables, sensors and contactors.
The followings are available.
- Opens the door without shutting off the drive power of motor.
- Operates at safety speed or lower while the door is opened.

M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
Function Outline
Dual emergency stop The NC control unit and the drive unit separately observe the input of emergency stop.
In case of an emergency stop, both the NC control unit and the drive unit (power supply unit) will independently control the contactors to shut the drive power OFF.
Speed monitor The NC control unit and the drive unit (servo/spindle drive unit) separately observe the following.
When an error is detected during observation, the main power for the drive will be shut OFF.
- That the command speed should not exceed the speed set by the parameter (the "safety speed").
- That the motor rotation speed should not exceed the rotation speed set by the parameter (the "safety rotation speed").

Door state signal moni tor
This observes the door state signal (open or closed) detected with different circuit.
Door open/close check sensor
NC-side door state signal
External emergency
stop A
NC
Door state
signal
monitor
Speed
monitor
NC-side door
state signal
Door state
signal
monitor
Speed
monitor
Drive-side door state signal
Drive-side door
state signal
Commanded
position
Feedbacked
position
Feedbacked
rotation speed
Contactor control
Contactor control
MC
Contactor
Main power
Drive
External emergency
stop B

15.5.2 Smart Safety Observation
The smart safety observation function achieves smart and high safety with the following features.
- The redundant observation is enabled not only for the door signal but for various signals that require the safety.
- Eight new functions including the position observation are added.
- Signal wiring is simplified by having redundant PLC signal. (With the conventional safety observation, the signal wiring is needed for NC and drive units.)
- Redundant safety ladder eliminates the need for MTB to prepare the safety unit.
- The dual safety ladder is enabled by making only one ladder if they serve as the equivalent role. (It is also possible to make two ladders to have different roles.)
- The I/O board equipped with safety signal input terminal is available, which is mounted on the back of the operation panel. This eliminates the need to mount the safety I/O unit additionally in the operation panel.

(1) Safety I/O devices (safety RIO unit, operation panel with safety I/O) are required for inputting/outputting safety signals. Of the I/O device connection channels on NC unit, the channels which input/output safety signals need to be composed only

of safety I/O devices and RIO2.0 units. (RIO1.0 units cannot be connected to I/O channels which input/output safety sig nals.)
(2) For user safety sequence, machine tool builders need to create safety signal process logic and write it to NC unit.
(3) Of connection channels for each drive unit in NC unit, channels with axes which use "Safety function S" need to be com posed only of drive units of MDS-E Series.
15.5.2.1 Safety-Related I/O Observation
Functional safety expansion unit is required for M80V.
Using the dual circuits for processing signals input/output to/from the machine (safety signal compare sequence) and dual execution of safety signal process logic made by users (safety PLC), if one circuit has broken down, the other circuit can detect errors, which improves the safety of signal process.
15.5.2.2 Emergency Stop Observation
Functional safety expansion unit is required for M80V.
Emergency stop signal is doubled and observed to see whether there is any error. When one emergency stop signal is in open state, the whole system can be set in emergency stop condition.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
Note

15.5.2.3 Drive Safety Function
15.5.2.3.1 SLS (Safely-Limited Speed)
Functional safety expansion unit is required for M80V.
Axis speed (command speed, FB speed) is observed doubly to see whether the speed exceeds the safe speed. Four steps of safe speed and 16 steps of override can be selected. (64 ways of safe speed can be created in total.)
15.5.2.3.2 SLP (Safely-Limited Position)
Functional safety expansion unit is required for M80V.
Axis absolute position (command position, FB position) is observed doubly to see whether the position exceeds the safe position range. Safe position range can be selected from 4 levels.
15.5.2.3.3 SOS (Safe Operating Stop)
Functional safety expansion unit is required for M80V.
SOS is made by performing the following operations simultaneously.
Axis stop speed (command speed, FB speed) is observed doubly whether the speed exceeds the safe stop speed.
Axis stop position (command position, FB position) is observed doubly whether the position exceeds the safe stop position range.
Axis stop position deviation (difference between command position and FB position) is observed doubly to make sure that the deviation does not exceed the safe stop position deviation.
15.5.2.3.4 SSM (Safe Speed Monitor)
Functional safety expansion unit is required for M80V.
This function uses the safety signals to inform that the axis speed (command speed, FB speed) is equal to or below the safe speed. Up to 4 safe speeds can be set.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L

15.5.2.3.5 SBC/SBT (Safe Brake Control/Safe Brake Test)
Functional safety expansion unit is required for M80V.
This function activates the brake connected to the motor. Because there are two circuits for activating the brakes, one circuit can activate the brakes even when the other circuit is broken down. Furthermore, Safe Brake Test (SBT) can diagnose the circuits for activating the breaks and the effectiveness of the brakes (deterioration due to abrasion, etc.).
15.5.2.3.6 SCA (Safe Cam)
Functional safety expansion unit is required for M80V.
This function uses the safety signals to inform that the axis absolute position (command position, FB position) is within the range of safe position. Up to 16 sets (16 each for pulse side and minus side) can be set for the safe position range.
15.5.2.3.7 SS1/SS2 (Safe Stop)

Functional safety expansion unit is required for M80V.

Safe stop 1 (SS1)

STO function is activated after an axis is decelerated and the speed (command speed, FB speed) becomes equal to or below the safe stop speed. STO function is also activated when the speed does not reach the safe stop speed within a specified time from the start of deceleration.

Safe stop 2 (SS2)

SOS function is activated after an axis is decelerated and the speed (command speed, FB speed) becomes equal to or below the safe stop speed. SOS function is also activated when the speed does not reach the safe stop speed within a specified time from the start of deceleration.

15.5.2.3.8 STO (Safe Torque Off)

Functional safety expansion unit is required for M80V.

This function shuts OFF power supply to axes. Because there are two power shutoff circuits, one circuit can shut OFF the power supply even when the other circuit is broken down. STO also performs fault diagnosis of the shutoff circuits.

M850VW M830VW M850VS M830VS M80VW M80V

TypeA

M80V

TypeB

M

L

M850VW M830VW M850VS M830VS M80VW M80V

TypeA

M80V

TypeB

M

L

M850VW M830VW M850VS M830VS M80VW M80V

TypeA

M80V

TypeB

M

L

M850VW M830VW M850VS M830VS M80VW M80V

TypeA

M80V

TypeB

M

L

16.1 Servo/Spindle

Refer to the following manuals for details on the servo and spindle system.

DRIVE SYSTEM DATA BOOK (IB-1501252 (ENG))

MDS-E/EH Series Specifications Manual (IB-1501226 (ENG))

MDS-EJ/EJH Series Specifications Manual (IB-1501232 (ENG))

MDS-EM/EMH Series Specifications Manual (IB-1501238 (ENG))

16.1.1 Feed Axis

16.1.1.1 MDS-E-Vx

16.1.1.2 MDS-EH-Vx

16.1.1.3 MDS-EJ-Vx

16.1.1.4 MDS-EJH-Vx

16.1.1.5 MDS-EM-SPVx

16.1.1.6 MDS-EMH-SPVx

M850VW M830VW M850VS M830VS M80VW M80V

TypeA

M80V

TypeB

M

L

M850VW M830VW M850VS M830VS M80VW M80V

TypeA

M80V

TypeB

M

L

M850VW M830VW M850VS M830VS M80VW M80V

TypeA

M80V

TypeB

M

L

M850VW M830VW M850VS M830VS M80VW M80V

TypeA

M80V

TypeB

M

L

M850VW M830VW M850VS M830VS M80VW M80V

TypeA
M80V
TypeB
M
L
M800V/M80V Series Specifications Manual (Function)
16 Drive System
16.1 Servo/Spindle
475 IB-1501610-G
16.1.2 Spindle
16.1.2.1 MDS-E-SPx
16.1.2.2 MDS-EH-SPx
16.1.2.3 MDS-EJ-SPx
16.1.2.5 MDS-EM-SPVx
16.1.2.6 MDS-EMH-SPVx
16.1.4 Power Supply
16.1.4.1 MDS-E-CV
16.1.4.2 MDS-EH-CV
16.1.4.3 MDS-EX-CVP
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
M800V/M80V Series Specifications Manual (Function)
16 Drive System
16.1 Servo/Spindle
IB-1501610-G 476
477 IB-1501610-G
17
Machine Support Functions
M800V/M80V Series Specifications Manual (Function)
17 Machine Support Functions
17.1 PLC
IB-1501610-G 478
17.1 PLC
17.1.1 Built-in PLC Processing Mode
An exclusive sequence program that controls the various signals between the controller and machine to realize operation applicable to each machine can be created and built in.
The sequence execution modes include high-speed processing and main processing.
High-speed processing
This mode provides repeated execution at constant cycles. It is used to process signals requiring high speeds.
The maximum number of program steps for high-speed processing (1 period) is 1000 steps when using basic instructions.
Main processing
This mode provides normal sequence processing. The processing cycle depends on the number of sequence steps.

17.1.2 PLC Functions

17.1.2.1 Built-in PLC Basic Function

This CNC has a built-in function for sequence control of machines.

There are the following instructions and functions for creating a sequence program.

Basic instructions (LD, OR, AND, OUT, etc.)

Function instructions (data transfer, four arithmetic operations, logical operations, etc.)

Exclusive instructions (ATC, ROT)

Applied functions (type conversion functions, arithmetic functions, etc.)

There are ladder language and ST language as languages for writing sequence programs.

As a multi-project function, you can create projects for each machine sequence and manage or start these projects separately with one CNC.

Available project range

M850VW M830VW M850VS M830VS M80VW M80V

TypeA

M80V

TypeB

M

L

M850VW M830VW M850VS M830VS M80VW M80V

TypeA

M80V

TypeB

M

L

M800V 1 to 6 projects (additional specifications for 3 or more projects)

M80V TypeA, M80VW 1 to 3 projects

M80V TypeB 1 to 2 projects

Devices

The device range in the following table is the default number of device points set in the project 1 when the multi-project setting or the setting of the number of device points is not performed.

(*1) These devices have designated applications. Do not use devices other than those corresponding to the input/output sig nals with the machine side (input/output signals of the remote I/O unit), even if it is an undefined vacant device.

(*2) Distinction of 10 ms timer and 100 ms timer is performed by command.

(10 ms timer is performed by OUTH command, 100 ms timer is performed by OUT command.)

Timer T can be set in 1 ms increments with a parameter.

(*3) For the Z device, the number of device points depends on the parameter setting.

(*4) The P device has two types of pointers (local and common), and the above points are the total number of points.

(*5) Integrated timer ST can be set in 1 ms or 10 ms increments with a parameter.

Device Device No. Unit Details

X (*1) X0 to X1FFF (8192 points) 1 bit Input signal to PLC, Machine input, etc.

Y (*1) Y0 to Y1FFF (8192 points) 1 bit Output signal from PLC, Machine output, etc.

M M0 to M61439 (61440 points) 1 bit Temporary memory

F F0 to F2047 (2048 points) 1 bit Temporary memory (Alarm message interface)

L L0 to L1023 (1024 points) 1 bit Latch relay (back up memory)

SM SM0 to SM2047 (2048 points) 1 bit Special relay

V V0 to V511 (512 points) 1 bit Edge relay

SB SB0 to SB3FF (1024 points) 1 bit Special relay

B B0 to BDFFF (57344 points) 1 bit Link relay

SW SW0 to SW3FF (1024 points) 16 bits Special register

SD SD0 to SD2047 (2048 points) 16 bits Special register

T T0 to T2047 (2048 points) 1 bit/16 bits Timer (The variable/fixed boundary is set with a pa rameter.) (*2)

ST ST0 to ST127 (128 points) 1 bit/16 bits Integrated timer (The variable/fixed boundary is set with a parameter.) (*5)

C C0 to C511 (512 points) 1 bit/16 bits Counter (The variable/fixed boundary is set with a parameter.)

D D0 to D4095 (4096 points) 16 bits/32 bits Data register (Register for calculation)

R (*1) R0 to R32767 (32768 points) 16 bits/32 bits File register (CNC word interface)

ZR (*1) ZR0 to ZR13311 (13312 points) 16 bits/32 bits File register, input/output signals with the PLC, ma chine input/output, etc.

W W0 to W2FFF (12288 points) 16 bits/32 bits Link register

Z (*3) Z0 to Z13 / Z0 to Z9 (14 points/10 points)

16 bits Address index

N N0 to N7 (8 points) Master controller nesting level

P (*1) P0 to P4095 (4096 points) Label for conditional jump, subroutine call command (*4)

K

K-32768 to K32767 Decimal constant for 16-bit command

K-2147483648 to K2147483647

Decimal constant for 32-bit command

H

H0 to HFFFF Hexadecimal constant for 16-bit command

H0 to HFFFFFFFF Hexadecimal constant for 32-bit command

E

E1.17549435-38 to E3.40282347+38

Real constant for 16-bit command

E2.2250738585072014-308 to E1.7976931348623157+308

Real constant for 32-bit command

$ 0 to 32 characters String constant

Parameters that can be used with the built-in PLC

PLC constants

This is a data type parameter that can be used with the built-in PLC. There is a basic area and an extended area.

Bit selection parameters

This is a bit type parameter that can be used with the built-in PLC. The set data is set in the file register.

PLC timer

The timer types include the 10 ms, 100 ms and 100 ms integral types.

(The timer setting unit can be changed by parameters. (1 ms timer, 1 ms integral timer, and 10 ms integral timer))

There are two methods for setting the timer setting value: in the PLC program and from the screen. The method can be selected with the parameter.

Whether to hold the integral timer when the power is turned OFF can also be selected.

PLC counter

There are two methods for setting the counter setting value: in the PLC program and from the screen. The method can be selected with the parameter.

Whether to hold the counter value when the power is turned OFF can also be selected.

External key input

By inputting the key data from the built-in PLC, the same operation as when the operator operates the operation board can be done.

Real spindle speed output

The real spindle speed is converted by the signals of the encoder installed on the spindle and is output to the PLC. The output increment is 0.001 r/min.

High speed input/output signal

There are signals that can be input and output at a 3.5 ms cycle for high-speed processing.

Input signal ON time

After the signal output is set in the interface, it can be output to the machine side with delay of up to 3.5 ms. The input also appears on the interface with a 3.5 ms delay.

The signals used for high-speed processing are assigned with the parameters. Assignment is possible in a continuous 16-point unit.

tson tson 3.5 ms

PLC analog voltage control

Analog output

When the specified data is put in the file register, the corresponding analog voltage is output from the analog output external connector.

(1) For analog output, the hardware corresponding to analog output is required.

Refer to the "PLC Programming Manual" for details.

-4095

4095

-1000 0

10

-2.44

10

-1000

4095

Analog output (V)

<Relation of file register details and analog output voltage>

File register details

Output voltage = x 10 V = -2.44 V

Output voltage

Resolution

Load conditions

Output impedance

: -10 V to +10 V (5%)

: 2 (1/4095) x Fullscale (10 V)

: 10 kohm resistance load

(standard)

: 220 ohm

-12

Note

17.1.2.1.1 Index Modification

17.1.2.1.2 Multi-Program [Number of Programs]

17.1.2.1.3 Multi-Project [Number of Projects Stored]

[M system]

[L system]

17.1.2.1.4 Function Block (FB)

17.1.2.1.5 Label Programming

17.1.2.1.6 ST Language

M850VW M830VW M850VS M830VS M80VW M80V

TypeA

M80V

TypeB

M

L

M850VW M830VW M850VS M830VS M80VW M80V

TypeA

M80V

TypeB

M 120 120 120 120 60 60 60

L 120 120 120 120 60 60 60

PLC project M850VW M830VW M850VS M830VS M80VW M80V

TypeA

M80V
TypeB
Number of PLC projects: 2
Number of PLC projects: 3
Number of PLC projects: 6
PLC project M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
Number of PLC projects: 2
Number of PLC projects: 3
Number of PLC projects: 6
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L

17.1.2.2 PLC Exclusive Instruction
PLC exclusive instruction is provided for certain limited applications, enabling a complex machining process, which is difficult to carry out only by the basic instructions and function instructions.
PLC exclusive instructions include:
- ATC exclusive instruction (ATC)

With this instruction, ATC, such as magazine index control, tool change by arm, etc. is performed.
ATC exclusive instructions include:
- Tool No. search
- Tool change
- Tool table forward/reverse run
- Pointer (which indicates magazine index position) forward/reverse run
- Tool data read/write
- Rotary body control instruction (ROT)

This is an instruction to determine the rotary body's target position or rotation direction, or to function as a ring counter.
This is used when calculating the rotation direction or number of index steps of the magazine or turret based on the output data figured from ATC exclusive instruction tool No. search processing, or when controlling the rotary body position.
[Using the ATC and ROT instructions]
The order for using the ATC and ROT instructions when T is commanded or tool exchange is commanded is shown below.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
ATC K1
ATC K2
ROT K1 ROT K3
ATC K5, K6
ATC K7, K8
ATC K3
ATC K4
T command Tool No. search
Tool No. logical search
Matching place No.
Number of
matches
Error process
Rotary body
index
Turning
direction
Number of
steps, etc.
Magazine turn
Variable pointer
method
Fixed pointer method
Ring counter control
Pointer forward run/reverse
run
Tool table forward run/reverse run
Magazine stop
Tool change

command
Tool change
Arbitrary position tool change
Pointer or ring
counter value

17.1.2.3 Enhanced PLC Security Mode
This function restricts connections to the built-in PLC from applications such as PLC on-board and GX Developer/GX Works2.
This function helps to protect the assets in the built-in PLC.
Two modes are available in this function:
PLC write protect mode (inhibits only write operations by applications)
PLC write protect mode prevents users from accidentally overwriting sequence programs and modifying device values when a sequence program is monitored.
PLC read/write protect mode (inhibits write and monitoring operations by applications)
PLC read/write protect mode protects sequence programs from being overwritten or read out by an unauthorized user.
While this function is used, one of the multi projects is available as the "end user project". (End user mode (or E/U mode))
Using this project, the end users can create sequence programs to add a new jig and sensor. Restrictions are imposed on the other projects; therefore, there is no risk of modifying or deleting sequence programs created by the machine tool builder.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
(*)
(*) Read/write operations between the application and the machine tool builder project depend on the enhanced PLC security mode settings.
Built-in PLC Machine tool builder project
End user project
- PLC on-board
- GX Developer/GX Works2
E/U mode
PLC write protect mode
PLC read/write protect mode
Project 1
Project 2 Project 3
Applications
Write to PLC
Read from PLC
Write to PLC
Read from PLC
Read from
PLC
Write to
PLC
Read from
PLC
Write to
PLC

17.1.3 PLC Support Functions
17.1.3.1 Alarm Message Display
The details of the alarms which occur during the sequence (user PLC) process can be displayed on the setting and display unit.
Up to four alarm message displays can be displayed simultaneously on the alarm diagnosis screen. The maximum length of one message is 46 characters.
17.1.3.2 Operator Message Display
When a condition to inform the operator of a message occurs, an operator message can be displayed independently of an alarm message.
The maximum length of an operator message on PLC message screen is 60 characters. The maximum number of characters per line is 55, and the message more than 56 characters is displayed on two lines. Up to 4 operator messages can be displayed at a time.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L

17.1.3.3 Memory Switch (PLC Switch)
The function equivalent to the machine operation switches can be implemented by using the setting display unit of controller.
Switches can be turned ON/OFF from PLC switch screen and user PLC. Each switch can be named arbitrarily.
By the PLC switch for reverse, the valid switches by the additional specifications will be reversed.

Even though the PLC switch reverse signals of the disabled switch is turned ON, the input signal is not reversed.
17.1.3.3.1 Memory Switch (PLC Switch) 32 Points
32 points of PLC switches can be set on the setting and display unit screen, and the ON/OFF control executed.
17.1.3.3.2 Memory Switch (PLC Switch) 64 Points
64 points of PLC switches can be set on the setting and display unit screen, and the ON/OFF control executed.
17.1.3.3.3 Memory Switch (PLC Switch) 96 Points
96 points of PLC switches can be set on the setting and display unit screen, and the ON/OFF control executed.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
M800V/M80V Series Specifications Manual (Function)
17 Machine Support Functions
17.1 PLC
487 IB-1501610-G
17.1.3.4 Load Meter Display
A load meter can be displayed on the setting and display unit.
Up to two axes designated with the built-in PLC such as the spindle load and Z axis load can be displayed as bar graphs on the screen.
17.1.3.5 User PLC Version Display
The user PLC version can be displayed in the software list on the Software Configuration screen.
17.1.3.6 Ladder Program Writing During RUN
The ladder program can be changed while PLC is running. This function is available, either by GX Developer or PLC onboard edit. (M8 only)
17.1.3.7 PLC Program Protection
(*1) Each file
For PLC data protection, the file password can be set to each file of PLC data.
The file password of the PLC data stored in NC can be released temporarily with PLC on-board.
(1) The file password registration/change or cancellation can not be made with PLC on-board. Use GX Developer/GX Works2 for these operation.
The file password has the writing attribute (write protection/permission) and the reading attribute (read protection/permission), and the following operation is prohibited for these attributes.
Write protection: PLC data overwrite and deletion, conversion after editing the ladder
Read/write protection: PLC data overwrite, deletion, read and verification, conversion after editing the ladder
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M (*1) (*1) (*1) (*1) (*1) (*1) (*1)
L (*1) (*1) (*1) (*1) (*1) (*1) (*1)
Note
M800V/M80V Series Specifications Manual (Function)
17 Machine Support Functions
17.1 PLC
IB-1501610-G 488
17.1.4 Built-in PLC Capacity
17.1.4.1 Standard PLC Capacity [Number of Steps]
17.1.4.2 Large PLC Capacity: 256 Ksteps
17.1.4.3 Large PLC Capacity: 512 Ksteps
17.1.5 Machine Contact Input/Output I/F
Refer to the "Specifications Manual (Hardware)" for details.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M 128K 128K 128K 128K 64K 64K 32K

L 128K 128K 128K 128K 64K 64K 32K
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
CAUTION
Follow the remote type machine contact input/output interface described in this manual. (Connect a diode in parallel with the inductive load or connect a protective resistor in serial with the capacitive load, etc.)

17.1.6 Ladder Monitor
This function enables the operating status of the sequence circuit to be checked on the controller's setting and display unit.
The ladder monitor functions include the following.
Circuit monitoring
Screen stop by monitor stop trigger point
Entry monitoring
Decimal-hexadecimal conversion present value monitoring
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L

17.1.7 PLC Development
17.1.7.1 On-Board Development
On-board refers generically to the PLC related operations carried out with the CNC unit.
This is the easy-to-use on-board with the enhanced ladder monitoring functions and improved ladder edit usability by enhancing the linkage with the PLC development tools (GX Developer/GX Works2) of Programmable Controller MELSEC series.
User safety sequence of smart safety observation function can also be displayed.
For details on the "smart safety observation function", refer to " 15.5.2 Smart Safety Observation".
For M800V/M80V series, PLC on-board supports labeled and structured projects created with GX Works2. This allows you to view and monitor programs using labels and FBs (function blocks).
17.1.7.2 MELSEC Development Tool (GX Developer)
This CNC supports the user PLC development environment using the FA engineering software MELSOFT Series (GX Developer), which is the PLC development tool for Programmable Controller MELSEC Series.
This is used to create the machine sequence and user safety sequence of the CNC.
Machine sequence: Control circuit created to control the machine tools (ladder circuit)
User safety sequence: Control circuit of the safety-related I/O observation created with the smart safety observation function (ladder circuit)
For the smart safety observation function, refer to "M800/M80 Series Smart safety observation Specification manual".
17.1.7.3 MELSEC Development Tool (GX Works2)
This CNC supports the user PLC development environment using the FA engineering software MELSOFT Series (GX Works2), which is the PLC development tool for Programmable Controller MELSEC Series.
GX Works2 is a programming software package (model name:SW1DND-GXW2) for Mitsubishi Electric programmable controller MELSEC series. It enables sequence programs for the CNC to be developed using similar operations to those for MELSEC series. Some of the functions are exclusively for MELSEC series and cannot be used in developing sequence programs for CNC.
GX Works2 Version 1.570U or newer version is recommended for developing sequence programs for the CNC. For details of the functions, refer to each of GX Works2 Operating Manuals.
(1) The software sold separately is necessary.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M

L
Note

17.1.8 PLC Parameter
The PLC constants set with the data type and the bit selection parameters set with bit types can be set from the screen as parameters used by the built-in PLC.
17.1.8.1 PLC Constant (150 Points)
17.1.8.2 PLC Constant Extension (Up to 750 Points)
There are PLC constants that can be set with data types as parameters used by the built-in PLC. The set data is set in the R register of the PLC and backed up. If data is set in the R register corresponding to the PLC constant with sequence program MOV commands, etc., the data will be backed up in the PLC constant parameter. However, the display will not change, so enter another screen, and then select this screen again.
The number of PLC constants is 150 points in the basic area and 750 points at the maximum in the extended area.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L

17.1.9 GOT Connection
This function connects and communicates between Mitsubishi Electric Graphic Operation Terminal (GOT) and the CNC.
Only GOT2000 series can be connected. Soft GOT 2000 can be connected, too.
There are two connection methods for GOT connection, Ethernet connection and CC-Link connection.
For details, refer to each manual of GOT.
Operation and monitoring from GOT to PLC device of the NC can be performed, and GOT can be used as a sub monitor of peripheral operation panel or NC operation panel.
17.1.9.1 Ethernet Connection
17.1.9.2 CC-Link Connection
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
Operation of PLC device
Monitoring PLC device
M8V series GOT2000 series

17.1.10 Pallet Program Registration
Pallet program function allows machining program to be registered for each pallet of the auto pallet changer (hereinafter referred to as APC) and assists in the machining setups.
Operation search for the registered program will be executed by PLC using the external search function.
Machining program for each pallet is registered at "Pallet program registration" screen in the setup screen group.
Registered program is output to PLC device.
If necessary, execute an external search on PLC ladder by referring to the program No. registered for each pallet.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
NC
PLC
.
.
.
HMI system
Pallet program
registration
screen
PLC device
Pallet program
registration interface
Pallet 1
Pallet 2
Machining

program No.
Operation
program No.
External search
interface
Device 1
Program No.
main system

17.2 Machine Construction
17.2.1 Servo OFF
When the "Servo OFF" signal (per axis) is input, the corresponding axis is set in the servo OFF state.
When the moving axis is mechanically clamped, this function is designed to prevent the servomotor from being overloaded by the clamping force.
Even if the motor shaft should move because of some reason in the servo OFF state, the movement amount will be compensated in the next servo ON state by one of the following two methods. (You can select the compensation method using a parameter.)
The counter is corrected according to the movement amount (follow up function).
The motor is moved according to the counter and compensated.
When follow up function is designated, the movement amount will be compensated even in the emergency stop state.
The axis is simultaneously set to servo OFF state and the interlock state.
[Mechanical handle]
Even if the servo OFF axis is moved with the mechanical handle with the application of the servo OFF function and follow up function, the position data can be constantly read in and the machine position updated. Thus, even if the axis is moved with the mechanical handle, the coordinate position display will not deviate.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L

17.2.2 Axis Detachment
This function enables the control axis to be freed from control. Conversely, an axis which has been freed from control can be returned to the control status.
This function enables the rotary table or attachments to be removed and replaced. Automatic operation is disabled until the axis for which the axis detachment command has been released completes its dog-type reference position return.
(1) Axis detachment can be executed even for the absolute position detection specifications axis, but when the axis is rein stalled, the zero point must be established.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
This shows the configuration of a machine for which switching be tween the C axis and turning table is performed. When the spindle motor is connected, the C axis is placed in the detached status. As a result, the position feedback of the detector is ignored.
POSITION
X 123.456
Z 0.000#1
C 345.678><
The detached status > < is indicated on the right of the POSITION display on the PO SITION screen and at the same time the servo ready for the controller output signal is set to OFF. The POSITION counter retains the value applying when detach was assigned.
C-axis/turning table
Rotary magnetic
scale (Position feedback)
(OFF with C-axis
control)
(Coupled with C-axis control)
Spindle
motor
C-axis
motor
Spindle
drive
unit
C-axis
drive
unit
Note

17.2.3 Synchronous Control
The synchronous control is a control method that both master and slave axes are controlled with the same movement command by designated the movement command for the master axis also to the slave axis. This function is assumed to be

used in the large machine tool, etc. which drives one axis with two servo motors.
The axis that serves as the reference of synchronization is called "master axis", whereas the axis that follows the master axis is called "slave axis".
(1) The axis detachment function cannot be added to the axes used in the synchronous control.
(2) The control axis synchronization between part systems and the synchronous control cannot be used simultaneously. (L system)
The synchronized axes are controlled with travel commands to the master axis.
One slave axis can be set to one master axis.
Up to the following sets of the master axes/slave axes can be set for all the part systems in total. 8 sets for M800V Series, 3 sets for M80V Series
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
Note
Y V
X
Z
Master axis Slave axis

There are 3 types of synchronous control as follows:
This is used when the machine's rigidity is low.
This conforms the position command of the master axis to that of the slave axis using the synchronous control function of NC and drive those axes in parallel.
This can be used only by changing the NC setting, without changing the settings in the servo drive unit.
[Position command synchronous control diagram]
The position command synchronous control has the following configuration:
This is used when reducing the scale of the full-closed system or when the machine's rigidity, etc. cause the mutual interference to the axes positions.
This drives the master axis and the slave axis in parallel using the common position feedback. Since the feedrate of each axis is controlled by the speed feedback of each axis, the stable control is available.
This can be used when the settings of the NC and the servo drive unit are changed.
[Speed command synchronous control diagram]
Position command synchronous control
Speed command synchronous control
CNC
M
M
Compensation
Position
command
Drive unit
Master axis
Slave axis
Detector
Compensation
Drive unit
Detector
Position command synchronous Synchronous operation
control
Synchronous
control mode
Correction mode
Independent operation
CNC
M
M
Drive unit
Master axis
Slave axis
Detector
Detector
Drive unit
Compensation
Position
command
Position
detector Compensation

This is used when the machine's rigidity is high.
This drives the master and slave axes in parallel by reference to the speed feedback from the encoder onto the master axis side on the slave axis. Since that speed feedback is not the slave axis's itself, the slave axis easily vibrates. Also, as the slave axis is easily influenced by the disturbance, this is not appropriate for the machine tools which need the positioning accuracy or the interpolation accuracy.
This can be used when the setting of the NC and the servo drive unit are changed.
[Current command synchronous control diagram]
The "compensation" in the Position command synchronous control diagram, Speed command synchronous control diagram, and Current command synchronous control diagram indicates the pitch error compensation, the thermal expansion compensation, the backlash compensation and the external machine coordinate compensation.
The axes which can set the compensation during the synchronous control differ according to the synchronous control type.

There are 2 types of modes as follows:

Synchronous control mode

The following two operation methods are available in the synchronous control mode.

Synchronous operation

This is a method that both master and slave axes are moved simultaneously with the movement command for the master axis.

Independent operation

This is a method that either the master or slave axis is moved with the movement command for the master axis.

Correction mode

The synchronization is temporary canceled to adjust the balance of the master and slave axes during the synchronous control mode in the machine adjustment. Each axis can be moved separately with the manual handle feed or the arbitrary feed in manual mode. If the operation mode other than the manual handle feed and arbitrary feed in manual mode is applied during the correction mode, the operation error will occur.

Current command synchronous control

CNC

M

M

Drive unit

Master axis

Slave axis

Detector

Drive unit

Detector

Position

command

Compensation

Compensation

17.2.4 Inclined Axis Control

Even when the control axes configuring that machine are mounted at an angle other than 90 degrees, this function enables it to be controlled by the same program as that for an orthogonal axis.

The inclination angle is set using a parameter, and axes are controlled using the movement amounts of the axes which are obtained through conversion and compensation using this angle.

[Case in which the X axis serves as the basic axis and the Y axis serves as the inclined axis]

X: Actual X axis

Y: Actual Y axis

y: Programmed Y axis

: Inclination angle

Yp, the Y-axis position on the programmed coordinates (on the orthogonal coordinates), is the position of Xa and Ya which are produced by synthesis of X axis and Y axis.

Therefore, the Y-axis (inclined axis) movement amount is expressed by the following formula:

Ya=Yp/cos (1)

The X-axis (basic axis) movement amount is compensated by the inclined movement of the Y axis, and it is expressed as follows:

Xa=Xp-Yp*tan (2)

The Y-axis (inclined axis) speed is as follows:

"Fa=Fp/cos"

M850VW M830VW M850VS M830VS M80VW M80V

TypeA

M80V

TypeB

M

L

Xa, Ya and Fa are the actual movement amounts and speed.

Xp, Yp and Fp are the movement amounts and speed on the program coordi nates.

X

Y

y

Xa

Ya

Yp*tan

Yp/cos

Yp

17.2.5 Position Switch

The position switch (PSW) function provides hypothetical dog switches in place of the dog switches provided on the machine axes so that signals are output to the PLC interface when the machine has reached these hypothetical dog range. The hypothetical dog switches are determined by setting the axis names and coordinate positions indicating hypothetical dog positions (dog1, dog2) in the parameters beforehand. The hypothetical dog switches are known as position switches (PSW).

24 points of the position switches can be set for each part system.

By using the position switch function, the axis is interlocked out of the position switch range to prohibit movement of the target axis. (Position switch interlock function)

Position switch area checking can be performed at high-speed by parameter setting.

In high-speed checking, the parameter determines which is used between the command type machine position or detector feedback position for area checking by each position switch.

[Example of dog1, dog2 settings and execution (for linear axes)]

M850VW M830VW M850VS M830VS M80VW M80V

TypeA

M80V

TypeB

M 24 24 24 24 24 24 24
L 24 24 24 24 24 24 24
dog1, dog2 settings dog1, dog2 positions Details
dog1 < dog2 Signal is output between dog1 and dog2
dog1 > dog2 Signal is output between dog2 and dog1
dog1 = dog2 Signal is output at the dog1 (dog2) position
dog1 dog2
dog2 dog1
dog1 = dog2
dog1
dog2
Basic machine coordinate system zero point
Hypothetical
dog Position switch area
(PSW width)

17.2.7 Index Table Indexing
The indexing of the index table can be performed by setting the index axes.
Programming is facilitated because, in terms of the index commands, only the indexing angle need to be designated using the address of the programmed axis serving as the index setting axis, and there is no need to designate special M codes for clamping and unclamping the table.
Clamp operation is performed by setting the "Unclamp command" signal to OFF (type A) or is performed with the clamp signal (type B).
(1) Designate the movement commands (absolute or incremental) for the selected axis using a program.
(2) The "Unclamp command" signal is now output prior to the axis movement.
(3) When the axes are unclamped, set the "Unclamp completion" signal to ON with the PLC. (Set the signal to ON after per forming required process such as servo ON or the process to release the clamp.)
(4) After checking the "Unclamp completion" signal, the designated axis starts moving.
(5) Upon completion of the movement, the "Unclamp command" signal is set to OFF.
(6) Clamp the axes and set the "Unclamp completion" signal to OFF with the PLC. (Set the signal to OFF after performing required process such as in-position check, servo OFF or the clamp process.)
(7) After checking that the "Unclamp completion" signal is OFF, processing of the next block is initiated.
[Operation timing chart for type A]
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
Type A
G00 B90.;
Standing by for completion Standing by for completion
Axis movement
Unclamp finish
(PLCCNC)
Unclamp command
(CNCPLC)
Programmed
command

(1) Designate the movement commands (absolute or incremental) for the selected axis using a program.
(2) The "Unclamp command" signal is now output prior to the axis movement.
(3) When the axes are unclamped, set the "Unclamp completion" signal to ON with the PLC.
(Set the signal to ON after performing required process such as servo ON or the process to release the clamp.)
(4) After checking the "Unclamp completion" signal, set the "Unclamp command" signal to OFF and the designated axis starts moving.
(5) Set the "Unclamp completion" signal to OFF with the PLC.
(6) Upon completion of the movement, the "Clamp command" signal is set to ON.
(7) Clamp the axes and set the "Clamp completion" signal to ON with the PLC.
(Set the signal to ON after performing required process such as in-position check, servo OFF or the clamp process.)
(8) After checking that the "Clamp completion" signal is ON, set the "Camp command" signal to OFF and processing of the next block is initiated.
(9) Set the "Clamp completion" signal to OFF with the PLC.
[Operation timing chart for type B]
Type B
G00 B90.;
Standing by for completion Standing by for completion
Axis movement
Unclamp finish
(PLC to CNC)
Unclamp command
(CNC to PLC)
Programmed
command
Clamp finish
(PLC to CNC)
Clamp command
(CNC to PLC)

17.2.8 Tool Length Compensation Along the Tool Axis

(*1) This function is available during program format switch.

Changing the tool length compensation in tool axis direction and compensation amount

Even if the tool axis direction is not the Z axis direction because the rotary axis is rotated, the tool can be compensated in the tool axis direction. By setting the deviation of the tool length value set when the program was created and the actual tool length as a compensation amount, the program can be made more flexible. This is especially effective for programs with many rotary axis movement commands.

The tool length compensation amount in the tool axis direction can be changed by rotating the manual pulse generator when the tool length compensation along tool axis mode and tool length compensation amount along the tool axis change mode are valid.

Machine configuration

The tool length compensation in tool axis direction is carried out in respect to the direction of the tool nose axis (rotary axis). The axis which determines the compensation direction is designated with the parameters as a combination of the Z-axis rotation C axis (spindle) and X-axis rotation A axis or Y-axis rotation B axis.

M850VW M830VW M850VS M830VS M80VW M80V

TypeA

M80V

TypeB

M

L (*1) (*1) (*1) (*1)

Y

Z

X

A

B

C

A/C B/C A/B

C

A/B

A

B

Rotation center

Tool

Axis direction

(compensation direction)

Workpiece

Rotation center

Tool

Axis direction

(compensation direction)

Workpiece

17.2.9 Tool Handle Feed & Interruption

The tool handle feed & interrupt function makes it possible to move the axis with the manual pulse generator in the tool axis direction, tool diameter direction X and tool diameter direction Y within the hypothetical coordinate system over the tool axis. Normal handle feed and interrupt operation is applied when this function is not provided.

This is also effective for a machine configuration having the tool tilt 1 axis and table tilt 1 axis.

17.2.10 Tool Center Coordinate Display

The tool center coordinates, handle interrupt amount (tool axis movement), table/workpiece installation, machine position coordinates in the inclined surface coordinate system, mechanical axis angle and tool center point speed are displayed during the tool center point control function, tool length compensation along tool axis function, and tool handle feed / interrupt function (tool axis direction handle feed, tool handle interrupt, tool diameter direction handle feed, nose center rotation handle feed).

The path using the tool center coordinate position is drawn on the Graphic Trace screen.

One of the following functions is required to validate this function.

Tool length compensation along the tool axis

Tool handle feed & interruption

Tool center point control

Workpiece installation error compensation

Inclined surface machining command

Simple inclined surface machining command

3-dimensional tool radius compensation (tool's vertical-direction compensation)

3-dimensional manual feed

R-Navi

M850VW M830VW M850VS M830VS M80VW M80V

TypeA

M80V

TypeB

M

L

M850VW M830VW M850VS M830VS M80VW M80V

TypeA

M80V

TypeB

M

L

X(-)

Y(-) Z(-)

C(+)

A(+)

<A-C>

X(-)

Y(-)

Z(-)

C(+)

B(+)

<B-C>
X(-)
Y(-) Z(-)
A(+)
<A-B>
B(+)

17.2.11 Tool Center Point Control
17.2.11.1 Tool Center Point Control (G43.4/G43.5)
(*1) Restrained to 4-axis simultaneous contouring
The tool center point control function controls so that the position command in the machining program is at the tool center point on the coordinate system (table coordinate system) which rotates together with the workpiece. This function can be applied to the following types of machines.
Tool tilt type
Table tilt type
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M (*1) (*1) (*1) (*1)
L
Tool tilt type A machine with two rotary axes set on the head.
Table tilt type A machine with two rotary axes set on the table.
Combined type A machine with one rotary axis set on the tool and another on the table.
Tool center point control is OFF
Tool length compensation along tool axis is ON
Tool center point control is ON
Controls so that the holder center point moves straight. Controls so that the tool center point draws a straight line.
Tool center point control is OFF
Tool length compensation along tool axis is ON
Tool center point control is ON
Controls so that the holder center point is at the workpiece coor dinate system's position.
Controls so that the tool center point is at the table coordinate
system's position.
Rotation center
Program
path
Tool center point path
Rotation center
Program
path
Tool center point path
Z(+)
X(+)
B(-)
Rotation center
Tool center
point path Z(+)
X(+)
X'(+)
Z"(+)
X"(+)
B(-)
Rotation
center
Tool center
point path

Combined type
[Axis configuration of applicable machines]
This function can be used on the machine whose rotary axis is installed with ISO polarity and the machine whose axis is installed with non-ISO polarity. However, the orthogonal axis needs to be installed with ISO polarity.(*1)
Note that this function can be also used on the machine with a tilted rotary axis.
(*1) In the machine coordinate system (right-hand orthogonal coordinate system) defined in ISO standard, the rotation turn ing to the right-handed screw is handled as ISO polarity and the one turning to the left-handed screw is handled as non ISO polarity.
This function is not applicable to machines as in the table below:
Tool center point control is OFF
Tool length compensation along tool axis is ON
Tool center point control is ON
Controls so that the holder center point is at the workpiece coor dinate system's position.
Controls so that the tool center point is at the table coordinate
system's position.
Details Example of machines
A machine whose direction of the tool axis (from the tool tip to the tool base) is
not parallel to Z axis (Z axis positive direction) when machine positions of the ro tary axes are all 0
(The arrow shown in the figure at the right indicates the direction of the tool axis.)
Z(+)
X(+)
B(-)
Rotation center
Tool center
point path Z(+)

X(+)
X'(+)
Z"(+)
X"(+)
Z'(+)
B(-)
Rotation
center
Tool center
point path
0

17.2.11.2 Tool Cutting Point Control Command (G43.8/G43.9)
Tool cutting point control is a function to control the point (cutting point) where the tool comes into contact with the workpiece so that it moves at the path and speed specified by the machining program.
NC automatically compensates the tool length and tool shape (tool radius, corner R). Therefore, machining can be performed without changing the machining program to change tools. This has the advantage of improving the diversion of machining programs.
To use this function, additional specifications of both "tool cutting point control" and "tool center point control" are required.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
Tool axial vector
(Vector from the tip of the tool to the root)
Machined surface normal vector
(Vector in the direction perpendicular to the
machined surface seen from the workpiece)
Cutting point
Workpiece
Tool
diameter
Tool center point
Program path
Tool
Corner R
Center of tool
center point
Tool length

17.2.12 Inclined Surface Machining Command
This function is to define the new coordinate system (called the "feature coordinate system") which was created by rotation and reference position translation of the X, Y, Z axes of the original one (before the inclined surface machining command was applied). With this function, you can define an arbitrary plane in a space and issue normal program commands to this plane in machining.
Also, the tool axis can automatically be controlled to the + Z direction of the newly defined feature coordinate system. Since the feature coordinate system will be re-created in accordance with the tool axis direction, machining programs can be developed without the need to consider the direction of the feature coordinate system and rotation of the tool axis.
The feature coordinate system is defined in the following method.
- Designation with Euler angle.
- Designation with the roll angle, pitch and yaw angle.
- Designation with the three points on the plane.
- Designation with two vectors.
- Designation with a projection angle.
- Designation with the registered machining surface selection
- Designation with the tool axis direction.

M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
Original coordinate system
Feature coordinate system
Z
Y
X
Y Z
X

The orthogonal axes must be installed with ISO polarity, while the rotary axes can be installed with either ISO polarity or non ISO polarity.
This function is compatible with the following types of machine.
(1) This function is not applicable to machine configuration of the following types:
A machine where the direction from the tool tip to the tool base is not parallel to Z axis (Z axis positive direction) when machine positions of the rotary axes are all 0
(2) Only one rotary axis can be tilted. When you attempt to tilt two or more rotary axes, an operation error occurs.
(3) The inclined surface machining cannot be performed on a machine where the primary rotary axis rotates around the K

axis or where the primary and secondary rotary axes rotate around the same axis. A program error occurs when the com mand is issued.
Type Tool tilt type Table tilt type Combined type
Description Two rotary axes on the tool side Two rotary axes on the table side One rotary axis on each of the
tool side and table side
Example of ma chines
Primary rotary
axis
The 2nd rotary axis on the tool
side The 1st rotary axis on the table side Rotary axis on the tool side
The 1st
rotary axis
on the tool
side
The 2nd
rotary axis
on the tool
side
The 2nd rotary axis
on the table side
The 1st rotary
axis on the
table side
Rotary
axis on the
table side
Rotary axis
on the tool
side
Note

17.2.13 Simple Inclined Surface Machining Command
In a lathe with three orthogonal axes and one rotary axis on the tool side, this function enables simultaneous 4-axis control milling on an inclined surface along workpiece end face.
To facilitate machining on an inclined surface, this function uses three commands: simple inclined surface control (G176), simple tool center point control (G174), and tool axis direction control (G53.1) as follows. The tool axis direction can be turned at right angles to the inclined surface by issuing the tool axis direction control command (G53.1) after the simple inclined surface control command (G176). When G174 is given after G176, the direction of tool length is compensated in accordance with the tool angle.
For a machine configured with a turret, this function allows you to use any tool on the turret to carry out simple inclined surface machining.
Simple inclined surface control (G176)
G176 enables a new coordinate system (called "feature coordinate system") to be defined. Feature coordinate system is obtained by rotating and parallel translating a plane using the X, Y and Z axes configuring the workpiece coordinate system as a rotary axis. Consequently, there is no need to calculate the coordinate position in accordance with the inclined surface angle. This simplifies creation of a machining program.
Simple tool center point control (G174)
G174 allows a tool length offset in the tool axis direction even when the tool axis direction is not parallel to the orthogonal coordinate system after rotation of the rotary axis. Consequently, the nose of the tool mounted on the rotary axis can be kept in the programmed position at all times. This simplifies creation of a complicated-shape machining program.
Tool axis direction control (G53.1)
G53.1 aligns the tool with the + Z direction of the feature coordinate system. This eliminates the need for you to mind the feature coordinate system's direction or tool axis' rotation direction, resulting in greater ease of programming.
[Feature coordinate system]
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
X
Y
Y
Z
X
Z
(X, Y, Z)
(X,Y,Z) = (0.0, 0.0, 100.0)
(X, Y, Z)
Workpiece
coordinate system
Rotation center coordinate = Feature coordinate zero point
Rotation angle 45
Feature coordinate
system

Command format
Simple inclined surface control start
Simple inclined surface control cancel
Tool axis direction control
Simple tool center point control start
Simple tool center point control cancel command
G176 X__Z__D__ ; When rotating K-I plane about the axis parallel to the J axis

G176 X__Y__D__ ; When rotating I-J plane about the axis parallel to the K axis
G176 Y__Z__D__ ; When rotating J-K plane about the axis parallel to the I axis
X, Y, Z : Feature coordinate system zero point (Rotation center position)
(-99999.999 to 99999.999 (mm)) (-9999.9999 to 9999.9999 (inch))
D : Rotation angle (-359.999 to 359.999 ( ))
G69.1;
G53.1 R__ ;
R : Tool axis rotation angle compensation amount (-359.999 to 359.999 ( ))
G174 R__ ;
R : Tool axis rotation angle compensation amount (-359.999 to 359.999 ( ))
G175;

17.2.14 3-Dimensional Tool Radius Compensation (Tool's Vertical-Direction Compensation)
(*1) This function is available during program format switch.
This function is to compensate the tool radius of the machine with two rotary axes, in accordance with the change of the workpiece direction and inclination of the tool due to the movement of the rotary axis. The 3-dimensional tool radius compensation was realized by searching the tool path on the workpiece by the program command and calculating the compensation vector on the plane (compensation plane) which is vertical to the path in the tool direction.
When the 3-dimensional tool radius compensation (tool's vertical-direction compensation) is commanded while the specification is not added, an alarm will occur.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L (*1) (*1) (*1) (*1)
r : Compensation amount
: Tool center path
: Program path
r
r
X
Y
Z
Tool
direction
Compensation
plane

17.2.15 Workpiece Installation Error Compensation
(*1) This function is available during program format switch.
This function is for the 5-axis machine. This compensates the error when a workpiece is placed off the workpiece coordinate system to enable machining according to the program. In this function, a new coordinate system with the workpiece as its reference position will be defined (called "workpiece installation coordinate system") and the program will be executed in this new coordinate system.
This function is compatible with the same types of machine as listed in the inclined surface machining command.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L (*1) (*1)
Error at the workpiece
installation

17.2.16 3-Dimensional Manual Feed
By selecting the hypothetical coordinate system to be machined, axis can be moved with manual feed (JOG, HANDLE or INCREMENTAL) in the coordinate system with this function.
If a movement command on the hypothetical coordinate is issued, it can be easy to setup because multiple axes is moved by NC according to the tool angle or the inclination of the table.
This function consists of the hypothetical coordinate feed and tool center point rotation.
Movement command for the linear axis operates as the hypothetical coordinate feed and manual feed will be carried out on the hypothetical coordinate.
Movement command for the rotary axis operates as the tool center point rotation and manual feed will be carried out with the rotary axis and 3 linear axes which are issued a movement command to keep position relations of the workpiece and tool tip.
This function can be used on the machine whose rotary axis is installed with ISO polarity and the machine whose axis is installed with non-ISO polarity. However, the orthogonal axis needs to be installed with ISO polarity.(*1)
Note that this function can be also used on the machine with a tilted rotary axis.
(*1) In the machine coordinate system (right-hand orthogonal coordinate system) defined in ISO standard, the rotation turn ing to the right-handed screw is handled as ISO polarity and the one turning to the left-handed screw is handled as non ISO polarity.
Standard manual feed is applied when this function is not provided.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
<Tool tilt B-C axis> <Table tilt A-C axis>

Linear axis:
Hypothetical
coordinate
feed
Rotary axis:
Tool center
point rotation
(*1) Keep the position of the workpiece and tool tip along C
axis rotation.
Original coordinate system
Hypothetical coordinate system
Y(+)
Y(+)
X(+)
X(+)
Z(+)
Z(+)
Y(+)
X(+)
Z(+)
Y(+)
Z(+)
X(+)
Y(+)
X(+)
Z(+)
X(+)
Y(+) Z(+)
Y(+)
C(+)
Z(+)
X(+)
*1

17.2.17 R-Navi
This function allows you to perform index machining (including inclined surface and multiple-surface machining) simply and smoothly using a rotary axis.
To enable index machining, register a feature coordinate system (coordinate origin and coordinate axial direction) along the machining surface in advance, and select the registered surface from the operation screen. Then the tool is able to move along the coordinate system to perform index machining.
As shown below, the machining surface selected from the screen is not affected by whether the surface indexing is complete or not.
The function is effective for the machine configuration with the right-hand orthogonal coordinate system defined in ISO standard.
The R-Navi function enables you to use "Inclined machining surface" and "3-dimensional manual feed".
Features of this function are as follows;
Various and simple machining surface registration (Feature coordinate system registration)
- Possible to register multiple surfaces (Up to 16 surfaces per workpiece, and up to 10 workpieces)
- Guide drawing which helps to set the coordinate system along the machining surface
- Feature coordinate system setting without dependence on the workpiece installation position.
- 3D workpiece graphics which enables a visual check of the registered surface.
Easy-to-understand machining surface selection
- An operator is able to select a surface while observing the 3D workpiece graphics.
Automatic indexing and manual indexing of the selected machining surface
- R-Navi automatically executes surface indexing to set the tool to be perpendicular to the selected surface.
- Manual indexing is also available.
- The coordinate system is linked with rotation of the rotary axis (no need to calculate the coordinate origin after the rota tion).
A program for 3-axis machining can be used without modification (G68.2 command-less inclined surface machining).
- Able to work on the coordinate system defined along the selected surface (by automatic or manual operation)
- The coordinate system is held even when NC reset is input (no need to re-define the coordinate system).
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
Inclined
coordinate system
Register surface Select a surface Index the surface 3-axis machining
Register
Select
3-axis
machining
program
Manual
Automatic

Command format
The R-Navi setup parameters can be configured from a machining program.
[Workpiece registration and setting]
[Machining surface registration and setting]
Command address of machining surface registration

Command address of coordinate axial direction designation
G69 ; Cancel the selected machining surface
G10 L110 ; Start setting workpiece data
Q__ <__> F__ C__ R__ X__ Y__ Z__ I__ J__ K__ ; Data setting
G11 ; End data setting
Q Workpiece registration No. (1 to 10)
< > Workpiece name (maximum 20 characters)
F Workpiece shape
C Basic coordinate system
R Basic No. (0 to 8)
X/Y/Z Workpiece size (0.000 to 99999.999)
I, J, K Workpiece shift (-99999.999 to 99999.999)
G69 ; Cancel the selected machining surface
G10 L111 ; Start setting machining surface data
P0 Q__ D__ <__> X__ Y__ Z__ A__ ; Machining surface setting
P1 M__ B__ C__ E__ F__ H__ I__ ; Designate coordinate axial direction for 1st axis
P2 M__ B__ C__ E__ F__ H__ I__ ; Designate coordinate axial direction for 2nd axis
G11 ; End data setting
G68.2 P10 Q__ D__; Select the registered machining surface
P Machining surface registration
Q Workpiece registration No. (1 to 10)
D Machining surface registration No. (2 to 17)
< > Machining surface name (maximum 15 characters)
X/Y/Z Feature coordinate origin (-99999.999 to 99999.999)
A Coordinate axis selection
P Coordinate axial direction axis designation
M Coordinate axial direction designation method
B, C, E, F, H, I Coordinate axial direction setting (-99999.999 to 99999.999)

17.2.18 Simple Synchronous Control
This function is an extension of the synchronous control function. This function enables an axis to be synchronized with the axis previously defined as master axis for the synchronous control, and another axis to be synchronized with the slave axis. Backlash can be restrained by distributing load torque imposed on one axis to two servo motors. When the synchronous control and the simple synchronous control are combined, one axis can be driven with four servo motors. An axis to be synchronized with is referred to as a "main axis" and an axis which follows the main axis is referred to as a "sub axis".
This is a control method in which the main axis and the sub axis are controlled in the same position by executing a position command for the main axis to the sub axis as well.
The main points of the method are as follows:
The sub axes can be set only for the master axis and the slave axis for the synchronous control.
The sub axis is controlled with the movement command for the main axis.
Only one sub axis can be set for the main axis.
The main axis and the sub axis are controlled at the same position. Therefore, the main axis and the sub axis can only be used together, while either of the axes can be used singly for single operation and correction mode for the synchronous control.
For simple synchronous control, synchronization error between the main axis and the sub axis is not monitored.
For the main axis and the sub axis, specify the speed command synchronous control or the current command synchronous control.
[Example of use of the simple synchronous control]
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
U X
V
W
Drive unit
Movement
commands
Synchronous control
Simple synchronous
control
Master axis
(Main axis)
Slave axis
(Main axis)
Sub axis Sub axis
Servo motor
Table
Simple synchronous
control

17.2.20 Real-Time Tuning
17.2.20.1 Real-Time Tuning 1 (Speed Gain)
This function estimates the inertia (or workpiece weight) of mechanical system and changes the speed control gain automatically according to the estimation results to suppress mechanical vibration.
For example, this suppresses vibration caused when a large workpiece becomes smaller in turning machining as illustrated in Example 1 below. This function also suppresses vibration caused when a workpiece that is relatively small for the table is replaced by a larger one as illustrated in Example 2 below.
Using this function, users can expect suppression of vibration caused by inertia fluctuation, as well as reduction of machining time through adaptation of appropriate speed control gain.

This function also commands a stop of speed control gain change and displays the estimated inertia ratio and magnification of speed control gain (ratio of the changed speed control gain to the initially set gain).
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
Existing Real-time tuning 1
Machining
Replacement
Time
Speed
Time
Speed
Example1: Turning machining
Example2: Workpiece replacement
Speed waveform
Time
Speed
Machining
Replacement
Time
Speed
Example1: Turning machining
Example2: Workpiece replacement
Speed waveform

17.2.20.2 Real-Time Tuning 2 (Rapid Traverse Time Constant)
This function estimates the inertia of workpiece and optimizes the operation acceleration/deceleration time constant automatically according to the estimation results.
This allows the cycle time to be reduced when the inertia of workpiece fluctuates considerably.
This function is useful when the inertia of workpiece fluctuates considerably during machining as illustrated in Example 1: Indexing machining and Example 2: Workpiece replacement on the rotary table below.
In Example 1, the inertia of workpiece is reduced gradually as machining progresses. In Example 2, the inertia of workpiece on the rotary table is reduced by workpiece replacement. When the inertia of workpiece is large in Example 1 or Example 2, the machine tool is required to be operated at a low acceleration to suppress the vibration for the workpiece and overload for the motor. On the other hand, when the inertia of workpiece is smaller, the operation at a higher acceleration is available. In other words, acceleration/deceleration time constant can be reduced when the inertia of workpiece is smaller.
In the existing specifications, the operation acceleration/deceleration time constant is fixed regardless of the inertia of workpiece, which wastes time because a large time constant is applied even if the inertia of workpiece is small.
On the other hand, this function enables the operation with optimum acceleration/deceleration time constant according to the inertia of the workpiece. Therefore, machining is performed while reducing the acceleration/deceleration time constant in example 1 or example 2. This allows the tact time to be reduced.
Furthermore, the large inertia workpiece is not machined with small acceleration/deceleration time constant since the optimum time constant is adjusted automatically. This enables suppression of vibration and overload.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
Machining
Replacement
Speed
Time
Example1: Indexing machining
Example2: Workpiece replacement
Speed waveform
Current waveform
Current
Time
Varying load
Existing Real-time tuning 2
Time is wasted because
acceleration/deceleration time constant is fixed
Cycle time can be reduced because
acceleration/deceleration time constant is
changed
Machining
Replacement
Speed
Time
Example1: Indexing machining
Example2: Workpiece replacement
Speed waveform
Current waveform
Current
Time
Constant load
Time can be reduced

17.2.21 Constant Torque Control

Constant torque control

By setting "Constant torque control request axis" signal to ON from PLC, the servo motor of the designated axis outputs torque set by the parameter in a constant direction. By using this function for a servo motor which drives a bar feeder, the bar feeder can push the workpiece with constant torque regardless of whether it is during movement, stop, or acceleration/deceleration.

Proportional torque stopper control is a function which enables a servo motor of the designated axis to generate torque set with the parameter in the pushing direction by setting "Proportional torque stopper control request axis" signal (R2620) to ON from PLC. When position droop is generated, the motor generates torque in proportion to the position droop in the pushing direction to keep the pushing position.

(1) Do not cancel the constant torque control or the proportional torque stopper control for an axis moving under manual or automatic operation. Otherwise the fixed workpiece, fixed turret, etc., may get loose, and it is dangerous.

[Example of constant torque control]

Droop cancel under constant torque control

Droop cancel under constant torque control cancels the position droop generated during constant torque control without moving an axis.

Note that the droop cancel under constant torque control must be commanded while the axis is pushed against the workpiece, etc.

Proportional constant torque control

Proportional torque stopper control generates constant torque in the pushing direction according to the value designated to the parameter. When position droop is generated, the motor generates torque in proportion to the position droop in the pushing direction to keep the pushing position.

M850VW M830VW M850VS M830VS M80VW M80V

TypeA

M80V

TypeB

M

L

Note

Cutting-off tool

Retraction

Z axis

Spindle

Bar feeder pushing arrow

Push with constant torque

Push with constant torque

Push with constant torque in

accordance with movement

command

Workpiece

Axis controlled under

constant torque controll

Chuck

(closed)

Chuck (opened)

Chuck (closed)

17.2.22 External Encoder Position Output I/F

Encoder I/F expansion unit is required for M800VW/M80VW.

This function outputs the position (angle) of external encoder to PLC device and CNC drive monitor screen based on the input pulses from the encoder.

This function can be used to monitor the position of angular head which the external encoder is connected to.

The position to output to PLC device and CNC drive monitor screen can be cleared to "0" with PLC signal.

[M800VW/M80VW connection diagram]

(1) Encoder I/F expansion unit can be used for ENC1 only.

[M800VS/M80V connection diagram]

M850VW M830VW M850VS M830VS M80VW M80V

TypeA

M80V

TypeB

M

L

EXT1

ENC1

CNC unit

Encoder I/F

expansion unit

External encoder

Note

ENC

CNC unit

External encoder

17.2.23 Multiple-Axis Synchronization Control

Multiple-axis synchronization control is the function that enables multiple slave axes to be synchronized with commands to the master axis. This function can be used, for example, in multi-head machine configurations.

The axis that serves as the reference of synchronization is called "master axis", whereas the axis that follows the master axis is called "slave axis".

The synchronized axes are controlled with travel commands to the master axis.

For one master axis, two or more slave axes can be set.

Up to three combinations of master axis and slave axes can be set for all the part systems.

[Configuration example of multiple-axis synchronization control]

The "compensation" in the figure indicates the pitch error compensation, the thermal expansion compensation, the backlash compensation and the external machine coordinate compensation. Even under the multiple-axis synchronization control, the compensation is performed independently for each axis.

M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
CNC
M
M
M

Position
command
Compensation
Compensation
Compensation
Drive unit
Drive unit
Drive unit
Master axis
Encoder
Encoder
Encoder
Slave axis 1
Slave axis n

17.2.25 BiSS Encoder I/F

This function outputs input data from the encoder compatible with BiSS-C (hereinafter referred to BiSS encoder) to the PLC device (ZR register).

This function can be used to monitor the position of the turret rotary axis by connecting the BiSS encoder.

Data length and data bit arrangement of the BiSS encoder differ depending on the encoder specifications.

Create a sequence program according to the specifications of the data sent from the encoder to calculate the encoder angle.

The figure below is an example of connection structure for 3-axis tapping center.

(1) This function supports both BiSS-C and BiSS-C (unidirectional), but does not support access to the register in the device on the slave side of the BiSS-C.

M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
CNC drive unit CNC spindle motor
Sequence program
(Created by MTB)
ZR register
NC control unit
General-purpose
drive unit General-purpose
servo motor
Turret
BiSS encoder
CNC servo motor
(X/Y/Z)
ATC
Connected to ENC
connector and RIO2
connector
Command
Feedback
Note

17.2.26 Tool Head Hot Swapping

This is a function to perform machining by detaching the tool head connected to the machine temporarily and attaching another tool head.

When the tool head side includes the drive sections of the rotary axis and the spindle, the tool head can be changed without turning off the NC and the drive units. In that case, the servo parameter of the rotary axis and the spindle parameter of the spindle can be changed according to the tool head to be used. When the rotary axis configuration differs depending on the tool head, the rotary axis configuration parameter can be changed.

This function is used by commanding a combination of the following three types of PLC signals. The combination of the signals needs to be selected according to the specifications of the machine head.

- NC axis switch
- Spindle switch
- Rotary axis configuration parameter switch (available only for the first part system)

[Image of tool head change including two rotary axes and spindle]

M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
CNC
. . .
. . .
Refer to the servo parameter and spindle parameter for switch.
Transfer the switch
parameters.
Head change command (signals)
4. Rotary axis configuration parameter
switch (tool tilt AC tool tilt BC)
3. Spindle switch
2. NC axis switch (A axis B axis)
1. NC axis switch (C axis C axis)
C axis
A axis
Spindle
C axis
B axis
Spindle
User PLC
NC axis switch parameter
1st set 2nd set 16th set
Servo drive unit
Spindle switch parameter
1st set 2nd set 8th set
Spindle drive unit

17.3 PLC Operation
17.3.1 Arbitrary Feed in Manual Mode
This is a function to control the NC control axis with command from the PLC in addition to the normal automatic operation command on the NC.
This function can be primarily used for axis control for ATC.
This function enables positioning of the axes from the PLC.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L

17.3.2 Circular Feed in Manual Mode
By specifying a hypothetical coordinate on the machine coordinate system from the user PLC, oblique linear interpolation or circular interpolation is executed with jog feed, handle feed, manual rapid traverse or incremental feed of the two axes designated by plane selection.
This function is valid only in the jog mode, handle mode, manual rapid traverse mode or incremental mode. This function cannot be used in the other manual modes and automatic operation modes.
This function operates for the horizontal axis (H axis) and vertical axes (V axis) determined by the parameters and PLC device settings. This function cannot be used for the other NC axes and PLC axis. When this function is valid, all the axes other than H axis and V axis move as usual.
Oblique linear interpolation
Operation example:
When handle feed is performed in the "+" direction of H axis at the current position (point "A"), the axis position moves to point "B". Following this operation, when handle feed is performed in the "-" direction of H axis at point "B", the axis position moves to point "A".
When handle feed is performed in the "+" direction of V axis at the current position (point "A"), the axis position moves to point "C". Following this operation, when handle feed is performed in the "-" direction of V axis at point "C", the axis position moves to point "A".
These are set in the R registers.
a: Gradient angle
h, v: Reference point coordinate
h': H' travel range
v': V' travel range
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
A
B
h
v
H
V
a
C
V' H'

-h'
+h' +v'
-v'
Reference point
When the circular feed in manual mode (oblique linear interpolation) is valid:
- Jog/handle feed of H axis results in the movement in parallel with H' axis (see above).
- Jog/handle feed of V axis results in the movement in parallel with V' axis (see above).

Circular interpolation
By specifying a hypothetical coordinate on the machine coordinate as shown in the figure below, jog feed or handle feed can be executed on the hypothetical coordinate.
Operation example:
When handle feed is performed in the "+" direction of H axis at the current position (point "A"), the axis position moves to point "B". Following this operation, when handle feed is performed in the "-" direction of H axis at point "B", the axis position moves to point "A". The movement is done along the circumference of the arc whose radius is the distance from the arc center to the current position (point "A").
When handle feed is performed in the "-" direction of V axis at the current position (point "A"), the axis position moves to point "C". Following this operation, when handle feed is performed in the "+" direction of V axis at point "C", the axis posi tion moves to point "A".
These are set in the R registers.
h1, v1: Reference point coordinate
h2, v2: Arc center coordinate
h': H' travel range
v': V' travel range
A B
H
V
C
v1
v2
h1 h2
-H
+H +v
-v
+H
-V
+V
Reference point
Arc center
When the circular feed in manual mode (circular interpolation) is valid:
- Jog/handle feed of H axis results in the movement along the arc whose radius is the distance from the arc center to the current position.
- Jog/handle feed of V axis results in the movement on the line connecting the current position and the arc center.

17.3.3 PLC Axis Control
Over and above the NC control axes, this function enables axes to be controlled independently by commands based on the PLC.
[Specifications]
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
Item Details
Number of control axes Refer to " 1.1.2.3 Max. Number of PLC Axes".
Simultaneous control axes The PLC control axis is controlled independently of the NC control axis.
Simultaneous start of multiple PLC axes is possible.
Command unit Least command increment
0.001 mm (0.0001 inch)
0.0001 mm (0.00001 inch)
0.00001 mm (0.000001 inch)
0.000001 mm (0.0000001 inch)
(The command increment depends on the parameter setting.)
Feed rate 0 to 1000000 mm/min (0 to 100000 inch/min)
(Speed is fixed regardless of the unit system.)
Movement commands Incremental commands from current position
Absolute commands for machine coordinate system
0 to 99999999
(The command increment depends on the parameter setting.)
Operation modes Rapid traverse, cutting feed
Jog feed (+) (-)
Reference position return feed (+) (-)
Handle feed
Backlash compensation Available
Stroke end Devices can be allocated arbitrarily
Soft limit Available
Rotary axis command Available
For absolute commands: Rotates by the amount within 1 rotation
(Rotates the remainder of the rotation amount divided by rotational axis division count.)
For incremental commands: Rotates by assigned amount
Inch/mm changeover None
Set to the command that corresponds to the feedback unit.

Position detector Encoder (Absolute position can also be detected.)

17.3.5 PLC Axis Indexing
PLC axis indexing allows a PLC axis to function as an auxiliary axis with no need for changing the user ladder used conventionally for an auxiliary axis. (The position of R register will be changed.)
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
Command methods
Station method
(for rotary axis)
: One rotation (360) of the rotary axis is equally divided to determine the stations (positioning destinations). The maximum number of divisions is 360.
Setting 8 stations (8 divisions)
Station method
(for linear axis)
: A valid stroke is equally divided to determine the stations (positioning destinations). The maximum number of stations is 360.
Setting 5 stations
The zero point is station 1, and the final end of the valid stroke is station 5.
When using a linear axis, the No. of equal divisions is "number of stations - 1".
Unequal station method : When the positioning stations are not at equal intervals, this method allows you to set up to 20 coordinate points arbitrarily to determine the station coordinates. This method is avail able for a rotary or linear axis.
Arbitrary coordinate designation method : This method allows you to transfer arbitrary coordinates (the absolute coordinates based on the zero point) from PLC to perform positioning.
1
2
3
4
5
6
7
8
Station
12 34 5
Zero
point Valid stroke length
Station
Station No.

The following operation modes are available. Send a command from PLC to change the operation mode.
Feed functions
Feed rate selection : Four different feeds per minute are set in the unit of " /min" (rotary axis) or "mm/min" (linear axis). Which of the four is used is switched by the PLC I/F.
Acceleration/deceleration method : The constant-gradient acceleration/deceleration is automatically controlled. The linear or soft acceleration/deceleration is selectable.
Acceleration/deceleration pattern desig nation method
: Four different acceleration/deceleration patterns are set to be selected by switching with PLC I/F.
Short-cut control : A least movement distance is automatically judged when a rotary axis is rotated. Also the rotation direction can be designated by the command.
Operation functions
Automatic operation mode : The axis is positioned at the station No. designated by the start signal. When the start signal has turned OFF before the positioning is completed, the axis is positioned at the nearest station position.
The arbitrary position command operation is also available: the positioning can be carried out to any position other than a station by directly commanding the positioning coordinates from the PLC. (Arbitrary position command operation)
Manual operation mode : While the start signal is ON, the axis is rotated at a constant speed in the designated direc tion. When the start signal has turned OFF, the axis is positioned at the nearest station po sition.
JOG mode : While the start signal is ON, the axis is rotated at a constant speed in the designated direc tion.
Incremental feed mode : This mode is to feed the axis by the designated distance at each activation.
Manual handle mode : The axis is moved by using a pulse generator.
Reference position return mode : This mode is to position at the reference position. The reference position return by the dog switch is not available.
Operation support function
Position switch : A signal is output to the PLC interface when the machine has reached within the specified range.

17.3.6 NC Axis/PLC Axis Switchover
This function is to use one drive unit by switching the control from the NC or the PLC dynamically.
The function of the NC axis can be used during the NC axis control and the function of the PLC axis can be used during the PLC axis control respectively.
A part of function or signal of the NC axis can also be used during the PLC axis control.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V

TypeB
M
L
X YZ 1 A
NC axis
Switch NC axis with PLC
axis with PLC signal (NC
axis/PLC axis switchover
request) NC axis command
PLC axis command
NC axis
(Switching axis)
PLC axis

17.4 PLC Interface
17.4.1 CNC Control Signal
Control commands to the CNC system are assigned from the PLC. Input signals with an A/D conversion function and skip inputs that respond at high speed can also be used.
Control signals
Control signals for operations in automatic operation mode
Control signals for operations in manual operation mode
Control signals for program execution
Control signals for interrupt operations
Control signals for servo
Control signals for spindle
Control signals for mode selection
Control signals for axis selection
Control signals for feed rates
Analog voltage control [M system]
When an analog voltage is input to an external connector used to connect CNC analog inputs, the data corresponding to the input voltage can be read out in the prescribed file register. This data can be used for load meter displays, thermal deformation compensation, etc. (Maximum 4 points)
Skip signals
When signals are input to the skip input interface, they are processed by interrupt processing. This enables functions requiring a high response speed to be implemented. (Maximum 8 points)
For further details, refer to the PLC Interface Manual.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L

17.4.2 CNC Status Signal
The status signals are output from the CNC system. They can be utilized by referencing them from the PLC.
These signals can also be output as analog data by setting the data from the PLC in the R register.
Status output functions
(1) Controller operation ready
When the controller power is turned ON and the controller enters the operation ready status, the "Ready" signal is output to the machine.
Refer to the PLC Interface Manual for details of the sequences from when the controller power is supplied to when the controller ready status is entered.
(2) Servo ready completion
When the controller power is turned ON and the servo system enters the operation ready status, the "Servo ready completion" signal is output to the machine.
Refer to the PLC Interface Manual for details of the sequences from when the power is supplied to when the "Servo ready completion" signal is turned ON.
(3) In automatic operation
Generally, if the "cycle start" switch is turned ON in the automatic operation mode (memory, MDI), this signal is output until the reset state or emergency stop state is entered by the M02, M30 execution or the "Reset & rewind" input to the controller using the reset button.
(4) In cycle start
The signal that denotes that the controller is operating in the automatic mode is output from the time when the cycle start button is pressed in the memory or MDI mode and the cycle start status has been entered until the time when the automatic operation is terminated in the automatic operation pause status entered by the "feed hold" function, block completion stop entered by the block stop function or resetting.
(5) In automatic pause
An automatic operation pause occurs and this signal is output during automatic operation from when the automatic pause switch is pressed ON until the cycle start switch is pressed ON, or during automatic operation when the mode select switch is changed from the automatic mode to the manual mode.
(6) In rapid traverse
The "In rapid traverse" signal is output when the command now being executed is moving an axis by rapid traverse during automatic operation.
(7) In cutting feed
The "In cutting feed" signal is output when the command now being executed is moving an axis by cutting feed during automatic operation.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L

(8) In tapping
The "In tapping" signal is output when the command now being executed is in a tapping modal which means that one of the statuses below is entered during automatic operation.
G84, G88 (fixed cycle: tapping cycle)
G84.1, G88.1 (fixed cycle: reverse tapping cycle)
G63 (tapping mode)
(9) In thread cutting
The "In thread cutting" signal is output when the command now being executed is moving an axis by thread cutting feed during automatic operation.
(10)In rewinding
The "In rewinding" signal is output when the "Reset & rewind" signal is input by M02/M30, etc., during memory operation and the program currently being executed is being indexed.
The rewinding time is short, so there may be cases when it cannot be confirmed with the sequence program (ladder).
(11)Axis selection output
The "Axis selection output" signal for each axis is output to the machine during machine axis movement.
Automatic mode
The signal is output during the movement command for each axis. It is output until the machine stops during stop based on feed hold or block stop.
Manual mode (including incremental feed)
The signal is output while the axis is moving from the time when the jog feed signal is turned ON until the time when it is turned OFF and the machine feed stops.
Handle feed mode
The signal is output at all times when the axis selection input is on.
(12)Axis movement direction
This output signal denotes the direction of the axis now moving, and for each axis a "+" (plus) signal and a "-" (minus) signal are output respectively.
(13)Alarm
This signal indicates the various alarm statuses that arise during controller operation. It is divided into the following types and output.
System errors
Servo alarms
Program errors
Operation errors
(14)In resetting
The "Reset" signal is output during the reset process when the Reset & rewind command is input to the controller with the "reset" button on the setting and display unit is pressed or when the "Reset" signal is input from the machine operation panel, etc.
This signal will also be output when the controller READY status is OFF, when the Emergency stop signal is input or when a servo alarm is occurring, etc.
(15)Movement command completion
In the memory or MDI automatic operation, the "Movement command completion" signal is output when the command block in the machining program features a movement command and when that block command has been completed.
When the movement command and M, S, T or B command have been assigned in the same block, then the movement command signal can be used as a sync signal for either executing the processing of the M, S, T or B command at the same time as the command or executing it upon completion of the movement command.

17.4.3 PLC Window
Using the "read window" or "write window" that are arbitrarily allocated to the R register's user area, it is possible to read and write the CNC operation status, axis information, parameters and tool data etc.
The area used for the "read window" and "write window" has 1500 points for the backup area and 100 points for the non backup area.
Up to three window areas can be specified simultaneously for both "read window" area and "write window" area. 16 R registers (18 R registers when an extended interface is used) are used for one read window or write window.
The read window is further divided into the "read control window" and "read data window". The write window is also divided into the "write control window" and "write data window".
Up to four data items can be successively read or written from the data designated in one read window or write window.
(1) PLC turns control signal ON.
(2) NC receives control signal, and reads designated data in control window.
(3) Results of NC read are set in read control window and read data window.
(4) PLC turns control signal ON.
(5) NC receives control signal, and writes contents of write data window corresponding to designated data in control window.
(6) Results of NC write are set in write control window.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
NC PLC
(1)
(2)
(2)
(3)
(3)
NC
PLC
(4)
(5)
(5)
(5) (6)
<Reading>
<Writing>

Operation
status
Axis
information
Parameters
Tool data
Operation
status
Axis
information
Parameters
Tool data
R register (user area)
Read window
R register (user area)
Read control
window
Read data
window
Designate arbitrary position with parameter
(R register)
Write window
Write control
window
Write data
window

17.4.4 External Search
Machining program can be searched from user PLC by specifying the storage device of machining program, program No., sequence No. or block No.
17.4.5 Direct Screen Selection
This function enables automatic transition to an arbitrary screen by setting the screen selection information to the file registers from user PLC.
The screens that can be selected as the transition destination are Monitr, Setup, Edit, Diagn, Mainte and custom release screens.
This function is used to move to the custom screen being set by the MTB.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
NC
Automatic
transition
File register
(R356 to R359)
Automatic
transition
User PLC
Screen
processing
Screen selection
information

17.4.6 Buzzer Sound Control
This function gives a buzzer mounted on the NC keyboard by operating the PLC device.
The buzzer will be activated when the PLC device is turned ON, and be deactivated when the PLC device is turned OFF.
This is effective in applications of sounding a buzzer such as during the alarm occurrence, or for the program operation end notification.
This function also gives a buzzer when the operation sound disable has set.
This can be used when the NC keyboard is mounted.
[The buzzer sound image by the buzzer ON operation]
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
Buzzer ON state
Buzzer ON signal
Sound OFF Sound ON Sound OFF

17.5 Machine Contact I/O
17.5.1 Operation Panel I/O
17.5.1.1 DI:64/DO:64
17.5.1.2 DI:64/DO:64 + SDI:8
17.5.1.3 DI:96/DO:64
17.5.1.5 DI:64/DO:48/AO:1
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
M800V/M80V Series Specifications Manual (Function)
17 Machine Support Functions
17.5 Machine Contact I/O
539 IB-1501610-G
17.5.2 Remote I/O
17.5.2.1 DI:32/DO:32
17.5.2.2 DI:64/DO:48
17.5.2.3 DI:64/DO:48+AO:1
17.5.2.5 DI:16/DO:8
17.5.2.6 DI:32/DO:32 + SDI:8/SDO:4
Functional safety expansion unit is required for M80V.
17.5.2.7 SDI:8/SDO:4
Functional safety expansion unit is required for M80V.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
M800V/M80V Series Specifications Manual (Function)
17 Machine Support Functions
17.6 External PLC Link
IB-1501610-G 540
17.6 External PLC Link
17.6.1 CC-Link (Master/Local)
NC unit can be directly connected to the network to serve as the master/local station of the MELSEC CC-Link.
CC-Link unit is required for this connection.
Outline of CC-Link

Distributing and installing each unit to the equipments such as conveyor line and mechanical device can simplify the wiring of the whole system.

The ON/OFF data and numerical data such as input/output treated by each unit can be communicated easily and at high speed.

The simple distribution system can be established by connecting several PLC CPUs or NCs.

Connecting the device equipments made by the partner manufacturer can flexibly support various systems.

Outline drawing (M800VW Series)

M850VW M830VW M850VS M830VS M80VW M80V

TypeA

M80V

TypeB

M

L

Master station This station controls the remote station and local station.

One master station is required for one system.

Local station This station contains the CPU and can communicate with the master and the other local stations.

Remote I/O station Remote station that handles only bit information.

Remote device station Remote station that handles bit information and word information.

Intelligent device station This station allows the transient transmission. (Including local station)

Local station

(NC unit)

Remote I/O station

CC - Link Expansion unit

FCU8-EX561

CC - Link

Partner manufacturer

product

or Local station

Master station

Master station (NC unit) or

Remote device station

PLC

CPU

PLC

CPU

Remote I/O station

Performance specifications

Mitsubishi Electric CNC M8V Series is compliant with CC-Link Ver. 2.00.

[CC-Link Ver. 2.00 specification]

Item CC-Link master/local unit

Maximum number of link points per

system (*1)

Remote input/output (RX, RY) 8192 points each

Remote register (RWw)

(Master St. -> Remote/Local St.)

2048 points

Remote register (RWr)

(Remote/Local St. -> Master St.)

2048 points

Extended cyclic setting 1 time setting 2 times set ting

4 times set ting

8 times set ting

Number of link points per

remote/local station

1 station

occupied

Remote input/output (RX, RY) 32 points

each

32 points

each

64 points

each

128 points

each

Remote register (RWw)

(Master St. -> Remote/Local St.)

4 words 8 words 16 words 32 words

Remote register (RWr)

(Remote/Local St. -> Master St.)

4 words 8 words 16 words 32 words

2 stations

occupied

Remote input/output (RX, RY) 64 points

each

96 points

each

192 points

each

384 points

each

Remote register (RWw)

(Master St. -> Remote/Local St.)

8 words 16 words 32 words 64 words

Remote register (RWr)
(Remote/Local St. -> Master St.)
8 words 16 words 32 words 64 words
3 stations
occupied
Remote input/output (RX, RY) 96 points
each
160 points
each
320 points
each
640 points
each
Remote register (RWw)
(Master St. -> Remote/Local St.)
12 words 24 words 48 words 96 words
Remote register (RWr)
(Remote/Local St. -> Master St.)
12 words 24 words 48 words 96 words
4 stations
occupied
Remote input/output (RX, RY) 128 points
each
224 points
each
448 points
each
896 points
each
Remote register (RWw)
(Master St. -> Remote/Local St.)
16 words 32 words 64 words 128 words
Remote register (RWr)
(Remote/Local St. -> Master St.)
16 words 32 words 64 words 128 words
Number of occupied stations (Num ber of local stations)
Station 1 to station 4 (The station No. can be switched with parameters.)
Baud rates 156 kbps/625 kbps/2.5 Mbps/5 Mbps/10 Mbps can be selected.
(Baud rate can be selected with parameters.)
Communication method Polling method
Synchronization method Flame synchronization method
Encode method NRZI method
Transmission path Bus (conforming to EIA RS485)
Transmission format HDLC compliant
Error control system CRC (X16 X12 X5 1)
M800V/M80V Series Specifications Manual (Function)
17 Machine Support Functions
17.6 External PLC Link
IB-1501610-G 542
(*1) If the points which can be reserved as the device for the CC-Link in the NC side does not reach 8192 points, the number of points which can be reserved in the NC side is the maximum number of link points per system. This applies for the remote register (RWw, RWr), as well.
(*2) When CC-Link Ver.1.00 compliant cables are mixed, the cable length between stations and the maximum total length of the cable should follow the specifications for CC-Link Ver.1.00.
(*3) This can be used with the cables made by different manufacturers as long as they are Ver.1.10 compliant cables.
(*4) RAS stands for "Reliability", "Availability" and "Serviceability".
Maximum number of connected sta tions
64 units. Note that the following two conditions must be satisfied.
Condition 1:
(a + a2 + a4 + a8) + (b + b2 + b4 + b8) 2 + (c + c2 + c4 + c8) 3 + (d + d2 + d4 + d8) 4 64
(a 32 + a2 32 + a4 64 + a8 128) + (b 64 + b2 96 + b4 192 + b8 384) + (c 96 + c2
160 + c4 320 + c8 640) + (d 128 + d2 224 + d4 448 + d8 896) 8192
(a 4 + a2 8 + a4 16 + a8 32) + (b 8 + b2 16 + b4 32 + b8 64) + (c 12 + c2 24 +
c4 48 + c8 96) + (d 16 + d2 32 + d4 64 + d8 128) 2048
a: Number of units when 1 station is occupied in 1 time extended cyclic setting
b: Number of units when 2 stations are occupied in 1 time extended cyclic setting
c: Number of units when 3 stations are occupied in 1 time extended cyclic setting
d: Number of units when 4 stations are occupied in 1 time extended cyclic setting
a2: Number of units when 1 station is occupied in 2 times extended cyclic setting
b2: Number of units when 2 stations are occupied in 2 times extended cyclic setting
c2: Number of units when 3 stations are occupied in 2 times extended cyclic setting
d2: Number of units when 4 stations are occupied in 2 times extended cyclic setting
a4: Number of units when 1 station is occupied in 4 times extended cyclic setting
b4: Number of units when 2 stations are occupied in 4 times extended cyclic setting
c4: Number of units when 3 stations are occupied in 4 times extended cyclic setting
d4: Number of units when 4 stations are occupied in 4 times extended cyclic setting
a8: Number of units when 1 station is occupied in 8 times extended cyclic setting
b8: Number of units when 2 stations are occupied in 8 times extended cyclic setting
c8: Number of units when 3 stations are occupied in 8 times extended cyclic setting
d8: Number of units when 4 stations are occupied in 8 times extended cyclic setting
Condition 2:
{(16 A) + (54 B) + (88 C)} 2304
A: Number of remote I/O stations 64 units
B: Number of remote device stations 42 units
C: Number of local stations, standby master stations and intelligent device stations 26 units
Remote station No. 1 to 64
Maximum total cable length and each
cable length between stations

CC-Link Ver.1.10 compliant cable (When a 110 of terminating resistance is used.) (*2)
Baud rates Cable length be tween stations
Maximum total cable length
156 kbps
 20 cm or more
1200 m
625 kbps 900 m
2.5 Mbps 400 m
5 Mbps 160 m
10 Mbps 100 m
Connection cable CC-Link Ver.1.10 compliant cable (3-core twisted pair cable with shield) (*3)
RAS function(*4)
 Automatic return function
 Slave station cut-off function
 Error detection by the link special relay/register
Item CC-Link master/local unit
M800V/M80V Series Specifications Manual (Function)
17 Machine Support Functions
 17.6 External PLC Link
543 IB-1501610-G
 Usable functions
Of all the CC-Link functions, the following functions can be used with the NC.
: Available
: Not available
-: Not relevant
(*1) The transient instruction cannot be used.
(*2) The parameter for the CC-Link is set with the GX Developer.
(*3) With this function, when an error occurs in the master station, switch to the standby master station so that data link can be continued.
Function item
MELSEC NC unit
Master station Local station Master station Local station
Method
Ver.1.00
Ver.2.00
Master func tion
Communication between master station and remote
I/O station
 - -
Communication between master station and remote
device station
 - -
Communication between master station and local
station

Mixed system communication
Reserved station function - -
Error cancel station function - -
Setting of data link status when trouble occurs in
CPU of master station

Registration of parameters in E2PROM - (*2) -
Setting of input data status from data link trouble
station

Unit resetting by sequence program
Data link stop/restart
Parameter registration function (*2) (*2)
Automatic refresh function
Scan synchronization function
Synchronous
mode
 - -
Asynchronous
mode

Setting and
display func tion
LED diagnosis status 16-point display
(A1SJ61QBT11)
16-point display
Station number setting Unit front panel switches Parameters(*2)
Baud rate setting
Mode setting switch
Condition setting H/W switches
RAS function
Automatic return function
Slave station cut-off function -
Data link status check (SB/SW)
Off-line test
On-line test
Monitor diagnosis
Standby master function(*3) - -
Temporary error cancel station designation function - -
Exclusive in struction
READ instruction / SREAD instruction(*1)
WRITE instruction / SWRITE instruction(*1)
RIRD instruction / RIWT instruction(*1)

 Communication data flow The flow of data communicated by the CC-Link's link scan is as follows. (The master station and local station of MELSEC CPU can be also mixed.) RX RY
RWr
RY
RX
RWw
RWr
RX
RY
RWr
RWw
RY
RX RY
RX
RWw
RWr RWw

(1)
(2)
(3)
(4)
(1)
(2)
(3)
(4)
(1)
(2)
(3)
(4)
(1)
(2)
(3)
(4)
Devices
X device, etc.
Built-in PLC
Y device, etc.
R register, etc.
R register, etc.
NC
(Master station)
Local station
Remote
device station
Remote I/O
station
NC (Local station)
Transmission data
<Flow of data>
Risk scan
Automatic refresh
(When master station/local station is NC.)
Devices
Built-in PLC
Y device, etc.
X device, etc.
R register, etc.
R register, etc.

By executing a link scan, data in the remote I/O station and remote device station's remote input (RX) and in the local sta tion's remote output (RY) is transmitted to the master station's remote input (RX) and the local station's remote output (RY).
By executing a link scan, data in the master station's remote output (RY) is transmitted to the remote I/O station and remote device station's remote output (RY) and the local station's remote input (RX).
By executing a link scan, data in the remote device station's remote register (RWr) and the local station's remote register (RWw) is transmitted to the master station's remote register (RWr) and the local station's remote register (RWw).
By executing a link scan, data in the master station's remote register (RWw) is transmitted to the remote device station's remote register (RWw) and the local station's remote register (RWr).

17.6.2 PROFIBUS-DP (Master)

On Mitsubishi Electric CNC M8V Series, by mounting the PROFIBUS-DP master unit on the expansion slot or option relay unit and by connecting the unit with the slave stations compatible with PROFIBUS-DP communication, NC can input/output the devices to/from the slave stations as the master station for PROFIBUS-DP communication. CNC can be connected to up to 125 slave stations.
For the I/O data communication function (Cyclic communication), the maximum number of device I/O points is 8192 each. The CNC handles all the devices input/output to/from the PLC as bit device data. At this time, the maximum number of device I/O points of CNC's remote I/O is 768 each.
Using the aperiodic data communication function (Acyclic communication) with the slave station, data exchange can be performed to the slave station via PLC word device. Aperiodic data communication function can be performed with the I/O data communication function simultaneously.
Also, an error that occurred in the slave station can be acquired or responded via PLC word device as diagnosis data or alarm information.
There are two types of PLC I/O device assignment method for PROFIBUS-DP, fixed or arbitrary assignment, which you can select with the parameter. According to the assignment method, the number of available device points differs as follows:
Hilscher's Fieldbus communication control circuit (COMX module) is mounted on PROFIBUS-DP master unit and the parameter setting is carried out using Hilscher's configurator "SYCON.net".
However, two PROFIBUS-DP master units cannot be mounted at a time. If these are mounted at the same time, both units stop their operations and the error occurs.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
Fixed device assignment Arbitrary device assignment
Maximum number of input de vice points 512 bits 8192 bits
Maximum number of output de vice points 512 bits 8192 bits
EXT1 EXT2 EXT3 EXT4
PROFIBUS-DP master unit FCU8-EX563
CNC CPU control unit
RIO communication
PROFIBUS-DP communication
PROFIBUS cable
USB cable
Slave station: up to 125 stations
Terminator
Terminator
Tapping
Slot for expansion unit
Mitsubishi Electric CNC M800V series
Windows computer for parameter setting

Hilschers configurator
M800V/M80V Series Specifications Manual (Function)
17 Machine Support Functions
17.6 External PLC Link
547 IB-1501610-G
17.6.3 CC-Link IE Field (Master/Local)
CC-Link IE Field is high-speed and large capacity open field network using Ethernet (1000BASE-T).
By mounting CC-Link IE Field expansion unit on the expansion slot of NC control unit, NC can be operated as master or local station of CC-Link IE Field. By connecting CC-Link IE Field expansion unit with CC-Link IE Field unit, data communication with the connected unit can be performed.
NC can be set as master or local station, but cannot be set as sub master station.
When CC-Link IE Field expansion unit is not mounted on the expansion slot, CC-Link IE Field cannot be used. CC-Link IE Field related parameter screen is not displayed on NC screen, either.
Data communication
High-speed and large-capacity data communication is available between a master station and device stations on CC-Link IE Field Network. The network supports cyclic transmission (periodic communication) and transient transmission (non-periodic communication).
[Cyclic transmission (periodic communication)]
Data communications can be made periodically between stations of the same network.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
X
Y
W
RX
RY
RWw
RWr
RX
RY
RWw
RWr
RX
RY
RWw
RWr
X
Y
W
RX
RY
RWw

RWr
NC
Master station
Master
station
Intelligent device
station
Remote device
station
Local device station
Intelligent
device station
Remote
device station
Local station PLC CPU
Switching hub

[Transient transmission (non-periodic communication)]
Data are transmitted upon request.
1 Gbps communication speed
1 Gbps communication speed allows high-speed communication.
Use of Ethernet cable
A 1000BASE-T-compliant Ethernet is used for the connection interface. The wiring cost can be reduced because 1000BASE T-compliant Ethernet cables are commercially available.
Flexible wiring for system arrangements
The network can be wired into star topology, line topology and ring topology.
For star topology, a 1000BASE-T-compliant switching hub can be used.
Wiring is highly flexible because a network can consist of a combination of star and line topologies. For example, the machine tools can be connected through a line topology whereas star and line topologies can be used within each machine.
NC Master station
Intelligent device
station
Local station PLC CPU
PLC device Device
1234H 1234H
Write request
Command
Instruction

17.6.5 EtherNet/IP
EtherNet/IP is the Ethernet for industry which ODVA (Open DeviceNet Vendor Association) suggests.
It communicates using TCP/IP which is the standard Ethernet technology and the communication protocol which is called CIP (Common Industrial Protocol). EtherNet/IP can be used as not only field network but also the network between controllers.
Also, as the standard Ethernet technology is used as lower protocol at the same time, it can be used mixing various general purpose Ethernet devices.
By mounting EtherNet/IP scanner/adapter unit on the expansion slot or option relay unit of NC control unit to connect EtherNet/IP-compatible equipment, PLC devices can be input/output using NC control unit as a scanner or an adapter for EtherNet/IP communication.
When EtherNet/IP scanner/adapter unit is not mounted on the expansion slot or option relay unit, EtherNet/IP cannot be used.
Ethernet/IP related parameter screen is not displayed, either.
Two EtherNet/IP scanner/adapter units cannot be mounted on the expansion slot or option relay unit. When two of them are mounted at the same time, both units stop operating and an alarm is output.
EtherNet/IP has two communication functions: Implicit message communication which communicates at regular intervals and Explicit message communication which communicates at arbitrary timing.
[Connection diagram]
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
Message type Outline
Explicit message
Communication based on TCP/IP. Communication method which sends and receives data at 1:1 at arbitrary timing.
(Example) Parameter communication, reading diagnostic data, etc.
Implicit message
Communication based on UDP/IP. Communication method which sends and receives data at regular intervals (Cyclic).
(Example) Transferring periodic data
NC control unit
LAN hub
NC control unitscanner device
Explicit Message
Scanner device
LAN hub NC control unitadapters
Implicit Message
Ethernet cable
EtherNet/IP scanner/adapter unit
EtherNet/IP configuration tool
Windows computer
(For checking diagnostic information) Adapters
(Up to 64)

17.6.8 FL-Net
FL-net is a network capable of interconnecting various FA controllers such as the programmable controllers (PLC) and the CNC from many manufacturers, and personal computers for control and monitoring.
FL-net communication is made available by mounting an FL-net expansion unit on the expansion slot or option relay unit of NC control unit.
FL-net expansion unit of the NC control unit supports the following FL-net (OPCN-2) version.

M850VW M830VW M850VS M830VS M80VW M80V	
TypeA	
M80V	
TypeB	
M	
L	
FL-net version Class	
FL-net Version 3.01 Class 1	

Controller level network (Version 2.00 of FL-net) is available.
PC PC PC EWS
Server
WAN
PLC PLC PLC CNC RC
Computer
Controller
Device Sensors and actuators
Field network
Host LAN Ethernet (TCP/IP, UDP/IP)
FL-net (Ethernet based control network)
Panel
computer

17.6.10 CC-Link IE Field Basic
CC-Link IE field Basic is an FA network taking advantage of general Ethernet. This function is used to perform cyclic transmission between the master station and remote station using link devices.
The CNC enables periodic (cyclic transmission) data communication between the master station and remote station by connecting the machine to the device conforming to CC-Link IE field Basic communication through the built-in Ethernet port.
The data communicated is assigned to built-in PLC devices and can be referred to from the ladder program.
The CNC can function as a master station or as a remote station of CC-Link IE field Basic communication. Whether to use the CNC as the master station or as the remote station is determined by the parameters. The function as the master station or as the remote station cannot be used concurrently.
The parameters are used to set CC-Link IE field Basic communication, to specify the communication device, and to assign the link refresh devices.

M850VW M830VW M850VS M830VS M80VW M80V	
TypeA	
M80V	
TypeB	
M	
L	

The advantages of using CC-Link IE field Basic are described below.
Cyclic transmission (periodic communication)
Data communications can be made periodically between stations of the same network.
Reduction in system costs
The NC communicates through its built-in Ethernet port. This eliminates the need for a dedicated network unit, and therefore contributes to reduction in system costs.
Mixture of protocols
CC-Link IE field Basic can be used concurrently with other general Ethernet protocols. Therefore, the network can be configured using FTP, HTTP, SLMP, etc. However, a link scan time for cyclic transmission may increase due to those Ethernet protocols.
Easy-to-configure system
All the settings of CC-Link IE field Basic are made on the master station. Cyclic transmission is enabled by setting the IP address and the subnet mask on the remote station. There is no need for setting the information of the master station on the remote station.
In addition, there is no restriction on the connection order nor connecting locations of the devices as they are connected via a star network. It is therefore easy to connect an additional remote device.
NC
RX,RWr
RY,RWw
RX,RWr
RX,RWr
RX,RWr
RY,RWw
RY,RWw
RY,RWw
Remote station
Switching hub
Master station Remote station Remote station
Remote
station
Master
station

Device
Device
Remote
station
Remote
station

17.6.11 CC-Link IE TSN (Remote Station)
This function is used for data communication between a CC-Link IE TSN master device and a PLC device of the NC control unit through a CC-Link IE TSN remote unit mounted on the NC.
The CC-Link IE TSN (Ver.2.0 Class A) remote station function can be added by mounting the CC-Link IE TSN remote unit on an expansion slot of the NC control unit.
When the CC-Link IE TSN remote unit is not mounted on the expansion slot of the NC control unit, the CC-Link IE TSN remote station function cannot be used. The parameter screen related to CC-Link IE TSN remote unit is not displayed on the NC screen.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
CC-Link
IE TSN
NC control unit
Ethernet cable
Remote station
Local station
Master station
Remote station
Data communication
CC-Link IE TSN remote unit

17.7 Installing S/W for Machine Tools
17.7.1 Customization (NC Designer2)
Customization is a function which allows to display a user-created screen or user-created window as an HMI screen or as a screen of another application.
(1) The software sold separately is necessary.
Customization function has four types of assignment, "F0 assignment", "Menu assignment", "Partial-screen customization" and "Selectable-screen customization". Each customized screen can be created and registered with "NC Designer2 interpreter method", "NC Designer2 compilation method" or "Executable file registration method".
F0 assignment
The Customization screen (*1) can be assigned to the function keys (F0, SFP, window display, and window selection).
When the function key is pressed, the customized screen assigned is displayed.
Menu assignment
The Customization window (*2) can be assigned to a main menu of the monitor screen, setup screen, edit screen, diagnosis screen, or maintenance screen.
For the monitor screen, setup screen, edit screen, diagnosis screen, or maintenance screen, the display order of main menus can be changed.
When the registered menu is pressed, the customized window is displayed.
Also, display/non-display of the customized menu can be changed depending on the conditions.
Partial-screen customization
Customized window created with "NC Designer2 interpreter method" or "NC Designer2 compilation method" can be displayed as a part of the standard screen.
Selectable-screen customization
Customized window created with "NC Designer2 interpreter method" or "NC Designer2 compilation method" can be displayed in the selectable display area on the monitor screen. Designated customized window (menu assignment) opens by pressing the INPUT key in the same manner as the selectable display of the standard screen.
(*1) A user-created HMI screen with NC Designer2 or an executable file prepared by a user.
(Note that the executable file cannot be used with M800VS/M80V.)
(*2) A user-created HMI window with NC Designer2 or an executable file prepared by a user.
(Note that the executable file cannot be used with M800VS/M80V.)
[G-code guidance open, M-code guidance open]
In the G code guidance display area of the edit screen, the guidance of the original G code (G code macro) and M code (M code macro) created by the MTB can be displayed.
By creating a guidance file for G code macro (or M code macro) in HTML format and storing it in a custom folder by the MTB, the corresponding G code (or M code) guidance can be displayed.
If there is both a standard G code guidance file and a G code guidance file created by the MTB, the G code guidance created by the MTB is displayed with priority.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
Note

NC Designer2
Automatic generation of
source code

Commercially available
application development tool
(VB, VC, etc.)
Commercially available
application
NC Designer2 Interpreter method
NC Designer2 compilation method
Executable file registration method
Automatic
generation of
interpretation
data Project file
(*GRP)
Source code (C++) Original
source code
(C++)
Compilation/
Link
Compilation/
Link
Source code Original
source code
Macro
data

17.7.1.1 Customization Data Storage Capacity [MB]
(*1) Depending on display unit-side memory space.
(*2) The number indicates the maximum size of the custom screen module (.o).
17.7.1.2 Customization Working Memory Size [MB]
17.7.2 User-Defined Key
This function allows an arbitrary character string to be assigned to one key and makes it easy to input the fixed phrases.
Register correspondences between SHIFT keys and character strings in a configuration file (keydef.txt).
The maximum number of registerable key types is 8 for ABC layout and 10 for QWERTY layout.
The maximum number of characters used per definition is 256. The definition is disregarded when it is set exceeding the number.
In the configuration file (Keydef.txt), a character string should be defined as follows:
(Example)
17.7.3 EZSocket I/F
(1) The software sold separately is necessary.
This middleware makes it easy to develop applications having a Windows interface.
The various functions of the NC unit can be used from a Windows application using VC++ language, VB language and VBA macro language.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M (*1) (*1) 16 (*2) 16 (*2) (*1) 16 (*2) 16 (*2)
L (*1) (*1) 16 (*2) 16 (*2) (*1) 16 (*2) 16 (*2)
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M6 6 6 6 6 6 6
L6 6 6 6 6 6 6
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
n [character string] ;
n (Registration No.) : 0 to 7 (SHIFT+A to SHIFT+H (ABC layout))
: 0 to 9 (SHIFT+Q to SHIFT+G (QWERTY layout))
0[G28X0Y0]; When "SHIFT+A" and a key is input, a character string "G28X0Y0" is input.
1[G28Z0]; When "SHIFT+B" and a key is input, a character string "G28Z0" is input.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
Note

17.7.4 APLC Release
(1) The software sold separately is necessary.
APLC (Advanced Programmable Logic Controller) release is a function that allows the user-generated C language module to be called from NC.
Control operations that are difficult to express in ladder language can be created with C language.
PLC ladder can easily be customized by converting a part of PLC ladder that has grown complex and bulky into C language module.
There are three methods where APLC is executed. It is possible to use the three in combination.
Type 1

By registering the start address of the module to be processed asynchronously with PLC, C language module will be executed in a constant frequency.

Type 2

By registering the start address of the module to be processed synchronously with PLC, C language module will be started synchronizing with PLC. Note that C language will not be called if PLC is incorrect, even if the process has been registered.

Type 3

By registering the start address of the module to be called from the sequence program and processed, C language module will be started from the sequence program upon S.CALL instruction.

(1) C language module needs to be generated by NC compiler2.

[Hardware configuration]

This function is activated by installing the C language module into the following memory devices.

SD memory card

Built-in memory of the control unit

When the module is stored in an SD memory card, the function is activated by inserting the card into the control unit-side SD card interface for M800VW/M80VW Series, while the function is activated by inserting the card into the front-side SD card interface of the display unit for M800VS/M80V Series.

Up to 120 KB data can be stored in built-in memory.

When the C language module is installed into an SD memory card, C language inside the SD memory card is executed. (The module inside the built-in memory is not executed.)

[Software configuration]

The names of directory, file and initialize function, where C language modules are stored, are fixed.

(1) Incorrect hardware or software configuration disables operations.

M850VW M830VW M850VS M830VS M80VW M80V

TypeA

M80V

TypeB

M

L

Note

Note

Note

17.7.5 Custom API Library

This function is designed to interface an NC with an application developed by a user.

You can set and refer the data for NC using this function.

Please contact us for details.

17.7.6 MES Interface Library

This function enables to link the CNC internal data and the database of information system (manufacturing execution system). Production control and traceability can be ensured with the registered information by registering at machining completion, alarm occurrence, or user's arbitrary timing as needed. The data registered in the database can also be operated with CNC. Conventionally, data was obtained by constantly monitoring CNC from an external computer (information system). However, by using MES interface library function, it is possible to connect without a communication gateway and it allows the communication between CNC and the database at a necessary timing.

This function is supported on CNC and the function range is from obtaining the information at the time of machining completion, alarm occurrence, and user's arbitrary timing to transmitting to the database. Screen application of database and external computer must be prepared by user side.

M850VW M830VW M850VS M830VS M80VW M80V

TypeA

M80V

TypeB

M

L

M850VW M830VW M850VS M830VS M80VW M80V

TypeA

M80V

TypeB

M

L

17.7.7 SLMP Server

SLMP server is a function that transfers data using the SLMP between an NC and an external device.

SLMP (Seamless Message Protocol) is a general-purpose protocol to transfer information between the NC and an SLMP compatible external device through the Ethernet cable and the SLMP is applied to many external devices because it can be easily utilized only by applying S/W.

This function enables easy connection with external devices and read/write NC data through the Ethernet cable. This leads to improve productivity by utilizing external devices and meet broad range of automation needs.

The specifications of SLMP transmitted by an external device are shown below.

M850VW M830VW M850VS M830VS M80VW M80V

TypeA

M80V

TypeB

M

L

Item Specification

Supported protocols TCP/IP (UDP is not supported.)

SLMP data code Binary code (ASCII code is not supported.)

TCP/IP connection waiting port number 30000

Number of TCP/IP connections

(Number of external devices connected at the same time)

Up to 4 connections

(When multiple connections are made from a single external device, each one is counted

as one connection in the total number of connections.)
XXXXX XXXXX
XXXXX
X-XXXXXX-XX-X
SLMP
SLMP SLMP SLMP
DB
NC
Utilization for production control and traceability by linking
workpiece ID with machining information and alarm information
as database management
Utilization for a compensation function by measuring deviation
and inclination to the reference workpiece
Utilization for development of application linked with NC
data
Reference workpiece
Actual workpiece
Switching hub
Workpiece ID
Bar code reader Vision sensor
Ethernet cable
Workpiece shape
information
Data
input/output
PC (SLMP-compatible application)

17.7.8 Numerical Control (CNC) Communication Software FCSB1224W000
(1) The software sold separately is necessary.
The Numerical Control (CNC) communication software FCSB1224W000 is designed to help development of an application with Windows interface for Mitsubishi Electric computerized numerical controller.
The product can accelerate development by using OLE interface common to computerized numerical controller without knowing internal processing of the machine.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
Note

17.7.11 Motion Control Release
The motion control release enables MTB unique controls by calling functions registered in the MTB-generated C language module from CNC.
17.7.11.1 Coordinate Transformation
The coordinate transformation realizes the 5-axis control (tool center point control, etc.) in the MTB unique mechanical structure by using coordinate transformation functions created by MTB.
The 5-axis control can be used even on a special structure machine by commanding the 5-axis control from the machining program while add-on modules or function tables for the coordinate transformation are registered.
The following functions are available.
Tool center point control type 2 (G43.5)
Inclined surface machining (G68.2)
3-dimensional manual feed (table coordinate system/feature coordinate system feed)
This function is available only on a machine that has a special structure on the tool side. If this function is used on a machine that has a special structure on the table side, the coordinate transformation is not correctly performed. However, CNC cannot judge that the machine does not have the special structure on the table side; therefore, no alarm is output.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L

Available function
Tool center point control (G43.5)
Inclined surface machining (G68.2)
3-dimensional manual feed
Special structure
Transformation process is created with NC Complier2.
MTB unique machine tool
NC available on special
structure
Mitsubishi Electric
CNC
PC for MTB development
Machine
information is
set.
Special
structure
coordinate
transformation

process

17.7.12 Connection with High Speed Processing Unit (HPU)
The high speed processing unit (HPU) is equipped with functions for sampling data, such as various sensors and I/O signal data in addition to the feedback position and current value of the servo axis, at a high speed.
The sampled data can also be imported into an edge personal computer, and it is possible to add a machine tool builder's original functions, such as the operation status monitoring, machining diagnosis, and preventative maintenance of machine tools.
(*1) NC-HPU optical communication is available only in NC system which has up to 4 part systems and up to 16 axes.
To realize MTB's original functions, the MTB needs to create the following software.
HPU custom module (Hereinafter, it is called "custom module".)
This is a software which works in the high speed processing unit. Functions such as data sampling, compensation by model parameter, etc. can be mounted.
Custom application
This is a software which works in the edge personal computer. Functions such as creation of model parameter, etc. can be mounted by using data acquired by the custom module.
Custom screen
This is created to display an MTB-dedicated screen on a CNC display unit.
PLC program
This is created to request sampling and model creation from CNC to a custom module.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
AI
RIO
CNC unit High speed processing unit Drive unit Spindle motor
Servo motor
Edge personal computer
LAN (MQTT communication)
Various
sensors
RIO connected
device
Acquiring
servo/sensor data
Receiving and
sending
request/response
Selecting
function/request
Acquiring
sampling data
Creating/sending
model
NC-HPU optical
communication (*1)
Optical servo communication
(1ch/2ch)

17.8 Others
17.8.1 System Lock
System lock is a function that allows machine tool builders to set the expiration date for use of their machines.
If the cancel code is not entered by the specified deadline, the system forcibly turns OFF the "Servo ready completion" signal to place the machine in an inoperable status.
(1) We do not compensate for any detriment that may be caused when the lock is cancelled illegally.
17.8.2 CNC Remote Operation Tool
17.8.2.1 NC Monitor2
(1) The software sold separately is necessary.
NC Monitor2 is the software tool that monitors the condition of NC remotely with a personal computer using a intranet of a plant.
Multiple NCs can be connected and their conditions can be monitored simultaneously.
17.8.2.2 NC Explorer
(1) This tool is free of charge. Please contact us.
NC Explorer is a software tool to operate the machining data files of each NC unit connected with a host personal computer by Ethernet connection from the Explorer on the host personal computer.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
M850VW M830VW M850VS M830VS M80VW M80V
TypeA

M80V
TypeB
M
L
Note
Note
Note

17.8.3 Automatic Operation Lock
Automatic operation lock function prevents the falsification of APLC(C language module: herein after called APLC) by a third party.
Automatic operation will be prohibited when illegal APLC is installed by authenticating APLC with the password for APLC authentication which is registered to NC unit beforehand using this function.
For details on the APLC, refer to " 17.7.4 APLC Release".
17.8.4 Power Consumption Computation
Present power consumption, accumulated power consumption, and accumulated power consumption history can be acquired with this function.
The total amount of the drive section power consumption (power consumed by the operation of the spindles and servo axes) and the non-drive section power consumption (power consumed by the electrical equipment of the machine tool) is informed to the PLC device.
The instantaneous power consumption is informed as "present power consumption". The integrated value of the present power consumption is informed as "accumulated power consumption".
The "accumulated power consumption" can be recorded at the specified time, and the history data "accumulated power consumption history" can be extracted.
17.8.5 EcoMonitorLight Connection
(1) EcoMonitorLight sold separately is required.
NC system can collect and manage the electric power of the machine tool which is measured by the energy measuring unit "EcoMonitorLight".
The electric power (mainly consumed and regenerated power) of entire machine tool and peripheral devices can be measured by connecting EcoMonitorLight to the main breaker of the machine tool or the breaker of the peripheral devices (motor, coolant, etc.) which configure the machine tool.
By establishing serial communication (Modbus) between the NC unit and EcoMonitorLight using a serial cable, the NC system can collect the power values of the entire machine tool and peripheral devices measured by EcoMonitorLight.
Consequently, the electric power in the machine tool can be finely managed, which enables energy-saving operation.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
Note

17.8.8 Laser Processing Control
Laser processing control refers generically to the functions that enables the CNC to control the laser oscillator via the laser I/F unit in laser processing of sheet metal.
(*1) Ratio of ON time to one-cycle time of turning ON/OFF the laser
The following equipments are required to use the laser processing control.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L
Laser processing function Details
Laser oscillator output control The laser oscillator is controlled based on processing conditions, such as laser output (strength), frequency (the number of times of turning ON the laser per second), duty (*1),
etc.
Laser oscillator digital I/O control The digital I/O of the laser oscillator is controlled using PLC devices.
Laser processing condition selection The processing conditions can be selected using M code from the machining programs by setting multiple combinations of the processing conditions such as laser output, fre quency, etc.
DR (dross reduction) control Laser control appropriate for corners, etc. where speed is varied is performed to reduce dross formation.
F-CUT (fly-cutting) control Processing of cutting zone and non-cutting zone can be alternately repeated without stopping the axis movement.
Height control The laser focal length is kept constant even when a deflection occurs in the workpiece, by detecting the distance between the laser head and the machining surface of the work piece. (A height sensor is required.)
Output calibration control The laser output can be compensated based on the measurement result of the laser out put from the laser head.
Multi-part machining Multiple same-shape parts can be machined with one G code command.
This reduces programming time and improves productivity.
Required equipment Remarks

Laser I/F unit FCU8-DX522-001
Communication cable J210 between CNC and laser I/F
unit
Laser oscillator Laser oscillator where the control method of the laser I/F unit FCU8-DX522-001
is available
Peripheral devices required for laser processing Chiller, gas feeder, etc.

[Example of system configuration]
Provided by
Mitsubishi Electric Provided by MTB
Laser oscillator
Mitsubishi Electric CNC
Drive unit
Safety remote
I/O unit
Laser I/F unit
FCU8-DX522-001
Chiller Gas feeder Height sensor Processing head
EMG
Analog I/O
Digital I/O
J210
(RIO2.0 communication)

17.8.9 Wireless LAN
This function enables the NC to exchange data with devices compliant with wireless LAN standards using wireless
communication through the built-in wireless module.
This enables the NC screen to be monitored on a tablet device and allows the peripheral tools that are previously connected
by wires to be connected wirelessly, which leads to reduced network wiring cost.
The software license authorized for this function
wpa_supplicant and hostapd

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These programs are licensed under the BSD license (the one with advertisement clause removed).
If you are submitting changes to the project, please see CONTRIBUTIONS file for more instructions.
This package may include either wpa_supplicant, hostapd, or both. See README file respective subdirectories
(wpa_supplicant/README or hostapd/README) for more details.
Source code files were moved around in v0.6.x releases and compared to earlier releases, the programs are now built by first
going to a subdirectory (wpa_supplicant or hostapd) and creating build configuration (.config) and running 'make' there (for
Linux/BSD/cygwin builds).
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CONTRIBUTORS BE LIABLE FOR ANY DIRECT, INDIRECT, INCIDENTAL, SPECIAL, EXEMPLARY, OR
CONSEQUENTIAL DAMAGES (INCLUDING, BUT NOT LIMITED TO, PROCUREMENT OF SUBSTITUTE GOODS OR
SERVICES; LOSS OF USE, DATA, OR PROFITS; OR BUSINESS INTERRUPTION) HOWEVER CAUSED AND ON ANY
THEORY OF LIABILITY, WHETHER IN CONTRACT, STRICT LIABILITY, OR TORT (INCLUDING NEGLIGENCE OR
OTHERWISE) ARISING IN ANY WAY OUT OF THE USE OF THIS SOFTWARE, EVEN IF ADVISED OF THE POSSIBILITY
OF SUCH DAMAGE.
M850VW M830VW M850VS M830VS M80VW M80V
TypeA
M80V
TypeB
M
L

Revision History
Date of revision Manual No. Revision details
Mar. 2021 IB(NA)1501610-A The first edition was created.
Jul. 2021 IB(NA)1501610-B Contents were revised to correspond to Mitsubishi Electric CNC M800VS/M80V Series.
Contents were revised to correspond to Mitsubishi Electric CNC M800V/M80V Series software ver sion A1.
The following chapters were added.
5.1.2 Extended Memory
6.1.1 Color Display (8.4-Type LCD TFT)
6.1.2 Color Display (8.4-Type LCD TFT)
6.1.3 Color Touchscreen Display (15-Type LCD TFT)
6.2.14 Screenshot Capture
6.2.20 Remote Desktop Connection
6.2.21 VNC Server
6.3.10.18 Vietnamese

8.1.1.9 Spindle Control with Pulse Train Output
15.4.4 Servo Tuning Support
15.4.4.1 NC Analyzer2
15.4.10 NC Configurator2
17.5.1.3 DI:96/DO:64
17.5.1.5 DI:64/DO:48/AO:1
17.8.2 CNC Remote Operation Tool
17.8.2.1 NC Monitor2
17.8.2.2 NC Explorer
17.8.9 Wireless LAN
The following chapters were changed.
1.3.4.2 Display Unit-Side High-Speed Program Server Mode
5.1 Memory Capacity
5.2.3 Buffer Correction
5.2.7 Finish Shape View Programming
6.3.5 Edit Screen Display
7.4.3 IP Filter Setting
8.1.1.7 Spindle-Mode Rotary Axis Control
12.1.1.1 Subprogram Control [Layers]
12.1.1.2 Figure Rotation
12.1.3.1 Fixed Cycle for Drilling
12.1.3.5 Compound Type Fixed Cycle for Turning Machining
12.1.8.9 Multi-Part System Program Management
14.1.8 Rotation Center Error Measurement
15.1.2 Data Protection Key
15.2.5 Thermal Detection
15.2.6 Battery Alarm/Warning
17.7.1.1 Customization Data Storage Capacity [MB]
17.7.1.2 Customization Working Memory Size [MB]
17.7.7 SLMP Server
Other mistakes were corrected.
Mar. 2022 IB(NA)1501610-C Contents were revised to correspond to Mitsubishi Electric CNC M800V/M80V Series software ver sion A3.
The following chapters were added.
6.1.4 Color Touchscreen Display (19-Type LCD TFT)
7.2.8 Image Input I/F
13.2.9 Variable Torsion Compensation
15.3.19 Real-Time 3D Machine Interference Check
15.4.15 Remote service iQ Care Remote4U
15.4.15.2 Connection with no RGU
17.2.25 BiSS Encoder I/F
17.8.8 Laser Processing Control
The following chapters were changed.
4.7.1 Dwell (Time-Based Designation)
4.7.2 Dwell (Revolution-Based Designation)
10.1.13 Workpiece Coordinate System Shift
13.1.7 Rotation Center Error Compensation
14.1.3 Manual Tool Length Measurement 1
14.1.8 Rotation Center Error Measurement
17.2.22 External Encoder Position Output I/F
The following chapter numbers were changed.
6.1.8 Separated-Type Color Touchscreen Display (15-Type LCD TFT/Windows10)
6.1.9 Separated-Type Color Touchscreen Display (19-Type LCD TFT/Windows10)
6.1.10 Separated-Type Color Touchscreen Display (19-Type Horizontal LCD TFT/Windows10)
Other mistakes were corrected.
Mar. 2023 IB(NA)1501610-D Contents were revised to correspond to Mitsubishi Electric CNC M800V/M80V Series software ver sion A7.
The following chapters were added.
12.1.2.5 Extended Common Variable
12.1.8.13 Loader Control Part System
15.4.15.1 Connection with RGU
17.7.11 Motion Control Release
17.7.11.1 Coordinate Transformation
The following chapters were changed.
1.1.6 Max. Number of NC Axes in a Part System
1.1.7 Axis Name Extension
1.2.2 Max. Number of Part Systems (Main + Sub)
8.1.1.5 Encoder Input I/F
12.1.2.2 Machine Tool Builder Macro
12.1.3.1 Fixed Cycle for Drilling
12.1.11.1 Rapid Traverse Block Overlap
12.3.1.2 High-Speed Machining Mode II (G05P2) Maximum [kBPM]
14.2.1 Tool Life Management
15.4.13 Security Feature for Windows Display
17.1.7.1 On-Board Development
17.2.5 Position Switch
17.8.4 Power Consumption Computation
Other mistakes were corrected.
Date of revision Manual No. Revision details
Jul. 2023 IB(NA)1501610-E Contents were revised to correspond to Mitsubishi Electric CNC M800V/M80V Series software ver sion A8.
The following chapter was added.
17.2.26 Tool Head Hot Swapping
The following chapters were changed.
4.1.1 Rapid Traverse Rate (m/min)
4.4.2 Rapid Traverse Constant-Gradient Acceleration/Deceleration
12.1.2.5 Extended Common Variable
14.2.1.2 Tool Life Management II
14.3.7 Direct Robot Control
15.3.2 Stored Stroke Limit
15.3.2.1 Stored Stroke Limit I/II

15.3.2.2 Stored Stroke Limit IB
15.3.2.3 Stored Stroke Limit IIB
17.1.2.1 Built-in PLC Basic Function
17.2.12 Inclined Surface Machining Command
17.8.8 Laser Processing Control
Other mistakes were corrected.
Dec. 2023 IB(NA)1501610-F Contents were revised to correspond to Mitsubishi Electric CNC M800V/M80V Series software ver sion A9.
The following chapters were added.
12.1.3.9 Text Engraving Cycle
17.6.11 CC-Link IE TSN (Remote Station)
The following chapters were changed.
4.5.3.2 Pecking Tapping Cycle
4.5.3.3 Deep-Hole Tapping Cycle
9.2.1 Tool Radius Compensation
9.2.3 Tool Nose Radius Compensation (G40/41/42)
12.1.3.1 Fixed Cycle for Drilling
12.1.3.6 Compound Type Fixed Cycle for Turning Machining (Type II)
12.1.7.4 Vibration Cutting Control
12.3.4 Machining Condition Selection I
13.2.8 OMR-CC (Optimum Machine Response - Contour Control)
14.2.1.1 Tool Life Management I
17.1.7.1 On-Board Development
17.6.2 PROFIBUS-DP (Master)
17.6.5 EtherNet/IP
Other mistakes were corrected.
Apr. 2024 IB(NA)1501610-G Contents were revised to correspond to Mitsubishi Electric CNC M800V/M80V Series software ver sion AA.
The following chapters were added.
7.2.9 Measuring Instrument I/F
15.4.16 Brake Wear Diagnostics
17.7.12 Connection with High Speed Processing Unit (HPU)
The following chapters were changed.
12.1.2.1 User Macro [Layers]
12.1.8.5 Control Axis Synchronization Between Part Systems
12.1.8.9 Multi-Part System Program Management
12.3.1.2 High-Speed Machining Mode II (G05P2) Maximum [kBPM]
12.3.3.1 High-Speed High-Accuracy Control I (G05.1Q1) Maximum [kBPM]
12.3.3.2 High-Speed High-Accuracy Control II (G05P10000) Maximum [kBPM]
12.3.3.3 High-Speed High-Accuracy Control III (G05P20000) Maximum [kBPM]
Other mistakes were corrected.
Date of revision Manual No. Revision details
Global Service Network
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0562-874-748-1+ :XAF / 0052-874-748-1+ :LET 0195-684-2012-94+ :XAF / 0005-684-2012-94+ :LET
Minneapolis, MN Service Satellite
Detroit, MI Service Satellite South Germany Service Center (Stuttgart)
Grand Rapids, MI Service Satellite SCHELMENWASENSTRASSE 16-20, 70567 STUTTGART, GERMANY
Cleveland, OH Service Satellite TEL: + 49-711-770598-123 / FAX: +49-711-770598-141
St. Louis, MO Service Satellite
Indianapolis, IN Service Saltellite France Service Center (Paris)
2 RUE DE LUNION, 92565 RUEIL-MALMAISON CEDEX, FRANCE
TEL: +33-1-41-02-83-13 / FAX: +33-1-49-01-07-25
South/East Region Service Center (Georgia)
1845 SATELLITE BOULEVARD STE. 450, DULUTH, GEORGIA 30097, U.S.A. France Service Satellite (Lyon)
9154-852-876-1+ XAF / 9254-852-876-1+ LET ECNARF TSEIRP TNIAS 00896 DONOM SEUQCAJ EELLA ,042
Charleston, SC Service Satellite TEL: +33-1-41-02-83-13 / FAX: +33-1-49-01-07-25
Charlotte, NC Service Satellite
Raleigh, NC Service Satellite Italy Service Center (Milan)
Dallas, TX Service Satellite VIA ENERGY PARK 14, VIMERCATE 20871 (MB) ITALY
Houston, TX Service Satellite TEL: +39-039-6053-342 / FAX: +39-039-6053-206
Hartford, CT Service Satellite
Knoxville, TN Service Satellite Italy Service Satellite (Padova)
Nashville, TN Service Satellite VIA G. SAVELLI, 24 - 35129 PADOVA, ITALY
Huntsville, AL Satellite TEL: +39-039-6053-342 / FAX: +39-039-6053-206
Pittsburg, PA Service Satellite
Tampa, FL Service Satellite U.K. Service Center
Miami, FL Satelite TRAVELLERS LANE, HATFIELD, HERTFORDSHIRE, AL10 8XB, U.K.
Lafayette, LA Service Satellite TEL: +44-1707-288-780 / FAX: +44-1707-278-695
Allentown, PA Satelite
Spain Service Center
CTRA. RUBI, 76-80 8174 SAINT CUGAT DEL VALLES, BARCELONA, SPAIN
Western Region Service Center (California) TEL: +34-935-65-2236 / FAX: +34-935-89-1579
5900-B KATELLA AVE. - 5900-A KATELLA AVE. CYPRESS, CALIFORNIA 90630, U.S.A.
TEL: +1-714-699-2625 / FAX: +1-847-478-2650 Poland Service Center
San Francisco, CA Satelite UL.KRAKOWSKA 50, 32-083 BALICE, POLAND
Seattle, WA Service Satellite TEL: +48-12-347-6500 / FAX: +48-12-630-4701
Denver, CO Service Satellite
Hungary Service Center
Canada Region Service Center (Toronto) MITSUBISHI ELECTRIC EUROPE B.V. HUNGARIAN BRANCH
NO ,MAHKRAM EUNEVA HT41 9924 ADANAC ,2JO R3L OIRAT YRAGNUH ,SRADUB 0402 ,.711 T GSDABAZS ,KRAP ECIFFO SRADUB
5397-574-509-1+ :XAF / 8277-574-509-1+ :LET 3622-334-07-63+ :LET
Edmonton, AB Service Satellite
Montreal, QC Service Satellite Turkey Service Center
MITSUBISHI ELECTRIC TURKEY ELEKTRK RNLER A.
Mexico Region Service Center (Queretaro) SERIFALI MAHALLESI KALE SOKAK. NO.41 34775
Parque Tecnolgico Innovacin Quertaro, Lateral Carretera Estatal 431, Km 2+200, Lote 91 Modulos 1 y 2 UMRANIYE, ISTANBUL, TURKEY

hcaM al adneicaH ocixM ,oratreuQ ,suqraM lE ,64267 PC ,arro 74-44-166-612-09+ :XAF / 0052-969-612-09+ :LET
TEL: +52-442-153-6050
Monterrey, NL Service Satellite Czech Republic Service Center
Mexico City, DF Service Satellite MITSUBISHI ELECTRIC EUROPE B.V. PRAGUE OFFICE
Pekask 621/7, 155 00 PRAHA 5, CZECH REPUBLIC
TEL: +420-734-402-587
BRAZIL
Sweden Service Center
MITSUBISHI ELECTRIC DO BRASIL COMRCIO E SERVIOS LTDA. HAMMARBACKEN 14, P.O.BOX 750 SE-19127, SOLLENTUNA, SWEDEN
Votorantim Office TEL: +46-8-6251200 / FAX: +46-8-6251014
AV. GISELE CONSTANTINO,1578, PARQUE BELA VISTA, VOTORANTIM-SP, BRAZIL CEP:18.110-650
TEL: +55-15-3023-9000 Bulgaria Service Center
Blumenau, Santa Catarina Office AKHNATON Ltd. (Service Partner)
4 ANDREJ LJAPCHEV BLVD. POB 21, BG-1756 SOFIA, BULGARIA
TEL: +359-2-8176009 / FAX: +359-2-9744061
Ukraine Service Center (Kiev)
CSC Automation Ltd. (Service Partner)
4 B, YEVHENA SVERSTYUKA STR., 02002 KIEV, UKRAINE
TEL: +380-44-494-3344 / FAX: +380-44-494-3366
South Africa Service Center
Adroit Technologies (Service Partner)
20 WATERFORD OFFICE PARK, WATERFORD DRIVE, CNR OF WITKOPPEN ROAD,
FOURWAYS JOHANNESBURG SOUTH AFRICA
TEL: +27-11-658-8100 / FAX: +27-11-658-8101
ASEAN CHINA
)RETNEC AF NAESA(.DTL .ETP AISA CIRTCELE IHSIBUSTIM)RETNEC AF ANIHC(.DTL)ANIHC(NOITAMOTUA CIRTCELE IHSIBUSTIM
Singapore Service Center CNC Call Center
349951 EROPAGNIS GNIDLIUB CIRTCELE IHSIBUSTIM DAOR ARDNAXELA 703 0315-129-004-68+ :LET
TEL: +65-6473-2308 / FAX: +65-6476-7439
Shanghai Service Center
NO.1386 HONG QIAO ROAD, CHANG NING QU, SHANGHAI 200336, CHINA
PHILIPPINES TEL: +86-21-2322-3030 / FAX: +86-21-2322-3000*8422
Qingdao Service Center
MELCO FACTORY AUTOMATION PHILIPPINES INC. Suzhou Service Center
Head Office Wuhan Service Center
128 LOPEZ RIZAL STREET, BRGY., HIGHWAY HILLS, MANDALUYONG CITY , MM PHILIPPINES 1550 Ningbo Service Center
TEL: +63-2-8256-8042 / FAX: +632-8637-2294 Hefei Service Center
Beijing Service Center
Philippines Service Center Tianjin Service Center
KM.23 WEST SERVICE ROAD SSH, CUPANG ,MUNTINLUPA CITY, PHILIPPINES Xian Service Center
TEL: +63-2-8807-0420 / FAX: +63-2-8842-5202 Dalian Service Center
Chengdu Service Center
VIETNAM Shenzhen Service Center
LEVEL8, GALAXY WORLD TOWER B, 1 YABAO ROAD, LONGGANG DISTRICT,
MITSUBISHI ELECTRIC VIETNAM CO., LTD. SHENZHEN 518129, CHINA
Vietnam Ho Chi Minh Service Center TEL: +86-755-2399-8272 / FAX: +86-755-8229-3686
11TH & 12TH FLOOR, VIETTEL TOWER B, 285 CACH MANG THANG 8 STREET, WARD 12, DISTRICT 10, Dongguan Service Center
HO CHI MINH CITY, VIETNAM Xiamen Service Center
TEL: +84-28-3910-5945 / FAX: +84-28-3910-5947
Vietnam Hanoi Service Center KOREA
14TH FLOOR, CAPITAL TOWER, 109 TRAN HUNG DAO STREET, CUA NAM WARD,
HOAN KIEM DISTRICT, HA NOI CITY, VIETNAM MITSUBISHI ELECTRIC AUTOMATION KOREA CO., LTD. (KOREA FA CENTER)
TEL: +84-24-3937-8075 / FAX: +84-24-3937-8076 Korea Seoul Service Center
8F GANGSEO HANGANG XI-TOWER A, 401 YANGCHEON-RO, GANGSEO-GU,
SEOUL 07528 KOREA
INDONESIA TEL: +82-2-3660-9631 / FAX: +82-2-3664-8668
PT. MITSUBISHI ELECTRIC INDONESIA Korea Daegu Service Center
Indonesia Service Center (Cikarang) 2F KT BLDG. 8, HOGUK-RO, BUK-GU, DAEGU 41518, KOREA
JL. KENARI RAYA BLOK G2-07A, DELTA SILICON 5, LIPPO CIKARANG - BEKASI 17550, INDONESIA TEL: +82-53-382-7401 / FAX: +82-53-382-7412
TEL: +62-21-2961-7797 / FAX: +62-21-2961-7794
Korea Changwon Technical Center
#205, 888, CHANGWON-DAERO, SEONGSAN-GU, CHANGWON-SI,
MALAYSIA GYEONGSANGNAM-DO, 51532, KOREA
TEL: +82-55-261-5559 / FAX: +82-55-261-5558
MITSUBISHI ELECTRIC SALES MALAYSIA SDN. BHD.
Malaysia Service Center (Kuala Lumpur Service Center)
LOT 11, JALAN 219, P.O BOX 1036, 46860 PETALING JAYA, SELANGOR DARUL EHSAN, MALAYSIA TAIWAN
TEL: +60-3-7626-5032
MITSUBISHI ELECTRIC TAIWAN CO., LTD. (TAIWAN FA CENTER)
Johor Bahru Service Center Taiwan Taichung Service Center
.rohoJ 00118 ,nnO otaD radnaB ,6/4 nanarijreP nalaJ ,9 WIAT , 86704 YTIC GNUHCIAT ,.TSID NUTIX ,.DR HT61 UQEYGNOG ,1-8 .ON AN
TEL: 07-3642250 / 2256 TEL: +886-4-2359-0688 / FAX: +886-4-2359-0689
Pulau Pinang Service Center Taiwan Taipei Service Center
25-G, Pusat Perniagaan Perdana Jaya, Jalan Permatang Rawa, 14000 Bukit Mertajam, Pulau Pinang 11F, NO.88, SEC.6, ZHONGSHAN N. RD., SHILIN DIST., TAIPEI CITY 11155, TAIWAN
5381-015-4-06+ :xaF / 8381-015-4-06+ :LET 3345-3382-2-688+ :XAF / 0345-3382-2-688+ :LET
Taiwan Tainan Service Center
THAILAND 11F-1, NO.30, ZHONGZHENG S. RD., YONGKANG DIST., TAINAN CITY 71067, TAIWAN
TEL: +886-6-252-5030 / FAX: +886-6-252-5031
MITSUBISHI ELECTRIC FACTORY AUTOMATION (THAILAND) CO., LTD.
Thailand Service Center (Bangkok)
101, TRUE DIGITAL PARK OFFICE, 5TH FLOOR, SUKHUMVIT ROAD, BANGCHAK, PHRA KHANONG, OCEANIA
BANGKOK, 10260 THAILAND
TEL: +66-2-092-8600 / FAX: +66-2-043-1231-33 MITSUBISHI ELECTRIC AUSTRALIA PTY. LTD.
Oceania Service Center
348 VICTORIA ROAD, RYDALMERE, N.S.W. 2116 AUSTRALIA
INDIA TEL: +61-2-9684-7269/ FAX: +61-2-9684-7245
MITSUBISHI ELECTRIC INDIA PVT., LTD.
Service Head office and South India Service Center (Bangalore)

CNC eXPerience Park, PLOT NO. 57/A, PEENYA PHASE 3,
PEENYA INDUSTRIAL AREA, BANGALORE 560058, KARNATAKA, INDIA
TEL : +91-80-4655-2121
Chennai Service Satellite
Coimbatore Service Satellite
Hyderabad Service Satellite
North India Service Center (Gurgaon)
PLOT 517, GROUND FLOOR, UDYOG VIHAR PHASE-III, GURUGRAM 122008, HARYANA, INDIA
TEL : +91-124-463-0300
Ludhiana Service Satellite
Panthnagar Service Satellite
Delhi Service Satellite
Jamshedpur Service Satellite
Manesar Service Satellite
West India Service Center (Pune)
ICC-Devi GAURAV TECHNOLOGY PARK, UNIT NO.402, FOURTH FLOOR, NORTH WING,
SURVEY NUMBER 191-192 (P), NEXT to INDIAN CARD CLOTHING COMPANY Ltd,
OPP. VALLABH NAGAR, PIMPRI, PUNE- 411 018, MAHARASHTRA, INDIA
TEL : +91-20-6819-2274
Kolhapur Service Satellite
Aurangabad Service Satellite
Mumbai Service Satellite
West India Service Center (Ahmedabad)
204-209, 2ND FLOOR, 31FIVE, CORPORATE ROAD PRAHLADNAGAR,
AHMEDABAD -380015, GUJARAT, INDIA
TEL : + 91-79-6777-7888
Rajkot Service Satellite

Notice

Every effort has been made to keep up with software and hardware revisions in the contents described in this manual. However, please understand that in some unavoidable cases simultaneous revision is not possible.

Please contact your Mitsubishi Electric dealer with any questions or comments regarding the use of this product.

Duplication Prohibited

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Introduction

This manual describes the various signal interfaces and functions required to create sequence programs (built-in PLC) of Mitsubishi Electric CNC.

Read this manual thoroughly and understand the product's functions and performance before use.

Supported models of this manual are as follows:

Abbreviations for model names used in this manual are as follows:

To safely use this CNC unit, thoroughly study the "Precautions for Safety" before use.

Be sure to keep this manual on hand so that users can refer to it at any time.

Also refer to the manuals on "Manual List" as necessary.

Details described in this manual

(1) "Sequencer" is referred to as "PLC" in some parts of this manual.

Supported models Abbreviations in this manual

M800VW Series M850VW, M830VW

M800VS Series M850VS, M830VS

M80VW Series M80VW

M80V Series M80V TypeA, M80V TypeB

Abbreviations Supported models

M800V, M800V Series M800VW Series/M800VS Series

M80V, M80V Series M80VW Series/M80V Series

M800V/M80V, M800V/M80V Series M800VW Series/M800VS Series/M80VW Series/M80V Series

M8V, M8V Series M800VW Series/M800VS Series/M80VW Series/M80V Series

Manual List

Manuals related to M800V/M80V Series are listed as follows.

These manuals are written on the assumption that all optional functions are added to the targeted model.

Some functions or screens may not be available depending on the machine or specifications set by MTB. (Confirm the specifications before use.)

The manuals issued by MTB take precedence over these manuals.

Manual IB No. Purpose and Contents

M800V/M80V Series

Instruction Manual IB-1501618 Operation guide for NC

Explanation for screen operation, etc.

M800V/M80V Series

Programming Manual

(Lathe System) (1/2)

IB-1501619 G code programming for lathe system

Basic functions, etc.

M800V/M80V Series

Programming Manual

(Lathe System) (2/2)

IB-1501620 G code programming for lathe system

Functions for multi-part system, high-accuracy function, etc.

M800V/M80V Series

Programming Manual

(Machining Center System) (1/2)

IB-1501621 G code programming for machining center system

Basic functions, etc.

M800V/M80V Series

Programming Manual

(Machining Center System) (2/2)

IB-1501622 G code programming for machining center system

Functions for multi-part system, high-accuracy function, etc.

M800V/M80V Series
Alarm/Parameter Manual IB-1501623 Alarms
Parameters
Manuals for MTBs (NC)
Manuals for MTBs (drive section)
Manual IB No. Purpose and Contents
M800V/M80V Series
Specifications Manual (Function) IB-1501610 Model selection
Outline of various functions
M800V/M80V Series
Specifications Manual (Hardware) IB-1501611 Model selection
Specifications of hardware unit
M800VW/M80VW Series
Connection and Setup Manual IB-1501612 Detailed specifications of hardware unit
Installation, connection, wiring, setup (startup/adjustment)
M800VS/M80V Series
Connection and Setup Manual IB-1501613 Detailed specifications of hardware unit
Installation, connection, wiring, setup (startup/adjustment)
M800V/M80V Series
PLC Development Manual IB-1501614
Electrical design
I/O relation (assignment, setting, connection), field network
Development environment (PLC on-board, peripheral
development environment), etc.
M800V/M80V Series
PLC Programming Manual (1/2) IB-1501667
Electrical design
Sequence programming
Explanation for instructions, functions, and parameters
M800V/M80V Series
PLC Programming Manual (2/2) IB-1501668
Electrical design
Sequence programming
Usage examples of instructions
M800V/M80V Series
PLC Interface Manual IB-1501616 Electrical design
Interface signals between NC and PLC
M800V/M80V Series
Maintenance Manual IB-1501617 Cleaning and replacement for each unit
Other items related to maintenance
High Speed Processing Unit User's
Manual IB-1501714 Specifications for high speed processing unit (HPU)
Manual IB No. Contents
MDS-E/EH Series
Specifications Manual IB-1501226 Specifications for power supply regeneration type
MDS-E/EH Series
Instruction Manual IB-1501229 Instruction for power supply regeneration type
MDS-EJ/EJH Series
Specifications Manual IB-1501232 Specifications for regenerative resistor type
MDS-EJ/EJH Series
Instruction Manual IB-1501235 Instruction for regenerative resistor type
MDS-EM/EMH Series
Specifications Manual IB-1501238 Specifications for multi-hybrid, power supply regeneration
type
MDS-EM/EMH Series
Instruction Manual IB-1501241 Instruction for multi-hybrid, power supply regeneration type
DATA BOOK IB-1501252 Specifications of servo drive unit, spindle drive unit, motor, etc.
MDS-EX-CVP Series
Specifications and Instruction
Manual
IB-1501587 Specifications and instruction for the power supply unit with
large capacity
Manuals for MTBs (Others)
Manual No. Purpose and Contents
GOT2000 Series Users Manual
(Hardware) SH-081194ENG Outline of hardware such as part names, external dimensions,
installation, wiring, maintenance, etc. of GOTs
GOT2000 Series Users Manual
(Utility) SH-081195ENG Outline of utilities such as screen display setting, operation
method, etc. of GOTs
GOT2000 Series Users Manual
(Monitor) SH-081196ENG Outline of each monitor function of GOTs
GOT2000 Series Connection Manual
(Mitsubishi Electric Products) SH-081197ENG Outline of connection types and connection method between
GOT and Mitsubishi Electric connection devices
GOT2000 Series Connection Manual
(Non-Mitsubishi Electric Products 1) SH-081198ENG Explanation for connection types and connection method
GOT2000 Series Connection Manual between GOT and other company's devices
(Non-Mitsubishi Electric Products 2) SH-081199ENG
GOT2000 Series Connection Manual
(Microcomputers, MODBUS/Fieldbus
Products, Peripherals)
SH-081200ENG
Explanation for connection types and connection method
between GOT and microcomputers, MODBUS/fieldbus
products, peripherals
GT SoftGOT2000 Version1 Operating
Manual SH-081201ENG

Explanation for system configuration, screen configuration
and operation method of monitoring software GT
SoftGOT2000
GT Designer3 (GOT2000) Screen
Design Manual SH-081220ENG Outline of screen design method using screen creation
software GT Designer3
GOT2000/GOT1000 Series CC-Link
Communication Unit User's Manual IB-0800351 Explanation for handling CC-Link communication unit (for
GOT2000 series/GOT1000 series)
GX Developer Version 8 Operating
Manual (Startup) SH-080372E Explanation for system configuration, installation, etc. of PLC
development tool GX Developer
GX Developer Version 8 Operating
Manual SH-080373E Explanation for operations using PLC development tool GX
Developer
GX Converter Version 1 Operating
Manual IB-0800004 Explanation for operations using data conversion tool GX
Converter
GX Works2 Installation Instructions BCN-P5999-0944 Explanation for the operating environment and installation
method of GX Works2
GX Works2 Version 1 Operating
Manual (Common) SH-080779ENG
Explanation for the system configuration of GX Works2 and
the functions common to Simple project and Structured project
such as parameter setting, operation method for the online
function
GX Works2 Version 1 Operating
Manual (Simple Project) SH-080780ENG Explanation for methods for such as creating and monitoring
programs in Simple project of GX Works2
GX Works2 Version 1 Operating
Manual (Simple Project, Function
Block)
SH-080984ENG
Explanation for methods for such as creating function blocks,
pasting function blocks to sequence programs, and operating
FB library in Simple project of GX Works2
GX Works2 Version 1 Operating
Manual (Structured Project) SH-080781ENG Explanation for methods for such as creating and monitoring
programs in Structured project of GX Works2
GX Works3 Installation Instructions BCN-P5999-0391 Explanation for the operating environment and installation
method of GX Works3
MELSEC-Q/L/F Structured
Programming Manual (Fundamentals) SH-080782ENG Explanation for programming methods, types of programming
languages, etc. required to create structured programs
MELSEC-Q/L Structured
Programming Manual (Application
Functions)
SH-080784ENG
Explanation for specifications and functions related to
application functions which can be used in structured
programs
MELSEC-Q CC-Link System Master/
Local Module Users Manual SH-080394E Explanation for system configuration, installation, wiring, etc.
of master/local modules for CC-Link system
MELSEC iQ-R Programming Manual
(CPU Module Instructions, Standard
Functions/Function Blocks)
SH-081266ENG
Explanation for instructions, general-purpose functions, and
general-purpose function blocks required for programming the
sequencer MELSEC iQ-R series
Reference Manual for MTBs
Manual No. Purpose and Contents
M800/M80 Series Smart safety
observation Specification manual BNP-C3072-022 Explanation for smart safety observation function
M800/M80 Series Interactive cycle
insertion (Customization)
Specification manual
BNP-C3072-121-
0003 Explanation for interactive cycle insertion
M800/M80 Series Synchronous
Control Specifications manual BNP-C3072-074 Explanation for synchronous control
M800/M80 Series Multiple-Axis
Synchronization Control
Specifications manual
BNP-C3072-339 Explanation for multiple-axis synchronization control
M800/M80 Series GOT Connection
Specifications manual BNP-C3072-314 Explanation for GOT connection
M800/M80 Series PROFIBUS-DP
Specification manual BNP-C3072-118 Explanation for PROFIBUS-DP communication function
M800/M80 Series EtherNet/IP
Specifications manual BNP-C3072-263 Explanation for EtherNet/IP
M800/M80 Series FL-net
Specifications manual BNP-C3072-368 Explanation for FL-net
M800/M80 Series CC-Link (Master/
Local) Specification manual BNP-C3072-089 Explanation for CC-Link
M800/M80 Series CC-Link IE Field
(Master/local) Specifications manual BNP-C3072-283 Explanation for CC-Link IE Field

M800/M80 Series CC-Link IE Field
Basic Specifications manual BNP-C3072-337 Explanation for CC-Link IE Field Basic

Precautions for Safety

Always read the specifications issued by the machine tool builder, this manual, related manuals and attached documents before installation, operation, programming, maintenance or inspection to ensure correct use. Understand this numerical controller, safety items and cautions before using the unit.

This manual ranks the safety precautions into "DANGER", "WARNING" and "CAUTION".

Note that even items ranked as " CAUTION", may lead to serious consequences depending on the situation. All the items are important and must always be observed.

The following signs indicate prohibition and compulsory.

The following signs indicate prohibition and compulsory.

DANGER

When the user may be subject to imminent fatalities or major injuries if handling is mistaken.

WARNING

When the user may be subject to fatalities or major injuries if handling is mistaken.

CAUTION

When the user may be subject to medium or minor injuries or when only property damage may occur, if handling is mistaken.

This sign indicates prohibited behavior (must not do).

For example, indicates "Keep fire away".

This sign indicates a thing that is compulsory (must do).

For example, indicates "it must be grounded".

CAUTION CAUTION rotated
object CAUTION HOT Danger Electric
shock risk Danger explosive
Prohibited Disassembly is
prohibited
KEEP FIRE
AWAY
General instruc tion Earth ground

Mitsubishi Electric CNC is designed and manufactured solely for applications to machine tools to be used for industrial purposes.

Do not use this product in any applications other than those specified above, especially those which are substantially influential on the public interest or which are expected to have significant influence on human lives or properties.

Not applicable in this manual.

Items related to prevention of electric shocks

Do not operate the switches with wet hands. Failure to observe this caution could result in electric shocks.

Do not damage, apply excessive stress, place heavy things on or sandwich the cables. Failure to observe this caution could result in electric shocks.

Items related to product and manual

For items described as "Restrictions" or "Usable State" in this manual, the instruction manual issued by the machine tool builder takes precedence over this manual.

Items not described in this manual must be interpreted as "not possible".

This manual is written on the assumption that all the applicable functions are included. Some of them, however, may not be available for your NC system. Refer to the specifications issued by the machine tool builder before use.

Some screens and functions may differ depending on each NC system (or version), and some functions may not be possible. Please confirm the specifications before starting to use.

To protect the availability, integrity and confidentiality of the NC system against cyber-attacks including unauthorized access, denial-of-service (DoS) (*1) attack, and computer virus from external sources via a network, take security measures such as firewall, VPN, and anti-virus software.

(*1) Denial-of-service (DoS) refers to a type of cyber-attack that disrupts services by overloading the system or by exploiting a vulnerability of the system.

Mitsubishi Electric assumes no responsibility for any problems caused to the NC system by any type of cyber-attacks including DoS attack, unauthorized access and computer virus.

Items related to connection

When using an inductive load such as relays, always contact a diode in parallel to the load as a noise measure.

When using a capacitive load such as a lamp, always connect a protective resistor serially to the load to suppress rush currents.

Since the analog output R registers are allocated in ascending order of channels and station numbers, the analog output destination may change depending on added option.

Items related to design

Always turn the spindle phase synchronization completion signal ON before chucking both ends of the workpiece to the reference spindle and synchronized spindle. If the spindle phase synchronization signal is turned ON when both ends of the workpiece are chucked to the reference spindle and synchronized spindle, the chuck or workpiece could be damaged by the torsion that occurs during phase alignment.

For Safe Use

DANGER

WARNING

CAUTION

If the temperature rise detection function is invalidated with the parameters, the control could be disabled when the temperature is excessive. This could result in machine damage or personal injuries due to runaway axis, and could damage the device. Enable the detection function for normal use.

Disposal

(Note) This symbol mark is for EU countries only.

This symbol mark is according to the directive 2006/66/EC Article 20 Information for end-users and Annex II.

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This symbol means that batteries and accumulators, at their end-of-life, should be disposed of separately from your household waste.

If a chemical symbol is printed beneath the symbol shown above, this chemical symbol means that the battery or accumulator contains a heavy metal at a certain concentration. This will be indicated as follows:

Hg: mercury (0.0005%), Cd: cadmium (0.002%), Pb: lead (0.004%)

In the European Union there are separate collection systems for used batteries and accumulators.

Please, dispose of batteries and accumulators correctly at your local community waste collection/recycling centre.

Please, help us to conserve the environment we live in!

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(/Japanese)
(A)

Handling of our product
(English)
This is a class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

(/Korean)
(A)
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Contents
1 List of Devices..... 1
1.1 List of Devices 2
1.1.1 Device Range Setting at Multi-project..... 3
1.2 File Register General Map..... 5
2 Input/Output Signals with Controller 7
2.1 PLC Input Signals (Bit Type: X***)..... 10
2.2 PLC Input Signals (Data Type: R***) 36
2.3 PLC Output Signals (Bit Type: Y***) 75
2.4 PLC Output Signals (Data Type: R***) 102
2.5 Special Relay/Special Register..... 131
2.6 ZR Devices 133
2.7 Classified for Each Application 145
3 Other Devices..... 163
4 Explanation of Interface Signals..... 167
4.1 PLC Input Signals (Bit Type: X***)..... 169
4.2 PLC Input Signals (Data Type: R***) 284
4.3 PLC Output Signals (Bit Type: Y***) 369
4.4 PLC Output Signals (Data Type: R***) 542
4.5 Explanation of Special Relays (SM***) 647
4.6 Explanation of ZR Device 648
4.6.1 Smart Safety Observation..... 648
4.6.1.1 PLC -> CNC 648
4.6.1.2 CNC -> PLC 666
4.6.2 Memory Switch (PLC Switch)..... 691
4.6.3 MES Interface Library 692
4.6.4 Diagnosis Data Output..... 705
4.6.5 Spindle Protection..... 708
4.6.6 External Encoder Position Output I/F..... 709
4.6.7 Machine Contact Input/Output I/F 710
4.6.8 BiSS Encoder I/F..... 713
4.6.9 Variable torsion compensation..... 714
4.6.10 Brake wear diagnostics..... 715
4.6.10.1 PLC -> CNC 715
4.6.10.2 CNC -> PLC 718
4.6.11 High Speed Processing Unit I/F..... 720
5 Appx.1: PLC window..... 721
5.1 Details..... 722
5.1.1 Read/Write Operation 724
5.2 PLC Window Interface 726
5.2.1 Parameter Interface 726
5.2.2 Read Window Interface..... 728
5.2.3 Write Window Interface..... 729
5.2.4 Read Window Expanded Interface..... 730
5.2.5 Write Window Expanded Interface..... 731
5.2.6 Interface for Consecutive Writes Detection Log..... 732
5.3 Data Type 733

5.4 Read/Write PLC Axis Data 734
5.5 Precautions..... 735
5.6 Usage Example 736
6 Appx.2: List of PLC Window Data 739
6.1 Section No. List..... 740
6.2 Sub-section No. List..... 742
7 Appx.3: List of Option Status Exported to PLC 773

1.1 List of Devices
The device range in the following table is the default number of device points set in the project 1 when the multi-project setting
or the setting of the number of device points is not performed.
(*1) These devices have designated applications. Do not use devices other than those corresponding to the input/output sig nals with the machine side (input/output signals of the remote I/O unit), even if it is an undefined vacant device.
(*2) Distinction of 10 ms timer and 100 ms timer is performed by command.
(10 ms timer is performed by OUTH command, 100 ms timer is performed by OUT command.)
Timer T can be set in 1 ms increments with the parameter "#8142 PLC timer unit".
(*3) For the Z device, the number of device points depends on the parameter "#6471/bit1" setting.
(*4) The P device has two types of pointers (local and common), and the above points are the total points.
(*5) Integrated timer ST can be set in 1 ms or 10 ms increments with the parameter "#8143 PLC int.timer unit".
Device Device No. Unit Details
X (*1) X0 to X1FFF (8192 points) 1 bit Input signal to PLC: Machine input, etc.
Y (*1) Y0 to Y1FFF (8192 points) 1 bit Output signal from PLC: Machine output, etc.
M M0 to M61439 (61440 points) 1 bit Temporary memory
F F0 to F2047 (2048 points) 1 bit Temporary memory, alarm message interface
L L0 to L1023 (1024 points) 1 bit Latch relay (back up memory)
SM SM0 to SM2047 (2048 points) 1 bit Special relay
V V0 to V511 (512 points) 1 bit Edge relay
SB SB0 to SB3FF (1024 points) 1 bit Special relay
B B0 to BDFFF (57344 points) 1 bit Link relay
SW SW0 to SW3FF (1024 points) 16 bits Special register
SD SD0 to SD2047 (2048 points) 16 bits Special register
T T0 to T2047 (2048 points) 1 bit/16 bits Timer (The variable/fixed boundary is set with a pa rameter.) (*2)
ST ST0 to ST127 (128 points) 1 bit/16 bits Integrated timer (The variable/fixed boundary is set
with a parameter.) (*5)
C C0 to C511 (512 points) 1 bit/16 bits Counter (The variable/fixed boundary is set with a
parameter.)
D D0 to D4095 (4096 points) 16 bits/32 bits Data register (Register for calculation)
R (*1) R0 to R32767 (32768 points) 16 bits/32 bits File register, CNC word interface
ZR (*1) ZR0 to ZR13311 (13312 points) 16 bits/32 bits File register (Input/output signals with the PLC, ma chine input/output, etc.)
W W0 to W2FFF (12288 points) 16 bits/32 bits Link register
Z (*3) Z0 to Z13/Z0 to Z9 (14 points/10
points)
16 bits Address index
N N0 to N7 (8 points) Master controller nesting level
P (*1) P0 to P4095 (4096 points) Label for conditional jump, subroutine call command
(*4)
K
K-32768 to K32767 Decimal constant for 16-bit command
K-2147483648 to K2147483647 Decimal constant for 32-bit command
H
H0 to HFFFF Hexadecimal constant for 16-bit command
H0 to HFFFFFFFF Hexadecimal constant for 32-bit command
E
E1.17549435-38 to
E3.40282347+38
Real number constant for 16-bit command
E2.2250738585072014 - 308 to
E1.7976931348623157+308
Real number constant for 32-bit command
$ 0 to 32 characters String constant

1.1.1 Device Range Setting at Multi-project
Each device will be categorized to either the common device among projects (common device among projects) or the
independent device for each projects (independent device among projects) when the multi-project function is used.
Common device among projects
Device is influenced by the access from the multiple projects.
The number of device points is fixed without being affected by the number of projects.
For example, the X/Y/R devices are common devices among projects.
Independent device among projects
Device can be used independently in the multiple projects.
In addition, independent device among projects are categorized into variable points or fixed points device.
[Independent device among projects (Fixed points)]
The number of device points is fixed without being affected by the number of projects.
For example, the SM/SD/Z devices are independent devices among projects (fixed points).
[Independent device among projects (Variable points)]
The maximum number of project is allocated to each project and used.
For example, the M/L/SB devices are independent devices among projects (variable points).

The list of device categories is as follows.
[Category explanation]
[List of categories]
When the additional specification of "Number of PLC projects: 6" is valid, the number of device points in "( )" (parentheses) becomes valid.
Refer to "PLC Programming Manual" for details on the independent device among projects and the common device among projects.
Category Details
Common Common device among projects
Independent (fixed) Independent device among projects (Fixed points)
Independent (variable) Independent device among projects (Variable points)
Common/independent Independent device among projects (Variable points)
However, it is possible to set as the common device among projects from the top.
Device Category
Number of device points
(Maximum number of proj ects)
X Common 8192 points
Y Common 8192 points
M Common/independent 61440 points (122880 points)
L Independent (variable) 1024 points (2048 points)
F Common 2048 points
SB Independent (variable) 1024 points (2048 points)
B Independent (variable) 57344 points (114688 points)
SM Independent (fixed) 2048 points
V Independent (variable) 256 points (1024 points)
SW Independent (variable) 1024 points (2048 points)
SD Independent (fixed) 2048 points
T Independent (variable) 2048 points (4096 points)
ST Independent (variable) 128 points (256 points)
C Independent (variable) 512 points (1024 points)
D Common/independent 4096 points (8192 points)
R Common 32768 points
ZR Common 13312 points
W Independent (variable) 12288 points (24576 points)
Z Independent (fixed) 14 points
N Independent (fixed) 15 points
P Independent (fixed) 4096 points

Device Details
R00000 to R00199 System common data (NC -> PLC)
R00200 to R00499 System common data (PLC -> NC)
R00500 to R00699 1st part system data (NC -> PLC)
R00700 to R00899 2nd part system data (NC -> PLC)
R00900 to R01099 3rd part system data (NC -> PLC)
R01100 to R01299 4th part system data (NC -> PLC)
R01300 to R01499 5th part system data (NC -> PLC)
R01500 to R01699 6th part system data (NC -> PLC)
R01700 to R01899 7th part system data (NC -> PLC)
R01900 to R02099 8th part system data (NC -> PLC)
R02100 to R02397 Pallet program data (Drive unit -> PLC)
R02398 to R20499 System reserve
R02500 to R02699 1st part system data (PLC -> NC)
R02700 to R02899 2nd part system data (PLC -> NC)
R02900 to R03099 3rd part system data (PLC -> NC)
R03100 to R03299 4th part system data (PLC -> NC)
R03300 to R03499 5th part system data (PLC -> NC)
R03500 to R03699 6th part system data (PLC -> NC)
R03700 to R03899 7th part system data (PLC -> NC)
R03900 to R04099 8th part system data (PLC -> NC)
R04100 to R04103 Pallet program data (PLC -> Drive unit)
R04104 to R04499 System reserve
R04500 to R05683 Axis data (NC -> PLC)
R05684 to R05699 System reserve
R05700 to R06371 Axis data (PLC -> NC)
R06372 to R06499 User macro (NC -> PLC: 64 point, PLC -> NC: 64 point)
R06500 to R06549 1st spindle data (NC -> PLC)
R06550 to R06599 2nd spindle data (NC -> PLC)
R06600 to R06649 3rd spindle data (NC -> PLC)
R06650 to R06699 4th spindle data (NC -> PLC)
R06700 to R06749 5th spindle data (NC -> PLC)
R06750 to R06799 6th spindle data (NC -> PLC)
R06800 to R06849 7th spindle data (NC -> PLC)
R06850 to R06899 8th spindle data (NC -> PLC)
R06900 to R06999 System reserve
R07000 to R07049 1st spindle data (PLC -> NC)
R07050 to R07099 2nd spindle data (PLC -> NC)
R07100 to R07149 3rd spindle data (PLC -> NC)
R07150 to R07199 4th spindle data (PLC -> NC)
R07200 to R07249 5th spindle data (PLC -> NC)
R07250 to R07299 6th spindle data (PLC -> NC)
R07300 to R07349 7th spindle data (PLC -> NC)
R07350 to R07399 8th spindle data (PLC -> NC)
R07400 to R07499 System reserve

R07500 to R07949 PLC constants
R07950 to R07999 System reserve
R08000 to R08099 PLC axis indexing
R08100 to R08259 System reserve
R08260 to R08289 Option status export to PLC
R08290 to R08299 Optimum acceleration/deceleration (Spindle)
R08300 to R09799 User backed up area
R09800 to R09899 User work area

(1) Do not use the system reserve as it is used by Mitsubishi Electric for function expansion.
Device Details
R10000 to R10099 Remote I/O communication error information
R10181 to R10187 System reserve
R10188 to R10189 Base PLC mounting check
R10600 to R12759 ATC data, tool life management for M system/Tool life management I, II for L system
R12760 to R13999 System reserve
R14000 to R14499 EcoMonitorLight data (NC -> PLC)
R14500 to R14699 MES Interface (System common data)
R14700 to R14949 MES Interface (1st part system data) (PLC -> NC)
R14950 to R15199 MES Interface (2nd part system data) (PLC -> NC)
R15200 to R15449 MES Interface (3rd part system data) (PLC -> NC)
R15450 to R15699 MES Interface (4th part system data) (PLC -> NC)
R15700 to R15949 MES Interface (5th part system data) (PLC -> NC)
R15950 to R16199 MES Interface (6th part system data) (PLC -> NC)
R16200 to R16449 MES Interface (7th part system data) (PLC -> NC)
R16450 to R16699 MES Interface (8th part system data) (PLC -> NC)
R16700 to R17299 System reserve
R17300 to R18299 Modbus input/output device
R18300 to R19799 User backed up area
R19800 to R19899 User work area
R19900 to R19999 System reserve
R20000 to R20199 System common data (NC -> PLC)
R20200 to R20499 System common data (PLC -> NC)
R20500 to R20699 1st part system data (NC -> PLC)
R20700 to R20899 2nd part system data (NC -> PLC)
R20900 to R21099 3rd part system data (NC -> PLC)
R21100 to R21299 4th part system data (NC -> PLC)
R21300 to R21499 5th part system data (NC -> PLC)
R21500 to R21699 6th part system data (NC -> PLC)
R21700 to R21899 7th part system data (NC -> PLC)
R21900 to R22099 8th part system data (NC -> PLC)
R22100 to R22499 System reserve
R22500 to R22699 1st part system data (PLC -> NC)
R22700 to R22899 2nd part system data (PLC -> NC)
R22900 to R23099 3rd part system data (PLC -> NC)
R23100 to R23299 4th part system data (PLC -> NC)
R23300 to R23499 5th part system data (PLC -> NC)
R23500 to R23699 6th part system data (PLC -> NC)
R23700 to R23899 7th part system data (PLC -> NC)
R23900 to R24099 8th part system data (PLC -> NC)
R24100 to R24499 System reserve
R24500 to R25683 Axis data (NC -> PLC)
R25684 to R26371 Axis data (PLC -> NC)
R26372 to R27499 System reserve
R27500 to R28299 PLC constants (prepared for specific machine tool builders)
R28300 to R29799 User backed up area
R29800 to R29899 User work area
R29900 to R32767 System reserve
Note

The followings are the types of input/output signals tables to be used.
[For devices used commonly by part systems (Sample)]
[For devices used in each part system (Sample)]
[For devices used in each spindle (Sample)]
(1) Signals marked with "*" in the "Abbrev." column are handled as B contacts.
(2) Signals with "" are prepared for a specific machine tool builder.
(3) Unit is changed by "#1040 M_inch" for the signals marked with [M].
(4) 32-bit signals are shown with (L)/(H), which indicates Low/High order. Data structure and the descriptions are as follows.
Types of Input/Output Signals Tables
Device Abbrev. Signal name Device Signal name
X720 X728
X721 X729
X722 Diagnosis data output completio X72A
X723 Collecting diagnosis data X72B
X724 In remote program input X72C
X725 Remote program input completion X72D
X726 Remote program input error X72E
X727 In tool ID communication X72F Power OFF required after parameter change
Abbrev.

Device No.
$1 Abbrev. Signal name
Y7A0 Y7A8 Y7B0 Y7B8 *SVF1 Servo OFF 1st axis
2nd axis
3rd axis
4th axis
5th axis
6th axis
7th axis
8th axis
Y7A1 Y7A9 Y7B1 Y7B9 *SVF2
Y7A2 Y7AA Y7B2 Y7BA *SVF3
Y7A3 Y7AB Y7B3 Y7BB *SVF4
Y7A4 Y7AC Y7B4 Y7BC *SVF5
Y7A5 Y7AD Y7B5 Y7BD *SVF6
Y7A6 Y7AE Y7B6 Y7BE *SVF7
Y7A7 Y7AF Y7B7 Y7BF *SVF8
$2 $3 $4
Device No.
1stSP Abbrev. Signal name
R6500 R6550 R6600 R6650 R6700 R6750 Spindle command rotation speed input (L)
R6501 R6551 R6601 R6651 R6701 R6751 (H)
R6502 R6552 R6602 R6652 R6702 R6752 Spindle command final data (rotation speed) (L)
R6503 R6553 R6603 R6653 R6703 R6753 (H)
R6504 R6554 R6604 R6654 R6704 R6754 Spindle command final data (12-bit binary) (L)
R6505 R6555 R6605 R6655 R6705 R6755) (H)
R6506 R6556 R6606 R6656 R6706 R6756 Spindle actual speed (L)
R6507 R6557 R6607 R6657 R6707 R6757 (H)
2ndSP 3rdSP 4thSP 5thSP 6thSP
Note
Rn
Rn+1
Low-order (L)
High-order (H)

There are 1-bit unit, and 16-bit or 32-bit unit controller input/output signals, which are classified as shown below.
When designing, refer to the section indicated below and make allocations according to the table in the respective section.
Classification of Input/Output Signals with Controller
Signal type Explanation Reference
Input
DI
Allocated to device X.
Data calculated in bit units are allocated as a principle.
Signals with only $1 or 1stSP section filled are common
for all part systems or all spindles.
2.1 PLC Input Signals (Bit Type: X***)
Data
Allocated to device R.
Data handled in 16-bit or 32-bit units is allocated as a
principle.
2.2 PLC Input Signals (Data Type: R***)
Output
DO
Allocated to device Y.
Data calculated in bit units are allocated as a principle.
Signals with only $1 or 1stSP section filled are common
for all part systems or all spindles.
2.3 PLC Output Signals (Bit Type: Y***)
Data
Allocated to device R.
Data handled in 16-bit or 32-bit units is allocated as a
principle.
2.4 PLC Output Signals (Data Type: R***)
Others
Special relay/register
Allocated to device SM, SB and SW.
The sequence instruction calculation state, results and
the signals with special operations are allocated.
2.5 Special Relay/Special Register
ZR Allocated to device ZR.
Use in the smart safety observation function.
2.6 ZR Devices
Classified under pur pose
Devices are classified under the usage purpose. 2.7 Classified for Each Application

2.1 PLC Input Signals (Bit Type: X***)
(1) Signals with "" are prepared for a specific machine tool builder.
Common ($) Abbrev. Signal name Common ($) Abbrev. Signal name
X2F0 BRST Board reset
Common ($) Abbrev. Signal name Common ($) Abbrev. Signal name

X700 IPCEI1 Power consumption computation: Consump tion accumulation ON 1 X708 IPCCC1 Power consumption computation: Clear ing consumption accumulation 1 complete
X701 IPCEI2 Power consumption computation: Consump tion accumulation ON 2 X709 IPCCC2 Power consumption computation: Clear ing consumption accumulation 2 complete
X702 IPCEI3 Power consumption computation: Consump tion accumulation ON 3 X70A IPCCC3 Power consumption computation: Clear ing consumption accumulation 3 complete
X703 IPCEI4 Power consumption computation: Consump tion accumulation ON 4 X70B IPCCC4 Power consumption computation: Clear ing consumption accumulation 4 complete
X704 X70C
X705 X70D
X706 X70E BATWR Battery warning
X707 Power OFF processing X70F BATAL Battery alarm
Common ($) Abbrev. Signal name Common ($) Abbrev. Signal name
X710 X718
X711 ESTSPF Optimum acceleration/deceleration pa rameter switch completion [spindle] X719
X712 SMLKO High-speed simple program check mode ON X71A
X713 SPSCO High-speed simple program check: Coordi nate position check ON X71B
X714 PNCM DO
Manual arbitrary reverse run: Actual cutting
mode ON X71C
X715 PCHKO Manual arbitrary reverse run mode ON X71D
X716 MOREV Manual arbitrary reverse run: Reverse run ON X71E
X717 X71F
Common ($) Abbrev. Signal name Common ($) Abbrev. Signal name
X720 In sampling trace X728 MDBUSIF Modbus/TCP communicating
X721 Sampling trace complete X729 MDBUSER1 Modbus time-out 1
X722 Diagnosis data output completion X72A MDBUSER2 Modbus time-out 2
X723 Collecting diagnosis data X72B FLNETO FL-net: Online
X724 In remote program input X72C
X725 Remote program input completion X72D
X726 Remote program input error X72E
X727 In tool ID communication X72F Power OFF required after parameter
change
Common ($) Abbrev. Signal name Common ($) Abbrev. Signal name
X730 X738
X731 X739
X732 X73A
X733 X73B
X734 X73C
X735 X73D
X736 X73E
X737 X73F
Note

Common ($) Abbrev. Signal name Common ($) Abbrev. Signal name
X740 X748
X741 X749
X742 X74A
X743 X74B
X744 X74C
X745 X74D MBSTP Thread, tap block stopping in manual arbitrary
reverse run
X746 X74E MRVNG Thread, tap reverse run prohibition alarm in
manual arbitrary reverse run
X747 X74F MES interface library: Operation trigger status
Common ($) Abbrev. Signal name Common ($) Abbrev. Signal name
X750 X758 Pallet program registration Ext. workpiece co ordinate transfer completion
X751 X759 Graphic check (check method II) in progress
X752 CNOP 24 hours continuous operation X75A
X753 MSOE In multi-step speed monitor X75B
X754 X75C
X755 X75D
X756 X75E
X757 X75F
Common ($) Abbrev. Signal name Common ($) Abbrev. Signal name
X760 $1 Display X768
X761 $2 Display X769
X762 $3 Display X76A
X763 $4 Display X76B
X764 $5 Display X76C
X765 $6 Display X76D
X766 $7 Display X76E
X767 $8 Display X76F
Common ($) Abbrev. Signal name Common ($) Abbrev. Signal name
X770 X778 GBMOD G/B spindle synchronizing mode
X771 ITF3DTF Interference check III: Interfering object selec tion data setting completed X779 GBSYN G/B spindle synchronization: Position control
synchronizing
X772 ITF3MD Interference check III: In interference check III
mode X77A GBPHF G/B spindle synchronization: Phase align ment complete
X773 Interference check between part systems:
Mode is active X77B GBPCM G/B spindle synchronization: Position error
compensating
X774 X77C
X775 X77D
X776 X77E
X777 X77F

(1) The CNC control and CNC status signals are arbitrarily assigned to the device and axis numbers by the parameter "#1603 PLCdev_no" for each axis.
For details of setting, refer to the "PLC I/F axis random device assignment" in the "PLC Programming Manual".
Device No.
$1 $2 $3 $4 Abbrev. Signal name
X780 X788 X790 X798 RDY1 Servo ready 1st axis
X781 X789 X791 X799 RDY2 Servo ready 2nd axis
X782 X78A X792 X79A RDY3 Servo ready 3rd axis
X783 X78B X793 X79B RDY4 Servo ready 4th axis
X784 X78C X794 X79C RDY5 Servo ready 5th axis
X785 X78D X795 X79D RDY6 Servo ready 6th axis
X786 X78E X796 X79E RDY7 Servo ready 7th axis
X787 X78F X797 X79F RDY8 Servo ready 8th axis
Device No.
$1 $2 $3 $4 Abbrev. Signal name
X7A0 X7A8 X7B0 X7B8 AX1 Axis selection 1st axis
X7A1 X7A9 X7B1 X7B9 AX2 Axis selection 2nd axis
X7A2 X7AA X7B2 X7BA AX3 Axis selection 3rd axis
X7A3 X7AB X7B3 X7BB AX4 Axis selection 4th axis
X7A4 X7AC X7B4 X7BC AX5 Axis selection 5th axis
X7A5 X7AD X7B5 X7BD AX6 Axis selection 6th axis
X7A6 X7AE X7B6 X7BE AX7 Axis selection 7th axis
X7A7 X7AF X7B7 X7BF AX8 Axis selection 8th axis
Device No.
$1 $2 $3 $4 Abbrev. Signal name
X7C0 X7C8 X7D0 X7D8 MVP1 In axis plus motion 1st axis
X7C1 X7C9 X7D1 X7D9 MVP2 In axis plus motion 2nd axis
X7C2 X7CA X7D2 X7DA MVP3 In axis plus motion 3rd axis
X7C3 X7CB X7D3 X7DB MVP4 In axis plus motion 4th axis
X7C4 X7CC X7D4 X7DC MVP5 In axis plus motion 5th axis
X7C5 X7CD X7D5 X7DD MVP6 In axis plus motion 6th axis
X7C6 X7CE X7D6 X7DE MVP7 In axis plus motion 7th axis
X7C7 X7CF X7D7 X7DF MVP8 In axis plus motion 8th axis
Device No.
$1 $2 $3 $4 Abbrev. Signal name
X7E0 X7E8 X7F0 X7F8 MVM1 In axis minus motion 1st axis
X7E1 X7E9 X7F1 X7F9 MVM2 In axis minus motion 2nd axis
X7E2 X7EA X7F2 X7FA MVM3 In axis minus motion 3rd axis
X7E3 X7EB X7F3 X7FB MVM4 In axis minus motion 4th axis
X7E4 X7EC X7F4 X7FC MVM5 In axis minus motion 5th axis
X7E5 X7ED X7F5 X7FD MVM6 In axis minus motion 6th axis
X7E6 X7EE X7F6 X7FE MVM7 In axis minus motion 7th axis
X7E7 X7EF X7F7 X7FF MVM8 In axis minus motion 8th axis
Note

(1) The CNC control and CNC status signals are arbitrarily assigned to the device and axis numbers by the parameter "#1603 PLCdev_no" for each axis.
For details of setting, refer to the "PLC I/F axis random device assignment" in the "PLC Programming Manual".
Device No.
$1 $2 $3 $4 Abbrev. Signal name
X800 X808 X810 X818 ZP11 1st reference position reached 1st axis
X801 X809 X811 X819 ZP12 1st reference position reached 2nd axis
X802 X80A X812 X81A ZP13 1st reference position reached 3rd axis
X803 X80B X813 X81B ZP14 1st reference position reached 4th axis
X804 X80C X814 X81C ZP15 1st reference position reached 5th axis
X805 X80D X815 X81D ZP16 1st reference position reached 6th axis
X806 X80E X816 X81E ZP17 1st reference position reached 7th axis
X807 X80F X817 X81F ZP18 1st reference position reached 8th axis
Device No.
$1 $2 $3 $4 Abbrev. Signal name
X820 X828 X830 X838 ZP21 2nd reference position reached 1st axis
X821 X829 X831 X839 ZP22 2nd reference position reached 2nd axis
X822 X82A X832 X83A ZP23 2nd reference position reached 3rd axis
X823 X82B X833 X83B ZP24 2nd reference position reached 4th axis
X824 X82C X834 X83C ZP25 2nd reference position reached 5th axis
X825 X82D X835 X83D ZP26 2nd reference position reached 6th axis
X826 X82E X836 X83E ZP27 2nd reference position reached 7th axis
X827 X82F X837 X83F ZP28 2nd reference position reached 8th axis
Device No.
$1 $2 $3 $4 Abbrev. Signal name
X840 X848 X850 X858 ZP31 3rd reference position reached 1st axis
X841 X849 X851 X859 ZP32 3rd reference position reached 2nd axis
X842 X84A X852 X85A ZP33 3rd reference position reached 3rd axis
X843 X84B X853 X85B ZP34 3rd reference position reached 4th axis
X844 X84C X854 X85C ZP35 3rd reference position reached 5th axis
X845 X84D X855 X85D ZP36 3rd reference position reached 6th axis
X846 X84E X856 X85E ZP37 3rd reference position reached 7th axis
X847 X84F X857 X85F ZP38 3rd reference position reached 8th axis
Device No.
$1 $2 $3 $4 Abbrev. Signal name
X860 X868 X870 X878 ZP41 4th reference position reached 1st axis
X861 X869 X871 X879 ZP42 4th reference position reached 2nd axis
X862 X86A X872 X87A ZP43 4th reference position reached 3rd axis
X863 X86B X873 X87B ZP44 4th reference position reached 4th axis

X864 X86C X874 X87C ZP45 4th reference position reached 5th axis
X865 X86D X875 X87D ZP46 4th reference position reached 6th axis
X866 X86E X876 X87E ZP47 4th reference position reached 7th axis
X867 X86F X877 X87F ZP48 4th reference position reached 8th axis
Note

(1) The CNC control and CNC status signals are arbitrarily assigned to the device and axis numbers by the parameter "#1603 PLCdev_no" for each axis.
For details of setting, refer to the "PLC I/F axis random device assignment" in the "PLC Programming Manual".
Device No.
$1 $2 $3 $4 Abbrev. Signal name
X880 X888 X890 X898 NRF1 Near reference position 1st axis
X881 X889 X891 X899 NRF2 Near reference position 2nd axis
X882 X88A X892 X89A NRF3 Near reference position 3rd axis
X883 X88B X893 X89B NRF4 Near reference position 4th axis
X884 X88C X894 X89C NRF5 Near reference position 5th axis
X885 X88D X895 X89D NRF6 Near reference position 6th axis
X886 X88E X896 X89E NRF7 Near reference position 7th axis
X887 X88F X897 X89F NRF8 Near reference position 8th axis
Device No.
$1 $2 $3 $4 Abbrev. Signal name
X8A0 X8A8 X8B0 X8B8 PLFN1 Arbitrary axis superimposition complete 1st axis
X8A1 X8A9 X8B1 X8B9 PLFN2 Arbitrary axis superimposition complete 2nd axis
X8A2 X8AA X8B2 X8BA PLFN3 Arbitrary axis superimposition complete 3rd axis
X8A3 X8AB X8B3 X8BB PLFN4 Arbitrary axis superimposition complete 4th axis
X8A4 X8AC X8B4 X8BC PLFN5 Arbitrary axis superimposition complete 5th axis
X8A5 X8AD X8B5 X8BD PLFN6 Arbitrary axis superimposition complete 6th axis
X8A6 X8AE X8B6 X8BE PLFN7 Arbitrary axis superimposition complete 7th axis
X8A7 X8AF X8B7 X8BF PLFN8 Arbitrary axis superimposition complete 8th axis
Device No.
$1 $2 $3 $4 Abbrev. Signal name
X8C0 X8C8 X8D0 X8D8 ZSF1 Zero point initialization set completed 1st axis
X8C1 X8C9 X8D1 X8D9 ZSF2 Zero point initialization set completed 2nd axis
X8C2 X8CA X8D2 X8DA ZSF3 Zero point initialization set completed 3rd axis
X8C3 X8CB X8D3 X8DB ZSF4 Zero point initialization set completed 4th axis
X8C4 X8CC X8D4 X8DC ZSF5 Zero point initialization set completed 5th axis
X8C5 X8CD X8D5 X8DD ZSF6 Zero point initialization set completed 6th axis
X8C6 X8CE X8D6 X8DE ZSF7 Zero point initialization set completed 7th axis
X8C7 X8CF X8D7 X8DF ZSF8 Zero point initialization set completed 8th axis
Device No.
$1 $2 $3 $4 Abbrev. Signal name
X8E0 X8E8 X8F0 X8F8 ZSE1 Zero point initialization set error completed 1st axis
X8E1 X8E9 X8F1 X8F9 ZSE2 Zero point initialization set error completed 2nd axis
X8E2 X8EA X8F2 X8FA ZSE3 Zero point initialization set error completed 3rd axis
X8E3 X8EB X8F3 X8FB ZSE4 Zero point initialization set error completed 4th axis
X8E4 X8EC X8F4 X8FC ZSE5 Zero point initialization set error completed 5th axis
X8E5 X8ED X8F5 X8FD ZSE6 Zero point initialization set error completed 6th axis
X8E6 X8EE X8F6 X8FE ZSE7 Zero point initialization set error completed 7th axis
X8E7 X8EF X8F7 X8FF ZSE8 Zero point initialization set error completed 8th axis
Note

(1) The CNC control and CNC status signals are arbitrarily assigned to the device and axis numbers by the parameter "#1603 PLCdev_no" for each axis.
For details of setting, refer to the "PLC I/F axis random device assignment" in the "PLC Programming Manual".
Device No.
$1 $2 $3 $4 Abbrev. Signal name
X900 X908 X910 X918 ILI1 In current limit 1st axis
X901 X909 X911 X919 ILI2 In current limit 2nd axis
X902 X90A X912 X91A ILI3 In current limit 3rd axis
X903 X90B X913 X91B ILI4 In current limit 4th axis
X904 X90C X914 X91C ILI5 In current limit 5th axis
X905 X90D X915 X91D ILI6 In current limit 6th axis
X906 X90E X916 X91E ILI7 In current limit 7th axis
X907 X90F X917 X91F ILI8 In current limit 8th axis
Device No.
$1 $2 $3 $4 Abbrev. Signal name
X920 X928 X930 X938 ILA1 Current limit reached 1st axis
X921 X929 X931 X939 ILA2 Current limit reached 2nd axis
X922 X92A X932 X93A ILA3 Current limit reached 3rd axis
X923 X92B X933 X93B ILA4 Current limit reached 4th axis
X924 X92C X934 X93C ILA5 Current limit reached 5th axis
X925 X92D X935 X93D ILA6 Current limit reached 6th axis
X926 X92E X936 X93E ILA7 Current limit reached 7th axis
X927 X92F X937 X93F ILA8 Current limit reached 8th axis
Device No.
$1 $2 $3 $4 Abbrev. Signal name
X940 X948 X950 X958 ARRF1 NC axis up-to-speed 1st axis
X941 X949 X951 X959 ARRF2 NC axis up-to-speed 2nd axis
X942 X94A X952 X95A ARRF3 NC axis up-to-speed 3rd axis
X943 X94B X953 X95B ARRF4 NC axis up-to-speed 4th axis
X944 X94C X954 X95C ARRF5 NC axis up-to-speed 5th axis
X945 X94D X955 X95D ARRF6 NC axis up-to-speed 6th axis

X946 X94E X956 X95E ARRF7 NC axis up-to-speed 7th axis
X947 X94F X957 X95F ARRF8 NC axis up-to-speed 8th axis
Device No.
$1 $2 $3 $4 Abbrev. Signal name
X960 X968 X970 X978 UCLP1 Unclamp command 1st axis
X961 X969 X971 X979 UCLP2 Unclamp command 2nd axis
X962 X96A X972 X97A UCLP3 Unclamp command 3rd axis
X963 X96B X973 X97B UCLP4 Unclamp command 4th axis
X964 X96C X974 X97C UCLP5 Unclamp command 5th axis
X965 X96D X975 X97D UCLP6 Unclamp command 6th axis
X966 X96E X976 X97E UCLP7 Unclamp command 7th axis
X967 X96F X977 X97F UCLP8 Unclamp command 8th axis
Note

(1) The CNC control and CNC status signals are arbitrarily assigned to the device and axis numbers by the parameter "#1603 PLCdev_no" for each axis.
For details of setting, refer to the "PLC I/F axis random device assignment" in the "PLC Programming Manual".
Device No.
$1 $2 $3 $4 Abbrev. Signal name
X980 X988 X990 X998 In mixed control (cross axis control) 1st axis
X981 X989 X991 X999 In mixed control (cross axis control) 2nd axis
X982 X98A X992 X99A In mixed control (cross axis control) 3rd axis
X983 X98B X993 X99B In mixed control (cross axis control) 4th axis
X984 X98C X994 X99C In mixed control (cross axis control) 5th axis
X985 X98D X995 X99D In mixed control (cross axis control) 6th axis
X986 X98E X996 X99E In mixed control (cross axis control) 7th axis
X987 X98F X997 X99F In mixed control (cross axis control) 8th axis
Device No.
$1 $2 $3 $4 Abbrev. Signal name
X9A0 X9A8 X9B0 X9B8 In synchronous/superimposition control 1st axis
X9A1 X9A9 X9B1 X9B9 In synchronous/superimposition control 2nd axis
X9A2 X9AA X9B2 X9BA In synchronous/superimposition control 3rd axis
X9A3 X9AB X9B3 X9BB In synchronous/superimposition control 4th axis
X9A4 X9AC X9B4 X9BC In synchronous/superimposition control 5th axis
X9A5 X9AD X9B5 X9BD In synchronous/superimposition control 6th axis
X9A6 X9AE X9B6 X9BE In synchronous/superimposition control 7th axis
X9A7 X9AF X9B7 X9BF In synchronous/superimposition control 8th axis
Device No.
$1 $2 $3 $4 Abbrev. Signal name
X9C0 X9C8 X9D0 X9D8 MIR1 In mirror image 1st axis
X9C1 X9C9 X9D1 X9D9 MIR2 In mirror image 2nd axis
X9C2 X9CA X9D2 X9DA MIR3 In mirror image 3rd axis
X9C3 X9CB X9D3 X9DB MIR4 In mirror image 4th axis
X9C4 X9CC X9D4 X9DC MIR5 In mirror image 5th axis
X9C5 X9CD X9D5 X9DD MIR6 In mirror image 6th axis
X9C6 X9CE X9D6 X9DE MIR7 In mirror image 7th axis
X9C7 X9CF X9D7 X9DF MIR8 In mirror image 8th axis
Device No.
$1 $2 $3 $4 Abbrev. Signal name
X9E0 X9E8 X9F0 X9F8 Reference position establishment 1st axis
X9E1 X9E9 X9F1 X9F9 Reference position establishment 2nd axis
X9E2 X9EA X9F2 X9FA Reference position establishment 3rd axis
X9E3 X9EB X9F3 X9FB Reference position establishment 4th axis
X9E4 X9EC X9F4 X9FC Reference position establishment 5th axis
X9E5 X9ED X9F5 X9FD Reference position establishment 6th axis
X9E6 X9EE X9F6 X9FE Reference position establishment 7th axis
X9E7 X9EF X9F7 X9FF Reference position establishment 8th axis
Note

(1) The CNC control and CNC status signals are arbitrarily assigned to the device and axis numbers by the parameter "#1603 PLCdev_no" for each axis.
For details of setting, refer to the "PLC I/F axis random device assignment" in the "PLC Programming Manual".
Device No.
$1 $2 $3 $4 Abbrev. Signal name
XA00 XA08 XA10 XA18 Reference position return direction 1st axis
XA01 XA09 XA11 XA19 Reference position return direction 2nd axis
XA02 XA0A XA12 XA1A Reference position return direction 3rd axis
XA03 XA0B XA13 XA1B Reference position return direction 4th axis
XA04 XA0C XA14 XA1C Reference position return direction 5th axis
XA05 XA0D XA15 XA1D Reference position return direction 6th axis
XA06 XA0E XA16 XA1E Reference position return direction 7th axis
XA07 XA0F XA17 XA1F Reference position return direction 8th axis
Device No.
$1 $2 $3 $4 Abbrev. Signal name
XA20 XA28 XA30 XA38 In NC axis control 1st axis
XA21 XA29 XA31 XA39 In NC axis control 2nd axis
XA22 XA2A XA32 XA3A In NC axis control 3rd axis
XA23 XA2B XA33 XA3B In NC axis control 4th axis
XA24 XA2C XA34 XA3C In NC axis control 5th axis
XA25 XA2D XA35 XA3D In NC axis control 6th axis
XA26 XA2E XA36 XA3E In NC axis control 7th axis
XA27 XA2F XA37 XA3F In NC axis control 8th axis

Device No.
$1 $2 $3 $4 Abbrev. Signal name
XA40 XA48 XA50 XA58 ECIL1 Ext. machine coordinate system offset data illegal 1st axis
XA41 XA49 XA51 XA59 ECIL2 Ext. machine coordinate system offset data illegal 2nd axis
XA42 XA4A XA52 XA5A ECIL3 Ext. machine coordinate system offset data illegal 3rd axis
XA43 XA4B XA53 XA5B ECIL4 Ext. machine coordinate system offset data illegal 4th axis
XA44 XA4C XA54 XA5C ECIL5 Ext. machine coordinate system offset data illegal 5th axis
XA45 XA4D XA55 XA5D ECIL6 Ext. machine coordinate system offset data illegal 6th axis
XA46 XA4E XA56 XA5E ECIL7 Ext. machine coordinate system offset data illegal 7th axis
XA47 XA4F XA57 XA5F ECIL8 Ext. machine coordinate system offset data illegal 8th axis
Device No.
$1 $2 $3 $4 Abbrev. Signal name
XA60 XA68 XA70 XA78 Vertical axis pull-up prevented 1st axis
XA61 XA69 XA71 XA79 Vertical axis pull-up prevented 2nd axis
XA62 XA6A XA72 XA7A Vertical axis pull-up prevented 3rd axis
XA63 XA6B XA73 XA7B Vertical axis pull-up prevented 4th axis
XA64 XA6C XA74 XA7C Vertical axis pull-up prevented 5th axis
XA65 XA6D XA75 XA7D Vertical axis pull-up prevented 6th axis
XA66 XA6E XA76 XA7E Vertical axis pull-up prevented 7th axis
XA67 XA6F XA77 XA7F Vertical axis pull-up prevented 8th axis
Note

(1) The CNC control and CNC status signals are arbitrarily assigned to the device and axis numbers by the parameter "#1603 PLCdev_no" for each axis.
For details of setting, refer to the "PLC I/F axis random device assignment" in the "PLC Programming Manual".
Device No.
$1 $2 $3 $4 Abbrev. Signal name
XA80 XA88 XA90 XA98 Mirror image status 1st axis
XA81 XA89 XA91 XA99 Mirror image status 2nd axis
XA82 XA8A XA92 XA9A Mirror image status 3rd axis
XA83 XA8B XA93 XA9B Mirror image status 4th axis
XA84 XA8C XA94 XA9C Mirror image status 5th axis
XA85 XA8D XA95 XA9D Mirror image status 6th axis
XA86 XA8E XA96 XA9E Mirror image status 7th axis
XA87 XA8F XA97 XA9F Mirror image status 8th axis
Device No.
$1 $2 $3 $4 Abbrev. Signal name
XAC0 XAC8 XAD0 XAD8 CRSWT1 Mixed control (cross axis control): Waiting for target axis travel completion (1st axis)
XAC1 XAC9 XAD1 XAD9 CRSWT2 Mixed control (cross axis control): Waiting for target axis travel completion (2nd axis)
XAC2 XACA XAD2 XADA CRSWT3 Mixed control (cross axis control): Waiting for target axis travel completion (3rd axis)
XAC3 XACB XAD3 XADB CRSWT4 Mixed control (cross axis control): Waiting for target axis travel completion (4th axis)
XAC4 XACC XAD4 XADC CRSWT5 Mixed control (cross axis control): Waiting for target axis travel completion (5th axis)
XAC5 XACD XAD5 XADD CRSWT6 Mixed control (cross axis control): Waiting for target axis travel completion (6th axis)
XAC6 XACE XAD6 XADE CRSWT7 Mixed control (cross axis control): Waiting for target axis travel completion (7th axis)
XAC7 XACF XAD7 XADF CRSWT8 Mixed control (cross axis control): Waiting for target axis travel completion (8th axis)
Device No.
$1 $2 $3 $4 Abbrev. Signal name
XAE0 XAE8 XAF0 XAF8 CRSAL1 Mixed control (cross axis control): Alarm complete (1st axis)
XAE1 XAE9 XAF1 XAF9 CRSAL2 Mixed control (cross axis control): Alarm complete (2nd axis)
XAE2 XAEA XAF2 XAFA CRSAL3 Mixed control (cross axis control): Alarm complete (3rd axis)
XAE3 XAEB XAF3 XAFB CRSAL4 Mixed control (cross axis control): Alarm complete (4th axis)
XAE4 XAEC XAF4 XAFC CRSAL5 Mixed control (cross axis control): Alarm complete (5th axis)
XAE5 XAED XAF5 XAFD CRSAL6 Mixed control (cross axis control): Alarm complete (6th axis)
XAE6 XAEE XAF6 XAFE CRSAL7 Mixed control (cross axis control): Alarm complete (7th axis)
XAE7 XAEF XAF7 XAFF CRSAL8 Mixed control (cross axis control): Alarm complete (8th axis)
Note

(1) The CNC control and CNC status signals are arbitrarily assigned to the device and axis numbers by the parameter

"#1603 PLCdev_no" for each axis.
For details of setting, refer to the "PLC I/F axis random device assignment" in the "PLC Programming Manual".
Device No.
$1 $2 $3 $4 Abbrev. Signal name
XB00 XB08 XB10 XB18 CLP1 Clamp command 1st axis
XB01 XB09 XB11 XB19 CLP2 Clamp command 2nd axis
XB02 XB0A XB12 XB1A CLP3 Clamp command 3rd axis
XB03 XB0B XB13 XB1B CLP4 Clamp command 4th axis
XB04 XB0C XB14 XB1C CLP5 Clamp command 5th axis
XB05 XB0D XB15 XB1D CLP6 Clamp command 6th axis
XB06 XB0E XB16 XB1E CLP7 Clamp command 7th axis
XB07 XB0F XB17 XB1F CLP8 Clamp command 8th axis
Device No.
$1 $2 $3 $4 Abbrev. Signal name
XB40 XB48 XB50 XB58 ROTSPM1 Spindle-mode rotary axis control mode 1st axis
XB41 XB49 XB51 XB59 ROTSPM2 Spindle-mode rotary axis control mode 2nd axis
XB42 XB4A XB52 XB5A ROTSPM3 Spindle-mode rotary axis control mode 3rd axis
XB43 XB4B XB53 XB5B ROTSPM4 Spindle-mode rotary axis control mode 4th axis
XB44 XB4C XB54 XB5C ROTSPM5 Spindle-mode rotary axis control mode 5th axis
XB45 XB4D XB55 XB5D ROTSPM6 Spindle-mode rotary axis control mode 6th axis
XB46 XB4E XB56 XB5E ROTSPM7 Spindle-mode rotary axis control mode 7th axis
XB47 XB4F XB57 XB5F ROTSPM8 Spindle-mode rotary axis control mode 8th axis
Device No.
$1 $2 $3 $4 Abbrev. Signal name
XB60 XB68 XB70 XB78 AXINP1 Each axis in-position 1st axis
XB61 XB69 XB71 XB79 AXINP2 Each axis in-position 2nd axis
XB62 XB6A XB72 XB7A AXINP3 Each axis in-position 3rd axis
XB63 XB6B XB73 XB7B AXINP4 Each axis in-position 4th axis
XB64 XB6C XB74 XB7C AXINP5 Each axis in-position 5th axis
XB65 XB6D XB75 XB7D AXINP6 Each axis in-position 6th axis
XB66 XB6E XB76 XB7E AXINP7 Each axis in-position 7th axis
XB67 XB6F XB77 XB7F AXINP8 Each axis in-position 8th axis
Note

(1) The CNC control and CNC status signals are arbitrarily assigned to the device and axis numbers by the parameter
"#1603 PLCdev_no" for each axis.
For details of setting, refer to the "PLC I/F axis random device assignment" in the "PLC Programming Manual".
Device No.
$1 $2 $3 $4 Abbrev. Signal name
XB80 XB88 XB90 XB98 VGHLD1 Real-time tuning 1: Speed control gain changeover hold-down ON 1st axis
XB81 XB89 XB91 XB99 VGHLD2 Real-time tuning 1: Speed control gain changeover hold-down ON 2nd axis
XB82 XB8A XB92 XB9A VGHLD3 Real-time tuning 1: Speed control gain changeover hold-down ON 3rd axis
XB83 XB8B XB93 XB9B VGHLD4 Real-time tuning 1: Speed control gain changeover hold-down ON 4th axis
XB84 XB8C XB94 XB9C VGHLD5 Real-time tuning 1: Speed control gain changeover hold-down ON 5th axis
XB85 XB8D XB95 XB9D VGHLD6 Real-time tuning 1: Speed control gain changeover hold-down ON 6th axis
XB86 XB8E XB96 XB9E VGHLD7 Real-time tuning 1: Speed control gain changeover hold-down ON 7th axis
XB87 XB8F XB97 XB9F VGHLD8 Real-time tuning 1: Speed control gain changeover hold-down ON 8th axis
Device No.
$1 $2 $3 $4 Abbrev. Signal name
XBA0 XBA8 XBB0 XBB8 NPCHGIS1 NC axis/PLC axis switchover invalid status 1st axis
XBA1 XBA9 XBB1 XBB9 NPCHGIS2 NC axis/PLC axis switchover invalid status 2nd axis
XBA2 XBAA XBB2 XBBA NPCHGIS3 NC axis/PLC axis switchover invalid status 3rd axis
XBA3 XBAB XBB3 XBBB NPCHGIS4 NC axis/PLC axis switchover invalid status 4th axis
XBA4 XBAC XBB4 XBBC NPCHGIS5 NC axis/PLC axis switchover invalid status 5th axis
XBA5 XBAD XBB5 XBBD NPCHGIS6 NC axis/PLC axis switchover invalid status 6th axis
XBA6 XBAE XBB6 XBBE NPCHGIS7 NC axis/PLC axis switchover invalid status 7th axis
XBA7 XBAF XBB7 XBBF NPCHGIS8 NC axis/PLC axis switchover invalid status 8th axis
Device No.
$1 $2 $3 $4 Abbrev. Signal name
XBC0 XBC8 XBD0 XBD8 NPCHGMOD1 NC axis/PLC axis switchover 1st axis in process
XBC1 XBC9 XBD1 XBD9 NPCHGMOD2 NC axis/PLC axis switchover 2nd axis in process
XBC2 XBCA XBD2 XBDA NPCHGMOD3 NC axis/PLC axis switchover 3rd axis in process
XBC3 XBCB XBD3 XBDB NPCHGMOD4 NC axis/PLC axis switchover 4th axis in process
XBC4 XBCC XBD4 XBDC NPCHGMOD5 NC axis/PLC axis switchover 5th axis in process
XBC5 XBCD XBD5 XBDD NPCHGMOD6 NC axis/PLC axis switchover 6th axis in process
XBC6 XBCE XBD6 XBDE NPCHGMOD7 NC axis/PLC axis switchover 7th axis in process
XBC7 XBCF XBD7 XBDF NPCHGMOD8 NC axis/PLC axis switchover 8th axis in process
Device No.
$1 $2 $3 $4 Abbrev. Signal name
XBE0 XBE8 XBF0 XBF8 GQEMGO1 Machine group-based alarm stop: Machine group-based PLC interlock ON
1st axis
XBE1 XBE9 XBF1 XBF9 GQEMGO2 Machine group-based alarm stop: Machine group-based PLC interlock ON
2nd axis
XBE2 XBEA XBF2 XBFA GQEMGO3 Machine group-based alarm stop: Machine group-based PLC interlock ON
3rd axis
XBE3 XBEB XBF3 XBFB GQEMGO4 Machine group-based alarm stop: Machine group-based PLC interlock ON
4th axis
XBE4 XBEC XBF4 XBFC GQEMGO5 Machine group-based alarm stop: Machine group-based PLC interlock ON
5th axis
XBE5 XBED XBF5 XBFD GQEMGO6 Machine group-based alarm stop: Machine group-based PLC interlock ON
6th axis
XBE6 XBEE XBF6 XBFE GQEMGO7 Machine group-based alarm stop: Machine group-based PLC interlock ON
7th axis
XBE7 XBEF XBF7 XBFF GQEMGO8 Machine group-based alarm stop: Machine group-based PLC interlock ON
8th axis

Note

Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
XC00 XD40 XE80 XFC0 X1100 X1240 X1380 X14C0 JO In jog mode
XC01 XD41 XE81 XFC1 X1101 X1241 X1381 X14C1 HO In handle mode
XC02 XD42 XE82 XFC2 X1102 X1242 X1382 X14C2 SO In incremental mode
XC03 XD43 XE83 XFC3 X1103 X1243 X1383 X14C3 PTPO In manual arbitrary feed mode
XC04 XD44 XE84 XFC4 X1104 X1244 X1384 X14C4 ZRNO In reference position return mode
XC05 XD45 XE85 XFC5 X1105 X1245 X1385 X14C5 ASTO In automatic initial set mode
XC06 XD46 XE86 XFC6 X1106 X1246 X1386 X14C6 In JOG-handle simultaneous mode
XC07 XD47 XE87 XFC7 X1107 X1247 X1387 X14C7
Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
XC08 XD48 XE88 XFC8 X1108 X1248 X1388 X14C8 MEMO In memory mode
XC09 XD49 XE89 XFC9 X1109 X1249 X1389 X14C9 TO In tape mode
XC0A XD4A XE8A XFCA X110A X124A X138A X14CA In online operation mode
XC0B XD4B XE8B XFCB X110B X124B X138B X14CB DO In MDI mode
XC0C XD4C XE8C XFCC X110C X124C X138C X14CC
XC0D XD4D XE8D XFCD X110D X124D X138D X14CD
XC0E XD4E XE8E XFCE X110E X124E X138E X14CE SBSMO Sub part system control: Sub part system control I mode
ON
XC0F XD4F XE8F XFCF X110F X124F X138F X14CF
Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
XC10 XD50 XE90 XFD0 X1110 X1250 X1390 X14D0 MA Controller ready completion
XC11 XD51 XE91 XFD1 X1111 X1251 X1391 X14D1 SA Servo ready completion
XC12 XD52 XE92 XFD2 X1112 X1252 X1392 X14D2 OP In automatic operation "run"
XC13 XD53 XE93 XFD3 X1113 X1253 X1393 X14D3 STL In automatic operation "start"
XC14 XD54 XE94 XFD4 X1114 X1254 X1394 X14D4 SPL In automatic operation "pause"
XC15 XD55 XE95 XFD5 X1115 X1255 X1395 X14D5 RST In "reset"
XC16 XD56 XE96 XFD6 X1116 X1256 X1396 X14D6 CXN In manual arbitrary feed
XC17 XD57 XE97 XFD7 X1117 X1257 X1397 X14D7 RWD In rewind
Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
XC18 XD58 XE98 XFD8 X1118 X1258 X1398 X14D8 DEN Motion command completion
XC19 XD59 XE99 XFD9 X1119 X1259 X1399 X14D9 TIMP All axes in-position
XC1A XD5A XE9A XFDA X111A X125A X139A X14DA TSMZ All axes smoothing zero
XC1B XD5B XE9B XFDB X111B X125B X139B X14DB
XC1C XD5C XE9C XFDC X111C X125C X139C X14DC CXFIN Manual arbitrary feed completion
XC1D XD5D XE9D XFDD X111D X125D X139D X14DD External search finished
XC1E XD5E XE9E XFDE X111E X125E X139E X14DE
XC1F XD5F XE9F XFDF X111F X125F X139F X14DF In high-speed machining mode (G05)

Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
XC20 XD60 XEA0 XFE0 X1120 X1260 X13A0 X14E0 RPN In rapid traverse
XC21 XD61 XEA1 XFE1 X1121 X1261 X13A1 X14E1 CUT In cutting feed
XC22 XD62 XEA2 XFE2 X1122 X1262 X13A2 X14E2 TAP In tapping
XC23 XD63 XEA3 XFE3 X1123 X1263 X13A3 X14E3 THRD In thread cutting
XC24 XD64 XEA4 XFE4 X1124 X1264 X13A4 X14E4 SYN In synchronous feed
XC25 XD65 XEA5 XFE5 X1125 X1265 X13A5 X14E5 CSS In constant surface speed
XC26 XD66 XEA6 XFE6 X1126 X1266 X13A6 X14E6 SKIP In skip
XC27 XD67 XEA7 XFE7 X1127 X1267 X13A7 X14E7 ZRNN In reference position return
Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
XC28 XD68 XEA8 XFE8 X1128 X1268 X13A8 X14E8 INCH In inch unit selection
XC29 XD69 XEA9 XFE9 X1129 X1269 X13A9 X14E9 DLKN In display lock
XC2A XD6A XEAA XFEA X112A X126A X13AA X14EA F1DN F 1-digit commanded
XC2B XD6B XEAB XFEB X112B X126B X13AB X14EB TLFO In tool life management
XC2C XD6C XEAC XFEC X112C X126C X13AC X14EC Tool life management: Temporary cancel of tool life
expiration ON
XC2D XD6D XEAD XFED X112D X126D X13AD X14ED Tool life management: Temporary cancel of tool
group life expiration ON
XC2E XD6E XEAE XFEE X112E X126E X13AE X14EE TLOV Tool life over
XC2F XD6F XEAF XFEF X112F X126F X13AF X14EF Tool group life over
Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
XC30 XD70 XEB0 XFF0 X1130 X1270 X13B0 X14F0 F11 F1-digit No. code 1
XC31 XD71 XEB1 XFF1 X1131 X1271 X13B1 X14F1 F12 F1-digit No. code 2
XC32 XD72 XEB2 XFF2 X1132 X1272 X13B2 X14F2 F14 F1-digit No. code 4
XC33 XD73 XEB3 XFF3 X1133 X1273 X13B3 X14F3 F18 F1-digit No. code 8
XC34 XD74 XEB4 XFF4 X1134 X1274 X13B4 X14F4 Timing synchronization between part systems
XC35 XD75 XEB5 XFF5 X1135 X1275 X13B5 X14F5 PCINO In PLC interrupt
XC36 XD76 XEB6 XFF6 X1136 X1276 X13B6 X14F6
XC37 XD77 XEB7 XFF7 X1137 X1277 X13B7 X14F7 ASLE Illegal axis selected
Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
XC38 XD78 XEB8 XFF8 X1138 X1278 X13B8 X14F8
XC39 XD79 XEB9 XFF9 X1139 X1279 X13B9 X14F9
XC3A XD7A XEBA XFFA X113A X127A X13BA X14FA
XC3B XD7B XEBB XFFB X113B X127B X13BB X14FB

XC3C XD7C XEBC XFFC X113C X127C X13BC X14FC
XC3D XD7D XEBD XFFD X113D X127D X13BD X14FD
XC3E XD7E XEBE XFFE X113E X127E X13BE X14FE
XC3F XD7F XEBF XFFF X113F X127F X13BF X14FF

Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
XC40 XD80 XEC0 X1000 X1140 X1280 X13C0 X1500 DM00 M code independent output M00
XC41 XD81 XEC1 X1001 X1141 X1281 X13C1 X1501 DM01 M code independent output M01
XC42 XD82 XEC2 X1002 X1142 X1282 X13C2 X1502 DM02 M code independent output M02
XC43 XD83 XEC3 X1003 X1143 X1283 X13C3 X1503 DM30 M code independent output M30
XC44 XD84 XEC4 X1004 X1144 X1284 X13C4 X1504
XC45 XD85 XEC5 X1005 X1145 X1285 X13C5 X1505
XC46 XD86 XEC6 X1006 X1146 X1286 X13C6 X1506
XC47 XD87 XEC7 X1007 X1147 X1287 X13C7 X1507
Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
XC48 XD88 XEC8 X1008 X1148 X1288 X13C8 X1508 In manual speed command valid
XC49 XD89 XEC9 X1009 X1149 X1289 X13C9 X1509 MMS Manual numerical command
XC4A XD8A XECA X100A X114A X128A X13CA X150A In tool escape and return mode
XC4B XD8B XECB X100B X114B X128B X13CB X150B
XC4C XD8C XECC X100C X114C X128C X13CC X150C
XC4D XD8D XECD X100D X114D X128D X13CD X150D
XC4E XD8E XECE X100E X114E X128E X13CE X150E SBS Sub part system control: Sub part system processing
XC4F XD8F XECF X100F X114F X128F X13CF X150F In circular feed in manual mode
Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
XC50 XD90 XED0 X1010 X1150 X1290 X13D0 X1510
XC51 XD91 XED1 X1011 X1151 X1291 X13D1 X1511
XC52 XD92 XED2 X1012 X1152 X1292 X13D2 X1512
XC53 XD93 XED3 X1013 X1153 X1293 X13D3 X1513 TRTN2 In tool retract and return 2 mode
XC54 XD94 XED4 X1014 X1154 X1294 X13D4 X1514
XC55 XD95 XED5 X1015 X1155 X1295 X13D5 X1515
XC56 XD96 XED6 X1016 X1156 X1296 X13D6 X1516
XC57 XD97 XED7 X1017 X1157 X1297 X13D7 X1517
Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
XC58 XD98 XED8 X1018 X1158 X1298 X13D8 X1518
XC59 XD99 XED9 X1019 X1159 X1299 X13D9 X1519
XC5A XD9A XEDA X101A X115A X129A X13DA X151A
XC5B XD9B XEDB X101B X115B X129B X13DB X151B
XC5C XD9C XEDC X101C X115C X129C X13DC X151C
XC5D XD9D XEDD X101D X115D X129D X13DD X151D
XC5E XD9E XEDE X101E X115E X129E X13DE X151E
XC5F XD9F XEDF X101F X115F X129F X13DF X151F Coordinate rotation by parameter: Manual feed coordi nate system

Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
XC60 XDA0 XEE0 X1020 X1160 X12A0 X13E0 X1520 MF1 M function strobe 1
XC61 XDA1 XEE1 X1021 X1161 X12A1 X13E1 X1521 MF2 M function strobe 2
XC62 XDA2 XEE2 X1022 X1162 X12A2 X13E2 X1522 MF3 M function strobe 3
XC63 XDA3 XEE3 X1023 X1163 X12A3 X13E3 X1523 MF4 M function strobe 4
XC64 XDA4 XEE4 X1024 X1164 X12A4 X13E4 X1524 SF1 S function strobe 1
XC65 XDA5 XEE5 X1025 X1165 X12A5 X13E5 X1525 SF2 S function strobe 2
XC66 XDA6 XEE6 X1026 X1166 X12A6 X13E6 X1526 SF3 S function strobe 3
XC67 XDA7 XEE7 X1027 X1167 X12A7 X13E7 X1527 SF4 S function strobe 4
Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
XC68 XDA8 XEE8 X1028 X1168 X12A8 X13E8 X1528 TF1 T function strobe 1
XC69 XDA9 XEE9 X1029 X1169 X12A9 X13E9 X1529 TF2 T function strobe 2
XC6A XDAA XEEA X102A X116A X12AA X13EA X152A TF3 T function strobe 3
XC6B XDAB XEEB X102B X116B X12AB X13EB X152B TF4 T function strobe 4
XC6C XDAC XEEC X102C X116C X12AC X13EC X152C BF1 2nd M function strobe 1
XC6D XDAD XEED X102D X116D X12AD X13ED X152D BF2 2nd M function strobe 2
XC6E XDAE XEEE X102E X116E X12AE X13EE X152E BF3 2nd M function strobe 3
XC6F XDAF XEEF X102F X116F X12AF X13EF X152F BF4 2nd M function strobe 4
Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
XC70 XDB0 XEF0 X1030 X1170 X12B0 X13F0 X1530 SF5 S function strobe 5
XC71 XDB1 XEF1 X1031 X1171 X12B1 X13F1 X1531 SF6 S function strobe 6
XC72 XDB2 XEF2 X1032 X1172 X12B2 X13F2 X1532 SF7 S function strobe 7
XC73 XDB3 XEF3 X1033 X1173 X12B3 X13F3 X1533 SF8 S function strobe 8
XC74 XDB4 XEF4 X1034 X1174 X12B4 X13F4 X1534
XC75 XDB5 XEF5 X1035 X1175 X12B5 X13F5 X1535
XC76 XDB6 XEF6 X1036 X1176 X12B6 X13F6 X1536
XC77 XDB7 XEF7 X1037 X1177 X12B7 X13F7 X1537
Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
XC78 XDB8 XEF8 X1038 X1178 X12B8 X13F8 X1538
XC79 XDB9 XEF9 X1039 X1179 X12B9 X13F9 X1539
XC7A XDBA XEFA X103A X117A X12BA X13FA X153A
XC7B XDBB XEFB X103B X117B X12BB X13FB X153B

XC7C XDBC XEFC X103C X117C X12BC X13FC X153C
XC7D XDBD XEFD X103D X117D X12BD X13FD X153D
XC7E XDBE XEFE X103E X117E X12BE X13FE X153E
XC7F XDBF XEFF X103F X117F X12BF X13FF X153F CHPRCC Chopping compensation update prevented

Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
XC80 XDC0 XF00 X1040 X1180 X12C0 X1400 X1540 CHOP In chopping start
XC81 XDC1 XF01 X1041 X1181 X12C1 X1401 X1541 CHP1 Basic position -> upper dead point path flag
XC82 XDC2 XF02 X1042 X1182 X12C2 X1402 X1542 CHP2 Upper dead point -> bottom dead point path flag
XC83 XDC3 XF03 X1043 X1183 X12C3 X1403 X1543 CHP3 Bottom dead point -> upper dead point path flag
XC84 XDC4 XF04 X1044 X1184 X12C4 X1404 X1544 CHP4 Upper dead point -> basic position path flag
XC85 XDC5 XF05 X1045 X1185 X12C5 X1405 X1545 CHPMD In chopping mode
XC86 XDC6 XF06 X1046 X1186 X12C6 X1406 X1546 Stroke compensation completion
XC87 XDC7 XF07 X1047 X1187 X12C7 X1407 X1547 Tool escape and return transit point recognition completed
Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
XC88 XDC8 XF08 X1048 X1188 X12C8 X1408 X1548
XC89 XDC9 XF09 X1049 X1189 X12C9 X1409 X1549
XC8A XDCA XF0A X104A X118A X12CA X140A X154A SSE Search & start Error
XC8B XDCB XF0B X104B X118B X12CB X140B X154B SSG Search & start Search
XC8C XDCC XF0C X104C X118C X12CC X140C X154C
XC8D XDCD XF0D X104D X118D X12CD X140D X154D
XC8E XDCE XF0E X104E X118E X12CE X140E X154E PTAPn Punchtap cycle in progress
XC8F XDCF XF0F X104F X118F X12CF X140F X154F
Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
XC90 XDD0 XF10 X1050 X1190 X12D0 X1410 X1550
XC91 XDD1 XF11 X1051 X1191 X12D1 X1411 X1551
XC92 XDD2 XF12 X1052 X1192 X12D2 X1412 X1552
XC93 XDD3 XF13 X1053 X1193 X12D3 X1413 X1553 TCP Tool change position return completion
XC94 XDD4 XF14 X1054 X1194 X12D4 X1414 X1554 TCRQ New tool change
XC95 XDD5 XF15 X1055 X1195 X12D5 X1415 X1555 All spindles simultaneous control (G47.1)
XC96 XDD6 XF16 X1056 X1196 X12D6 X1416 X1556 Tool life prediction
XC97 XDD7 XF17 X1057 X1197 X12D7 X1417 X1557
Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
XC98 XDD8 XF18 X1058 X1198 X12D8 X1418 X1558 AL1 NC alarm 1
XC99 XDD9 XF19 X1059 X1199 X12D9 X1419 X1559 AL2 NC alarm 2 (Servo alarm)
XC9A XDDA XF1A X105A X119A X12DA X141A X155A AL3 NC alarm 3 (Program error)
XC9B XDDB XF1B X105B X119B X12DB X141B X155B AL4 NC alarm 4 (Operation error)
XC9C XDDC XF1C X105C X119C X12DC X141C X155C WR1 NC warning (Servo warning)
XC9D XDDD XF1D X105D X119D X12DD X141D X155D
XC9E XDDE XF1E X105E X119E X12DE X141E X155E
XC9F XDDF XF1F X105F X119F X12DF X141F X155F

Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
XCA0 XDE0 XF20 X1060 X11A0 X12E0 X1420 X1560 Load monitor I: Teaching/Monitor mode in execu tion
XCA1 XDE1 XF21 X1061 X11A1 X12E1 X1421 X1561 Load monitor I: Teaching mode valid
XCA2 XDE2 XF22 X1062 X11A2 X12E2 X1422 X1562 Load monitor I: Monitor mode valid
XCA3 XDE3 XF23 X1063 X11A3 X12E3 X1423 X1563 Load monitor I: Adaptive control in execution
XCA4 XDE4 XF24 X1064 X11A4 X12E4 X1424 X1564 FFCO Thread cutting: Feed-forward control ON
XCA5 XDE5 XF25 X1065 X11A5 X12E5 X1425 X1565 TRVE Tap retract possible
XCA6 XDE6 XF26 X1066 X11A6 X12E6 X1426 X1566 PCNT No. of work machining over
XCA7 XDE7 XF27 X1067 X11A7 X12E7 X1427 X1567 ABSW Absolute position warning
Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
XCA8 XDE8 XF28 X1068 X11A8 X12E8 X1428 X1568
XCA9 XDE9 XF29 X1069 X11A9 X12E9 X1429 X1569 In axis name switch
XCAA XDEA XF2A X106A X11AA X12EA X142A X156A ESTSVF Optimum acceleration/deceleration parameter switch completion [axis]
XCAB XDEB XF2B X106B X11AB X12EB X142B X156B ESTSVIN Optimum acceleration/deceleration selection: NC axis inertia estimation in progress
XCAC XDEC XF2C X106C X11AC X12EC X142C X156C GETAFLT
Optimum acceleration/deceleration selection: Esti mated resonance frequency acquisition in prog ress

XCAD XDED XF2D X106D X11AD X12ED X142D X156D VFTCIS Variable feed thread cutting invalid state
XCAE XDEE XF2E X106E X11AE X12EE X142E X156E HOBRTM Hob machining: Retracting
XCAF XDEF XF2F X106F X11AF X12EF X142F X156F HOBRTF Hob machining: Retract complete
Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
XCB0 XDF0 XF30 X1070 X11B0 X12F0 X1430 X1570 In spindle-NC axis polygon mode
XCB1 XDF1 XF31 X1071 X11B1 X12F1 X1431 X1571 AL5 NC alarm 5
XCB2 XDF2 XF32 X1072 X11B2 X12F2 X1432 X1572 In spindle-spindle polygon mode
XCB3 XDF3 XF33 X1073 X11B3 X12F3 X1433 X1573 Spindle-spindle polygon synchronization completion
XCB4 XDF4 XF34 X1074 X11B4 X12F4 X1434 X1574
XCB5 XDF5 XF35 X1075 X11B5 X12F5 X1435 X1575 PSNCP Phase alignment incomplete (polygon)
XCB6 XDF6 XF36 X1076 X11B6 X12F6 X1436 X1576 TFF Thread cutting: Feed-forwarding
XCB7 XDF7 XF37 X1077 X11B7 X12F7 X1437 X1577
Device No.

$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
XCB8 XDF8 XF38 X1078 X11B8 X12F8 X1438 X1578
XCB9 XDF9 XF39 X1079 X11B9 X12F9 X1439 X1579 In 3-dimensional coordinate conversion
XCBA XDFA XF3A X107A X11BA X12FA X143A X157A
XCBB XDFB XF3B X107B X11BB X12FB X143B X157B
XCBC XDFC XF3C X107C X11BC X12FC X143C X157C
XCBD XDFD XF3D X107D X11BD X12FD X143D X157D MCSLF Machining condition selection I: Machining condition pa rameter group switch completed
XCBE XDFE XF3E X107E X11BE X12FE X143E X157E MCSLCF Machining condition selection I: Machining condition pa rameter group switch cancel completed
XCBF XDFF XF3F X107F X11BF X12FF X143F X157F

Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
XCC0 XE00 XF40 X1080 X11C0 X1300 X1440 X1580 RTAP In synchronized tapping selection (M command)
XCC1 XE01 XF41 X1081 X11C1 X1301 X1441 X1581 In small diameter deep hole cycle
XCC2 XE02 XF42 X1082 X11C2 X1302 X1442 X1582 High-speed retract function valid state
XCC3 XE03 XF43 X1083 X11C3 X1303 X1443 X1583 In high-speed retract function operation
XCC4 XE04 XF44 X1084 X11C4 X1304 X1444 X1584
XCC5 XE05 XF45 X1085 X11C5 X1305 X1445 X1585
XCC6 XE06 XF46 X1086 X11C6 X1306 X1446 X1586
XCC7 XE07 XF47 X1087 X11C7 X1307 X1447 X1587
Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
XCC8 XE08 XF48 X1088 X11C8 X1308 X1448 X1588 In barrier valid (left)
XCC9 XE09 XF49 X1089 X11C9 X1309 X1449 X1589 In barrier valid (right)
XCCA XE0A XF4A X108A X11CA X130A X144A X158A TLMSFIN Tool length measurement completion
XCCB XE0B XF4B X108B X11CB X130B X144B X158B TLMSERR Tool length measurement error
XCCC XE0C XF4C X108C X11CC X130C X144C X158C
XCCD XE0D XF4D X108D X11CD X130D X144D X158D
XCCE XE0E XF4E X108E X11CE X130E X144E X158E TLMSSE LO Tool length measurement sub-side selected
XCCF XE0F XF4F X108F X11CF X130F X144F X158F Tool retract position reached
Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
XCD0 XE10 XF50 X1090 X11D0 X1310 X1450 X1590 TRME With tool retract amount command
XCD1 XE11 XF51 X1091 X11D1 X1311 X1451 X1591 TRRP In tool repositioning
XCD2 XE12 XF52 X1092 X11D2 X1312 X1452 X1592
XCD3 XE13 XF53 X1093 X11D3 X1313 X1453 X1593
XCD4 XE14 XF54 X1094 X11D4 X1314 X1454 X1594
XCD5 XE15 XF55 X1095 X11D5 X1315 X1455 X1595
XCD6 XE16 XF56 X1096 X11D6 X1316 X1456 X1596
XCD7 XE17 XF57 X1097 X11D7 X1317 X1457 X1597
Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
XCD8 XE18 XF58 X1098 X11D8 X1318 X1458 X1598 Door open enable
XCD9 XE19 XF59 X1099 X11D9 X1319 X1459 X1599
XCDA XE1A XF5A X109A X11DA X131A X145A X159A
XCDB XE1B XF5B X109B X11DB X131B X145B X159B
XCDC XE1C XF5C X109C X11DC X131C X145C X159C
XCDD XE1D XF5D X109D X11DD X131D X145D X159D
XCDE XE1E XF5E X109E X11DE X131E X145E X159E
XCDF XE1F XF5F X109F X11DF X131F X145F X159F

Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
XCE0 XE20 XF60 X10A0 X11E0 X1320 X1460 X15A0
XCE1 XE21 XF61 X10A1 X11E1 X1321 X1461 X15A1
XCE2 XE22 XF62 X10A2 X11E2 X1322 X1462 X15A2
XCE3 XE23 XF63 X10A3 X11E3 X1323 X1463 X15A3
XCE4 XE24 XF64 X10A4 X11E4 X1324 X1464 X15A4
XCE5 XE25 XF65 X10A5 X11E5 X1325 X1465 X15A5
XCE6 XE26 XF66 X10A6 X11E6 X1326 X1466 X15A6
XCE7 XE27 XF67 X10A7 X11E7 X1327 X1467 X15A7
Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
XCE8 XE28 XF68 X10A8 X11E8 X1328 X1468 X15A8 Door open enable (2 channels per 1 part system)
XCE9 XE29 XF69 X10A9 X11E9 X1329 X1469 X15A9
XCEA XE2A XF6A X10AA X11EA X132A X146A X15AA External search: Program return completed
XCEB XE2B XF6B X10AB X11EB X132B X146B X15AB
XCEC XE2C XF6C X10AC X11EC X132C X146C X15AC
XCED XE2D XF6D X10AD X11ED X132D X146D X15AD Optimum machining diagnosis in progress
XCEE XE2E XF6E X10AE X11EE X132E X146E X15AE Load monitor I: Cutting torque estimation in prog ress
XCEF XE2F XF6F X10AF X11EF X132F X146F X15AF Load monitor I: Cutting torque estimation complet ed
Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
XCF0 XE30 XF70 X10B0 X11F0 X1330 X1470 X15B0 PFCHS Program format switch in progress
XCF1 XE31 XF71 X10B1 X11F1 X1331 X1471 X15B1
XCF2 XE32 XF72 X10B2 X11F2 X1332 X1472 X15B2
XCF3 XE33 XF73 X10B3 X11F3 X1333 X1473 X15B3
XCF4 XE34 XF74 X10B4 X11F4 X1334 X1474 X15B4
XCF5 XE35 XF75 X10B5 X11F5 X1335 X1475 X15B5
XCF6 XE36 XF76 X10B6 X11F6 X1336 X1476 X15B6
XCF7 XE37 XF77 X10B7 X11F7 X1337 X1477 X15B7
Device No.

$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
XCF8 XE38 XF78 X10B8 X11F8 X1338 X1478 X15B8
XCF9 XE39 XF79 X10B9 X11F9 X1339 X1479 X15B9 GLMT Torque limitation skip: G160 torque limit ON
XCFA XE3A XF7A X10BA X11FA X133A X147A X15BA
XCFB XE3B XF7B X10BB X11FB X133B X147B X15BB
XCFC XE3C XF7C X10BC X11FC X133C X147C X15BC
XCFD XE3D XF7D X10BD X11FD X133D X147D X15BD
XCFE XE3E XF7E X10BE X11FE X133E X147E X15BE
XCFF XE3F XF7F X10BF X11FF X133F X147F X15BF

Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
XD00 XE40 XF80 X10C0 X1200 X1340 X1480 X15C0
XD01 XE41 XF81 X10C1 X1201 X1341 X1481 X15C1
XD02 XE42 XF82 X10C2 X1202 X1342 X1482 X15C2
XD03 XE43 XF83 X10C3 X1203 X1343 X1483 X15C3
XD04 XE44 XF84 X10C4 X1204 X1344 X1484 X15C4
XD05 XE45 XF85 X10C5 X1205 X1345 X1485 X15C5
XD06 XE46 XF86 X10C6 X1206 X1346 X1486 X15C6
XD07 XE47 XF87 X10C7 X1207 X1347 X1487 X15C7
Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
XD08 XE48 XF88 X10C8 X1208 X1348 X1488 X15C8
XD09 XE49 XF89 X10C9 X1209 X1349 X1489 X15C9
XD0A XE4A XF8A X10CA X120A X134A X148A X15CA
XD0B XE4B XF8B X10CB X120B X134B X148B X15CB G0AC Rapid traverse time constant: In switchover
XD0C XE4C XF8C X10CC X120C X134C X148C X15CC RT2CHG Real-time tuning 2: Acceleration/deceleration time con stant in switchover
XD0D XE4D XF8D X10CD X120D X134D X148D X15CD
XD0E XE4E XF8E X10CE X120E X134E X148E X15CE TWNIN Reserved tool wear compensation not reflected
XD0F XE4F XF8F X10CF X120F X134F X148F X15CF TWOUT Reflection of reserved tool wear compensation is com plete
Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
XD10 XE50 XF90 X10D0 X1210 X1350 X1490 X15D0
XD11 XE51 XF91 X10D1 X1211 X1351 X1491 X15D1
XD12 XE52 XF92 X10D2 X1212 X1352 X1492 X15D2
XD13 XE53 XF93 X10D3 X1213 X1353 X1493 X15D3
XD14 XE54 XF94 X10D4 X1214 X1354 X1494 X15D4 3D coordinate conversion: Manual feed valid
XD15 XE55 XF95 X10D5 X1215 X1355 X1495 X15D5 RCEI Rotation center error compensation in progress
XD16 XE56 XF96 X10D6 X1216 X1356 X1496 X15D6 SECA Spatial error compensation invalid
XD17 XE57 XF97 X10D7 X1217 X1357 X1497 X15D7 SECI Spatial error compensation in progress
Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
XD18 XE58 XF98 X10D8 X1218 X1358 X1498 X15D8 MJST 3D manual feed (JOG, INC): Tool axis coordinate system selected
XD19 XE59 XF99 X10D9 X1219 X1359 X1499 X15D9 MJSB 3D manual feed (JOG, INC): Table coordinate system se lected
XD1A XE5A XF9A X10DA X121A X135A X149A X15DA MJSF 3D manual feed (JOG, INC): Feature coordinate system selected
XD1B XE5B XF9B X10DB X121B X135B X149B X15DB MH1ST 3D manual feed (1st handle): Tool axis coordinate system selected
XD1C XE5C XF9C X10DC X121C X135C X149C X15DC MH1SB 3D manual feed (1st handle): Table coordinate system selected
XD1D XE5D XF9D X10DD X121D X135D X149D X15DD MH1SF 3D manual feed (1st handle): Feature coordinate system selected
XD1E XE5E XF9E X10DE X121E X135E X149E X15DE MH2ST 3D manual feed (2nd handle): Tool axis coordinate sys tem selected
XD1F XE5F XF9F X10DF X121F X135F X149F X15DF MH2SB 3D manual feed (2nd handle): Table coordinate system selected

Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
XD20 XE60 XFA0 X10E0 X1220 X1360 X14A0 X15E0 MH2SF 3D manual feed (2nd handle): Feature coordinate sys tem selected
XD21 XE61 XFA1 X10E1 X1221 X1361 X14A1 X15E1 MH3ST 3D manual feed (3rd handle): Tool axis coordinate sys tem selected
XD22 XE62 XFA2 X10E2 X1222 X1362 X14A2 X15E2 MH3SB 3D manual feed (3rd handle): Table coordinate system selected
XD23 XE63 XFA3 X10E3 X1223 X1363 X14A3 X15E3 MH3SF 3D manual feed (3rd handle): Feature coordinate system selected
XD24 XE64 XFA4 X10E4 X1224 X1364 X14A4 X15E4
XD25 XE65 XFA5 X10E5 X1225 X1365 X14A5 X15E5
XD26 XE66 XFA6 X10E6 X1226 X1366 X14A6 X15E6
XD27 XE67 XFA7 X10E7 X1227 X1367 X14A7 X15E7 TCPRS In tool center point rotation
Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
XD28 XE68 XFA8 X10E8 X1228 X1368 X14A8 X15E8 RSSCT R-Navi: Machining surface being selected
XD29 XE69 XFA9 X10E9 X1229 X1369 X14A9 X15E9 RSIND R-Navi: Machining surface being indexed
XD2A XE6A XFAA X10EA X122A X136A X14AA X15EA RSIDF R-Navi: Machine surface index complete
XD2B XE6B XFAB X10EB X122B X136B X14AB X15EB
XD2C XE6C XFAC X10EC X122C X136C X14AC X15EC
XD2D XE6D XFAD X10ED X122D X136D X14AD X15ED
XD2E XE6E XFAE X10EE X122E X136E X14AE X15EE
XD2F XE6F XFAF X10EF X122F X136F X14AF X15EF SLOP Simple inclined surface machining/Inclined surface con trol command ON
Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
XD30 XE70 XFB0 X10F0 X1230 X1370 X14B0 X15F0 MES interface library: Sending user arbitrary information

XD31 XE71 XFB1 X10F1 X1231 X1371 X14B1 X15F1 Manual arbitrary reverse run: Reverse run invalid status
XD32 XE72 XFB2 X10F2 X1232 X1372 X14B2 X15F2
XD33 XE73 XFB3 X10F3 X1233 X1373 X14B3 X15F3
XD34 XE74 XFB4 X10F4 X1234 X1374 X14B4 X15F4
XD35 XE75 XFB5 X10F5 X1235 X1375 X14B5 X15F5
XD36 XE76 XFB6 X10F6 X1236 X1376 X14B6 X15F6
XD37 XE77 XFB7 X10F7 X1237 X1377 X14B7 X15F7
Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
X1810 X1811 X1812 X1813 X1814 X1815 X1816 X1817 VCC VCC: Mode in execution
Common ($) Abbrev. Signal name Common ($) Abbrev. Signal name
X1870 X1878 Edit/search window displayed
X1871 X1879
X1872 X187A
X1873 X187B
X1874 X187C
X1875 X187D
X1876 X187E
X1877 X187F
M800V/M80V Series PLC Interface Manual
2 Input/Output Signals with Controller
2.1 PLC Input Signals (Bit Type: X***)
31 IB-1501616-F
Device No.
1stSP 2ndSP 3rdSP 4thSP 5thSP 6thSP 7thSP 8thSP Abbrev. Signal name
X1880 X18E0 X1940 X19A0 X1A00 X1A60 X1AC0 X1B20
X1881 X18E1 X1941 X19A1 X1A01 X1A61 X1AC1 X1B21
X1882 X18E2 X1942 X19A2 X1A02 X1A62 X1AC2 X1B22 SIGE S command gear No. illegal
X1883 X18E3 X1943 X19A3 X1A03 X1A63 X1AC3 X1B23 SOVE S command max./min. command value over
X1884 X18E4 X1944 X19A4 X1A04 X1A64 X1AC4 X1B24 SNGE S command no gear selected
X1885 X18E5 X1945 X19A5 X1A05 X1A65 X1AC5 X1B25 GR1 Spindle gear shift command 1
X1886 X18E6 X1946 X19A6 X1A06 X1A66 X1AC6 X1B26 GR2 Spindle gear shift command 2
X1887 X18E7 X1947 X19A7 X1A07 X1A67 X1AC7 X1B27 - (Always "0")
Device No.
1stSP 2ndSP 3rdSP 4thSP 5thSP 6thSP 7thSP 8thSP Abbrev. Signal name
X1888 X18E8 X1948 X19A8 X1A08 X1A68 X1AC8 X1B28 ORAO2 Spindle 2nd in-position
X1889 X18E9 X1949 X19A9 X1A09 X1A69 X1AC9 X1B29 CDO Current detection
X188A X18EA X194A X19AA X1A0A X1A6A X1ACA X1B2A VRO Speed detection
X188B X18EB X194B X19AB X1A0B X1A6B X1ACB X1B2B FLO In spindle alarm
X188C X18EC X194C X19AC X1A0C X1A6C X1ACC X1B2C ZSO Zero speed
X188D X18ED X194D X19AD X1A0D X1A6D X1ACD X1B2D USO Spindle up-to-speed
X188E X18EE X194E X19AE X1A0E X1A6E X1ACE X1B2E ORAO Spindle in-position
X188F X18EF X194F X19AF X1A0F X1A6F X1ACF X1B2F LCSA In L coil selection
Device No.
1stSP 2ndSP 3rdSP 4thSP 5thSP 6thSP 7thSP 8thSP Abbrev. Signal name
X1890 X18F0 X1950 X19B0 X1A10 X1A70 X1AD0 X1B30 SMA Spindle ready-ON
X1891 X18F1 X1951 X19B1 X1A11 X1A71 X1AD1 X1B31 SSA Spindle servo-ON
X1892 X18F2 X1952 X19B2 X1A12 X1A72 X1AD2 X1B32 SEMG In spindle emergency stop
X1893 X18F3 X1953 X19B3 X1A13 X1A73 X1AD3 X1B33 SSRN In spindle forward run
X1894 X18F4 X1954 X19B4 X1A14 X1A74 X1AD4 X1B34 SSRI In spindle reverse run
X1895 X18F5 X1955 X19B5 X1A15 X1A75 X1AD5 X1B35 Z phase passed
X1896 X18F6 X1956 X19B6 X1A16 X1A76 X1AD6 X1B36 SIMP Position loop in-position
X1897 X18F7 X1957 X19B7 X1A17 X1A77 X1AD7 X1B37 STLQ In spindle torque limit
Device No.
1stSP 2ndSP 3rdSP 4thSP 5thSP 6thSP 7thSP 8thSP Abbrev. Signal name
X1898 X18F8 X1958 X19B8 X1A18 X1A78 X1AD8 X1B38
X1899 X18F9 X1959 X19B9 X1A19 X1A79 X1AD9 X1B39
X189A X18FA X195A X19BA X1A1A X1A7A X1ADA X1B3A Spindle torque limit reached
X189B X18FB X195B X19BB X1A1B X1A7B X1ADB X1B3B
X189C X18FC X195C X19BC X1A1C X1A7C X1ADC X1B3C
X189D X18FD X195D X19BD X1A1D X1A7D X1ADD X1B3D SD2 Speed detection 2
X189E X18FE X195E X19BE X1A1E X1A7E X1ADE X1B3E MCSA In M coil selection
X189F X18FF X195F X19BF X1A1F X1A7F X1ADF X1B3F Index positioning completion
M800V/M80V Series PLC Interface Manual
2 Input/Output Signals with Controller
2.1 PLC Input Signals (Bit Type: X***)
IB-1501616-F 32
Device No.
1stSP 2ndSP 3rdSP 4thSP 5thSP 6thSP 7thSP 8thSP Abbrev. Signal name
X18A0 X1900 X1960 X19C0 X1A20 X1A80 X1AE0 X1B40 ENB Spindle enable
X18A1 X1901 X1961 X19C1 X1A21 X1A81 X1AE1 X1B41
X18A2 X1902 X1962 X19C2 X1A22 X1A82 X1AE2 X1B42
X18A3 X1903 X1963 X19C3 X1A23 X1A83 X1AE3 X1B43
X18A4 X1904 X1964 X19C4 X1A24 X1A84 X1AE4 X1B44
X18A5 X1905 X1965 X19C5 X1A25 X1A85 X1AE5 X1B45
X18A6 X1906 X1966 X19C6 X1A26 X1A86 X1AE6 X1B46 PSNCS Phase alignment incomplete (spindle syn chronization control II)
X18A7 X1907 X1967 X19C7 X1A27 X1A87 X1AE7 X1B47 Spindle synchronization speed detect
Device No.
1stSP 2ndSP 3rdSP 4thSP 5thSP 6thSP 7thSP 8thSP Abbrev. Signal name
X18A8 X1908 X1968 X19C8 X1A28 X1A88 X1AE8 X1B48 SPSYN
1 In spindle synchronization
X18A9 X1909 X1969 X19C9 X1A29 X1A89 X1AE9 X1B49 FSPRV Spindle rotation speed synchronization
completion
X18AA X190A X196A X19CA X1A2A X1A8A X1AEA X1B4A FSPPH Spindle phase synchronization comple tion
X18AB X190B X196B X19CB X1A2B X1A8B X1AEB X1B4B SPSYN
2 In spindle synchronization 2
X18AC X190C X196C X19CC X1A2C X1A8C X1AEC X1B4C SPCMP Chuck close confirmation
X18AD X190D X196D X19CD X1A2D X1A8D X1AED X1B4D TSS1 In tool spindle synchronization I (Polygon)

X18AE X190E X196E X19CE X1A2E X1A8E X1AEE X1B4E SPSYN
3 In tool spindle synchronization II
X18AF X190F X196F X19CF X1A2F X1A8F X1AEF X1B4F SPNCH Spindle superimposition control: Speed
change disabled
Device No.
1stSP 2ndSP 3rdSP 4thSP 5thSP 6thSP 7thSP 8thSP Abbrev. Signal name
X18B0 X1910 X1970 X19D0 X1A30 X1A90 X1AF0 X1B50 SP PHOV Spindle synchronization phase error over
X18B1 X1911 X1971 X19D1 X1A31 X1A91 X1AF1 X1B51 SPILE Spindle superimposition control ON
X18B2 X1912 X1972 X19D2 X1A32 X1A92 X1AF2 X1B52 SPLCR Spindle superimposition control: Spindle
superimposition clamped
X18B3 X1913 X1973 X19D3 X1A33 X1A93 X1AF3 X1B53 PHOVR Hob axis delay excess
X18B4 X1914 X1974 X19D4 X1A34 X1A94 X1AF4 X1B54
X18B5 X1915 X1975 X19D5 X1A35 X1A95 X1AF5 X1B55 EXOFN Holding power of spindle increased
X18B6 X1916 X1976 X19D6 X1A36 X1A96 X1AF6 X1B56 SPOF FA In spindle off
X18B7 X1917 X1977 X19D7 X1A37 X1A97 X1AF7 X1B57 SSRD Spindle speed fluctuation detection: Spin dle speed out of setting range
Device No.
1stSP 2ndSP 3rdSP 4thSP 5thSP 6thSP 7thSP 8thSP Abbrev. Signal name
X18B8 X1918 X1978 X19D8 X1A38 X1A98 X1AF8 X1B58
X18B9 X1919 X1979 X19D9 X1A39 X1A99 X1AF9 X1B59
X18BA X191A X197A X19DA X1A3A X1A9A X1AFA X1B5A
X18BB X191B X197B X19DB X1A3B X1A9B X1AFB X1B5B
X18BC X191C X197C X19DC X1A3C X1A9C X1AFC X1B5C
X18BD X191D X197D X19DD X1A3D X1A9D X1AFD X1B5D
X18BE X191E X197E X19DE X1A3E X1A9E X1AFE X1B5E
X18BF X191F X197F X19DF X1A3F X1A9F X1AFF X1B5F

Device No.
1stSP 2ndSP 3rdSP 4thSP 5thSP 6thSP 7thSP 8thSP Abbrev. Signal name
X18C0 X1920 X1980 X19E0 X1A40 X1AA0 X1B00 X1B60
X18C1 X1921 X1981 X19E1 X1A41 X1AA1 X1B01 X1B61 SVMD Spindle position control (Spindle/C axis
control): C axis mode ON
X18C2 X1922 X1982 X19E2 X1A42 X1AA2 X1B02 X1B62 GO1 Spindle gear selection output 1
X18C3 X1923 X1983 X19E3 X1A43 X1AA3 X1B03 X1B63 GO2 Spindle gear selection output 2
X18C4 X1924 X1984 X19E4 X1A44 X1AA4 X1B04 X1B64
X18C5 X1925 X1985 X19E5 X1A45 X1AA5 X1B05 X1B65
X18C6 X1926 X1986 X19E6 X1A46 X1AA6 X1B06 X1B66
X18C7 X1927 X1987 X19E7 X1A47 X1AA7 X1B07 X1B67
Device No.
1stSP 2ndSP 3rdSP 4thSP 5thSP 6thSP 7thSP 8thSP Abbrev. Signal name
X18C8 X1928 X1988 X19E8 X1A48 X1AA8 X1B08 X1B68 Spindle oscillation in progress
X18C9 X1929 X1989 X19E9 X1A49 X1AA9 X1B09 X1B69 SPRTC
T Spindle protection: Mode in progress
X18CA X192A X198A X19EA X1A4A X1AAA X1B0A X1B6A VGHLD Real-time tuning 1: Speed control gain
changeover hold-down ON
X18CB X192B X198B X19EB X1A4B X1AAB X1B0B X1B6B SP FLST SPFL: Control in execution
X18CC X192C X198C X19EC X1A4C X1AAC X1B0C X1B6C
X18CD X192D X198D X19ED X1A4D X1AAD X1B0D X1B6D
X18CE X192E X198E X19EE X1A4E X1AAE X1B0E X1B6E
X18CF X192F X198F X19EF X1A4F X1AAF X1B0F X1B6F
Common ($) Abbrev. Signal name Common ($) Abbrev. Signal name
X1CA0 Laser: Height control in progress X1CA8
X1CA1 Laser: Approach in height control completed X1CA9
X1CA2 Laser: Height being retained in height control X1CAA
X1CA3 Laser: Height control high-speed retraction in
progress
X1CAB
X1CA4 X1CAC
X1CA5 X1CAD
X1CA6 Laser: Laser condition change strobe X1CAE
X1CA7 Laser: Laser beam irradiating X1CAF

Common ($) Abbrev. Signal name Common ($) Abbrev. Signal name
X1CD0 Handy terminal key 1 X1CD8 Handy terminal key 9
X1CD1 Handy terminal key 2 X1CD9 Handy terminal key 10
X1CD2 Handy terminal key 3 X1CDA Handy terminal key 11
X1CD3 Handy terminal key 4 X1CDB Handy terminal key 12
X1CD4 Handy terminal key 5 X1CDC Handy terminal key 13
X1CD5 Handy terminal key 6 X1CDD Handy terminal key 14
X1CD6 Handy terminal key 7 X1CDE Handy terminal key 15
X1CD7 Handy terminal key 8 X1CDF Handy terminal key 16
Common ($) Abbrev. Signal name Common ($) Abbrev. Signal name
X1CE0 Handy terminal key 17 X1CE8 Handy terminal key 25
X1CE1 Handy terminal key 18 X1CE9 Handy terminal key 26
X1CE2 Handy terminal key 19 X1CEA Handy terminal key 27
X1CE3 Handy terminal key 20 X1CEB Handy terminal key 28
X1CE4 Handy terminal key 21 X1CEC Handy terminal key 29
X1CE5 Handy terminal key 22 X1CED Handy terminal key 30
X1CE6 Handy terminal key 23 X1CEE Handy terminal key 31
X1CE7 Handy terminal key 24 X1CEF Handy terminal key 32
Common ($) Abbrev. Signal name Common ($) Abbrev. Signal name
X1CF0 Handy terminal key 33 X1CF8 Handy terminal key 41
X1CF1 Handy terminal key 34 X1CF9 Handy terminal key 42

X1CF2 Handy terminal key 35 X1CFA Handy terminal key 43
X1CF3 Handy terminal key 36 X1CFB Handy terminal key 44
X1CF4 Handy terminal key 37 X1CFC Handy terminal key 45
X1CF5 Handy terminal key 38 X1CFD
X1CF6 Handy terminal key 39 X1CFE
X1CF7 Handy terminal key 40 X1CFF

Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
X1D00 X1D20 X1D40 X1D60 X1D80 X1DA0 X1DC0 X1DE0 PSW1 Position switch 1
X1D01 X1D21 X1D41 X1D61 X1D81 X1DA1 X1DC1 X1DE1 PSW2 Position switch 2
X1D02 X1D22 X1D42 X1D62 X1D82 X1DA2 X1DC2 X1DE2 PSW3 Position switch 3
X1D03 X1D23 X1D43 X1D63 X1D83 X1DA3 X1DC3 X1DE3 PSW4 Position switch 4
X1D04 X1D24 X1D44 X1D64 X1D84 X1DA4 X1DC4 X1DE4 PSW5 Position switch 5
X1D05 X1D25 X1D45 X1D65 X1D85 X1DA5 X1DC5 X1DE5 PSW6 Position switch 6
X1D06 X1D26 X1D46 X1D66 X1D86 X1DA6 X1DC6 X1DE6 PSW7 Position switch 7
X1D07 X1D27 X1D47 X1D67 X1D87 X1DA7 X1DC7 X1DE7 PSW8 Position switch 8
Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
X1D08 X1D28 X1D48 X1D68 X1D88 X1DA8 X1DC8 X1DE8 PSW9 Position switch 9
X1D09 X1D29 X1D49 X1D69 X1D89 X1DA9 X1DC9 X1DE9 PSW10 Position switch 10
X1D0A X1D2A X1D4A X1D6A X1D8A X1DAA X1DCA X1DEA PSW11 Position switch 11
X1D0B X1D2B X1D4B X1D6B X1D8B X1DAB X1DCB X1DEB PSW12 Position switch 12
X1D0C X1D2C X1D4C X1D6C X1D8C X1DAC X1DCC X1DEC PSW13 Position switch 13
X1D0D X1D2D X1D4D X1D6D X1D8D X1DAD X1DCD X1DED PSW14 Position switch 14
X1D0E X1D2E X1D4E X1D6E X1D8E X1DAE X1DCE X1DEE PSW15 Position switch 15
X1D0F X1D2F X1D4F X1D6F X1D8F X1DAF X1DCF X1DEF PSW16 Position switch 16
Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
X1D10 X1D30 X1D50 X1D70 X1D90 X1DB0 X1DD0 X1DF0 PSW17 Position switch 17
X1D11 X1D31 X1D51 X1D71 X1D91 X1DB1 X1DD1 X1DF1 PSW18 Position switch 18
X1D12 X1D32 X1D52 X1D72 X1D92 X1DB2 X1DD2 X1DF2 PSW19 Position switch 19
X1D13 X1D33 X1D53 X1D73 X1D93 X1DB3 X1DD3 X1DF3 PSW20 Position switch 20
X1D14 X1D34 X1D54 X1D74 X1D94 X1DB4 X1DD4 X1DF4 PSW21 Position switch 21
X1D15 X1D35 X1D55 X1D75 X1D95 X1DB5 X1DD5 X1DF5 PSW22 Position switch 22
X1D16 X1D36 X1D56 X1D76 X1D96 X1DB6 X1DD6 X1DF6 PSW23 Position switch 23
X1D17 X1D37 X1D57 X1D77 X1D97 X1DB7 X1DD7 X1DF7 PSW24 Position switch 24
Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
X1D18 X1D38 X1D58 X1D78 X1D98 X1DB8 X1DD8 X1DF8 PSW25 Position switch 25
X1D19 X1D39 X1D59 X1D79 X1D99 X1DB9 X1DD9 X1DF9 PSW26 Position switch 26
X1D1A X1D3A X1D5A X1D7A X1D9A X1DBA X1DDA X1DFA PSW27 Position switch 27
X1D1B X1D3B X1D5B X1D7B X1D9B X1DBB X1DDB X1DFB PSW28 Position switch 28
X1D1C X1D3C X1D5C X1D7C X1D9C X1DBC X1DDC X1DFC PSW29 Position switch 29
X1D1D X1D3D X1D5D X1D7D X1D9D X1DBD X1DDD X1DFD PSW30 Position switch 30
X1D1E X1D3E X1D5E X1D7E X1D9E X1DBE X1DDE X1DFE PSW31 Position switch 31
X1D1F X1D3F X1D5F X1D7F X1D9F X1DBF X1DDF X1DFF PSW32 Position switch 32

2.2 PLC Input Signals (Data Type: R***)
(1) Signals with "" are prepared for a specific machine tool builder.
Common ($) Abbrev. Signal name Common ($) Abbrev. Signal name
R0 AI1 Analog input 1 R8 KEY IN 1
R1 AI2 Analog input 2 R9
R2 AI3 Analog input 3 R10
R3 AI4 Analog input 4 R11 Clock data Year/Month
R4 AI5 Analog input 5 R12 Clock data Date/Hour
R5 AI6 Analog input 6 R13 Clock data Minute/Second
R6 AI7 Analog input 7 R14
R7 AI8 Analog input 8 R15
Common ($) Abbrev. Signal name Common ($) Abbrev. Signal name
R16 CNC software version code A R24
R17 CNC software version code B R25 PC high-speed process time
R18 CNC software version code C1 R26 Turret interference check status
R19 CNC software version code C2 R27 Interference object alarm information
R20 R28
R21 R29
R22 R30 Remote program input error information
R23 R31 Diagnosis data output
Common ($) Abbrev. Signal name Common ($) Abbrev. Signal name
R32 R40 ASYNC error: Exceptional occurrence
R register number
R33 R41
R34 R42
R35 R43
R36 R44
R37 PLC window parameter error status R45
R38 ASYNC error: Exceptional occurrence
step number
R46
R39 R47
Common ($) Abbrev. Signal name Common ($) Abbrev. Signal name
R48 R56 Battery drop cause

R49 R57 Temperature warning cause
R50 R58 5V/24V error cause
R51 R59
R52 R60 Control unit temperature
R53 R61
R54 R62 Tool ID communication error informa tion
R55 R63
Note

Common ($) Abbrev. Signal name Common ($) Abbrev. Signal name
R64 R72
Ball screw thermal displacement com pensation: Compensation amount 1st
axis
[M]
R65 R73
Ball screw thermal displacement com pensation: Compensation amount 2nd
axis
[M]
R66 R74
Ball screw thermal displacement com pensation: Compensation amount 3rd
axis
[M]
R67 R75
Ball screw thermal displacement com pensation: Compensation amount 4th
axis
[M]
R68 PLC main scan time R76
R69 Emergency stop cause R77
R70 DIO card information R78
R71 R79
Common ($) Abbrev. Signal name Common ($) Abbrev. Signal name
R80 R88
R81 R89
R82 R90 Modbus/TCP connection request moni tor
R83 Modbus/RTU received packet monitor R91 Modbus/TCP number of connections
monitor
R84 Modbus/RTU communication error
monitor R92 Modbus/TCP received packet monitor
R85 Modal task data update cycle R93 Modbus/TCP communication error
monitor
R86 R94 Modbus protocol error packet monitor
R87 R95
Common ($) Abbrev. Signal name Common ($) Abbrev. Signal name
R96 SM DOEN Speed monitor door open possible R104
R97 R105
R98 SOPFN Multi-step speed monitor selected
speed output R106
R99 R107
R100 SODIO2 Safety observation I/O signal state 2 R108
R101 Interference check between part systems:
Setting error alarm information R109
R102 Interference check between part systems:
Alarm information R110
R103 R111

Common ($) Abbrev. Signal name Common ($) Abbrev. Signal name
R112 R120 DTPPC
Power consumption computation: Pres ent consumption of entire drive system
(L)
R113 SMPSTS NC data sampling: Sampling state R121
Power consumption computation: Pres ent consumption of entire drive system
(H)
R114 PLC axis position switch 1 to 16 R122 DTIPC1
Power consumption computation: Ac cumulated consumption of entire drive
system 1 (L)
R115 PLC axis position switch 17 to 32 R123
Power consumption computation: Ac cumulated consumption of entire drive
system 1 (H)
R116 HS1PCN
T Handle feed: 1st handle pulse counter R124 DTIPC2
Power consumption computation: Ac cumulated consumption of entire drive
system 2 (L)
R117 HS2PCN
T Handle feed: 2nd handle pulse counter R125
Power consumption computation: Ac cumulated consumption of entire drive
system 2 (H)
R118 HS3PCN
T Handle feed: 3rd handle pulse counter R126 DTIPC3
Power consumption computation: Ac cumulated consumption of entire drive
system 3 (L)
R119 R127
Power consumption computation: Ac cumulated consumption of entire drive

system 3 (H)
Common ($) Abbrev. Signal name Common ($) Abbrev. Signal name
R128 DTIPC4
Power consumption computation: Ac cumulated consumption of entire drive
system 4 (L)
R136 NDIPC4
Power consumption computation: Ac cumulated consumption of devices oth er than drive system 4 (L)
R129
Power consumption computation: Ac cumulated consumption of entire drive
system 4 (H)
R137
Power consumption computation: Ac cumulated consumption of devices oth er than drive system 4 (H)
R130 NDIPC1
Power consumption computation: Ac cumulated consumption of devices oth er than drive system 1 (L)
R138 ITF3CH
WGOBJ
Interference check III: Entry in interfer ence warning area interfering object in formation
R131
Power consumption computation: Ac cumulated consumption of devices oth er than drive system 1 (H)
R139 ITF3CHA
LOBJ
Interference check III: Interference de tection interfering object information
R132 NDIPC2
Power consumption computation: Ac cumulated consumption of devices oth er than drive system 2 (L)
R140
ITF3-
TRAL OBJ
Interference check III: Entry in interfer ence alarm area interfering object infor mation
R133
Power consumption computation: Ac cumulated consumption of devices oth er than drive system 2 (H)
R141 ITF3DTE
R1
Interference check III: Data setting error
information 1
R134 NDIPC3
Power consumption computation: Ac cumulated consumption of devices oth er than drive system 3 (L)
R142
ITF3DTE
R2
Interference check III: Data setting error
information 2
R135
Power consumption computation: Ac cumulated consumption of devices oth er than drive system 3 (H)
R143
Common ($) Abbrev. Signal name Common ($) Abbrev. Signal name
R144
ITF3DTE
R2
Interference check III: Data setting error
information 2
R152
R145 R153
R146 R154
R147 R155
R148 R156
R149 R157
R150 R158 HYPSP Hypothetical spindle configured
R151 R159 HYPSPE Hypothetical spindle command invalid
M800V/M80V Series PLC Interface Manual
2 Input/Output Signals with Controller
2.2 PLC Input Signals (Data Type: R***)
39 IB-1501616-F
Common ($) Abbrev. Signal name Common ($) Abbrev. Signal name
R160 R168 PLC axis alarm/warning No. 1st axis
R161 R169 PLC axis alarm/warning No. 2nd axis
R162 R170 PLC axis alarm/warning No. 3rd axis
R163 R171 PLC axis alarm/warning No. 4th axis
R164 R172 PLC axis alarm/warning No. 5th axis
R165 R173 PLC axis alarm/warning No. 6th axis
R166 R174 PLC axis alarm/warning No. 7th axis
R167 R175 PLC axis alarm/warning No. 8th axis
Common ($) Abbrev. Signal name Common ($) Abbrev. Signal name
R176 R184
R177 R185
R178 R186
R179 R187
R180 R188
R181 R189
R182 R190
R183 R191
Common ($) Abbrev. Signal name Common ($) Abbrev. Signal name
R192
R193
R194
R195
R196
R197
R198

R199
Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
R500 R700 R900 R1100 R1300 R1500 R1700 R1900 External search status
R501 R701 R901 R1101 R1301 R1501 R1701 R1901 External search: Program return complete status
R502 R702 R902 R1102 R1302 R1502 R1702 R1902
R503 R703 R903 R1103 R1303 R1503 R1703 R1903
R504 R704 R904 R1104 R1304 R1504 R1704 R1904 M code data 1 (L)
R505 R705 R905 R1105 R1305 R1505 R1705 R1905 M code data 1 (H)
R506 R706 R906 R1106 R1306 R1506 R1706 R1906 M code data 2 (L)
R507 R707 R907 R1107 R1307 R1507 R1707 R1907 M code data 2 (H)
Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
R508 R708 R908 R1108 R1308 R1508 R1708 R1908 M code data 3 (L)
R509 R709 R909 R1109 R1309 R1509 R1709 R1909 M code data 3 (H)
R510 R710 R910 R1110 R1310 R1510 R1710 R1910 M code data 4 (L)
R511 R711 R911 R1111 R1311 R1511 R1711 R1911 M code data 4 (H)
R512 R712 R912 R1112 R1312 R1512 R1712 R1912 S code data 1 (L)
R513 R713 R913 R1113 R1313 R1513 R1713 R1913 S code data 1 (H)
R514 R714 R914 R1114 R1314 R1514 R1714 R1914 S code data 2 (L)
R515 R715 R915 R1115 R1315 R1515 R1715 R1915 S code data 2 (H)

Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
R516 R716 R916 R1116 R1316 R1516 R1716 R1916 S code data 3 (L)
R517 R717 R917 R1117 R1317 R1517 R1717 R1917 S code data 3 (H)
R518 R718 R918 R1118 R1318 R1518 R1718 R1918 S code data 4 (L)
R519 R719 R919 R1119 R1319 R1519 R1719 R1919 S code data 4 (H)
R520 R720 R920 R1120 R1320 R1520 R1720 R1920 S code data 5 (L)
R521 R721 R921 R1121 R1321 R1521 R1721 R1921 S code data 5 (H)
R522 R722 R922 R1122 R1322 R1522 R1722 R1922 S code data 6 (L)
R523 R723 R923 R1123 R1323 R1523 R1723 R1923 S code data 6 (H)
Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
R524 R724 R924 R1124 R1324 R1524 R1724 R1924 S code data 7 (L)
R525 R725 R925 R1125 R1325 R1525 R1725 R1925 S code data 7 (H)
R526 R726 R926 R1126 R1326 R1526 R1726 R1926 S code data 8 (L)
R527 R727 R927 R1127 R1327 R1527 R1727 R1927 S code data 8 (H)
R528 R728 R928 R1128 R1328 R1528 R1728 R1928
R529 R729 R929 R1129 R1329 R1529 R1729 R1929
R530 R730 R930 R1130 R1330 R1530 R1730 R1930
R531 R731 R931 R1131 R1331 R1531 R1731 R1931
Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
R532 R732 R932 R1132 R1332 R1532 R1732 R1932
R533 R733 R933 R1133 R1333 R1533 R1733 R1933
R534 R734 R934 R1134 R1334 R1534 R1734 R1934
R535 R735 R935 R1135 R1335 R1535 R1735 R1935
R536 R736 R936 R1136 R1336 R1536 R1736 R1936 T code data 1 (L)
R537 R737 R937 R1137 R1337 R1537 R1737 R1937 T code data 1 (H)
R538 R738 R938 R1138 R1338 R1538 R1738 R1938 T code data 2 (L)
R539 R739 R939 R1139 R1339 R1539 R1739 R1939 T code data 2 (H)
Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
R540 R740 R940 R1140 R1340 R1540 R1740 R1940 T code data 3 (L)
R541 R741 R941 R1141 R1341 R1541 R1741 R1941 T code data 3 (H)
R542 R742 R942 R1142 R1342 R1542 R1742 R1942 T code data 4 (L)
R543 R743 R943 R1143 R1343 R1543 R1743 R1943 T code data 4 (H)
R544 R744 R944 R1144 R1344 R1544 R1744 R1944 2nd M function data 1 (L)
R545 R745 R945 R1145 R1345 R1545 R1745 R1945 2nd M function data 1 (H)
R546 R746 R946 R1146 R1346 R1546 R1746 R1946 2nd M function data 2 (L)
R547 R747 R947 R1147 R1347 R1547 R1747 R1947 2nd M function data 2 (H)

Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
R548 R748 R948 R1148 R1348 R1548 R1748 R1948 2nd M function data 3 (L)
R549 R749 R949 R1149 R1349 R1549 R1749 R1949 2nd M function data 3 (H)
R550 R750 R950 R1150 R1350 R1550 R1750 R1950 2nd M function data 4 (L)
R551 R751 R951 R1151 R1351 R1551 R1751 R1951 2nd M function data 4 (H)
R552 R752 R952 R1152 R1352 R1552 R1752 R1952
R553 R753 R953 R1153 R1353 R1553 R1753 R1953
R554 R754 R954 R1154 R1354 R1554 R1754 R1954 Chopping error No.
R555 R755 R955 R1155 R1355 R1555 R1755 R1955 Manual measurement status
Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
R556 R756 R956 R1156 R1356 R1556 R1756 R1956
R557 R757 R957 R1157 R1357 R1557 R1757 R1957
R558 R758 R958 R1158 R1358 R1558 R1758 R1958
R559 R759 R959 R1159 R1359 R1559 R1759 R1959
R560 R760 R960 R1160 R1360 R1560 R1760 R1960
R561 R761 R961 R1161 R1361 R1561 R1761 R1961
R562 R762 R962 R1162 R1362 R1562 R1762 R1962

R563 R763 R963 R1163 R1363 R1563 R1763 R1963
Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
R564 R764 R964 R1164 R1364 R1564 R1764 R1964 Load monitor I: Warning axis
R565 R765 R965 R1165 R1365 R1565 R1765 R1965 Load monitor I: Alarm axis
R566 R766 R966 R1166 R1366 R1566 R1766 R1966 Load monitor I: Data error information
R567 R767 R967 R1167 R1367 R1567 R1767 R1967 Group in tool life management
R568 R768 R968 R1168 R1368 R1568 R1768 R1968
R569 R769 R969 R1169 R1369 R1569 R1769 R1969
R570 R770 R970 R1170 R1370 R1570 R1770 R1970
R571 R771 R971 R1171 R1371 R1571 R1771 R1971 Load monitor I: Adaptive control override
Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
R572 R772 R972 R1172 R1372 R1572 R1772 R1972 CNC completion standby status
R573 R773 R973 R1173 R1373 R1573 R1773 R1973
R574 R774 R974 R1174 R1374 R1574 R1774 R1974 In initialization
R575 R775 R975 R1175 R1375 R1575 R1775 R1975 Initialization incompletion
R576 R776 R976 R1176 R1376 R1576 R1776 R1976 Reference position adjustment value parameter setting
completed
R577 R777 R977 R1177 R1377 R1577 R1777 R1977 APIER User macro section and sub-section designated execu tion result
R578 R778 R978 R1178 R1378 R1578 R1778 R1978 Measurement tool tip point No.
R579 R779 R979 R1179 R1379 R1579 R1779 R1979

Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
R580 R780 R980 R1180 R1380 R1580 R1780 R1980 Near reference position (per reference position)
1 to 4 axes
R581 R781 R981 R1181 R1381 R1581 R1781 R1981 Near reference position (per reference position)
5 to 8 axes
R582 R782 R982 R1182 R1382 R1582 R1782 R1982 Presetter contact
R583 R783 R983 R1183 R1383 R1583 R1783 R1983 Presetter interlock
R584 R784 R984 R1184 R1384 R1584 R1784 R1984 Area signal X axis ON/OFF
R585 R785 R985 R1185 R1385 R1585 R1785 R1985 Area signal Z axis ON/OFF
R586 R786 R986 R1186 R1386 R1586 R1786 R1986 Area signal X axis (-) ON/OFF
R587 R787 R987 R1187 R1387 R1587 R1787 R1987 Area signal Z axis (-) ON/OFF
Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
R588 R788 R988 R1188 R1388 R1588 R1788 R1988 Takt time (ms) (L)
R589 R789 R989 R1189 R1389 R1589 R1789 R1989 Takt time (ms) (H)
R590 R790 R990 R1190 R1390 R1590 R1790 R1990 Takt time (min) (L)
R591 R791 R991 R1191 R1391 R1591 R1791 R1991 Takt time (min) (H)
R592 R792 R992 R1192 R1392 R1592 R1792 R1992
R593 R793 R993 R1193 R1393 R1593 R1793 R1993
R594 R794 R994 R1194 R1394 R1594 R1794 R1994
R595 R795 R995 R1195 R1395 R1595 R1795 R1995
Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
R596 R796 R996 R1196 R1396 R1596 R1796 R1996 Load monitor I: Status output (1)
R597 R797 R997 R1197 R1397 R1597 R1797 R1997 Load monitor I: Status output (2)
R598 R798 R998 R1198 R1398 R1598 R1798 R1998 Load monitor I: Status output (3)
R599 R799 R999 R1199 R1399 R1599 R1799 R1999 Load monitor I: Status output (4)
R600 R800 R1000 R1200 R1400 R1600 R1800 R2000 Load monitor I: Status output (5)
R601 R801 R1001 R1201 R1401 R1601 R1801 R2001 Load monitor I: Status output (6)
R602 R802 R1002 R1202 R1402 R1602 R1802 R2002 Load monitor I: Status output (7)
R603 R803 R1003 R1203 R1403 R1603 R1803 R2003 Load monitor I: Status output (8)
Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
R604 R804 R1004 R1204 R1404 R1604 R1804 R2004 Load monitor I: Status output (9)
R605 R805 R1005 R1205 R1405 R1605 R1805 R2005 Load monitor I: Status output (10)
R606 R806 R1006 R1206 R1406 R1606 R1806 R2006 No. of work machining (current value) (L)
R607 R807 R1007 R1207 R1407 R1607 R1807 R2007 No. of work machining (current value) (H)
R608 R808 R1008 R1208 R1408 R1608 R1808 R2008 No. of work machining (maximum value) (L)
R609 R809 R1009 R1209 R1409 R1609 R1809 R2009 No. of work machining (maximum value) (H)
R610 R810 R1010 R1210 R1410 R1610 R1810 R2010
R611 R811 R1011 R1211 R1411 R1611 R1811 R2011

Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
R612 R812 R1012 R1212 R1412 R1612 R1812 R2012
R613 R813 R1013 R1213 R1413 R1613 R1813 R2013
R614 R814 R1014 R1214 R1414 R1614 R1814 R2014
R615 R815 R1015 R1215 R1415 R1615 R1815 R2015
R616 R816 R1016 R1216 R1416 R1616 R1816 R2016 SBSID Sub part system control: Sub part system control II iden tification No.
R617 R817 R1017 R1217 R1417 R1617 R1817 R2017 SBSCL Sub part system control: Calling sub part system
R618 R818 R1018 R1218 R1418 R1618 R1818 R2018 SBSWT Sub part system control: Waiting for sub part system
completion
R619 R819 R1019 R1219 R1419 R1619 R1819 R2019 SBSSY Sub part system control: Caller of sub part system
Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
R620 R820 R1020 R1220 R1420 R1620 R1820 R2020
R621 R821 R1021 R1221 R1421 R1621 R1821 R2021
R622 R822 R1022 R1222 R1422 R1622 R1822 R2022

R623 R823 R1023 R1223 R1423 R1623 R1823 R2023
R624 R824 R1024 R1224 R1424 R1624 R1824 R2024 Constant torque control: Axis under constant torque/pro portional torque stopper control
R625 R825 R1025 R1225 R1425 R1625 R1825 R2025 Constant torque control: Constant torque droop cancel
axis status
R626 R826 R1026 R1226 R1426 R1626 R1826 R2026
R627 R827 R1027 R1227 R1427 R1627 R1827 R2027
Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
R628 R828 R1028 R1228 R1428 R1628 R1828 R2028 Tool life usage data (L)
R629 R829 R1029 R1229 R1429 R1629 R1829 R2029 Tool life usage data (H)
R630 R830 R1030 R1230 R1430 R1630 R1830 R2030 Number of registered tool life control tools
R631 R831 R1031 R1231 R1431 R1631 R1831 R2031
R632 R832 R1032 R1232 R1432 R1632 R1832 R2032
R633 R833 R1033 R1233 R1433 R1633 R1833 R2033
R634 R834 R1034 R1234 R1434 R1634 R1834 R2034
R635 R835 R1035 R1235 R1435 R1635 R1835 R2035
Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
R636 R836 R1036 R1236 R1436 R1636 R1836 R2036 Circular feed in manual mode Current position H
(L) [M]
R637 R837 R1037 R1237 R1437 R1637 R1837 R2037 Circular feed in manual mode Current position H
(H) [M]
R638 R838 R1038 R1238 R1438 R1638 R1838 R2038
R639 R839 R1039 R1239 R1439 R1639 R1839 R2039
R640 R840 R1040 R1240 R1440 R1640 R1840 R2040 Circular feed in manual mode Current position V
(L) [M]
R641 R841 R1041 R1241 R1441 R1641 R1841 R2041 Circular feed in manual mode Current position V
(H) [M]
R642 R842 R1042 R1242 R1442 R1642 R1842 R2042
R643 R843 R1043 R1243 R1443 R1643 R1843 R2043
M800V/M80V Series PLC Interface Manual
2 Input/Output Signals with Controller
2.2 PLC Input Signals (Data Type: R***)
IB-1501616-F 44
Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
R644 R844 R1044 R1244 R1444 R1644 R1844 R2044
R645 R845 R1045 R1245 R1445 R1645 R1845 R2045
R646 R846 R1046 R1246 R1446 R1646 R1846 R2046 Machining mode state
R647 R847 R1047 R1247 R1447 R1647 R1847 R2047
R648 R848 R1048 R1248 R1448 R1648 R1848 R2048 Thread recutting status
R649 R849 R1049 R1249 R1449 R1649 R1849 R2049 Thread recutting execution status
R650 R850 R1050 R1250 R1450 R1650 R1850 R2050 Thread recutting spindle No.
R651 R851 R1051 R1251 R1451 R1651 R1851 R2051 Thread recutting lead axis No.
Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
R652 R852 R1052 R1252 R1452 R1652 R1852 R2052 TLMSL NO1
Sensor ON Tool length compensation No.
(BCD output)
R653 R853 R1053 R1253 R1453 R1653 R1853 R2053 TLMSWN
O1
Sensor ON Tool wear compensation No.
(BCD output)
R654 R854 R1054 R1254 R1454 R1654 R1854 R2054 TLMSL NO2
Compensation data update Tool length compensa tion No.
(BCD output)

R655 R855 R1055 R1255 R1455 R1655 R1855 R2055 TLMSWN
O2
Compensation data update Tool wear compensa tion No.
(BCD output)

R656 R856 R1056 R1256 R1456 R1656 R1856 R2056 RPAROUT Rotary axis configuration parameter output
R657 R857 R1057 R1257 R1457 R1657 R1857 R2057
R658 R858 R1058 R1258 R1458 R1658 R1858 R2058
R659 R859 R1059 R1259 R1459 R1659 R1859 R2059 Ext. machine coordinate: Number input compensa tion offset valid axis
Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
R660 R860 R1060 R1260 R1460 R1660 R1860 R2060 RSWRK R-Navi: Selected workpiece No.
R661 R861 R1061 R1261 R1461 R1661 R1861 R2061 RSSRF R-Navi: Selecting machine surface number
R662 R862 R1062 R1262 R1462 R1662 R1862 R2062 CAXSVFO
Spindle position control (spindle/C axis control):
Servo OFF state during Spindle/C axis mode n-th
axis

R663 R863 R1063 R1263 R1463 R1663 R1863 R2063 SPGNCI
Spindle position control (spindle/C axis control):
Position loop gain switch at C axis mode in prog ress

R664 R864 R1064 R1264 R1464 R1664 R1864 R2064
R665 R865 R1065 R1265 R1465 R1665 R1865 R2065
R666 R866 R1066 R1266 R1466 R1666 R1866 R2066
R667 R867 R1067 R1267 R1467 R1667 R1867 R2067
Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
R668 R868 R1068 R1268 R1468 R1668 R1868 R2068 SVESTAF
Optimum acceleration/deceleration selection:
NC axis estimated resonance frequency (in esti mating inertia)

R669 R869 R1069 R1269 R1469 R1669 R1869 R2069 SVESTST Optimum acceleration/deceleration selection: NC
axis estimated inertia state
R670 R870 R1070 R1270 R1470 R1670 R1870 R2070 ITF3CHW
GSLD
Interference check III: Entry in interference warn
R671 R871 R1071 R1271 R1471 R1671 R1871 R2071 area solid information
R672 R872 R1072 R1272 R1472 R1672 R1872 R2072 ITF3CHAL
SLD
Interference check III: Interference detection solid
R673 R873 R1073 R1273 R1473 R1673 R1873 R2073 information
R674 R874 R1074 R1274 R1474 R1674 R1874 R2074 ITF3-
TRALSLD
Interference check III: Entry in interference alarm
R675 R875 R1075 R1275 R1475 R1675 R1875 R2075 area solid information

Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
R684 R884 R1084 R1284 R1484 R1684 R1884 R2084 Specific user NC status 1
R685 R885 R1085 R1285 R1485 R1685 R1885 R2085
R686 R886 R1086 R1286 R1486 R1686 R1886 R2086
R687 R887 R1087 R1287 R1487 R1687 R1887 R2087
R688 R888 R1088 R1288 R1488 R1688 R1888 R2088 Specific user Manual skip: Axis in skip motion
R689 R889 R1089 R1289 R1489 R1689 R1889 R2089 Specific user Manual skip: Skip motion direction
R690 R890 R1090 R1290 R1490 R1690 R1890 R2090 Specific user Error/Warning detail
R691 R891 R1091 R1291 R1491 R1691 R1891 R2091
Common ($) Abbrev. Signal name Common ($) Abbrev. Signal name
R2400 3D Machine Interference Check: Requested
shape group No.1 R2408
R2401 3D Machine Interference Check: Requested
shape group No.2 R2409
R2402 3D Machine Interference Check: Requested
shape group No.3 R2410
R2403 3D Machine Interference Check: Requested
shape group No.4 R2411
R2404 R2412
R2405 R2413
R2406 R2414
R2407 R2415
Device No.
$1 $2 $3 $4 Abbrev. Signal name
R4500 R4532 R4564 R4596 Machine position 1st axis (L) [M]
R4501 R4533 R4565 R4597 Machine position 1st axis (H) [M]
R4502 R4534 R4566 R4598
R4503 R4535 R4567 R4599
R4504 R4536 R4568 R4600 Machine position 2nd axis (L) [M]
R4505 R4537 R4569 R4601 Machine position 2nd axis (H) [M]
R4506 R4538 R4570 R4602
R4507 R4539 R4571 R4603
Device No.
$1 $2 $3 $4 Abbrev. Signal name
R4508 R4540 R4572 R4604 Machine position 3rd axis (L) [M]
R4509 R4541 R4573 R4605 Machine position 3rd axis (H) [M]
R4510 R4542 R4574 R4606
R4511 R4543 R4575 R4607
R4512 R4544 R4576 R4608 Machine position 4th axis (L) [M]
R4513 R4545 R4577 R4609 Machine position 4th axis (H) [M]
R4514 R4546 R4578 R4610
R4515 R4547 R4579 R4611

Device No.
$1 $2 $3 $4 Abbrev. Signal name
R4516 R4548 R4580 R4612 Machine position 5th axis (L) [M]
R4517 R4549 R4581 R4613 Machine position 5th axis (H) [M]
R4518 R4550 R4582 R4614
R4519 R4551 R4583 R4615
R4520 R4552 R4584 R4616 Machine position 6th axis (L) [M]
R4521 R4553 R4585 R4617 Machine position 6th axis (H) [M]
R4522 R4554 R4586 R4618
R4523 R4555 R4587 R4619
Device No.
$1 $2 $3 $4 Abbrev. Signal name
R4524 R4556 R4588 R4620 Machine position 7th axis (L) [M]
R4525 R4557 R4589 R4621 Machine position 7th axis (H) [M]
R4526 R4558 R4590 R4622
R4527 R4559 R4591 R4623
R4528 R4560 R4592 R4624 Machine position 8th axis (L) [M]
R4529 R4561 R4593 R4625 Machine position 8th axis (H) [M]
R4530 R4562 R4594 R4626
R4531 R4563 R4595 R4627
Device No.
$1 $2 $3 $4 Abbrev. Signal name

R4628 R4660 R4692 R4724 Feedback machine position 1st axis (L) [M]
R4629 R4661 R4693 R4725 Feedback machine position 1st axis (H) [M]
R4630 R4662 R4694 R4726
R4631 R4663 R4695 R4727
R4632 R4664 R4696 R4728 Feedback machine position 2nd axis (L) [M]
R4633 R4665 R4697 R4729 Feedback machine position 2nd axis (H) [M]
R4634 R4666 R4698 R4730
R4635 R4667 R4699 R4731
Device No.
$1 $2 $3 $4 Abbrev. Signal name
R4636 R4668 R4700 R4732 Feedback machine position 3rd axis (L) [M]
R4637 R4669 R4701 R4733 Feedback machine position 3rd axis (H) [M]
R4638 R4670 R4702 R4734
R4639 R4671 R4703 R4735
R4640 R4672 R4704 R4736 Feedback machine position 4th axis (L) [M]
R4641 R4673 R4705 R4737 Feedback machine position 4th axis (H) [M]
R4642 R4674 R4706 R4738
R4643 R4675 R4707 R4739

Device No.
$1 $2 $3 $4 Abbrev. Signal name
R4644 R4676 R4708 R4740 Feedback machine position 5th axis (L) [M]
R4645 R4677 R4709 R4741 Feedback machine position 5th axis (H) [M]
R4646 R4678 R4710 R4742
R4647 R4679 R4711 R4743
R4648 R4680 R4712 R4744 Feedback machine position 6th axis (L) [M]
R4649 R4681 R4713 R4745 Feedback machine position 6th axis (H) [M]
R4650 R4682 R4714 R4746
R4651 R4683 R4715 R4747
Device No.
$1 $2 $3 $4 Abbrev. Signal name
R4652 R4684 R4716 R4748 Feedback machine position 7th axis (L) [M]
R4653 R4685 R4717 R4749 Feedback machine position 7th axis (H) [M]
R4654 R4686 R4718 R4750
R4655 R4687 R4719 R4751
R4656 R4688 R4720 R4752 Feedback machine position 8th axis (L) [M]
R4657 R4689 R4721 R4753 Feedback machine position 8th axis (H) [M]
R4658 R4690 R4722 R4754
R4659 R4691 R4723 R4755
Device No.
$1 $2 $3 $4 Abbrev. Signal name
R4756 R4772 R4788 R4804 Servo deflection amount 1st axis (L) [M]
R4757 R4773 R4789 R4805 Servo deflection amount 1st axis (H) [M]
R4758 R4774 R4790 R4806 Servo deflection amount 2nd axis (L) [M]
R4759 R4775 R4791 R4807 Servo deflection amount 2nd axis (H) [M]
R4760 R4776 R4792 R4808 Servo deflection amount 3rd axis (L) [M]
R4761 R4777 R4793 R4809 Servo deflection amount 3rd axis (H) [M]
R4762 R4778 R4794 R4810 Servo deflection amount 4th axis (L) [M]
R4763 R4779 R4795 R4811 Servo deflection amount 4th axis (H) [M]
Device No.
$1 $2 $3 $4 Abbrev. Signal name
R4764 R4780 R4796 R4812 Servo deflection amount 5th axis (L) [M]
R4765 R4781 R4797 R4813 Servo deflection amount 5th axis (H) [M]
R4766 R4782 R4798 R4814 Servo deflection amount 6th axis (L) [M]
R4767 R4783 R4799 R4815 Servo deflection amount 6th axis (H) [M]
R4768 R4784 R4800 R4816 Servo deflection amount 7th axis (L) [M]
R4769 R4785 R4801 R4817 Servo deflection amount 7th axis (H) [M]
R4770 R4786 R4802 R4818 Servo deflection amount 8th axis (L) [M]
R4771 R4787 R4803 R4819 Servo deflection amount 8th axis (H) [M]

Device No.
$1 $2 $3 $4 Abbrev. Signal name
R4820 R4836 R4852 R4868 Motor rotation speed 1st axis (L)
R4821 R4837 R4853 R4869 Motor rotation speed 1st axis (H)
R4822 R4838 R4854 R4870 Motor rotation speed 2nd axis (L)
R4823 R4839 R4855 R4871 Motor rotation speed 2nd axis (H)
R4824 R4840 R4856 R4872 Motor rotation speed 3rd axis (L)
R4825 R4841 R4857 R4873 Motor rotation speed 3rd axis (H)
R4826 R4842 R4858 R4874 Motor rotation speed 4th axis (L)
R4827 R4843 R4859 R4875 Motor rotation speed 4th axis (H)
Device No.
$1 $2 $3 $4 Abbrev. Signal name
R4828 R4844 R4860 R4876 Motor rotation speed 5th axis (L)
R4829 R4845 R4861 R4877 Motor rotation speed 5th axis (H)
R4830 R4846 R4862 R4878 Motor rotation speed 6th axis (L)
R4831 R4847 R4863 R4879 Motor rotation speed 6th axis (H)
R4832 R4848 R4864 R4880 Motor rotation speed 7th axis (L)
R4833 R4849 R4865 R4881 Motor rotation speed 7th axis (H)
R4834 R4850 R4866 R4882 Motor rotation speed 8th axis (L)
R4835 R4851 R4867 R4883 Motor rotation speed 8th axis (H)
Device No.
$1 $2 $3 $4 Abbrev. Signal name

R4884 R4900 R4916 R4932 Motor load current 1st axis (L)
R4885 R4901 R4917 R4933 Motor load current 1st axis (H)
R4886 R4902 R4918 R4934 Motor load current 2nd axis (L)
R4887 R4903 R4919 R4935 Motor load current 2nd axis (H)
R4888 R4904 R4920 R4936 Motor load current 3rd axis (L)
R4889 R4905 R4921 R4937 Motor load current 3rd axis (H)
R4890 R4906 R4922 R4938 Motor load current 4th axis (L)
R4891 R4907 R4923 R4939 Motor load current 4th axis (H)
Device No.
$1 $2 $3 $4 Abbrev. Signal name
R4892 R4908 R4924 R4940 Motor load current 5th axis (L)
R4893 R4909 R4925 R4941 Motor load current 5th axis (H)
R4894 R4910 R4926 R4942 Motor load current 6th axis (L)
R4895 R4911 R4927 R4943 Motor load current 6th axis (H)
R4896 R4912 R4928 R4944 Motor load current 7th axis (L)
R4897 R4913 R4929 R4945 Motor load current 7th axis (H)
R4898 R4914 R4930 R4946 Motor load current 8th axis (L)
R4899 R4915 R4931 R4947 Motor load current 8th axis (H)

Device No.
$1 $2 $3 $4 Abbrev. Signal name
R4948 R4980 R5012 R5044 Skip coordinate position 1st axis (L) [M]
R4949 R4981 R5013 R5045 Skip coordinate position 1st axis (H) [M]
R4950 R4982 R5014 R5046
R4951 R4983 R5015 R5047
R4952 R4984 R5016 R5048 Skip coordinate position 2nd axis (L) [M]
R4953 R4985 R5017 R5049 Skip coordinate position 2nd axis (H) [M]
R4954 R4986 R5018 R5050
R4955 R4987 R5019 R5051
Device No.
$1 $2 $3 $4 Abbrev. Signal name
R4956 R4988 R5020 R5052 Skip coordinate position 3rd axis (L) [M]
R4957 R4989 R5021 R5053 Skip coordinate position 3rd axis (H) [M]
R4958 R4990 R5022 R5054
R4959 R4991 R5023 R5055
R4960 R4992 R5024 R5056 Skip coordinate position 4th axis (L) [M]
R4961 R4993 R5025 R5057 Skip coordinate position 4th axis (H) [M]
R4962 R4994 R5026 R5058
R4963 R4995 R5027 R5059
Device No.
$1 $2 $3 $4 Abbrev. Signal name
R4964 R4996 R5028 R5060 Skip coordinate position 5th axis (L) [M]
R4965 R4997 R5029 R5061 Skip coordinate position 5th axis (H) [M]
R4966 R4998 R5030 R5062
R4967 R4999 R5031 R5063
R4968 R5000 R5032 R5064 Skip coordinate position 6th axis (L) [M]
R4969 R5001 R5033 R5065 Skip coordinate position 6th axis (H) [M]
R4970 R5002 R5034 R5066
R4971 R5003 R5035 R5067
Device No.
$1 $2 $3 $4 Abbrev. Signal name
R4972 R5004 R5036 R5068 Skip coordinate position 7th axis (L) [M]
R4973 R5005 R5037 R5069 Skip coordinate position 7th axis (H) [M]
R4974 R5006 R5038 R5070
R4975 R5007 R5039 R5071
R4976 R5008 R5040 R5072 Skip coordinate position 8th axis (L) [M]
R4977 R5009 R5041 R5073 Skip coordinate position 8th axis (H) [M]
R4978 R5010 R5042 R5074
R4979 R5011 R5043 R5075

Device No.
$1 $2 $3 $4 Abbrev. Signal name
R5076 R5092 R5108 R5124 Synchronous error amount 1st, 9th, 17th, 25th axis (L) [M]
R5077 R5093 R5109 R5125 Synchronous error amount 1st, 9th, 17th, 25th axis (H) [M]
R5078 R5094 R5110 R5126 Synchronous error amount 2nd, 10th, 18th, 26th axis (L) [M]
R5079 R5095 R5111 R5127 Synchronous error amount 2nd, 10th, 18th, 26th axis (H) [M]
R5080 R5096 R5112 R5128 Synchronous error amount 3rd, 11th, 19th, 27th axis (L) [M]
R5081 R5097 R5113 R5129 Synchronous error amount 3rd, 11th, 19th, 27th axis (H) [M]
R5082 R5098 R5114 R5130 Synchronous error amount 4th, 12th, 20th, 28th axis (L) [M]
R5083 R5099 R5115 R5131 Synchronous error amount 4th, 12th, 20th, 28th axis (H) [M]
Device No.
$1 $2 $3 $4 Abbrev. Signal name
R5084 R5100 R5116 R5132 Synchronous error amount 5th, 13th, 21st, 29th axis (L) [M]

R5085 R5101 R5117 R5133 Synchronous error amount 5th, 13th, 21st, 29th axis (H) [M]
R5086 R5102 R5118 R5134 Synchronous error amount 6th, 14th, 22nd, 30th axis (L) [M]
R5087 R5103 R5119 R5135 Synchronous error amount 6th, 14th, 22nd, 30th axis (H) [M]
R5088 R5104 R5120 R5136 Synchronous error amount 7th, 15th, 23rd, 31st axis (L) [M]
R5089 R5105 R5121 R5137 Synchronous error amount 7th, 15th, 23rd, 31st axis (H) [M]
R5090 R5106 R5122 R5138 Synchronous error amount 8th, 16th, 24th, 32nd axis (L) [M]
R5091 R5107 R5123 R5139 Synchronous error amount 8th, 16th, 24th, 32nd axis (H) [M]
Device No.
$1 $2 $3 $4 Abbrev. Signal name
R5140 R5148 R5156 R5164 Optimum acceleration/deceleration parameter group currently selected (axis) 1st axis
R5141 R5149 R5157 R5165 Optimum acceleration/deceleration parameter group currently selected (axis) 2nd axis
R5142 R5150 R5158 R5166 Optimum acceleration/deceleration parameter group currently selected (axis) 3rd axis
R5143 R5151 R5159 R5167 Optimum acceleration/deceleration parameter group currently selected (axis) 4th axis
R5144 R5152 R5160 R5168 Optimum acceleration/deceleration parameter group currently selected (axis) 5th axis
R5145 R5153 R5161 R5169 Optimum acceleration/deceleration parameter group currently selected (axis) 6th axis
R5146 R5154 R5162 R5170 Optimum acceleration/deceleration parameter group currently selected (axis) 7th axis
R5147 R5155 R5163 R5171 Optimum acceleration/deceleration parameter group currently selected (axis) 8th axis

Device No.
$1 $2 $3 $4 Abbrev. Signal name
R5172 R5204 R5236 R5268 Cutting feed movement amount 1st axis (L) [M]
R5173 R5205 R5237 R5269 Cutting feed movement amount 1st axis (H) [M]
R5174 R5206 R5238 R5270
R5175 R5207 R5239 R5271
R5176 R5208 R5240 R5272 Cutting feed movement amount 2nd axis (L) [M]
R5177 R5209 R5241 R5273 Cutting feed movement amount 2nd axis (H) [M]
R5178 R5210 R5242 R5274
R5179 R5211 R5243 R5275
Device No.
$1 $2 $3 $4 Abbrev. Signal name
R5180 R5212 R5244 R5276 Cutting feed movement amount 3rd axis (L) [M]
R5181 R5213 R5245 R5277 Cutting feed movement amount 3rd axis (H) [M]
R5182 R5214 R5246 R5278
R5183 R5215 R5247 R5279
R5184 R5216 R5248 R5280 Cutting feed movement amount 4th axis (L) [M]
R5185 R5217 R5249 R5281 Cutting feed movement amount 4th axis (H) [M]
R5186 R5218 R5250 R5282
R5187 R5219 R5251 R5283
Device No.
$1 $2 $3 $4 Abbrev. Signal name
R5188 R5220 R5252 R5284 Cutting feed movement amount 5th axis (L) [M]
R5189 R5221 R5253 R5285 Cutting feed movement amount 5th axis (H) [M]
R5190 R5222 R5254 R5286
R5191 R5223 R5255 R5287
R5192 R5224 R5256 R5288 Cutting feed movement amount 6th axis (L) [M]
R5193 R5225 R5257 R5289 Cutting feed movement amount 6th axis (H) [M]
R5194 R5226 R5258 R5290
R5195 R5227 R5259 R5291
Device No.
$1 $2 $3 $4 Abbrev. Signal name
R5196 R5228 R5260 R5292 Cutting feed movement amount 7th axis (L) [M]
R5197 R5229 R5261 R5293 Cutting feed movement amount 7th axis (H) [M]
R5198 R5230 R5262 R5294
R5199 R5231 R5263 R5295
R5200 R5232 R5264 R5296 Cutting feed movement amount 8th axis (L) [M]
R5201 R5233 R5265 R5297 Cutting feed movement amount 8th axis (H) [M]
R5202 R5234 R5266 R5298
R5203 R5235 R5267 R5299
Device No.
$1 $2 $3 $4 Abbrev. Signal name
R5300 R5308 R5316 R5324
R5301 R5309 R5317 R5325
R5302 R5310 R5318 R5326
R5303 R5311 R5319 R5327
R5304 R5312 R5320 R5328
R5305 R5313 R5321 R5329
R5306 R5314 R5322 R5330
R5307 R5315 R5323 R5331

Device No.
$1 $2 $3 $4 Abbrev. Signal name
R5332 R5340 R5348 R5356 Servo alarm/warning No. 1st axis
R5333 R5341 R5349 R5357 Servo alarm/warning No. 2nd axis
R5334 R5342 R5350 R5358 Servo alarm/warning No. 3rd axis
R5335 R5343 R5351 R5359 Servo alarm/warning No. 4th axis
R5336 R5344 R5352 R5360 Servo alarm/warning No. 5th axis
R5337 R5345 R5353 R5361 Servo alarm/warning No. 6th axis
R5338 R5346 R5354 R5362 Servo alarm/warning No. 7th axis
R5339 R5347 R5355 R5363 Servo alarm/warning No. 8th axis
Device No.
$1 $2 $3 $4 Abbrev. Signal name
R5364 R5396 R5428 R5460 Skip coordinate position 1st axis feature coordinate
(L) [M]
R5365 R5397 R5429 R5461 Skip coordinate position 1st axis feature coordinate
(H) [M]
R5366 R5398 R5430 R5462
R5367 R5399 R5431 R5463
R5368 R5400 R5432 R5464 Skip coordinate position 2nd axis feature coordi nate (L) [M]
R5369 R5401 R5433 R5465 Skip coordinate position 2nd axis feature coordi nate (H) [M]
R5370 R5402 R5434 R5466
R5371 R5403 R5435 R5467
Device No.
$1 $2 $3 $4 Abbrev. Signal name
R5372 R5404 R5436 R5468 Skip coordinate position 3rd axis feature coordi nate (L) [M]
R5373 R5405 R5437 R5469 Skip coordinate position 3rd axis feature coordi nate (H) [M]
R5374 R5406 R5438 R5470
R5375 R5407 R5439 R5471
R5376 R5408 R5440 R5472 Skip coordinate position 4th axis feature coordi nate (L) [M]
R5377 R5409 R5441 R5473 Skip coordinate position 4th axis feature coordi nate (H) [M]
R5378 R5410 R5442 R5474
R5379 R5411 R5443 R5475
Device No.
$1 $2 $3 $4 Abbrev. Signal name
R5380 R5412 R5444 R5476 Skip coordinate position 5th axis feature coordi nate (L) [M]
R5381 R5413 R5445 R5477 Skip coordinate position 5th axis feature coordi nate (H) [M]
R5382 R5414 R5446 R5478
R5383 R5415 R5447 R5479
R5384 R5416 R5448 R5480 Skip coordinate position 6th axis feature coordi nate (L) [M]
R5385 R5417 R5449 R5481 Skip coordinate position 6th axis feature coordi nate (H) [M]
R5386 R5418 R5450 R5482
R5387 R5419 R5451 R5483

Device No.
$1 $2 $3 $4 Abbrev. Signal name
R5388 R5420 R5452 R5484 Skip coordinate position 7th axis feature coordinate
(L) [M]
R5389 R5421 R5453 R5485 Skip coordinate position 7th axis feature coordinate
(H) [M]
R5390 R5422 R5454 R5486
R5391 R5423 R5455 R5487
R5392 R5424 R5456 R5488 Skip coordinate position 8th axis feature coordinate
(L) [M]
R5393 R5425 R5457 R5489 Skip coordinate position 8th axis feature coordinate
(H) [M]
R5394 R5426 R5458 R5490
R5395 R5427 R5459 R5491
Device No.
$1 $2 $3 $4 Abbrev. Signal name
R5492 R5500 R5508 R5516 Load monitor I: Cutting torque output value 1st axis
R5493 R5501 R5509 R5517 Load monitor I: Cutting torque output value 2nd axis
R5494 R5502 R5510 R5518 Load monitor I: Cutting torque output value 3rd axis
R5495 R5503 R5511 R5519 Load monitor I: Cutting torque output value 4th axis
R5496 R5504 R5512 R5520 Load monitor I: Cutting torque output value 5th axis
R5497 R5505 R5513 R5521 Load monitor I: Cutting torque output value 6th axis
R5498 R5506 R5514 R5522 Load monitor I: Cutting torque output value 7th axis
R5499 R5507 R5515 R5523 Load monitor I: Cutting torque output value 8th axis
Device No.
$1 $2 $3 $4 Abbrev. Signal name
R5524 R5532 R5540 R5548 Actual machining time 1st axis
R5525 R5533 R5541 R5549 Actual machining time 2nd axis
R5526 R5534 R5542 R5550 Actual machining time 3rd axis
R5527 R5535 R5543 R5551 Actual machining time 4th axis
R5528 R5536 R5544 R5552 Actual machining time 5th axis
R5529 R5537 R5545 R5553 Actual machining time 6th axis
R5530 R5538 R5546 R5554 Actual machining time 7th axis
R5531 R5539 R5547 R5555 Actual machining time 8th axis
Device No.
$1 $2 $3 $4 Abbrev. Signal name
R5556 R5564 R5572 R5580 SVINER1 Optimum acceleration/deceleration selection: NC
axis estimated inertia ratio 1st axis
R5557 R5565 R5573 R5581 SVINER2 Optimum acceleration/deceleration selection: NC
axis estimated inertia ratio 2nd axis

R5558 R5566 R5574 R5582 SVINER3 Optimum acceleration/deceleration selection: NC axis estimated inertia ratio 3rd axis
R5559 R5567 R5575 R5583 SVINER4 Optimum acceleration/deceleration selection: NC axis estimated inertia ratio 4th axis
R5560 R5568 R5576 R5584 SVINER5 Optimum acceleration/deceleration selection: NC axis estimated inertia ratio 5th axis
R5561 R5569 R5577 R5585 SVINER6 Optimum acceleration/deceleration selection: NC axis estimated inertia ratio 6th axis
R5562 R5570 R5578 R5586 SVINER7 Optimum acceleration/deceleration selection: NC axis estimated inertia ratio 7th axis
R5563 R5571 R5579 R5587 SVINER8 Optimum acceleration/deceleration selection: NC axis estimated inertia ratio 8th axis

Device No.
$1 $2 $3 $4 Abbrev. Signal name
R5588 R5596 R5604 R5612 SVAFLT1 Optimum acceleration/deceleration selection: NC axis estimated resonance frequency 1st axis
R5589 R5597 R5605 R5613 SVAFLT2 Optimum acceleration/deceleration selection: NC axis estimated resonance frequency 2nd axis
R5590 R5598 R5606 R5614 SVAFLT3 Optimum acceleration/deceleration selection: NC axis estimated resonance frequency 3rd axis
R5591 R5599 R5607 R5615 SVAFLT4 Optimum acceleration/deceleration selection: NC axis estimated resonance frequency 4th axis
R5592 R5600 R5608 R5616 SVAFLT5 Optimum acceleration/deceleration selection: NC axis estimated resonance frequency 5th axis
R5593 R5601 R5609 R5617 SVAFLT6 Optimum acceleration/deceleration selection: NC axis estimated resonance frequency 6th axis
R5594 R5602 R5610 R5618 SVAFLT7 Optimum acceleration/deceleration selection: NC axis estimated resonance frequency 7th axis
R5595 R5603 R5611 R5619 SVAFLT8 Optimum acceleration/deceleration selection: NC axis estimated resonance frequency 8th axis
Device No.
$1 $2 $3 $4 Abbrev. Signal name
R5620 R5628 R5636 R5644 Load monitoring I: Effective torque output 1st axis
R5621 R5629 R5637 R5645 Load monitoring I: Effective torque output 2nd axis
R5622 R5630 R5638 R5646 Load monitoring I: Effective torque output 3rd axis
R5623 R5631 R5639 R5647 Load monitoring I: Effective torque output 4th axis
R5624 R5632 R5640 R5648 Load monitoring I: Effective torque output 5th axis
R5625 R5633 R5641 R5649 Load monitoring I: Effective torque output 6th axis
R5626 R5634 R5642 R5650 Load monitoring I: Effective torque output 7th axis
R5627 R5635 R5643 R5651 Load monitoring I: Effective torque output 8th axis
Device No.
$1 $2 $3 $4 Abbrev. Signal name
R5652 R5660 R5668 R5676
R5653 R5661 R5669 R5677
R5654 R5662 R5670 R5678
R5655 R5663 R5671 R5679
R5656 R5664 R5672 R5680
R5657 R5665 R5673 R5681
R5658 R5666 R5674 R5682
R5659 R5667 R5675 R5683
Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
R6372 R6380 R6388 R6396 R6404 R6412 R6420 R6428 User macro output #1132 (NC -> PLC) (L)
R6373 R6381 R6389 R6397 R6405 R6413 R6421 R6429 User macro output #1132 (NC -> PLC) (H)
R6374 R6382 R6390 R6398 R6406 R6414 R6422 R6430 User macro output #1133 (NC -> PLC) (L)
R6375 R6383 R6391 R6399 R6407 R6415 R6423 R6431 User macro output #1133 (NC -> PLC) (H)
R6376 R6384 R6392 R6400 R6408 R6416 R6424 R6432 User macro output #1134 (NC -> PLC) (L)
R6377 R6385 R6393 R6401 R6409 R6417 R6425 R6433 User macro output #1134 (NC -> PLC) (H)
R6378 R6386 R6394 R6402 R6410 R6418 R6426 R6434 User macro output #1135 (NC -> PLC) (L)
R6379 R6387 R6395 R6403 R6411 R6419 R6427 R6435 User macro output #1135 (NC -> PLC) (H)

Device No.
1stSP 2ndSP 3rdSP 4thSP 5thSP 6thSP 7thSP 8thSP Abbrev. Signal name
R6500 R6550 R6600 R6650 R6700 R6750 R6800 R6850 Spindle command rotation speed input (L)
R6501 R6551 R6601 R6651 R6701 R6751 R6801 R6851 Spindle command rotation speed input (H)
R6502 R6552 R6602 R6652 R6702 R6752 R6802 R6852 Spindle command final data (rotation speed) (L)
R6503 R6553 R6603 R6653 R6703 R6753 R6803 R6853 Spindle command final data (rotation speed) (H)
R6504 R6554 R6604 R6654 R6704 R6754 R6804 R6854 Spindle command final data (12-bit binary) (L)
R6505 R6555 R6605 R6655 R6705 R6755 R6805 R6855 Spindle command final data (12-bit binary) (H)
R6506 R6556 R6606 R6656 R6706 R6756 R6806 R6856 Spindle actual speed (L)
R6507 R6557 R6607 R6657 R6707 R6757 R6807 R6857 Spindle actual speed (H)
Device No.
1stSP 2ndSP 3rdSP 4thSP 5thSP 6thSP 7thSP 8thSP Abbrev. Signal name
R6508 R6558 R6608 R6658 R6708 R6758 R6808 R6858
R6509 R6559 R6609 R6659 R6709 R6759 R6809 R6859
R6510 R6560 R6610 R6660 R6710 R6760 R6810 R6860
R6511 R6561 R6611 R6661 R6711 R6761 R6811 R6861
R6512 R6562 R6612 R6662 R6712 R6762 R6812 R6862
R6513 R6563 R6613 R6663 R6713 R6763 R6813 R6863

R6514 R6564 R6614 R6664 R6714 R6764 R6814 R6864 Optimum acceleration/deceleration: Esti mated inertia ratio (spindle)
R6515 R6565 R6615 R6665 R6715 R6765 R6815 R6865 Optimum acceleration/deceleration pa rameter group currently selected (spindle)
Device No.
1stSP 2ndSP 3rdSP 4thSP 5thSP 6thSP 7thSP 8thSP Abbrev. Signal name
R6516 R6566 R6616 R6666 R6716 R6766 R6816 R6866 Spindle synchronization: Phase error/Hob axis
delay angle
R6517 R6567 R6617 R6667 R6717 R6767 R6817 R6867 Spindle synchronization: Maximum phase er ror/Maximum hob axis delay angle
R6518 R6568 R6618 R6668 R6718 R6768 R6818 R6868 Spindle synchronization: Phase offset data
R6519 R6569 R6619 R6669 R6719 R6769 R6819 R6869 Spindle synchronization: Phase error monitor
R6520 R6570 R6620 R6670 R6720 R6770 R6820 R6870 Spindle synchronization: Phase error monitor
(lower limit)
R6521 R6571 R6621 R6671 R6721 R6771 R6821 R6871 Spindle synchronization: Phase error monitor
(upper limit)
R6522 R6572 R6622 R6672 R6722 R6772 R6822 R6872 Spindle synchronization: Phase error 1
R6523 R6573 R6623 R6673 R6723 R6773 R6823 R6873 Spindle synchronization: Phase error 2
Device No.
1stSP 2ndSP 3rdSP 4thSP 5thSP 6thSP 7thSP 8thSP Abbrev. Signal name
R6524 R6574 R6624 R6674 R6724 R6774 R6824 R6874
R6525 R6575 R6625 R6675 R6725 R6775 R6825 R6875 Spindle motor load ratio
R6526 R6576 R6626 R6676 R6726 R6776 R6826 R6876 SP TEMP Spindle temperature output
R6527 R6577 R6627 R6677 R6727 R6777 R6827 R6877 Spindle actual machining time
R6528 R6578 R6628 R6678 R6728 R6778 R6828 R6878 Load monitor I: Spindle cutting torque out put value
R6529 R6579 R6629 R6679 R6729 R6779 R6829 R6879 Spindle alarm/warning No.
R6530 R6580 R6630 R6680 R6730 R6780 R6830 R6880
R6531 R6581 R6631 R6681 R6731 R6781 R6831 R6881
M800V/M80V Series PLC Interface Manual
2 Input/Output Signals with Controller
2.2 PLC Input Signals (Data Type: R***)
IB-1501616-F 56
Device No.
1stSP 2ndSP 3rdSP 4thSP 5thSP 6thSP 7thSP 8thSP Abbrev. Signal name
R6532 R6582 R6632 R6682 R6732 R6782 R6832 R6882 Synchronous tapping Current error width (L)
R6533 R6583 R6633 R6683 R6733 R6783 R6833 R6883 Synchronous tapping Current error width (H)
R6534 R6584 R6634 R6684 R6734 R6784 R6834 R6884 Synchronous tapping Maximum error width (L)
R6535 R6585 R6635 R6685 R6735 R6785 R6835 R6885 Synchronous tapping Maximum error width (H)
R6536 R6586 R6636 R6686 R6736 R6786 R6836 R6886 Synchronous tapping Current error angle (L)
R6537 R6587 R6637 R6687 R6737 R6787 R6837 R6887 Synchronous tapping Current error angle (H)
R6538 R6588 R6638 R6688 R6738 R6788 R6838 R6888 Synchronous tapping Maximum error angle (L)
R6539 R6589 R6639 R6689 R6739 R6789 R6839 R6889 Synchronous tapping Maximum error angle (H)
Device No.
1stSP 2ndSP 3rdSP 4thSP 5thSP 6thSP 7thSP 8thSP Abbrev. Signal name
R6540 R6590 R6640 R6690 R6740 R6790 R6840 R6890
R6541 R6591 R6641 R6691 R6741 R6791 R6841 R6891 Load monitoring I: Estimated spindle distur bance torque output
R6542 R6592 R6642 R6692 R6742 R6792 R6842 R6892 Load monitoring I: Effective spindle torque out put
R6543 R6593 R6643 R6693 R6743 R6793 R6843 R6893
R6544 R6594 R6644 R6694 R6744 R6794 R6844 R6894
R6545 R6595 R6645 R6695 R6745 R6795 R6845 R6895
R6546 R6596 R6646 R6696 R6746 R6796 R6846 R6896
R6547 R6597 R6647 R6697 R6747 R6797 R6847 R6897 SP CHGST
S
Tool head hot swapping: Spindle switch status
Device No.
1stSP 2ndSP 3rdSP 4thSP 5thSP 6thSP 7thSP 8thSP Abbrev. Signal name
R6548 R6598 R6648 R6698 R6748 R6798 R6848 R6898 SPA FLTn
Optimum acceleration/deceleration selec tion: SP estimated resonance frequency/
notch filter effective frequency

R6549 R6599 R6649 R6699 R6749 R6799 R6849 R6899
Device No.
1stSP 2ndSP 3rdSP 4thSP 5thSP 6thSP 7thSP 8thSP Abbrev. Signal name
R7024 R7074 R7124 R7174 R7224 R7274 R7324 R7374 VC C_SPR
EV
VCC: Spindle rotation speed
R7025 R7075 R7125 R7175 R7225 R7275 R7325 R7375
M800V/M80V Series PLC Interface Manual
2 Input/Output Signals with Controller
2.2 PLC Input Signals (Data Type: R***)
57 IB-1501616-F
Common ($) Abbrev. Signal name Common ($) Abbrev. Signal name
R10000 RIO1 No. of error occurrences 1st ch R10008 RIO2 No. of error occurrences 1st ch
R10001 RIO1 No. of error occurrences 2nd ch R10009 RIO2 No. of error occurrences 2nd ch
R10002 RIO1 No. of error occurrences 3rd ch R10010 RIO2 No. of error occurrences 3rd ch
R10003 RIO1 No. of error occurrences 4th ch R10011 RIO2 No. of error occurrences 4th ch
R10004 RIO1 No. of error occurrences 5th ch R10012 RIO2 No. of error occurrences 5th ch
R10005 RIO1 No. of error occurrences 6th ch R10013 RIO2 No. of error occurrences 6th ch
R10006 RIO1 No. of error occurrences 7th ch R10014 RIO2 No. of error occurrences 7th ch
R10007 RIO1 No. of error occurrences 8th ch R10015 RIO2 No. of error occurrences 8th ch
Common ($) Abbrev. Signal name Common ($) Abbrev. Signal name
R10016 RIO3 No. of error occurrences 1st ch R10024 RIO4 No. of error occurrences 1st ch
R10017 RIO3 No. of error occurrences 2nd ch R10025 RIO4 No. of error occurrences 2nd ch
R10018 RIO3 No. of error occurrences 3rd ch R10026 RIO4 No. of error occurrences 3rd ch
R10019 RIO3 No. of error occurrences 4th ch R10027 RIO4 No. of error occurrences 4th ch
R10020 RIO3 No. of error occurrences 5th ch R10028 RIO4 No. of error occurrences 5th ch
R10021 RIO3 No. of error occurrences 6th ch R10029 RIO4 No. of error occurrences 6th ch
R10022 RIO3 No. of error occurrences 7th ch R10030 RIO4 No. of error occurrences 7th ch
R10023 RIO3 No. of error occurrences 8th ch R10031 RIO4 No. of error occurrences 8th ch
Common ($) Abbrev. Signal name Common ($) Abbrev. Signal name
R10064 Connection status of each channel RIO1, 2 R10072

R10065 Connection status of each channel RIO3, 4 R10073
R10066 R10074
R10067 R10075
R10068 CRC warning channel RIO1, 2 R10076
R10069 CRC warning channel RIO3, 4 R10077
R10070 R10078
R10071 R10079
Common ($) Abbrev. Signal name Common ($) Abbrev. Signal name
R10176 R10184
R10177 R10185
R10178 R10186
R10179 R10187
R10180 R10188 Base PLC mounting check (L)
R10181 R10189 Base PLC mounting check (H)
R10182 R10190
R10183 R10191

Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
R11800 R11850 R11900 R11950 R12000 R12050 R12100 R12150 Tool life management (M system)
Spare tool: Group No. (L)
R11801 R11851 R11901 R11951 R12001 R12051 R12101 R12151 Spare tool: Group No. (H)
R11802 R11852 R11902 R11952 R12002 R12052 R12102 R12152 Spare tool: Tool No. (L)
R11803 R11853 R11903 R11953 R12003 R12053 R12103 R12153 Spare tool: Tool No. (H)
R11804 R11854 R11904 R11954 R12004 R12054 R12104 R12154 Spare tool: Tool data flag/Status
R11805 R11855 R11905 R11955 R12005 R12055 R12105 R12155 Spare tool: Auxiliary data
R11806 R11856 R11906 R11956 R12006 R12056 R12106 R12156 Spare tool: Cumulative usage time (L)
R11807 R11857 R11907 R11957 R12007 R12057 R12107 R12157 Spare tool: Cumulative usage time (H)
Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
R11808 R11858 R11908 R11958 R12008 R12058 R12108 R12158 Spare tool: Service lifetime (L)
R11809 R11859 R11909 R11959 R12009 R12059 R12109 R12159 Spare tool: Service lifetime (H)
R11810 R11860 R11910 R11960 R12010 R12060 R12110 R12160 Spare tool: Cumulative usage count
R11811 R11861 R11911 R11961 R12011 R12061 R12111 R12161 Spare tool: Service life count
R11812 R11862 R11912 R11962 R12012 R12062 R12112 R12162 Spare tool: Cumulative usage wear amount (L)
R11813 R11863 R11913 R11963 R12013 R12063 R12113 R12163 Spare tool: Cumulative usage wear amount (H)
R11814 R11864 R11914 R11964 R12014 R12064 R12114 R12164 Spare tool: Service life wear amount (L)
R11815 R11865 R11915 R11965 R12015 R12065 R12115 R12165 Spare tool: Service life wear amount (H)
Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
R11816 R11866 R11916 R11966 R12016 R12066 R12116 R12166 Spare tool: Length compensation amount (L)
R11817 R11867 R11917 R11967 R12017 R12067 R12117 R12167 Spare tool: Length compensation amount (H)
R11818 R11868 R11918 R11968 R12018 R12068 R12118 R12168 Spare tool: Radius compensation amount (L)
R11819 R11869 R11919 R11969 R12019 R12069 R12119 R12169 Spare tool: Radius compensation amount (H)
R11820 R11870 R11920 R11970 R12020 R12070 R12120 R12170 Spare tool: Length wear amount (L)
R11821 R11871 R11921 R11971 R12021 R12071 R12121 R12171 Spare tool: Length wear amount (H)
R11822 R11872 R11922 R11972 R12022 R12072 R12122 R12172 Spare tool: Radius wear amount (L)
R11823 R11873 R11923 R11973 R12023 R12073 R12123 R12173 Spare tool: Radius wear amount (H)

Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
R11824 R11874 R11924 R11974 R12024 R12074 R12124 R12174 Tool life management (M system)
Active tool: Group No. (L)
R11825 R11875 R11925 R11975 R12025 R12075 R12125 R12175 Active tool: Group No. (H)
R11826 R11876 R11926 R11976 R12026 R12076 R12126 R12176 Active tool: Tool No. (L)
R11827 R11877 R11927 R11977 R12027 R12077 R12127 R12177 Active tool: Tool No. (H)
R11828 R11878 R11928 R11978 R12028 R12078 R12128 R12178 Active tool: Tool data flag/Status
R11829 R11879 R11929 R11979 R12029 R12079 R12129 R12179 Active tool: Auxiliary data
R11830 R11880 R11930 R11980 R12030 R12080 R12130 R12180 Active tool: Cumulative usage time (L)
R11831 R11881 R11931 R11981 R12031 R12081 R12131 R12181 Active tool: Cumulative usage time (H)
Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
R11832 R11882 R11932 R11982 R12032 R12082 R12132 R12182 Active tool: Service lifetime (L)
R11833 R11883 R11933 R11983 R12033 R12083 R12133 R12183 Active tool: Service lifetime (H)
R11834 R11884 R11934 R11984 R12034 R12084 R12134 R12184 Active tool: Cumulative usage count
R11835 R11885 R11935 R11985 R12035 R12085 R12135 R12185 Active tool: Service life count
R11836 R11886 R11936 R11986 R12036 R12086 R12136 R12186 Active tool: Cumulative usage wear amount (L)
R11837 R11887 R11937 R11987 R12037 R12087 R12137 R12187 Active tool: Cumulative usage wear amount (H)
R11838 R11888 R11938 R11988 R12038 R12088 R12138 R12188 Active tool: Service life wear amount (L)
R11839 R11889 R11939 R11989 R12039 R12089 R12139 R12189 Active tool: Service life wear amount (H)
Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
R11840 R11890 R11940 R11990 R12040 R12090 R12140 R12190 Active tool: Length compensation amount (L)
R11841 R11891 R11941 R11991 R12041 R12091 R12141 R12191 Active tool: Length compensation amount (H)
R11842 R11892 R11942 R11992 R12042 R12092 R12142 R12192 Active tool: Radius compensation amount (L)
R11843 R11893 R11943 R11993 R12043 R12093 R12143 R12193 Active tool: Radius compensation amount (H)
R11844 R11894 R11944 R11994 R12044 R12094 R12144 R12194 Active tool: Length wear amount (L)
R11845 R11895 R11945 R11995 R12045 R12095 R12145 R12195 Active tool: Length wear amount (H)
R11846 R11896 R11946 R11996 R12046 R12096 R12146 R12196 Active tool: Radius wear amount (L)
R11847 R11897 R11947 R11997 R12047 R12097 R12147 R12197 Active tool: Radius wear amount (H)

Common ($) Abbrev. Signal name Common ($) Abbrev. Signal name
R14000 EcoMonitorLight connection: Station #1 con sumed power
R14008
R14001 R14009
R14002 EcoMonitorLight connection: Station #1 regen erated power
R14010 EcoMonitorLight connection: Station #2 con R14003 R14011 sumed power
R14004 R14012 EcoMonitorLight connection: Station #2 regen R14005 R14013 erated power
R14006 R14014
R14007 R14015
Common ($) Abbrev. Signal name Common ($) Abbrev. Signal name
R14016 R14024
R14017 R14025
R14018 R14026
R14019 R14027
R14020 EcoMonitorLight connection: Station #3 con sumed power
R14028
R14021 R14029
R14022 EcoMonitorLight connection: Station #3 regen erated power
R14030 EcoMonitorLight connection: Station #4 con R14023 R14031 sumed power
Common ($) Abbrev. Signal name Common ($) Abbrev. Signal name
R14032 EcoMonitorLight connection: Station #4 regen erated power
R14040 EcoMonitorLight connection: Station #5 con R14033 R14041 sumed power
R14034 R14042 EcoMonitorLight connection: Station #5 regen R14035 R14043 erated power
R14036 R14044
R14037 R14045
R14038 R14046
R14039 R14047
Common ($) Abbrev. Signal name Common ($) Abbrev. Signal name
R14048 R14056
R14049 R14057
R14050 EcoMonitorLight connection: Station #6 con sumed power
R14058
R14051 R14059
R14052 EcoMonitorLight connection: Station #6 regen erated power
R14060 EcoMonitorLight connection: Station #7 con R14053 R14061 sumed power
R14054 R14062 EcoMonitorLight connection: Station #7 regen R14055 R14063 erated power

Common ($) Abbrev. Signal name Common ($) Abbrev. Signal name
R14064 R14072 EcoMonitorLight connection: Station #8 regen R14065 R14073 erated power
R14066 R14074
R14067 R14075
R14068 R14076
R14069 R14077
R14070 EcoMonitorLight connection: Station #8 con sumed power
R14078
R14071 R14079
Common ($) Abbrev. Signal name Common ($) Abbrev. Signal name
R14080 EcoMonitorLight connection: Station #9 con sumed power
R14088
R14081 R14089
R14082 EcoMonitorLight connection: Station #9 regen erated power
R14090 EcoMonitorLight connection: Station #10 con R14083 R14091 sumed power
R14084 R14092 EcoMonitorLight connection: Station #10 re R14085 R14093 generated power
R14086 R14094
R14087 R14095
Common ($) Abbrev. Signal name Common ($) Abbrev. Signal name
R14096 R14104
R14097 R14105
R14098 R14106
R14099 R14107
R14100 EcoMonitorLight connection: Station #11 con sumed power
R14108
R14101 R14109
R14102 EcoMonitorLight connection: Station #11 re generated power
R14110 EcoMonitorLight connection: Station #12 con R14103 R14111 sumed power
Common ($) Abbrev. Signal name Common ($) Abbrev. Signal name
R14112 EcoMonitorLight connection: Station #12 re generated power
R14120 EcoMonitorLight connection: Station #13 con R14113 R14121 sumed power
R14114 R14122 EcoMonitorLight connection: Station #13 re R14115 R14123 generated power
R14116 R14124
R14117 R14125
R14118 R14126
R14119 R14127
Common ($) Abbrev. Signal name Common ($) Abbrev. Signal name
R14128 R14136
R14129 R14137
R14130 EcoMonitorLight connection: Station #14 con sumed power
R14138
R14131 R14139
R14132 EcoMonitorLight connection: Station #14 re generated power
R14140 EcoMonitorLight connection: Station #15 con R14133 R14141 sumed power
R14134 R14142 EcoMonitorLight connection: Station #15 re R14135 R14143 generated power

Common ($) Abbrev. Signal name Common ($) Abbrev. Signal name
R14144 R14152 EcoMonitorLight connection: Station #16 re R14145 R14153 generated power
R14146 R14154
R14147 R14155
R14148 R14156
R14149 R14157
R14150 EcoMonitorLight connection: Station #16 con sumed power
R14158
R14151 R14159
Common ($) Abbrev. Signal name Common ($) Abbrev. Signal name
R14192 R14200 EcoMonitorLight connection: Station #1 num ber of reception errors
R14193 R14201 EcoMonitorLight connection: Station #1 maxi mum number of successive reception errors
R14194 R14202 EcoMonitorLight connection: Station #1 num ber of transmission errors
R14195 R14203 EcoMonitorLight connection: Station #1 maxi mum number of successive transmission errors
R14196 R14204
R14197 R14205
R14198 R14206
R14199 R14207
Common ($) Abbrev. Signal name Common ($) Abbrev. Signal name
R14208 R14216
R14209 R14217
R14210 EcoMonitorLight connection: Station #2 num ber of reception errors R14218
R14211 EcoMonitorLight connection: Station #2 maxi mum number of successive reception errors R14219
R14212 EcoMonitorLight connection: Station #2 num ber of transmission errors R14220 EcoMonitorLight connection: Station #3 num ber of reception errors
R14213
EcoMonitorLight connection: Station #2 maxi mum number of successive transmission er rors
R14221 EcoMonitorLight connection: Station #3 maxi mum number of successive reception errors
R14214 R14222 EcoMonitorLight connection: Station #3 num ber of transmission errors
R14215 R14223 EcoMonitorLight connection: Station #3 maxi mum number of successive transmission errors
Common ($) Abbrev. Signal name Common ($) Abbrev. Signal name
R14224 R14232 EcoMonitorLight connection: Station #4 num ber of transmission errors
R14225 R14233 EcoMonitorLight connection: Station #4 maxi mum number of successive transmission errors
R14226 R14234
R14227 R14235
R14228 R14236
R14229 R14237
R14230 EcoMonitorLight connection: Station #4 num ber of reception errors R14238
R14231 EcoMonitorLight connection: Station #4 maxi mum number of successive reception errors R14239

Common ($) Abbrev. Signal name Common ($) Abbrev. Signal name
R14240 EcoMonitorLight connection: Station #5 num ber of reception errors R14248
R14241 EcoMonitorLight connection: Station #5 maxi mum number of successive reception errors R14249
R14242 EcoMonitorLight connection: Station #5 num ber of transmission errors R14250 EcoMonitorLight connection: Station #6 num ber of reception errors
R14243
EcoMonitorLight connection: Station #5 maxi mum number of successive transmission er rors
R14251 EcoMonitorLight connection: Station #6 maxi mum number of successive reception errors
R14244 R14252 EcoMonitorLight connection: Station #6 num ber of transmission errors
R14245 R14253 EcoMonitorLight connection: Station #6 maxi mum number of successive transmission errors
R14246 R14254
R14247 R14255
Common ($) Abbrev. Signal name Common ($) Abbrev. Signal name
R14256 R14264
R14257 R14265
R14258 R14266
R14259 R14267
R14260 EcoMonitorLight connection: Station #7 num ber of reception errors R14268
R14261 EcoMonitorLight connection: Station #7 maxi mum number of successive reception errors R14269
R14262 EcoMonitorLight connection: Station #7 num ber of transmission errors R14270 EcoMonitorLight connection: Station #8 num ber of reception errors
R14263
EcoMonitorLight connection: Station #7 maxi mum number of successive transmission er rors
R14271 EcoMonitorLight connection: Station #8 maxi mum number of successive reception errors
Common ($) Abbrev. Signal name Common ($) Abbrev. Signal name
R14272 EcoMonitorLight connection: Station #8 num ber of transmission errors R14280 EcoMonitorLight connection: Station #9 num ber of reception errors
R14273
EcoMonitorLight connection: Station #8 maxi mum number of successive transmission er rors
R14281 EcoMonitorLight connection: Station #9 maxi mum number of successive reception errors
R14274 R14282 EcoMonitorLight connection: Station #9 num ber of transmission errors
R14275 R14283 EcoMonitorLight connection: Station #9 maxi mum number of successive transmission errors
R14276 R14284
R14277 R14285
R14278 R14286
R14279 R14287

Common ($) Abbrev. Signal name Common ($) Abbrev. Signal name
R14288 R14296
R14289 R14297
R14290 EcoMonitorLight connection: Station #10 num ber of reception errors R14298
R14291 EcoMonitorLight connection: Station #10 max imum number of successive reception errors R14299
R14292 EcoMonitorLight connection: Station #10 num ber of transmission errors R14300 EcoMonitorLight connection: Station #11 num ber of reception errors

R14293
EcoMonitorLight connection: Station #10 max imum number of successive transmission er rors
R14301 EcoMonitorLight connection: Station #11 max imum number of successive reception errors
R14294 R14302 EcoMonitorLight connection: Station #11 num ber of transmission errors
R14295 R14303
EcoMonitorLight connection: Station #11 max imum number of successive transmission er rors
Common ($) Abbrev. Signal name Common ($) Abbrev. Signal name
R14304 R14312 EcoMonitorLight connection: Station #12 num ber of transmission errors
R14305 R14313
EcoMonitorLight connection: Station #12 max imum number of successive transmission er rors
R14306 R14314
R14307 R14315
R14308 R14316
R14309 R14317
R14310 EcoMonitorLight connection: Station #12 num ber of reception errors R14318
R14311 EcoMonitorLight connection: Station #12 max imum number of successive reception errors R14319
Common ($) Abbrev. Signal name Common ($) Abbrev. Signal name
R14320 EcoMonitorLight connection: Station #13 num ber of reception errors R14328
R14321 EcoMonitorLight connection: Station #13 max imum number of successive reception errors R14329
R14322 EcoMonitorLight connection: Station #13 num ber of transmission errors R14330 EcoMonitorLight connection: Station #14 num ber of reception errors
R14323
EcoMonitorLight connection: Station #13 max imum number of successive transmission er rors
R14331 EcoMonitorLight connection: Station #14 max imum number of successive reception errors
R14324 R14332 EcoMonitorLight connection: Station #14 num ber of transmission errors
R14325 R14333
EcoMonitorLight connection: Station #14 max imum number of successive transmission er rors
R14326 R14334
R14327 R14335

Common ($) Abbrev. Signal name Common ($) Abbrev. Signal name
R14336 R14344
R14337 R14345
R14338 R14346
R14339 R14347
R14340 EcoMonitorLight connection: Station #15 num ber of reception errors R14348
R14341 EcoMonitorLight connection: Station #15 max imum number of successive reception errors R14349
R14342 EcoMonitorLight connection: Station #15 num ber of transmission errors R14350 EcoMonitorLight connection: Station #16 num ber of reception errors
R14343
EcoMonitorLight connection: Station #15 max imum number of successive transmission er rors
R14351 EcoMonitorLight connection: Station #16 max imum number of successive reception errors
Common ($) Abbrev. Signal name Common ($) Abbrev. Signal name
R14352 EcoMonitorLight connection: Station #16 num ber of transmission errors R14360
R14353
EcoMonitorLight connection: Station #16 max imum number of successive transmission er rors
R14361
R14354 R14362
R14355 R14363
R14356 R14364
R14357 R14365
R14358 R14366
R14359 R14367
Common ($) Abbrev. Signal name Common ($) Abbrev. Signal name
R14400 EcoMonitorLight connection: Completion bit
R14401 EcoMonitorLight connection: Completion sta tus
R14402
EcoMonitorLight connection: Acquired data
R14403
R14404
R14405
R14406
R14407

Common ($) Abbrev. Signal name Common ($) Abbrev. Signal name
R14500
MES interface library: Serial number
R14508
MES interface library: Serial number
R14501 R14509
R14502 R14510
R14503 R14511
R14504 R14512
R14505 R14513
R14506 R14514
R14507 R14515
Common ($) Abbrev. Signal name Common ($) Abbrev. Signal name
R14516
MES interface library: Serial number
R14524
MES interface library: Serial number
R14517 R14525
R14518 R14526
R14519 R14527

R14520 R14528
R14521 R14529
R14522 R14530
R14523 R14531
Common ($) Abbrev. Signal name Common ($) Abbrev. Signal name
R14532
MES interface library: Operator ID
R14540
MES interface library: Operator ID
R14533 R14541
R14534 R14542
R14535 R14543
R14536 R14544
R14537 R14545
R14538 R14546
R14539 R14547
Common ($) Abbrev. Signal name Common ($) Abbrev. Signal name
R14548
MES interface library: Operator ID
R14556
MES interface library: Operator ID
R14549 R14557
R14550 R14558
R14551 R14559
R14552 R14560
R14553 R14561
R14554 R14562
R14555 R14563
M800V/M80V Series PLC Interface Manual
2 Input/Output Signals with Controller
2.2 PLC Input Signals (Data Type: R***)
67 IB-1501616-F
Common ($) Abbrev. Signal name Common ($) Abbrev. Signal name
R14564
MES interface library: NC unit number
R14572
MES interface library: Line number
R14565 R14573
R14566 R14574
R14567 R14575
R14568 R14576
R14569 R14577
R14570 R14578
R14571 R14579
Common ($) Abbrev. Signal name Common ($) Abbrev. Signal name
R14580
MES interface library: Line number
R14588 MES interface library: Machine type
R14581 R14589 MES interface library: Database connection
status
R14582 R14590 MES interface library: Database operation re quest register
R14583 R14591 MES interface library: Database operation re ception register
R14584 R14592
MES interface library: Database operation re sult register
R14585 R14593
R14586 R14594
R14587 R14595
Common ($) Abbrev. Signal name Common ($) Abbrev. Signal name
R14596 MES interface library: Database operation re sult register
R14604 MES interface library: G code modal registra R14597 R14605 tion selection
R14598 MES interface library: DB operation selection R14606
R14599 MES interface library: Operation table selection R14607
R14600 MES interface library: Function selection at ma chining end R14608
R14601 MES interface library: Function selection at
alarm R14609
R14602 MES interface library: Function selection at us er's option R14610
R14603 R14611
Common ($) Abbrev. Signal name Common ($) Abbrev. Signal name
R20000 FLSYSM FL-net: System monitor R20008 RULS FL-net:
Upper layer status of reference node
R20001 LNA FL-net: Local node address R20009 RCAD1
FL-net:
Common memory area 1 data top address
of reference node

R20002 LULS FL-net: Upper layer status of local node R20010 RCSZ1
FL-net:
Common memory area 1 data size of ref erence node

R20003 LLKS FL-net: Link status of local node R20011 RCAD2
FL-net:
Common memory area 2 data top address
of reference node

R20004 LSTS FL-net: Status of local node R20012 RCSZ2
FL-net:
Common memory area 2 data size of ref erence node

R20005 PNADSP FL-net: Participating node top address on
display R20013 RLKS FL-net:
Link status of reference node
R20006 PNALST FL-net: List of participating nodes R20014 RMFT
FL-net:
Allowable minimum frame interval time of
reference node

R20007 RNAD SP
FL-net: Reference node address on dis play R20015 RCT NOW
FL-net:
Present value of refresh cycle measure ment time

Common ($) Abbrev. Signal name Common ($) Abbrev. Signal name
R20016 RVCYR FL-net: API return value of cyclic transmis sion read R20024
NC warning display: Alarm 3D accumula tion counter
R20017 RVCYW FL-net: API return value of cyclic transmis sion write R20025
R20018 R20026
R20019 R20027
R20020 R20028
R20021 R20029
R20022 R20030
R20023 R20031
Common ($) Abbrev. Signal name Common ($) Abbrev. Signal name
R20032
NC warning display: Alarm 3D frequency
counter
R20040
NC warning display: "Z48 Power supply
voltage error warning at acceleration/de celeration" state

R20033 R20041
R20034 R20042
R20035 R20043 SVIDDD
Diagnosis data output: Servomotor insula tion degradation detection in progress
(PLC axis)
R20036 R20044
R20037 R20045
R20038 R20046
R20039 R20047
Common ($) Abbrev. Signal name Common ($) Abbrev. Signal name
R20048 SPIDDD Diagnosis data output: Spindle motor in sulation degradation detection in progress R20056
R20049 R20057
R20050 R20058 PLC window: number of continuous writes
detected
R20051 R20059 PLC window: continuous write window No.
R20052 R20060
R20053 R20061
R20054 R20062
Laser: Laser output feedback value (W) R20055 R20063

Common ($) Abbrev. Signal name Common ($) Abbrev. Signal name
R20064 Motor load current PLC axis (1st axis) (L) R20072 Motor load current PLC axis (5th axis) (L)
R20065 Motor load current PLC axis (1st axis) (H) R20073 Motor load current PLC axis (5th axis) (H)
R20066 Motor load current PLC axis (2nd axis) (L) R20074 Motor load current PLC axis (6th axis) (L)
R20067 Motor load current PLC axis (2nd axis) (H) R20075 Motor load current PLC axis (6th axis) (H)
R20068 Motor load current PLC axis (3rd axis) (L) R20076 Motor load current PLC axis (7th axis) (L)
R20069 Motor load current PLC axis (3rd axis) (H) R20077 Motor load current PLC axis (7th axis) (H)
R20070 Motor load current PLC axis (4th axis) (L) R20078 Motor load current PLC axis (8th axis) (L)
R20071 Motor load current PLC axis (4th axis) (H) R20079 Motor load current PLC axis (8th axis) (H)
Common ($) Abbrev. Signal name Common ($) Abbrev. Signal name
R20080 PSWSY
Sn
Arbitrary-assigned PSW for each part sys tem 1 to 16
 R20088
R20081 PSWSY
Sn
Arbitrary-assigned PSW for each part sys tem 17 to 32
 R20089
R20082 PSWSY
Sn
Arbitrary-assigned PSW for each part sys tem 33 to 48
 R20090
R20083 PSWSY
Sn
Arbitrary-assigned PSW for each part sys tem 49 to 64
 R20091
R20084 R20092
R20085 R20093
R20086 R20094
R20087 R20095

Common ($) Abbrev. Signal name Common ($) Abbrev. Signal name
R20112 Motion control release: Valid/Invalid sta tus
R20120
R20113 Motion control release: Implementation
check by function
R20121
R20114 R20122
R20115 R20123
R20116 R20124
R20117 R20125
R20118 R20126
R20119 R20127

Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
R20500 R20700 R20900 R21100 R21300 R21500 R21700 R21900 Current spatial error compensation value (orthogonal co R20501 R20701 R20901 R21101 R21301 R21501 R21701 R21901 ordinate horizontal axis)
R20502 R20702 R20902 R21102 R21302 R21502 R21702 R21902 Current spatial error compensation value (orthogonal co R20503 R20703 R20903 R21103 R21303 R21503 R21703 R21903 ordinate vertical axis)
R20504 R20704 R20904 R21104 R21304 R21504 R21704 R21904 Current spatial error compensation value (orthogonal co R20505 R20705 R20905 R21105 R21305 R21505 R21705 R21905 ordinate height axis)
R20506 R20706 R20906 R21106 R21306 R21506 R21706 R21906
Current spatial error compensation value (1st rotary axis) R20507 R20707 R20907 R21107 R21307 R21507 R21707 R21907
Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
R20508 R20708 R20908 R21108 R21308 R21508 R21708 R21908 Current spatial error compensation value (2nd rotary ax R20509 R20709 R20909 R21109 R21309 R21509 R21709 R21909 is)
R20510 R20710 R20910 R21110 R21310 R21510 R21710 R21910
R20511 R20711 R20911 R21111 R21311 R21511 R21711 R21911
R20512 R20712 R20912 R21112 R21312 R21512 R21712 R21912
R20513 R20713 R20913 R21113 R21313 R21513 R21713 R21913
R20514 R20714 R20914 R21114 R21314 R21514 R21714 R21914
R20515 R20715 R20915 R21115 R21315 R21515 R21715 R21915
Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
R20516 R20716 R20916 R21116 R21316 R21516 R21716 R21916 Appropriate machining diagnosis error axis
R20517 R20717 R20917 R21117 R21317 R21517 R21717 R21917 TRTNCNT Tool retract and return 2: Number of transit points
stored
R20518 R20718 R20918 R21118 R21318 R21518 R21718 R21918
R20519 R20719 R20919 R21119 R21319 R21519 R21719 R21919 NC warning display: "Z48 Power supply voltage er ror warning at acceleration/deceleration" state
R20520 R20720 R20920 R21120 R21320 R21520 R21720 R21920
R20521 R20721 R20921 R21121 R21321 R21521 R21721 R21921
R20522 R20722 R20922 R21122 R21322 R21522 R21722 R21922 SVIDDD Diagnosis data output: Servomotor insulation degrada tion detection in progress
R20523 R20723 R20923 R21123 R21323 R21523 R21723 R21923
Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
R20524 R20724 R20924 R21124 R21324 R21524 R21724 R21924
R20525 R20725 R20925 R21125 R21325 R21525 R21725 R21925
R20526 R20726 R20926 R21126 R21326 R21526 R21726 R21926
R20527 R20727 R20927 R21127 R21327 R21527 R21727 R21927
R20528 R20728 R20928 R21128 R21328 R21528 R21728 R21928
R20529 R20729 R20929 R21129 R21329 R21529 R21729 R21929
R20530 R20730 R20930 R21130 R21330 R21530 R21730 R21930
R20531 R20731 R20931 R21131 R21331 R21531 R21731 R21931

Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
R20532 R20732 R20932 R21132 R21332 R21532 R21732 R21932
R20533 R20733 R20933 R21133 R21333 R21533 R21733 R21933
R20534 R20734 R20934 R21134 R21334 R21534 R21734 R21934
R20535 R20735 R20935 R21135 R21335 R21535 R21735 R21935
R20536 R20736 R20936 R21136 R21336 R21536 R21736 R21936
L system T code data R20537 R20737 R20937 R21137 R21337 R21537 R21737 R21937
R20538 R20738 R20938 R21138 R21338 R21538 R21738 R21938
R20539 R20739 R20939 R21139 R21339 R21539 R21739 R21939
Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
R20540 R20740 R20940 R21140 R21340 R21540 R21740 R21940
R20541 R20741 R20941 R21141 R21341 R21541 R21741 R21941
R20542 R20742 R20942 R21142 R21342 R21542 R21742 R21942
R20543 R20743 R20943 R21143 R21343 R21543 R21743 R21943
R20544 R20744 R20944 R21144 R21344 R21544 R21744 R21944
R20545 R20745 R20945 R21145 R21345 R21545 R21745 R21945
R20546 R20746 R20946 R21146 R21346 R21546 R21746 R21946
R20547 R20747 R20947 R21147 R21347 R21547 R21747 R21947
Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
R20556 R20756 R20956 R21156 R21356 R21556 R21756 R21956 VCC_VIB VCC: Number of vibrations
R20557 R20757 R20957 R21157 R21357 R21557 R21757 R21957 VCC_FRQ VCC: Frequency
R20558 R20758 R20958 R21158 R21358 R21558 R21758 R21958 VC C_VIBAX VCC: Vibrating axis
R20559 R20759 R20959 R21159 R21359 R21559 R21759 R21959 VCC_-
FACT VCC: Cause of non-vibration
R20560 R20760 R20960 R21160 R21360 R21560 R21760 R21960
R20561 R20761 R20961 R21161 R21361 R21561 R21761 R21961
R20562 R20762 R20962 R21162 R21362 R21562 R21762 R21962
R20563 R20763 R20963 R21163 R21363 R21563 R21763 R21963

Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
R20564 R20764 R20964 R21164 R21364 R21564 R21764 R21964 CLC: Maximum load
R20565 R20765 R20965 R21165 R21365 R21565 R21765 R21965 CLC: Minimum load
R20566 R20766 R20966 R21166 R21366 R21566 R21766 R21966
R20567 R20767 R20967 R21167 R21367 R21567 R21767 R21967
R20568 R20768 R20968 R21168 R21368 R21568 R21768 R21968
R20569 R20769 R20969 R21169 R21369 R21569 R21769 R21969
R20570 R20770 R20970 R21170 R21370 R21570 R21770 R21970
R20571 R20771 R20971 R21171 R21371 R21571 R21771 R21971

Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
R20580 R20780 R20980 R21180 R21380 R21580 R21780 R21980 MCSLPA Machining condition selection I: Current machining condi tion (application)
R20581 R20781 R20981 R21181 R21381 R21581 R21781 R21981 MCSLPC Machining condition selection I: Current machining condi tion (condition)
R20582 R20782 R20982 R21182 R21382 R21582 R21782 R21982 MCSLSTS Machining condition selection I: Current machining condi tion status
R20583 R20783 R20983 R21183 R21383 R21583 R21783 R21983 MCSLERR Machining condition selection I: Machining condition pa rameter group switch error status
R20584 R20784 R20984 R21184 R21384 R21584 R21784 R21984
R20585 R20785 R20985 R21185 R21385 R21585 R21785 R21985
R20586 R20786 R20986 R21186 R21386 R21586 R21786 R21986
R20587 R20787 R20987 R21187 R21387 R21587 R21787 R21987
Device No.
$1 $2 $3 $4 Abbrev. Signal name
R24500 R24532 R24564 R24596 NC warning display: Alarm 3D accumulation counter
1st axis
R24501 R24533 R24565 R24597 NC warning display: Alarm 3D accumulation counter
2nd axis
R24502 R24534 R24566 R24598 NC warning display: Alarm 3D accumulation counter
3rd axis
R24503 R24535 R24567 R24599 NC warning display: Alarm 3D accumulation counter
4th axis
R24504 R24536 R24568 R24600 NC warning display: Alarm 3D accumulation counter
5th axis
R24505 R24537 R24569 R24601 NC warning display: Alarm 3D accumulation counter
6th axis
R24506 R24538 R24570 R24602 NC warning display: Alarm 3D accumulation counter
7th axis
R24507 R24539 R24571 R24603 NC warning display: Alarm 3D accumulation counter
8th axis
Device No.
$1 $2 $3 $4 Abbrev. Signal name
R24508 R24540 R24572 R24604 NC warning display: Alarm 3D frequency counter 1st
axis
R24509 R24541 R24573 R24605 NC warning display: Alarm 3D frequency counter 2nd
axis
R24510 R24542 R24574 R24606 NC warning display: Alarm 3D frequency counter 3rd
axis
R24511 R24543 R24575 R24607 NC warning display: Alarm 3D frequency counter 4th
axis
R24512 R24544 R24576 R24608 NC warning display: Alarm 3D frequency counter 5th
axis
R24513 R24545 R24577 R24609 NC warning display: Alarm 3D frequency counter 6th
axis
R24514 R24546 R24578 R24610 NC warning display: Alarm 3D frequency counter 7th
axis
R24515 R24547 R24579 R24611 NC warning display: Alarm 3D frequency counter 8th
axis

Device No.
$1 $2 $3 $4 Abbrev. Signal name
R24756 R24788 R24820 R24852 CRSAXO1 Mixed control (cross axis control): Swapped axis (1st
axis)
R24757 R24789 R24821 R24853 CRSAXO2 Mixed control (cross axis control): Swapped axis (2nd
axis)
R24758 R24790 R24822 R24854 CRSAXO3 Mixed control (cross axis control): Swapped axis (3rd
axis)
R24759 R24791 R24823 R24855 CRSAXO4 Mixed control (cross axis control): Swapped axis (4th
axis)
R24760 R24792 R24824 R24856 CRSAXO5 Mixed control (cross axis control): Swapped axis (5th
axis)
R24761 R24793 R24825 R24857 CRSAXO6 Mixed control (cross axis control): Swapped axis (6th
axis)
R24762 R24794 R24826 R24858 CRSAXO7 Mixed control (cross axis control): Swapped axis (7th
axis)
R24763 R24795 R24827 R24859 CRSAXO8 Mixed control (cross axis control): Swapped axis (8th
axis)
Device No.
$1 $2 $3 $4 Abbrev. Signal name
R24884 R24916 R24948 R24980
Total distance traveled by 1st axis during automatic
operation [M]
R24885 R24917 R24949 R24981

R24886 R24918 R24950 R24982
R24887 R24919 R24951 R24983
R24888 R24920 R24952 R24984
Total distance traveled by 2nd axis during automatic
operation [M]
R24889 R24921 R24953 R24985
R24890 R24922 R24954 R24986
R24891 R24923 R24955 R24987
R24892 R24924 R24956 R24988
Total distance traveled by 3rd axis during automatic
operation [M]
R24893 R24925 R24957 R24989
R24894 R24926 R24958 R24990
R24895 R24927 R24959 R24991
R24896 R24928 R24960 R24992
Total distance traveled by 4th axis during automatic
operation [M]
R24897 R24929 R24961 R24993
R24898 R24930 R24962 R24994
R24899 R24931 R24963 R24995
R24900 R24932 R24964 R24996
Total distance traveled by 5th axis during automatic
operation [M]
R24901 R24933 R24965 R24997
R24902 R24934 R24966 R24998
R24903 R24935 R24967 R24999
R24904 R24936 R24968 R25000
Total distance traveled by 6th axis during automatic
operation [M]
R24905 R24937 R24969 R25001
R24906 R24938 R24970 R25002
R24907 R24939 R24971 R25003
R24908 R24940 R24972 R25004
Total distance traveled by 7th axis during automatic
operation [M]
R24909 R24941 R24973 R25005
R24910 R24942 R24974 R25006
R24911 R24943 R24975 R25007
R24912 R24944 R24976 R25008
Total distance traveled by 8th axis during automatic
operation [M]
R24913 R24945 R24977 R25009
R24914 R24946 R24978 R25010
R24915 R24947 R24979 R25011

Device No.
$1 $2 $3 $4 Abbrev. Signal name
R25012 R25020 R25028 R25036 AX CHGSTS1
Tool head hot swapping: NC axis switch status 1st axis
R25013 R25021 R25029 R25037 AX CHGSTS2
Tool head hot swapping: NC axis switch status 2nd axis
R25014 R25022 R25030 R25038 AX CHGSTS3
Tool head hot swapping: NC axis switch status 3rd axis
R25015 R25023 R25031 R25039 AX CHGSTS4
Tool head hot swapping: NC axis switch status 4th axis
R25016 R25024 R25032 R25040 AX CHGSTS5
Tool head hot swapping: NC axis switch status 5th axis
R25017 R25025 R25033 R25041 AX CHGSTS6
Tool head hot swapping: NC axis switch status 6th axis
R25018 R25026 R25034 R25042 AX CHGSTS7
Tool head hot swapping: NC axis switch status 7th axis
R25019 R25027 R25035 R25043 AX CHGSTS8
Tool head hot swapping: NC axis switch status 8th axis

2.3 PLC Output Signals (Bit Type: Y***)
(1) Signals with "" are prepared for a specific machine tool builder.
Common ($) Abbrev. Signal name Common ($) Abbrev. Signal name
Y700 IPCC1 Power consumption computation: Clear
consumption accumulation 1 Y708 *KEY1 Data protect key 1
Y701 IPCC2 Power consumption computation: Clear
consumption accumulation 2 Y709 *KEY2 Data protect key 2
Y702 IPCC3 Power consumption computation: Clear
consumption accumulation 3 Y70A *KEY3 Data protect key 3
Y703 IPCC4 Power consumption computation: Clear
consumption accumulation 4 Y70B
Y704 RHD1 Integration time input 1 Y70C PDISP Program display during operation
Y705 RHD2 Integration time input 2 Y70D Handle pulse encoder communication
connector priority
Y706 MD BUSRST1 Modbus Time-out 1 cancel Y70E
Y707 MD BUSRST2 Modbus Time-out 2 cancel Y70F
Common ($) Abbrev. Signal name Common ($) Abbrev. Signal name
Y710 Y718 *PCD1 PLC axis near point detection 1st axis

Y711 Optimum acceleration/deceleration pa rameter switch request [spindle] Y719 *PCD2 PLC axis near point detection 2nd axis
Y712 Y71A *PCD3 PLC axis near point detection 3rd axis
Y713 Y71B *PCD4 PLC axis near point detection 4th axis
Y714 Y71C *PCD5 PLC axis near point detection 5th axis
Y715 Y71D *PCD6 PLC axis near point detection 6th axis
Y716 Y71E *PCD7 PLC axis near point detection 7th axis
Y717 Y71F *PCD8 PLC axis near point detection 8th axis
Common ($) Abbrev. Signal name Common ($) Abbrev. Signal name
Y720 HS1P PLC axis 1st handle valid Y728 CRTFN CRT changeover completion
Y721 HS2P PLC axis 2nd handle valid Y729 SCRON Screen display request
Y722 HS3P PLC axis 3rd handle valid Y72A
Y723 PLC axis control buffering mode valid Y72B Collecting diagnosis data stop
Y724 IPCE1 Power consumption computation: Enable
consumption accumulation 1 Y72C SMPTRG Sampling start/stop
Y725 IPCE2 Power consumption computation: Enable
consumption accumulation 2 Y72D
Y726 IPCE3 Power consumption computation: Enable
consumption accumulation 3 Y72E Pallet program registration In APC execu tion
Y727 IPCE4 Power consumption computation: Enable
consumption accumulation 4 Y72F Pallet program registration Ext. workpiece
coordinate transfer ready
Common ($) Abbrev. Signal name Common ($) Abbrev. Signal name
Y730 DISP1 Display changeover $1 Y738
Y731 DISP2 Display changeover $2 Y739
Y732 DISP3 Display changeover $3 Y73A MSBK Single block between part systems
Y733 DISP4 Display changeover $4 Y73B
Y734 DISP5 Display changeover $5 Y73C MORR Manual arbitrary reverse run mode
Y735 DISP6 Display changeover $6 Y73D MORSP Manual arbitrary reverse run speed selec tion
Y736 DISP7 Display changeover $7 Y73E SMLK High-speed simple program check mode
Y737 DISP8 Display changeover $8 Y73F CCHK Interference check between part systems:
Interference check enabled
Note

Common ($) Abbrev. Signal name Common ($) Abbrev. Signal name
Y740 Tool IC new read Y748 PLC skip 1
Y741 Tool IC exchange read Y749 PLC skip 2
Y742 MCT Contactor shutoff test Y74A PLC skip 3
Y743 Y74B PLC skip 4
Y744 Y74C PLC skip 5
Y745 Y74D PLC skip 6
Y746 Y74E PLC skip 7
Y747 Turret interference check valid Y74F PLC skip 8
Common ($) Abbrev. Signal name Common ($) Abbrev. Signal name
Y750 Y758
Y751 Y759
Y752 Y75A
Y753 Y75B
Y754 Y75C
Y755 Y75D Automatic power OFF request
Y756 Y75E
Y757 Y75F
Common ($) Abbrev. Signal name Common ($) Abbrev. Signal name
Y760 Y768 Door open I
Y761 MRCMD Actual cutting mode (thread, tap) in manual ar bitrary reverse run Y769 ITF3VLD
T
Interference check III: Enable interfering
object selection data
Y762 Y76A ITF3CMD Interference check III: Interference check
III mode
Y763 Y76B SPSC High-speed simple program check: En able coordinate position check
Y764 Encoder 1 arbitrary pulse selection Y76C Remote program input start
Y765 Encoder 2 arbitrary pulse selection Y76D Tool ID data read
Y766 Encoder 1 arbitrary pulse valid Y76E Tool ID data write
Y767 Encoder 2 arbitrary pulse valid Y76F Tool ID data erase
Common ($) Abbrev. Signal name Common ($) Abbrev. Signal name
Y770 PLC axis control valid 1st axis Y778 GBON G/B spindle synchronization valid
Y771 PLC axis control valid 2nd axis Y779
Y772 PLC axis control valid 3rd axis Y77A GBPHS G/B spindle synchronization: Phase alignment
Y773 PLC axis control valid 4th axis Y77B GBPHM G/B spindle synchronization: Phase memory
Y774 PLC axis control valid 5th axis Y77C GBC MON
G/B spindle synchronization: Position error
compensation
Y775 PLC axis control valid 6th axis Y77D GBOFF G/B spindle synchronization: Temporary can cel
Y776 PLC axis control valid 7th axis Y77E GBCMKP G/B spindle synchronization: Keep position er ror compensation amount signal
Y777 PLC axis control valid 8th axis Y77F

(1) The CNC control and CNC status signals are arbitrarily assigned to the device and axis numbers by the parameter
"#1603 PLCdev_no" for each axis.
For details of setting, refer to the "PLC I/F axis random device assignment" in the "PLC Programming Manual".
Device No.
$1 $2 $3 $4 Abbrev. Signal name
Y780 Y788 Y790 Y798 DTCH1 Control axis detachment 1st axis

Y781 Y789 Y791 Y799 DTCH2 Control axis detachment 2nd axis
Y782 Y78A Y792 Y79A DTCH3 Control axis detachment 3rd axis
Y783 Y78B Y793 Y79B DTCH4 Control axis detachment 4th axis
Y784 Y78C Y794 Y79C DTCH5 Control axis detachment 5th axis
Y785 Y78D Y795 Y79D DTCH6 Control axis detachment 6th axis
Y786 Y78E Y796 Y79E DTCH7 Control axis detachment 7th axis
Y787 Y78F Y797 Y79F DTCH8 Control axis detachment 8th axis
Device No.
$1 $2 $3 $4 Abbrev. Signal name
Y7A0 Y7A8 Y7B0 Y7B8 *SVF1 Servo OFF 1st axis
Y7A1 Y7A9 Y7B1 Y7B9 *SVF2 Servo OFF 2nd axis
Y7A2 Y7AA Y7B2 Y7BA *SVF3 Servo OFF 3rd axis
Y7A3 Y7AB Y7B3 Y7BB *SVF4 Servo OFF 4th axis
Y7A4 Y7AC Y7B4 Y7BC *SVF5 Servo OFF 5th axis
Y7A5 Y7AD Y7B5 Y7BD *SVF6 Servo OFF 6th axis
Y7A6 Y7AE Y7B6 Y7BE *SVF7 Servo OFF 7th axis
Y7A7 Y7AF Y7B7 Y7BF *SVF8 Servo OFF 8th axis
Device No.
$1 $2 $3 $4 Abbrev. Signal name
Y7C0 Y7C8 Y7D0 Y7D8 MI1 Mirror image 1st axis
Y7C1 Y7C9 Y7D1 Y7D9 MI2 Mirror image 2nd axis
Y7C2 Y7CA Y7D2 Y7DA MI3 Mirror image 3rd axis
Y7C3 Y7CB Y7D3 Y7DB MI4 Mirror image 4th axis
Y7C4 Y7CC Y7D4 Y7DC MI5 Mirror image 5th axis
Y7C5 Y7CD Y7D5 Y7DD MI6 Mirror image 6th axis
Y7C6 Y7CE Y7D6 Y7DE MI7 Mirror image 7th axis
Y7C7 Y7CF Y7D7 Y7DF MI8 Mirror image 8th axis
Device No.
$1 $2 $3 $4 Abbrev. Signal name
Y7E0 Y7E8 Y7F0 Y7F8 *+EDT1 External deceleration+ 1st axis
Y7E1 Y7E9 Y7F1 Y7F9 *+EDT2 External deceleration+ 2nd axis
Y7E2 Y7EA Y7F2 Y7FA *+EDT3 External deceleration+ 3rd axis
Y7E3 Y7EB Y7F3 Y7FB *+EDT4 External deceleration+ 4th axis
Y7E4 Y7EC Y7F4 Y7FC *+EDT5 External deceleration+ 5th axis
Y7E5 Y7ED Y7F5 Y7FD *+EDT6 External deceleration+ 6th axis
Y7E6 Y7EE Y7F6 Y7FE *+EDT7 External deceleration+ 7th axis
Y7E7 Y7EF Y7F7 Y7FF *+EDT8 External deceleration+ 8th axis
Note

(1) The CNC control and CNC status signals are arbitrarily assigned to the device and axis numbers by the parameter "#1603 PLCdev_no" for each axis.
For details of setting, refer to the "PLC I/F axis random device assignment" in the "PLC Programming Manual".
Device No.
$1 $2 $3 $4 Abbrev. Signal name
Y800 Y808 Y810 Y818 *-EDT1 External deceleration- 1st axis
Y801 Y809 Y811 Y819 *-EDT2 External deceleration- 2nd axis
Y802 Y80A Y812 Y81A *-EDT3 External deceleration- 3rd axis
Y803 Y80B Y813 Y81B *-EDT4 External deceleration- 4th axis
Y804 Y80C Y814 Y81C *-EDT5 External deceleration- 5th axis
Y805 Y80D Y815 Y81D *-EDT6 External deceleration- 6th axis
Y806 Y80E Y816 Y81E *-EDT7 External deceleration- 7th axis
Y807 Y80F Y817 Y81F *-EDT8 External deceleration- 8th axis
Device No.
$1 $2 $3 $4 Abbrev. Signal name
Y820 Y828 Y830 Y838 *+AIT1 Automatic interlock+ 1st axis
Y821 Y829 Y831 Y839 *+AIT2 Automatic interlock+ 2nd axis
Y822 Y82A Y832 Y83A *+AIT3 Automatic interlock+ 3rd axis
Y823 Y82B Y833 Y83B *+AIT4 Automatic interlock+ 4th axis
Y824 Y82C Y834 Y83C *+AIT5 Automatic interlock+ 5th axis
Y825 Y82D Y835 Y83D *+AIT6 Automatic interlock+ 6th axis
Y826 Y82E Y836 Y83E *+AIT7 Automatic interlock+ 7th axis
Y827 Y82F Y837 Y83F *+AIT8 Automatic interlock+ 8th axis
Device No.
$1 $2 $3 $4 Abbrev. Signal name
Y840 Y848 Y850 Y858 *-AIT1 Automatic interlock- 1st axis
Y841 Y849 Y851 Y859 *-AIT2 Automatic interlock- 2nd axis
Y842 Y84A Y852 Y85A *-AIT3 Automatic interlock- 3rd axis
Y843 Y84B Y853 Y85B *-AIT4 Automatic interlock- 4th axis
Y844 Y84C Y854 Y85C *-AIT5 Automatic interlock- 5th axis
Y845 Y84D Y855 Y85D *-AIT6 Automatic interlock- 6th axis
Y846 Y84E Y856 Y85E *-AIT7 Automatic interlock- 7th axis
Y847 Y84F Y857 Y85F *-AIT8 Automatic interlock- 8th axis
Device No.
$1 $2 $3 $4 Abbrev. Signal name
Y860 Y868 Y870 Y878 *+MIT1 Manual interlock+ 1st axis
Y861 Y869 Y871 Y879 *+MIT2 Manual interlock+ 2nd axis
Y862 Y86A Y872 Y87A *+MIT3 Manual interlock+ 3rd axis
Y863 Y86B Y873 Y87B *+MIT4 Manual interlock+ 4th axis
Y864 Y86C Y874 Y87C *+MIT5 Manual interlock+ 5th axis
Y865 Y86D Y875 Y87D *+MIT6 Manual interlock+ 6th axis
Y866 Y86E Y876 Y87E *+MIT7 Manual interlock+ 7th axis
Y867 Y86F Y877 Y87F *+MIT8 Manual interlock+ 8th axis
Note

2.3 PLC Output Signals (Bit Type: Y***)
79 IB-1501616-F
(1) The CNC control and CNC status signals are arbitrarily assigned to the device and axis numbers by the parameter "#1603 PLCdev_no" for each axis.
For details of setting, refer to the "PLC I/F axis random device assignment" in the "PLC Programming Manual".
Device No.
$1 $2 $3 $4 Abbrev. Signal name
Y880 Y888 Y890 Y898 *-MIT1 Manual interlock- 1st axis
Y881 Y889 Y891 Y899 *-MIT2 Manual interlock- 2nd axis
Y882 Y88A Y892 Y89A *-MIT3 Manual interlock- 3rd axis
Y883 Y88B Y893 Y89B *-MIT4 Manual interlock- 4th axis
Y884 Y88C Y894 Y89C *-MIT5 Manual interlock- 5th axis
Y885 Y88D Y895 Y89D *-MIT6 Manual interlock- 6th axis
Y886 Y88E Y896 Y89E *-MIT7 Manual interlock- 7th axis
Y887 Y88F Y897 Y89F *-MIT8 Manual interlock- 8th axis
Device No.
$1 $2 $3 $4 Abbrev. Signal name
Y8A0 Y8A8 Y8B0 Y8B8 AMLK1 Automatic machine lock 1st axis
Y8A1 Y8A9 Y8B1 Y8B9 AMLK2 Automatic machine lock 2nd axis
Y8A2 Y8AA Y8B2 Y8BA AMLK3 Automatic machine lock 3rd axis
Y8A3 Y8AB Y8B3 Y8BB AMLK4 Automatic machine lock 4th axis
Y8A4 Y8AC Y8B4 Y8BC AMLK5 Automatic machine lock 5th axis
Y8A5 Y8AD Y8B5 Y8BD AMLK6 Automatic machine lock 6th axis
Y8A6 Y8AE Y8B6 Y8BE AMLK7 Automatic machine lock 7th axis
Y8A7 Y8AF Y8B7 Y8BF AMLK8 Automatic machine lock 8th axis
Device No.
$1 $2 $3 $4 Abbrev. Signal name
Y8C0 Y8C8 Y8D0 Y8D8 MMLK1 Manual machine lock 1st axis
Y8C1 Y8C9 Y8D1 Y8D9 MMLK2 Manual machine lock 2nd axis
Y8C2 Y8CA Y8D2 Y8DA MMLK3 Manual machine lock 3rd axis
Y8C3 Y8CB Y8D3 Y8DB MMLK4 Manual machine lock 4th axis
Y8C4 Y8CC Y8D4 Y8DC MMLK5 Manual machine lock 5th axis
Y8C5 Y8CD Y8D5 Y8DD MMLK6 Manual machine lock 6th axis
Y8C6 Y8CE Y8D6 Y8DE MMLK7 Manual machine lock 7th axis
Y8C7 Y8CF Y8D7 Y8DF MMLK8 Manual machine lock 8th axis
Device No.
$1 $2 $3 $4 Abbrev. Signal name
Y8E0 Y8E8 Y8F0 Y8F8 +J1 Feed axis selection+ 1st axis
Y8E1 Y8E9 Y8F1 Y8F9 +J2 Feed axis selection+ 2nd axis
Y8E2 Y8EA Y8F2 Y8FA +J3 Feed axis selection+ 3rd axis
Y8E3 Y8EB Y8F3 Y8FB +J4 Feed axis selection+ 4th axis
Y8E4 Y8EC Y8F4 Y8FC +J5 Feed axis selection+ 5th axis
Y8E5 Y8ED Y8F5 Y8FD +J6 Feed axis selection+ 6th axis
Y8E6 Y8EE Y8F6 Y8FE +J7 Feed axis selection+ 7th axis
Y8E7 Y8EF Y8F7 Y8FF +J8 Feed axis selection+ 8th axis
Note
M800V/M80V Series PLC Interface Manual
2 Input/Output Signals with Controller
2.3 PLC Output Signals (Bit Type: Y***)
IB-1501616-F 80
(1) The CNC control and CNC status signals are arbitrarily assigned to the device and axis numbers by the parameter "#1603 PLCdev_no" for each axis.
For details of setting, refer to the "PLC I/F axis random device assignment" in the "PLC Programming Manual".
Device No.
$1 $2 $3 $4 Abbrev. Signal name
Y900 Y908 Y910 Y918 -J1 Feed axis selection- 1st axis
Y901 Y909 Y911 Y919 -J2 Feed axis selection- 2nd axis
Y902 Y90A Y912 Y91A -J3 Feed axis selection- 3rd axis
Y903 Y90B Y913 Y91B -J4 Feed axis selection- 4th axis
Y904 Y90C Y914 Y91C -J5 Feed axis selection- 5th axis
Y905 Y90D Y915 Y91D -J6 Feed axis selection- 6th axis
Y906 Y90E Y916 Y91E -J7 Feed axis selection- 7th axis
Y907 Y90F Y917 Y91F -J8 Feed axis selection- 8th axis
Device No.
$1 $2 $3 $4 Abbrev. Signal name
Y920 Y928 Y930 Y938 MAE1 Manual/Automatic simultaneous valid 1st axis
Y921 Y929 Y931 Y939 MAE2 Manual/Automatic simultaneous valid 2nd axis
Y922 Y92A Y932 Y93A MAE3 Manual/Automatic simultaneous valid 3rd axis
Y923 Y92B Y933 Y93B MAE4 Manual/Automatic simultaneous valid 4th axis
Y924 Y92C Y934 Y93C MAE5 Manual/Automatic simultaneous valid 5th axis
Y925 Y92D Y935 Y93D MAE6 Manual/Automatic simultaneous valid 6th axis
Y926 Y92E Y936 Y93E MAE7 Manual/Automatic simultaneous valid 7th axis
Y927 Y92F Y937 Y93F MAE8 Manual/Automatic simultaneous valid 8th axis
Device No.
$1 $2 $3 $4 Abbrev. Signal name
Y940 Y948 Y950 Y958 FBE1 Manual feedrate B valid 1st axis
Y941 Y949 Y951 Y959 FBE2 Manual feedrate B valid 2nd axis
Y942 Y94A Y952 Y95A FBE3 Manual feedrate B valid 3rd axis
Y943 Y94B Y953 Y95B FBE4 Manual feedrate B valid 4th axis
Y944 Y94C Y954 Y95C FBE5 Manual feedrate B valid 5th axis
Y945 Y94D Y955 Y95D FBE6 Manual feedrate B valid 6th axis
Y946 Y94E Y956 Y95E FBE7 Manual feedrate B valid 7th axis
Y947 Y94F Y957 Y95F FBE8 Manual feedrate B valid 8th axis
Device No.
$1 $2 $3 $4 Abbrev. Signal name
Y960 Y968 Y970 Y978 AZS1 Zero point initialization set mode 1st axis
Y961 Y969 Y971 Y979 AZS2 Zero point initialization set mode 2nd axis
Y962 Y96A Y972 Y97A AZS3 Zero point initialization set mode 3rd axis

Y963 Y96B Y973 Y97B AZS4 Zero point initialization set mode 4th axis
Y964 Y96C Y974 Y97C AZS5 Zero point initialization set mode 5th axis
Y965 Y96D Y975 Y97D AZS6 Zero point initialization set mode 6th axis
Y966 Y96E Y976 Y97E AZS7 Zero point initialization set mode 7th axis
Y967 Y96F Y977 Y97F AZS8 Zero point initialization set mode 8th axis
Note

(1) The CNC control and CNC status signals are arbitrarily assigned to the device and axis numbers by the parameter "#1603 PLCdev_no" for each axis.
For details of setting, refer to the "PLC I/F axis random device assignment" in the "PLC Programming Manual".
Device No.
$1 $2 $3 $4 Abbrev. Signal name
Y980 Y988 Y990 Y998 ZST1 Zero point initialization set start 1st axis
Y981 Y989 Y991 Y999 ZST2 Zero point initialization set start 2nd axis
Y982 Y98A Y992 Y99A ZST3 Zero point initialization set start 3rd axis
Y983 Y98B Y993 Y99B ZST4 Zero point initialization set start 4th axis
Y984 Y98C Y994 Y99C ZST5 Zero point initialization set start 5th axis
Y985 Y98D Y995 Y99D ZST6 Zero point initialization set start 6th axis
Y986 Y98E Y996 Y99E ZST7 Zero point initialization set start 7th axis
Y987 Y98F Y997 Y99F ZST8 Zero point initialization set start 8th axis
Device No.
$1 $2 $3 $4 Abbrev. Signal name
Y9A0 Y9A8 Y9B0 Y9B8 ILC1 Current limit changeover 1st axis
Y9A1 Y9A9 Y9B1 Y9B9 ILC2 Current limit changeover 2nd axis
Y9A2 Y9AA Y9B2 Y9BA ILC3 Current limit changeover 3rd axis
Y9A3 Y9AB Y9B3 Y9BB ILC4 Current limit changeover 4th axis
Y9A4 Y9AC Y9B4 Y9BC ILC5 Current limit changeover 5th axis
Y9A5 Y9AD Y9B5 Y9BD ILC6 Current limit changeover 6th axis
Y9A6 Y9AE Y9B6 Y9BE ILC7 Current limit changeover 7th axis
Y9A7 Y9AF Y9B7 Y9BF ILC8 Current limit changeover 8th axis
Device No.
$1 $2 $3 $4 Abbrev. Signal name
Y9C0 Y9C8 Y9D0 Y9D8 DOR1 Droop cancel request 1st axis
Y9C1 Y9C9 Y9D1 Y9D9 DOR2 Droop cancel request 2nd axis
Y9C2 Y9CA Y9D2 Y9DA DOR3 Droop cancel request 3rd axis
Y9C3 Y9CB Y9D3 Y9DB DOR4 Droop cancel request 4th axis
Y9C4 Y9CC Y9D4 Y9DC DOR5 Droop cancel request 5th axis
Y9C5 Y9CD Y9D5 Y9DD DOR6 Droop cancel request 6th axis
Y9C6 Y9CE Y9D6 Y9DE DOR7 Droop cancel request 7th axis
Y9C7 Y9CF Y9D7 Y9DF DOR8 Droop cancel request 8th axis
Device No.
$1 $2 $3 $4 Abbrev. Signal name
Y9E0 Y9E8 Y9F0 Y9F8 Workpiece coordinate Measurement 1st axis (Spare)
Y9E1 Y9E9 Y9F1 Y9F9 Workpiece coordinate Measurement 2nd axis
Y9E2 Y9EA Y9F2 Y9FA Workpiece coordinate Measurement 3rd axis (Spare)
Y9E3 Y9EB Y9F3 Y9FB Workpiece coordinate Measurement 4th axis (Spare)
Y9E4 Y9EC Y9F4 Y9FC Workpiece coordinate Measurement 5th axis (Spare)
Y9E5 Y9ED Y9F5 Y9FD Workpiece coordinate Measurement 6th axis (Spare)
Y9E6 Y9EE Y9F6 Y9FE Workpiece coordinate Measurement 7th axis (Spare)
Y9E7 Y9EF Y9F7 Y9FF Workpiece coordinate Measurement 8th axis (Spare)
Note

(1) The CNC control and CNC status signals are arbitrarily assigned to the device and axis numbers by the parameter "#1603 PLCdev_no" for each axis.
For details of setting, refer to the "PLC I/F axis random device assignment" in the "PLC Programming Manual".
Device No.
$1 $2 $3 $4 Abbrev. Signal name
YA00 YA08 YA10 YA18 DTCH21 Control axis detachment 2 1st axis
YA01 YA09 YA11 YA19 DTCH22 Control axis detachment 2 2nd axis
YA02 YA0A YA12 YA1A DTCH23 Control axis detachment 2 3rd axis
YA03 YA0B YA13 YA1B DTCH24 Control axis detachment 2 4th axis
YA04 YA0C YA14 YA1C DTCH25 Control axis detachment 2 5th axis
YA05 YA0D YA15 YA1D DTCH26 Control axis detachment 2 6th axis
YA06 YA0E YA16 YA1E DTCH27 Control axis detachment 2 7th axis
YA07 YA0F YA17 YA1F DTCH28 Control axis detachment 2 8th axis
Device No.
$1 $2 $3 $4 Abbrev. Signal name
YA20 YA28 YA30 YA38 UCLPF1 Unclamp completion 1st axis
YA21 YA29 YA31 YA39 UCLPF2 Unclamp completion 2nd axis
YA22 YA2A YA32 YA3A UCLPF3 Unclamp completion 3rd axis
YA23 YA2B YA33 YA3B UCLPF4 Unclamp completion 4th axis
YA24 YA2C YA34 YA3C UCLPF5 Unclamp completion 5th axis
YA25 YA2D YA35 YA3D UCLPF6 Unclamp completion 6th axis
YA26 YA2E YA36 YA3E UCLPF7 Unclamp completion 7th axis
YA27 YA2F YA37 YA3F UCLPF8 Unclamp completion 8th axis
Device No.
$1 $2 $3 $4 Abbrev. Signal name
YA40 YA48 YA50 YA58 Each axis reference position return 1st axis
YA41 YA49 YA51 YA59 Each axis reference position return 2nd axis
YA42 YA4A YA52 YA5A Each axis reference position return 3rd axis
YA43 YA4B YA53 YA5B Each axis reference position return 4th axis
YA44 YA4C YA54 YA5C Each axis reference position return 5th axis

YA45 YA4D YA55 YA5D Each axis reference position return 6th axis
YA46 YA4E YA56 YA5E Each axis reference position return 7th axis
YA47 YA4F YA57 YA5F Each axis reference position return 8th axis
Device No.
$1 $2 $3 $4 Abbrev. Signal name
YA60 YA68 YA70 YA78 Mixed control (cross axis control) request 1st axis
YA61 YA69 YA71 YA79 Mixed control (cross axis control) request 2nd axis
YA62 YA6A YA72 YA7A Mixed control (cross axis control) request 3rd axis
YA63 YA6B YA73 YA7B Mixed control (cross axis control) request 4th axis
YA64 YA6C YA74 YA7C Mixed control (cross axis control) request 5th axis
YA65 YA6D YA75 YA7D Mixed control (cross axis control) request 6th axis
YA66 YA6E YA76 YA7E Mixed control (cross axis control) request 7th axis
YA67 YA6F YA77 YA7F Mixed control (cross axis control) request 8th axis
Note

(1) The CNC control and CNC status signals are arbitrarily assigned to the device and axis numbers by the parameter "#1603 PLCdev_no" for each axis.
For details of setting, refer to the "PLC I/F axis random device assignment" in the "PLC Programming Manual".
Device No.
$1 $2 $3 $4 Abbrev. Signal name
YA80 YA88 YA90 YA98 SYNC1 Synchronous control request 1st axis
YA81 YA89 YA91 YA99 SYNC2 Synchronous control request 2nd axis
YA82 YA8A YA92 YA9A SYNC3 Synchronous control request 3rd axis
YA83 YA8B YA93 YA9B SYNC4 Synchronous control request 4th axis
YA84 YA8C YA94 YA9C SYNC5 Synchronous control request 5th axis
YA85 YA8D YA95 YA9D SYNC6 Synchronous control request 6th axis
YA86 YA8E YA96 YA9E SYNC7 Synchronous control request 7th axis
YA87 YA8F YA97 YA9F SYNC8 Synchronous control request 8th axis
Device No.
$1 $2 $3 $4 Abbrev. Signal name
YAA0 YAA8 YAB0 YAB8 PILE1 Superimposition control request 1st axis
YAA1 YAA9 YAB1 YAB9 PILE2 Superimposition control request 2nd axis
YAA2 YAAA YAB2 YABA PILE3 Superimposition control request 3rd axis
YAA3 YAAB YAB3 YABB PILE4 Superimposition control request 4th axis
YAA4 YAAC YAB4 YABC PILE5 Superimposition control request 5th axis
YAA5 YAAD YAB5 YABD PILE6 Superimposition control request 6th axis
YAA6 YAAE YAB6 YABE PILE7 Superimposition control request 7th axis
YAA7 YAAF YAB7 YABF PILE8 Superimposition control request 8th axis
Device No.
$1 $2 $3 $4 Abbrev. Signal name
YAC0 YAC8 YAD0 YAD8 NC axis control selection 1st axis
YAC1 YAC9 YAD1 YAD9 NC axis control selection 2nd axis
YAC2 YACA YAD2 YADA NC axis control selection 3rd axis
YAC3 YACB YAD3 YADB NC axis control selection 4th axis
YAC4 YACC YAD4 YADC NC axis control selection 5th axis
YAC5 YACD YAD5 YADD NC axis control selection 6th axis
YAC6 YACE YAD6 YADE NC axis control selection 7th axis
YAC7 YACF YAD7 YADF NC axis control selection 8th axis
Device No.
$1 $2 $3 $4 Abbrev. Signal name
YAE0 YAE8 YAF0 YAF8 Vertical axis pull-up prevention request 1st axis
YAE1 YAE9 YAF1 YAF9 Vertical axis pull-up prevention request 2nd axis
YAE2 YAEA YAF2 YAFA Vertical axis pull-up prevention request 3rd axis
YAE3 YAEB YAF3 YAFB Vertical axis pull-up prevention request 4th axis
YAE4 YAEC YAF4 YAFC Vertical axis pull-up prevention request 5th axis
YAE5 YAED YAF5 YAFD Vertical axis pull-up prevention request 6th axis
YAE6 YAEE YAF6 YAFE Vertical axis pull-up prevention request 7th axis
YAE7 YAEF YAF7 YAFF Vertical axis pull-up prevention request 8th axis
Note

(1) The CNC control and CNC status signals are arbitrarily assigned to the device and axis numbers by the parameter "#1603 PLCdev_no" for each axis.
For details of setting, refer to the "PLC I/F axis random device assignment" in the "PLC Programming Manual".
Device No.
$1 $2 $3 $4 Abbrev. Signal name
YB00 YB08 YB10 YB18 CLPF1 Clamp completion 1st axis
YB01 YB09 YB11 YB19 CLPF2 Clamp completion 2nd axis
YB02 YB0A YB12 YB1A CLPF3 Clamp completion 3rd axis
YB03 YB0B YB13 YB1B CLPF4 Clamp completion 4th axis
YB04 YB0C YB14 YB1C CLPF5 Clamp completion 5th axis
YB05 YB0D YB15 YB1D CLPF6 Clamp completion 6th axis
YB06 YB0E YB16 YB1E CLPF7 Clamp completion 7th axis
YB07 YB0F YB17 YB1F CLPF8 Clamp completion 8th axis
Device No.
$1 $2 $3 $4 Abbrev. Signal name
YB20 YB28 YB30 YB38 HOBRTV1 Hob machining: Retract amount selection 1st axis
YB21 YB29 YB31 YB39 HOBRTV2 Hob machining: Retract amount selection 2nd axis
YB22 YB2A YB32 YB3A HOBRTV3 Hob machining: Retract amount selection 3rd axis
YB23 YB2B YB33 YB3B HOBRTV4 Hob machining: Retract amount selection 4th axis
YB24 YB2C YB34 YB3C HOBRTV5 Hob machining: Retract amount selection 5th axis
YB25 YB2D YB35 YB3D HOBRTV6 Hob machining: Retract amount selection 6th axis
YB26 YB2E YB36 YB3E HOBRTV7 Hob machining: Retract amount selection 7th axis

YB27 YB2F YB37 YB3F HOBRTV8 Hob machining: Retract amount selection 8th axis
Device No.
$1 $2 $3 $4 Abbrev. Signal name
YB40 YB48 YB50 YB58 ROTSPC1 Spindle-mode rotary axis control command 1st axis
YB41 YB49 YB51 YB59 ROTSPC2 Spindle-mode rotary axis control command 2nd axis
YB42 YB4A YB52 YB5A ROTSPC3 Spindle-mode rotary axis control command 3rd axis
YB43 YB4B YB53 YB5B ROTSPC4 Spindle-mode rotary axis control command 4th axis
YB44 YB4C YB54 YB5C ROTSPC5 Spindle-mode rotary axis control command 5th axis
YB45 YB4D YB55 YB5D ROTSPC6 Spindle-mode rotary axis control command 6th axis
YB46 YB4E YB56 YB5E ROTSPC7 Spindle-mode rotary axis control command 7th axis
YB47 YB4F YB57 YB5F ROTSPC8 Spindle-mode rotary axis control command 8th axis
Device No.
$1 $2 $3 $4 Abbrev. Signal name
YB60 YB68 YB70 YB78 SLMC1 Stored stroke limit I:Change request 1st axis
YB61 YB69 YB71 YB79 SLMC2 Stored stroke limit I:Change request 2nd axis
YB62 YB6A YB72 YB7A SLMC3 Stored stroke limit I:Change request 3rd axis
YB63 YB6B YB73 YB7B SLMC4 Stored stroke limit I:Change request 4th axis
YB64 YB6C YB74 YB7C SLMC5 Stored stroke limit I:Change request 5th axis
YB65 YB6D YB75 YB7D SLMC6 Stored stroke limit I:Change request 6th axis
YB66 YB6E YB76 YB7E SLMC7 Stored stroke limit I:Change request 7th axis
YB67 YB6F YB77 YB7F SLMC8 Stored stroke limit I:Change request 8th axis
Note

(1) The CNC control and CNC status signals are arbitrarily assigned to the device and axis numbers by the parameter "#1603 PLCdev_no" for each axis.
For details of setting, refer to the "PLC I/F axis random device assignment" in the "PLC Programming Manual".
Device No.
$1 $2 $3 $4 Abbrev. Signal name
YB80 YB88 YB90 YB98 VGHLDC1 Real-time tuning 1: Speed control gain changeover hold-down command 1st axis
YB81 YB89 YB91 YB99 VGHLDC2 Real-time tuning 1: Speed control gain changeover hold-down command 2nd axis
YB82 YB8A YB92 YB9A VGHLDC3 Real-time tuning 1: Speed control gain changeover hold-down command 3rd axis
YB83 YB8B YB93 YB9B VGHLDC4 Real-time tuning 1: Speed control gain changeover hold-down command 4th axis
YB84 YB8C YB94 YB9C VGHLDC5 Real-time tuning 1: Speed control gain changeover hold-down command 5th axis
YB85 YB8D YB95 YB9D VGHLDC6 Real-time tuning 1: Speed control gain changeover hold-down command 6th axis
YB86 YB8E YB96 YB9E VGHLDC7 Real-time tuning 1: Speed control gain changeover hold-down command 7th axis
YB87 YB8F YB97 YB9F VGHLDC8 Real-time tuning 1: Speed control gain changeover hold-down command 8th axis
Device No.
$1 $2 $3 $4 Abbrev. Signal name
YBA0 YBA8 YBB0 YBB8
YBA1 YBA9 YBB1 YBB9
YBA2 YBAA YBB2 YBBA
YBA3 YBAB YBB3 YBBB
YBA4 YBAC YBB4 YBBC
YBA5 YBAD YBB5 YBBD
YBA6 YBAE YBB6 YBBE
YBA7 YBAF YBB7 YBBF
Device No.
$1 $2 $3 $4 Abbrev. Signal name
YBC0 YBC8 YBD0 YBD8 NPCH GREQ1 NC axis/PLC axis switchover request 1st axis
YBC1 YBC9 YBD1 YBD9 NPCH GREQ2 NC axis/PLC axis switchover request 2nd axis
YBC2 YBCA YBD2 YBDA NPCH GREQ3 NC axis/PLC axis switchover request 3rd axis
YBC3 YBCB YBD3 YBDB NPCH GREQ4 NC axis/PLC axis switchover request 4th axis
YBC4 YBCC YBD4 YBDC NPCH GREQ5 NC axis/PLC axis switchover request 5th axis
YBC5 YBCD YBD5 YBDD NPCH GREQ6 NC axis/PLC axis switchover request 6th axis
YBC6 YBCE YBD6 YBDE NPCH GREQ7 NC axis/PLC axis switchover request 7th axis
YBC7 YBCF YBD7 YBDF NPCH GREQ8 NC axis/PLC axis switchover request 8th axis
Device No.
$1 $2 $3 $4 Abbrev. Signal name
YBE0 YBE8 YBF0 YBF8 GQEMG1 Machine group-based alarm stop: Machine group-based PLC interlock 1st axis
YBE1 YBE9 YBF1 YBF9 GQEMG2 Machine group-based alarm stop: Machine group-based PLC interlock 2nd axis
YBE2 YBEA YBF2 YBFA GQEMG3 Machine group-based alarm stop: Machine group-based PLC interlock 3rd axis
YBE3 YBEB YBF3 YBFB GQEMG4 Machine group-based alarm stop: Machine group-based PLC interlock 4th axis
YBE4 YBEC YBF4 YBFC GQEMG5 Machine group-based alarm stop: Machine group-based PLC interlock 5th axis
YBE5 YBED YBF5 YBFD GQEMG6 Machine group-based alarm stop: Machine group-based PLC interlock 6th axis
YBE6 YBEE YBF6 YBFE GQEMG7 Machine group-based alarm stop: Machine group-based PLC interlock 7th axis
YBE7 YBEF YBF7 YBFF GQEMG8 Machine group-based alarm stop: Machine group-based PLC interlock 8th axis
Note

Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
YC00 YD40 YE80 YFC0 Y1100 Y1240 Y1380 Y14C0 J Jog mode
YC01 YD41 YE81 YFC1 Y1101 Y1241 Y1381 Y14C1 H Handle mode
YC02 YD42 YE82 YFC2 Y1102 Y1242 Y1382 Y14C2 S Incremental mode
YC03 YD43 YE83 YFC3 Y1103 Y1243 Y1383 Y14C3 PTP Manual arbitrary feed mode
YC04 YD44 YE84 YFC4 Y1104 Y1244 Y1384 Y14C4 ZRN Reference position return mode
YC05 YD45 YE85 YFC5 Y1105 Y1245 Y1385 Y14C5 AST Automatic initialization mode
YC06 YD46 YE86 YFC6 Y1106 Y1246 Y1386 Y14C6
YC07 YD47 YE87 YFC7 Y1107 Y1247 Y1387 Y14C7
Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
YC08 YD48 YE88 YFC8 Y1108 Y1248 Y1388 Y14C8 MEM Memory mode
YC09 YD49 YE89 YFC9 Y1109 Y1249 Y1389 Y14C9 T Tape mode

YC0A YD4A YE8A YFCA Y110A Y124A Y138A Y14CA Online operation mode (Computer link B)
YC0B YD4B YE8B YFCB Y110B Y124B Y138B Y14CB D MDI mode
YC0C YD4C YE8C YFCC Y110C Y124C Y138C Y14CC
YC0D YD4D YE8D YFCD Y110D Y124D Y138D Y14CD
YC0E YD4E YE8E YFCE Y110E Y124E Y138E Y14CE SBSM Sub part system control: Sub part system control I mode
YC0F YD4F YE8F YFCF Y110F Y124F Y138F Y14CF
Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
YC10 YD50 YE90 YFD0 Y1110 Y1250 Y1390 Y14D0 ST Automatic operation "start" command (Cycle start)
YC11 YD51 YE91 YFD1 Y1111 Y1251 Y1391 Y14D1 *SP Automatic operation "pause" command (Feed hold)
YC12 YD52 YE92 YFD2 Y1112 Y1252 Y1392 Y14D2 SBK Single block
YC13 YD53 YE93 YFD3 Y1113 Y1253 Y1393 Y14D3 *BSL Block start interlock
YC14 YD54 YE94 YFD4 Y1114 Y1254 Y1394 Y14D4 *CSL Cutting block start interlock
YC15 YD55 YE95 YFD5 Y1115 Y1255 Y1395 Y14D5 DRN Dry run
YC16 YD56 YE96 YFD6 Y1116 Y1256 Y1396 Y14D6
YC17 YD57 YE97 YFD7 Y1117 Y1257 Y1397 Y14D7 ERD Error detection
Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
YC18 YD58 YE98 YFD8 Y1118 Y1258 Y1398 Y14D8 NRST1 NC reset 1
YC19 YD59 YE99 YFD9 Y1119 Y1259 Y1399 Y14D9 NRST2 NC reset 2
YC1A YD5A YE9A YFDA Y111A Y125A Y139A Y14DA RRW Reset & rewind
YC1B YD5B YE9B YFDB Y111B Y125B Y139B Y14DB *CDZ Chamfering
YC1C YD5C YE9C YFDC Y111C Y125C Y139C Y14DC ARST Automatic restart
YC1D YD5D YE9D YFDD Y111D Y125D Y139D Y14DD External search strobe
YC1E YD5E YE9E YFDE Y111E Y125E Y139E Y14DE FIN1 M function finish 1
YC1F YD5F YE9F YFDF Y111F Y125F Y139F Y14DF FIN2 M function finish 2

Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
YC20 YD60 YEA0 YFE0 Y1120 Y1260 Y13A0 Y14E0 TLM Tool length measurement 1
YC21 YD61 YEA1 YFE1 Y1121 Y1261 Y13A1 Y14E1 TLMS Tool length measurement 2
YC22 YD62 YEA2 YFE2 Y1122 Y1262 Y13A2 Y14E2 Synchronization correction mode
YC23 YD63 YEA3 YFE3 Y1123 Y1263 Y13A3 Y14E3 PRST Program restart
YC24 YD64 YEA4 YFE4 Y1124 Y1264 Y13A4 Y14E4
YC25 YD65 YEA5 YFE5 Y1125 Y1265 Y13A5 Y14E5 UIT Macro interrupt
YC26 YD66 YEA6 YFE6 Y1126 Y1266 Y13A6 Y14E6 RT Rapid traverse
YC27 YD67 YEA7 YFE7 Y1127 Y1267 Y13A7 Y14E7 VRV Reverse run
Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
YC28 YD68 YEA8 YFE8 Y1128 Y1268 Y13A8 Y14E8 ABS Manual absolute
YC29 YD69 YEA9 YFE9 Y1129 Y1269 Y13A9 Y14E9 DLK Display lock
YC2A YD6A YEAA YFEA Y112A Y126A Y13AA Y14EA F1D F1-digit speed change valid
YC2B YD6B YEAB YFEB Y112B Y126B Y13AB Y14EB CRQ Recalculation request
Common ($) Abbrev. Signal name Common ($) Abbrev. Signal name
YC2C QEMG PLC emergency stop
Device No.
YC2D YD6D YEAD YFED Y112D Y126D Y13AD Y14ED RTN Reference position retract
YC2E YD6E YEAE YFEE Y112E Y126E Y13AE Y14EE PIT PLC interrupt
YC2F YD6F YEAF YFEF Y112F Y126F Y13AF Y14EF
Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
YC30 YD70 YEB0 YFF0 Y1130 Y1270 Y13B0 Y14F0 CHPS Chopping
YC31 YD71 YEB1 YFF1 Y1131 Y1271 Y13B1 Y14F1 RSST Search & start
YC32 YD72 YEB2 YFF2 Y1132 Y1272 Y13B2 Y14F2
YC33 YD73 YEB3 YFF3 Y1133 Y1273 Y13B3 Y14F3
YC34 YD74 YEB4 YFF4 Y1134 Y1274 Y13B4 Y14F4 Chopping parameter valid
YC35 YD75 YEB5 YFF5 Y1135 Y1275 Y13B5 Y14F5 Inclined axis control valid
YC36 YD76 YEB6 YFF6 Y1136 Y1276 Y13B6 Y14F6 Inclined axis control: No Z axis compensation
YC37 YD77 YEB7 YFF7 Y1137 Y1277 Y13B7 Y14F7 BDT1 Optional block skip 1
Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
YC38 YD78 YEB8 YFF8 Y1138 Y1278 Y13B8 Y14F8 BDT2 Optional block skip 2
YC39 YD79 YEB9 YFF9 Y1139 Y1279 Y13B9 Y14F9 BDT3 Optional block skip 3
YC3A YD7A YEBA YFFA Y113A Y127A Y13BA Y14FA BDT4 Optional block skip 4
YC3B YD7B YEBB YFFB Y113B Y127B Y13BB Y14FB BDT5 Optional block skip 5
YC3C YD7C YEBC YFFC Y113C Y127C Y13BC Y14FC BDT6 Optional block skip 6
YC3D YD7D YEBD YFFD Y113D Y127D Y13BD Y14FD BDT7 Optional block skip 7
YC3E YD7E YEBE YFFE Y113E Y127E Y13BE Y14FE BDT8 Optional block skip 8
YC3F YD7F YEBF YFFF Y113F Y127F Y13BF Y14FF BDT9 Optional block skip 9

Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
YC40 YD80 YEC0 Y1000 Y1140 Y1280 Y13C0 Y1500 HS11 1st handle axis selection code 1
YC41 YD81 YEC1 Y1001 Y1141 Y1281 Y13C1 Y1501 HS12 1st handle axis selection code 2
YC42 YD82 YEC2 Y1002 Y1142 Y1282 Y13C2 Y1502 HS14 1st handle axis selection code 4
YC43 YD83 YEC3 Y1003 Y1143 Y1283 Y13C3 Y1503 HS18 1st handle axis selection code 8
YC44 YD84 YEC4 Y1004 Y1144 Y1284 Y13C4 Y1504 HS116 1st handle axis selection code 16
YC45 YD85 YEC5 Y1005 Y1145 Y1285 Y13C5 Y1505
YC46 YD86 YEC6 Y1006 Y1146 Y1286 Y13C6 Y1506
YC47 YD87 YEC7 Y1007 Y1147 Y1287 Y13C7 Y1507 HS1S 1st handle valid
Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name

YC48 YD88 YEC8 Y1008 Y1148 Y1288 Y13C8 Y1508 HS21 2nd handle axis selection code 1
YC49 YD89 YEC9 Y1009 Y1149 Y1289 Y13C9 Y1509 HS22 2nd handle axis selection code 2
YC4A YD8A YECA Y100A Y114A Y128A Y13CA Y150A HS24 2nd handle axis selection code 4
YC4B YD8B YECB Y100B Y114B Y128B Y13CB Y150B HS28 2nd handle axis selection code 8
YC4C YD8C YECC Y100C Y114C Y128C Y13CC Y150C HS216 2nd handle axis selection code 16
YC4D YD8D YECD Y100D Y114D Y128D Y13CD Y150D
YC4E YD8E YECE Y100E Y114E Y128E Y13CE Y150E
YC4F YD8F YECF Y100F Y114F Y128F Y13CF Y150F HS2S 2nd handle valid
Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
YC50 YD90 YED0 Y1010 Y1150 Y1290 Y13D0 Y1510 HS31 3rd handle axis selection code 1
YC51 YD91 YED1 Y1011 Y1151 Y1291 Y13D1 Y1511 HS32 3rd handle axis selection code 2
YC52 YD92 YED2 Y1012 Y1152 Y1292 Y13D2 Y1512 HS34 3rd handle axis selection code 4
YC53 YD93 YED3 Y1013 Y1153 Y1293 Y13D3 Y1513 HS38 3rd handle axis selection code 8
YC54 YD94 YED4 Y1014 Y1154 Y1294 Y13D4 Y1514 HS316 3rd handle axis selection code 16
YC55 YD95 YED5 Y1015 Y1155 Y1295 Y13D5 Y1515
YC56 YD96 YED6 Y1016 Y1156 Y1296 Y13D6 Y1516
YC57 YD97 YED7 Y1017 Y1157 Y1297 Y13D7 Y1517 HS3S 3rd handle valid
Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
YC58 YD98 YED8 Y1018 Y1158 Y1298 Y13D8 Y1518 OVC Override cancel
YC59 YD99 YED9 Y1019 Y1159 Y1299 Y13D9 Y1519 OVSL Manual override method selection
YC5A YD9A YEDA Y101A Y115A Y129A Y13DA Y151A AFL Miscellaneous function lock
YC5B YD9B YEDB Y101B Y115B Y129B Y13DB Y151B
YC5C YD9C YEDC Y101C Y115C Y129C Y13DC Y151C TRV Tap retract
YC5D YD9D YEDD Y101D Y115D Y129D Y13DD Y151D
YC5E YD9E YEDE Y101E Y115E Y129E Y13DE Y151E Tool handle feed mode
YC5F YD9F YEDF Y101F Y115F Y129F Y13DF Y151F

Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
YC60 YDA0 YEE0 Y1020 Y1160 Y12A0 Y13E0 Y1520 *FV1 Cutting feedrate override code 1
YC61 YDA1 YEE1 Y1021 Y1161 Y12A1 Y13E1 Y1521 *FV2 Cutting feedrate override code 2
YC62 YDA2 YEE2 Y1022 Y1162 Y12A2 Y13E2 Y1522 *FV4 Cutting feedrate override code 4
YC63 YDA3 YEE3 Y1023 Y1163 Y12A3 Y13E3 Y1523 *FV8 Cutting feedrate override code 8
YC64 YDA4 YEE4 Y1024 Y1164 Y12A4 Y13E4 Y1524 *FV16 Cutting feedrate override code 16
YC65 YDA5 YEE5 Y1025 Y1165 Y12A5 Y13E5 Y1525
YC66 YDA6 YEE6 Y1026 Y1166 Y12A6 Y13E6 Y1526 FV2E 2nd cutting feedrate override valid
YC67 YDA7 YEE7 Y1027 Y1167 Y12A7 Y13E7 Y1527 FVS Cutting feedrate override method selection
Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
YC68 YDA8 YEE8 Y1028 Y1168 Y12A8 Y13E8 Y1528 ROV1 Rapid traverse override code 1
YC69 YDA9 YEE9 Y1029 Y1169 Y12A9 Y13E9 Y1529 ROV2 Rapid traverse override code 2
YC6A YDAA YEEA Y102A Y116A Y12AA Y13EA Y152A
YC6B YDAB YEEB Y102B Y116B Y12AB Y13EB Y152B
YC6C YDAC YEEC Y102C Y116C Y12AC Y13EC Y152C
YC6D YDAD YEED Y102D Y116D Y12AD Y13ED Y152D MCSLR Machining condition selection I: Machining condition pa rameter group switch request
YC6E YDAE YEEE Y102E Y116E Y12AE Y13EE Y152E MCSLCR Machining condition selection I: Machining condition pa rameter group switch cancel request
YC6F YDAF YEEF Y102F Y116F Y12AF Y13EF Y152F ROVS Rapid traverse override method selection
Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
YC70 YDB0 YEF0 Y1030 Y1170 Y12B0 Y13F0 Y1530 *JV1 Manual feedrate code 1
YC71 YDB1 YEF1 Y1031 Y1171 Y12B1 Y13F1 Y1531 *JV2 Manual feedrate code 2
YC72 YDB2 YEF2 Y1032 Y1172 Y12B2 Y13F2 Y1532 *JV4 Manual feedrate code 4
YC73 YDB3 YEF3 Y1033 Y1173 Y12B3 Y13F3 Y1533 *JV8 Manual feedrate code 8
YC74 YDB4 YEF4 Y1034 Y1174 Y12B4 Y13F4 Y1534 *JV16 Manual feedrate code 16
YC75 YDB5 YEF5 Y1035 Y1175 Y12B5 Y13F5 Y1535
YC76 YDB6 YEF6 Y1036 Y1176 Y12B6 Y13F6 Y1536 MCLMP Manual speed clamp ON
YC77 YDB7 YEF7 Y1037 Y1177 Y12B7 Y13F7 Y1537 JVS Manual feedrate method selection
Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
YC78 YDB8 YEF8 Y1038 Y1178 Y12B8 Y13F8 Y1538 PCF1 Feedrate least increment code 1
YC79 YDB9 YEF9 Y1039 Y1179 Y12B9 Y13F9 Y1539 PCF2 Feedrate least increment code 2
YC7A YDBA YEFA Y103A Y117A Y12BA Y13FA Y153A
YC7B YDBB YEFB Y103B Y117B Y12BB Y13FB Y153B JHAN Jog handle synchronous
YC7C YDBC YEFC Y103C Y117C Y12BC Y13FC Y153C Each axis manual feedrate B valid
YC7D YDBD YEFD Y103D Y117D Y12BD Y13FD Y153D Manual feedrate B surface speed control valid
YC7E YDBE YEFE Y103E Y117E Y12BE Y13FE Y153E Circular feed in manual mode valid
YC7F YDBF YEFF Y103F Y117F Y12BF Y13FF Y153F Coordinate rotation by parameter: Coordinate switch for
manual feed

Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
YC80 YDC0 YF00 Y1040 Y1180 Y12C0 Y1400 Y1540 MP1 Handle/incremental feed magnification code 1
YC81 YDC1 YF01 Y1041 Y1181 Y12C1 Y1401 Y1541 MP2 Handle/incremental feed magnification code 2
YC82 YDC2 YF02 Y1042 Y1182 Y12C2 Y1402 Y1542 MP4 Handle/incremental feed magnification code 4
YC83 YDC3 YF03 Y1043 Y1183 Y12C3 Y1403 Y1543
YC84 YDC4 YF04 Y1044 Y1184 Y12C4 Y1404 Y1544
YC85 YDC5 YF05 Y1045 Y1185 Y12C5 Y1405 Y1545 CXS9 Manual arbitrary feed: Feedrate selection
YC86 YDC6 YF06 Y1046 Y1186 Y12C6 Y1406 Y1546 Magnification valid for each handle
YC87 YDC7 YF07 Y1047 Y1187 Y12C7 Y1407 Y1547 MPS Handle/incremental feed magnification method se lection
Device No.

$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
YC88 YDC8 YF08 Y1048 Y1188 Y12C8 Y1408 Y1548 TAL1 Tool alarm 1/Tool-skip
YC89 YDC9 YF09 Y1049 Y1189 Y12C9 Y1409 Y1549 TAL2 Tool alarm 2
YC8A YDCA YF0A Y104A Y118A Y12CA Y140A Y154A TCEF Usage data count valid
YC8B YDCB YF0B Y104B Y118B Y12CB Y140B Y154B TLF1 Tool life management input
YC8C YDCC YF0C Y104C Y118C Y12CC Y140C Y154C TRST Tool change reset
YC8D YDCD YF0D Y104D Y118D Y12CD Y140D Y154D Tool escape and return Transit point designation
YC8E YDCE YF0E Y104E Y118E Y12CE Y140E Y154E Manual tool length measurement interlock tempo rarily canceled
YC8F YDCF YF0F Y104F Y118F Y12CF Y140F Y154F
Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
YC90 YDD0 YF10 Y1050 Y1190 Y12D0 Y1410 Y1550 ZSL1 Reference position selection code 1
YC91 YDD1 YF11 Y1051 Y1191 Y12D1 Y1411 Y1551 ZSL2 Reference position selection code 2
YC92 YDD2 YF12 Y1052 Y1192 Y12D2 Y1412 Y1552 Tool length compensation along the tool axis Com pensation amount change mode
YC93 YDD3 YF13 Y1053 Y1193 Y12D3 Y1413 Y1553 RTNST Tool retract and return 2: Tool return start
YC94 YDD4 YF14 Y1054 Y1194 Y12D4 Y1414 Y1554 FFC Thread cutting: Feed-forward control request
YC95 YDD5 YF15 Y1055 Y1195 Y12D5 Y1415 Y1555 In balance cut timing synchronization invalid
YC96 YDD6 YF16 Y1056 Y1196 Y12D6 Y1416 Y1556
YC97 YDD7 YF17 Y1057 Y1197 Y12D7 Y1417 Y1557 Reference position selection method
Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
YC98 YDD8 YF18 Y1058 Y1198 Y12D8 Y1418 Y1558 Tool life management: Temporary cancel of tool life
expiration
YC99 YDD9 YF19 Y1059 Y1199 Y12D9 Y1419 Y1559 Tool life management: Temporary cancel of tool
group life expiration
YC9A YDDA YF1A Y105A Y119A Y12DA Y141A Y155A PRTN External search: Program return
YC9B YDDB YF1B Y105B Y119B Y12DB Y141B Y155B MES interface library: User arbitrary information
send request
YC9C YDDC YF1C Y105C Y119C Y12DC Y141C Y155C TFFC Thread cutting: Feed-forward cancel
YC9D YDDD YF1D Y105D Y119D Y12DD Y141D Y155D Manual speed command valid
YC9E YDDE YF1E Y105E Y119E Y12DE Y141E Y155E Manual speed command sign reversed
YC9F YDDF YF1F Y105F Y119F Y12DF Y141F Y155F Manual speed command reverse run valid

Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
YCA0 YDE0 YF20 Y1060 Y11A0 Y12E0 Y1420 Y1560 CX11 Manual arbitrary feed 1st axis selection code 1
YCA1 YDE1 YF21 Y1061 Y11A1 Y12E1 Y1421 Y1561 CX12 Manual arbitrary feed 1st axis selection code 2
YCA2 YDE2 YF22 Y1062 Y11A2 Y12E2 Y1422 Y1562 CX14 Manual arbitrary feed 1st axis selection code 4
YCA3 YDE3 YF23 Y1063 Y11A3 Y12E3 Y1423 Y1563 CX18 Manual arbitrary feed 1st axis selection code 8
YCA4 YDE4 YF24 Y1064 Y11A4 Y12E4 Y1424 Y1564 CX116 Manual arbitrary feed 1st axis selection code 16
YCA5 YDE5 YF25 Y1065 Y11A5 Y12E5 Y1425 Y1565
YCA6 YDE6 YF26 Y1066 Y11A6 Y12E6 Y1426 Y1566
YCA7 YDE7 YF27 Y1067 Y11A7 Y12E7 Y1427 Y1567 CX1S Manual arbitrary feed 1st axis valid
Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
YCA8 YDE8 YF28 Y1068 Y11A8 Y12E8 Y1428 Y1568 CX21 Manual arbitrary feed 2nd axis selection code 1
YCA9 YDE9 YF29 Y1069 Y11A9 Y12E9 Y1429 Y1569 CX22 Manual arbitrary feed 2nd axis selection code 2
YCAA YDEA YF2A Y106A Y11AA Y12EA Y142A Y156A CX24 Manual arbitrary feed 2nd axis selection code 4
YCAB YDEB YF2B Y106B Y11AB Y12EB Y142B Y156B CX28 Manual arbitrary feed 2nd axis selection code 8
YCAC YDEC YF2C Y106C Y11AC Y12EC Y142C Y156C CX216 Manual arbitrary feed 2nd axis selection code 16
YCAD YDED YF2D Y106D Y11AD Y12ED Y142D Y156D
YCAE YDEE YF2E Y106E Y11AE Y12EE Y142E Y156E
YCAF YDEF YF2F Y106F Y11AF Y12EF Y142F Y156F CX2S Manual arbitrary feed 2nd axis valid
Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
YCB0 YDF0 YF30 Y1070 Y11B0 Y12F0 Y1430 Y1570 CX31 Manual arbitrary feed 3rd axis selection code 1
YCB1 YDF1 YF31 Y1071 Y11B1 Y12F1 Y1431 Y1571 CX32 Manual arbitrary feed 3rd axis selection code 2
YCB2 YDF2 YF32 Y1072 Y11B2 Y12F2 Y1432 Y1572 CX34 Manual arbitrary feed 3rd axis selection code 4
YCB3 YDF3 YF33 Y1073 Y11B3 Y12F3 Y1433 Y1573 CX38 Manual arbitrary feed 3rd axis selection code 8
YCB4 YDF4 YF34 Y1074 Y11B4 Y12F4 Y1434 Y1574 CX316 Manual arbitrary feed 3rd axis selection code 16
YCB5 YDF5 YF35 Y1075 Y11B5 Y12F5 Y1435 Y1575
YCB6 YDF6 YF36 Y1076 Y11B6 Y12F6 Y1436 Y1576
YCB7 YDF7 YF37 Y1077 Y11B7 Y12F7 Y1437 Y1577 CX3S Manual arbitrary feed 3rd axis valid
Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
YCB8 YDF8 YF38 Y1078 Y11B8 Y12F8 Y1438 Y1578 CXS1 Manual arbitrary feed Smoothing off
YCB9 YDF9 YF39 Y1079 Y11B9 Y12F9 Y1439 Y1579 CXS2 Manual arbitrary feed Axis independent
YCBA YDFA YF3A Y107A Y11BA Y12FA Y143A Y157A CXS3 Manual arbitrary feed EX.F/MODAL.F
YCBB YDFB YF3B Y107B Y11BB Y12FB Y143B Y157B CXS4 Manual arbitrary feed G0/G1
YCBC YDFC YF3C Y107C Y11BC Y12FC Y143C Y157C CXS5 Manual arbitrary feed MC/WK
YCBD YDFD YF3D Y107D Y11BD Y12FD Y143D Y157D CXS6 Manual arbitrary feed ABS/INC
YCBE YDFE YF3E Y107E Y11BE Y12FE Y143E Y157E *CXS7 Manual arbitrary feed Stop
YCBF YDFF YF3F Y107F Y11BF Y12FF Y143F Y157F CXS8 Manual arbitrary feed Strobe

Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
YCC0 YE00 YF40 Y1080 Y11C0 Y1300 Y1440 Y1580 ILM1 Current limit mode 1
YCC1 YE01 YF41 Y1081 Y11C1 Y1301 Y1441 Y1581 ILM2 Current limit mode 2
YCC2 YE02 YF42 Y1082 Y11C2 Y1302 Y1442 Y1582
YCC3 YE03 YF43 Y1083 Y11C3 Y1303 Y1443 Y1583 LDWT Load monitor I: Teaching/Monitor execution
YCC4 YE04 YF44 Y1084 Y11C4 Y1304 Y1444 Y1584 Load monitor I: Teaching mode
YCC5 YE05 YF45 Y1085 Y11C5 Y1305 Y1445 Y1585 Load monitor I: Monitor mode

YCC6 YE06 YF46 Y1086 Y11C6 Y1306 Y1446 Y1586 Load monitor I: Alarm reset
YCC7 YE07 YF47 Y1087 Y11C7 Y1307 Y1447 Y1587 Load monitor I: Warning reset
Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
YCC8 YE08 YF48 Y1088 Y11C8 Y1308 Y1448 Y1588 *ZRIT 2nd reference position return interlock
YCC9 YE09 YF49 Y1089 Y11C9 Y1309 Y1449 Y1589 Load monitor I: Adaptive control execution
YCCA YE0A YF4A Y108A Y11CA Y130A Y144A Y158A Small diameter deep hole drilling cycle
YCCB YE0B YF4B Y108B Y11CB Y130B Y144B Y158B Chuck barrier ON
YCCC YE0C YF4C Y108C Y11CC Y130C Y144C Y158C High-speed retract function valid
YCCD YE0D YF4D Y108D Y11CD Y130D Y144D Y158D
YCCE YE0E YF4E Y108E Y11CE Y130E Y144E Y158E
YCCF YE0F YF4F Y108F Y11CF Y130F Y144F Y158F Tool retract start
Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
YCD0 YE10 YF50 Y1090 Y11D0 Y1310 Y1450 Y1590 Waiting ignore
YCD1 YE11 YF51 Y1091 Y11D1 Y1311 Y1451 Y1591 Spindle-spindle polygon cancel
YCD2 YE12 YF52 Y1092 Y11D2 Y1312 Y1452 Y1592 Synchronous tapping command polarity reversal
YCD3 YE13 YF53 Y1093 Y11D3 Y1313 Y1453 Y1593 Spindle OFF mode
YCD4 YE14 YF54 Y1094 Y11D4 Y1314 Y1454 Y1594 Longitudinal hole drilling axis selection
YCD5 YE15 YF55 Y1095 Y11D5 Y1315 Y1455 Y1595 Optimum acceleration/deceleration parameter
switching request [axis]
YCD6 YE16 YF56 Y1096 Y11D6 Y1316 Y1456 Y1596 TRVEC Tap retract possible state cancel
YCD7 YE17 YF57 Y1097 Y11D7 Y1317 Y1457 Y1597 CHPRCR Chopping compensation update prevention request
Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
YCD8 YE18 YF58 Y1098 Y11D8 Y1318 Y1458 Y1598 Barrier valid (left)
YCD9 YE19 YF59 Y1099 Y11D9 Y1319 Y1459 Y1599 Barrier valid (right)
YCDA YE1A YF5A Y109A Y11DA Y131A Y145A Y159A Tool pre-setter sub-side valid
YCDB YE1B YF5B Y109B Y11DB Y131B Y145B Y159B
YCDC YE1C YF5C Y109C Y11DC Y131C Y145C Y159C
YCDD YE1D YF5D Y109D Y11DD Y131D Y145D Y159D
YCDE YE1E YF5E Y109E Y11DE Y131E Y145E Y159E HOBRTR Hob machining: Retract request
YCDF YE1F YF5F Y109F Y11DF Y131F Y145F Y159F HOBARTC Hob machining: Alarm retract control

Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
YCE0 YE20 YF60 Y10A0 Y11E0 Y1320 Y1460 Y15A0 T command in tool life management prohibited
YCE1 YE21 YF61 Y10A1 Y11E1 Y1321 Y1461 Y15A1 Door open II
YCE2 YE22 YF62 Y10A2 Y11E2 Y1322 Y1462 Y15A2 Door open signal input (spindle speed monitor)
YCE3 YE23 YF63 Y10A3 Y11E3 Y1323 Y1463 Y15A3 Door interlock spindle speed clamp
YCE4 YE24 YF64 Y10A4 Y11E4 Y1324 Y1464 Y15A4
YCE5 YE25 YF65 Y10A5 Y11E5 Y1325 Y1465 Y15A5
YCE6 YE26 YF66 Y10A6 Y11E6 Y1326 Y1466 Y15A6
YCE7 YE27 YF67 Y10A7 Y11E7 Y1327 Y1467 Y15A7
Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
YCE8 YE28 YF68 Y10A8 Y11E8 Y1328 Y1468 Y15A8 Door open II (2 channels per 1 part system)
YCE9 YE29 YF69 Y10A9 Y11E9 Y1329 Y1469 Y15A9
YCEA YE2A YF6A Y10AA Y11EA Y132A Y146A Y15AA
YCEB YE2B YF6B Y10AB Y11EB Y132B Y146B Y15AB
YCEC YE2C YF6C Y10AC Y11EC Y132C Y146C Y15AC
YCED YE2D YF6D Y10AD Y11ED Y132D Y146D Y15AD
YCEE YE2E YF6E Y10AE Y11EE Y132E Y146E Y15AE
YCEF YE2F YF6F Y10AF Y11EF Y132F Y146F Y15AF Load monitor I: Cutting torque estimation execution
Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
YCF0 YE30 YF70 Y10B0 Y11F0 Y1330 Y1470 Y15B0
YCF1 YE31 YF71 Y10B1 Y11F1 Y1331 Y1471 Y15B1 VFTCI Variable feed thread cutting invalid
YCF2 YE32 YF72 Y10B2 Y11F2 Y1332 Y1472 Y15B2
YCF3 YE33 YF73 Y10B3 Y11F3 Y1333 Y1473 Y15B3
YCF4 YE34 YF74 Y10B4 Y11F4 Y1334 Y1474 Y15B4 BCHK Barrier check invalid
YCF5 YE35 YF75 Y10B5 Y11F5 Y1335 Y1475 Y15B5
YCF6 YE36 YF76 Y10B6 Y11F6 Y1336 Y1476 Y15B6
YCF7 YE37 YF77 Y10B7 Y11F7 Y1337 Y1477 Y15B7
Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
YCF8 YE38 YF78 Y10B8 Y11F8 Y1338 Y1478 Y15B8 MSYNC Synchronization between part systems OFF
YCF9 YE39 YF79 Y10B9 Y11F9 Y1339 Y1479 Y15B9
YCFA YE3A YF7A Y10BA Y11FA Y133A Y147A Y15BA DRNC Dry run invalid
YCFB YE3B YF7B Y10BB Y11FB Y133B Y147B Y15BB AUTED Automatic error detection
YCFC YE3C YF7C Y10BC Y11FC Y133C Y147C Y15BC MRPSG Manual arbitrary reverse run: MSTB reverse run
prohibited
YCFD YE3D YF7D Y10BD Y11FD Y133D Y147D Y15BD G71 Shape judgement disable
YCFE YE3E YF7E Y10BE Y11FE Y133E Y147E Y15BE Appropriate machining diagnosis in progress
YCFF YE3F YF7F Y10BF Y11FF Y133F Y147F Y15BF Appropriate machining diagnosis error reset

Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
YD00 YE40 YF80 Y10C0 Y1200 Y1340 Y1480 Y15C0 PFCHR Program format switch request
YD01 YE41 YF81 Y10C1 Y1201 Y1341 Y1481 Y15C1 RBSSY Manual arbitrary reverse run: Reverse run block
stop designated part system
YD02 YE42 YF82 Y10C2 Y1202 Y1342 Y1482 Y15C2

YD03 YE43 YF83 Y10C3 Y1203 Y1343 Y1483 Y15C3
YD04 YE44 YF84 Y10C4 Y1204 Y1344 Y1484 Y15C4
YD05 YE45 YF85 Y10C5 Y1205 Y1345 Y1485 Y15C5
YD06 YE46 YF86 Y10C6 Y1206 Y1346 Y1486 Y15C6
YD07 YE47 YF87 Y10C7 Y1207 Y1347 Y1487 Y15C7
Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
YD08 YE48 YF88 Y10C8 Y1208 Y1348 Y1488 Y15C8 RVSP Reverse run from block start
YD09 YE49 YF89 Y10C9 Y1209 Y1349 Y1489 Y15C9 RVIT Macro interrupt priority
YD0A YE4A YF8A Y10CA Y120A Y134A Y148A Y15CA RVMD Reverse run control mode
YD0B YE4B YF8B Y10CB Y120B Y134B Y148B Y15CB ACCG Rapid traverse time constant: Switchover request
YD0C YE4C YF8C Y10CC Y120C Y134C Y148C Y15CC RT2CHGA Real-time tuning 2: Acceleration/deceleration time con stant in automatic switchover
YD0D YE4D YF8D Y10CD Y120D Y134D Y148D Y15CD RT2CHGM Real-time tuning 2: Acceleration/deceleration time con stant in manual switchover
YD0E YE4E YF8E Y10CE Y120E Y134E Y148E Y15CE RT2RST Real-time tuning 2: Acceleration/deceleration time con stant reset
YD0F YE4F YF8F Y10CF Y120F Y134F Y148F Y15CF TWIN Request for reflecting reserved tool wear compen sation
Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
YD10 YE50 YF90 Y10D0 Y1210 Y1350 Y1490 Y15D0
YD11 YE51 YF91 Y10D1 Y1211 Y1351 Y1491 Y15D1
YD12 YE52 YF92 Y10D2 Y1212 Y1352 Y1492 Y15D2
YD13 YE53 YF93 Y10D3 Y1213 Y1353 Y1493 Y15D3
YD14 YE54 YF94 Y10D4 Y1214 Y1354 Y1494 Y15D4 3D coordinate conversion: Manual feed coordinates
switch
YD15 YE55 YF95 Y10D5 Y1215 Y1355 Y1495 Y15D5 RCEE Rotation center error compensation enabled
YD16 YE56 YF96 Y10D6 Y1216 Y1356 Y1496 Y15D6
YD17 YE57 YF97 Y10D7 Y1217 Y1357 Y1497 Y15D7 SECE Spatial error compensation enabled
Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
YD18 YE58 YF98 Y10D8 Y1218 Y1358 Y1498 Y15D8 MJCT 3D manual feed (JOG, INC): Tool axis coordinate system
selection
YD19 YE59 YF99 Y10D9 Y1219 Y1359 Y1499 Y15D9 MJCB 3D manual feed (JOG, INC): Table coordinate system se lection
YD1A YE5A YF9A Y10DA Y121A Y135A Y149A Y15DA MJCF 3D manual feed (JOG, INC): Feature coordinate system
selection
YD1B YE5B YF9B Y10DB Y121B Y135B Y149B Y15DB MH1CT 3D manual feed (1st handle): Tool axis coordinate system
selection
YD1C YE5C YF9C Y10DC Y121C Y135C Y149C Y15DC MH1CB 3D manual feed (1st handle): Table coordinate system
selection
YD1D YE5D YF9D Y10DD Y121D Y135D Y149D Y15DD MH1CF 3D manual feed (1st handle): Feature coordinate system
selection
YD1E YE5E YF9E Y10DE Y121E Y135E Y149E Y15DE MH2CT 3D manual feed (2nd handle): Tool axis coordinate sys tem selection
YD1F YE5F YF9F Y10DF Y121F Y135F Y149F Y15DF MH2CB 3D manual feed (2nd handle): Table coordinate system
selection

Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
YD20 YE60 YFA0 Y10E0 Y1220 Y1360 Y14A0 Y15E0 MH2CF 3D manual feed (2nd handle): Feature coordinate system
selection
YD21 YE61 YFA1 Y10E1 Y1221 Y1361 Y14A1 Y15E1 MH3CT 3D manual feed (3rd handle): Tool axis coordinate sys tem selection
YD22 YE62 YFA2 Y10E2 Y1222 Y1362 Y14A2 Y15E2 MH3CB 3D manual feed (3rd handle): Table coordinate system
selection
YD23 YE63 YFA3 Y10E3 Y1223 Y1363 Y14A3 Y15E3 MH3CF 3D manual feed (3rd handle): Feature coordinate system
selection
YD24 YE64 YFA4 Y10E4 Y1224 Y1364 Y14A4 Y15E4
YD25 YE65 YFA5 Y10E5 Y1225 Y1365 Y14A5 Y15E5
YD26 YE66 YFA6 Y10E6 Y1226 Y1366 Y14A6 Y15E6
YD27 YE67 YFA7 Y10E7 Y1227 Y1367 Y14A7 Y15E7 TCPRC Tool center point rotation
Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
YD28 YE68 YFA8 Y10E8 Y1228 Y1368 Y14A8 Y15E8 MFIN1 Miscellaneous function command high-speed output: M
function finish 1
YD29 YE69 YFA9 Y10E9 Y1229 Y1369 Y14A9 Y15E9 MFIN2 Miscellaneous function command high-speed output: M
function finish 2
YD2A YE6A YFAA Y10EA Y122A Y136A Y14AA Y15EA MFIN3 Miscellaneous function command high-speed output: M
function finish 3
YD2B YE6B YFAB Y10EB Y122B Y136B Y14AB Y15EB MFIN4 Miscellaneous function command high-speed output: M
function finish 4
YD2C YE6C YFAC Y10EC Y122C Y136C Y14AC Y15EC SFIN1 Miscellaneous function command high-speed output: S
function finish 1
YD2D YE6D YFAD Y10ED Y122D Y136D Y14AD Y15ED SFIN2 Miscellaneous function command high-speed output: S
function finish 2
YD2E YE6E YFAE Y10EE Y122E Y136E Y14AE Y15EE SFIN3 Miscellaneous function command high-speed output: S
function finish 3
YD2F YE6F YFAF Y10EF Y122F Y136F Y14AF Y15EF SFIN4 Miscellaneous function command high-speed output: S
function finish 4
Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
YD30 YE70 YFB0 Y10F0 Y1230 Y1370 Y14B0 Y15F0 TFIN1 Miscellaneous function command high-speed output: T
function finish 1
YD31 YE71 YFB1 Y10F1 Y1231 Y1371 Y14B1 Y15F1 TFIN2 Miscellaneous function command high-speed output: T
function finish 2
YD32 YE72 YFB2 Y10F2 Y1232 Y1372 Y14B2 Y15F2 TFIN3 Miscellaneous function command high-speed output: T
function finish 3
YD33 YE73 YFB3 Y10F3 Y1233 Y1373 Y14B3 Y15F3 TFIN4 Miscellaneous function command high-speed output: T
function finish 4
YD34 YE74 YFB4 Y10F4 Y1234 Y1374 Y14B4 Y15F4 BFIN1 Miscellaneous function command high-speed output: 2nd

M function finish 1
YD35 YE75 YFB5 Y10F5 Y1235 Y1375 Y14B5 Y15F5 BFIN2 Miscellaneous function command high-speed output: 2nd M function finish 2
YD36 YE76 YFB6 Y10F6 Y1236 Y1376 Y14B6 Y15F6 BFIN3 Miscellaneous function command high-speed output: 2nd M function finish 3
YD37 YE77 YFB7 Y10F7 Y1237 Y1377 Y14B7 Y15F7 BFIN4 Miscellaneous function command high-speed output: 2nd M function finish 4

Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
YD38 YE78 YFB8 Y10F8 Y1238 Y1378 Y14B8 Y15F8 SFIN5 Miscellaneous function command high-speed output: S function finish 5
YD39 YE79 YFB9 Y10F9 Y1239 Y1379 Y14B9 Y15F9 SFIN6 Miscellaneous function command high-speed output: S function finish 6
YD3A YE7A YFBA Y10FA Y123A Y137A Y14BA Y15FA SFIN7 Miscellaneous function command high-speed output: S function finish 7
YD3B YE7B YFBB Y10FB Y123B Y137B Y14BB Y15FB SFIN8 Miscellaneous function command high-speed output: S function finish 8
YD3C YE7C YFBC Y10FC Y123C Y137C Y14BC Y15FC
YD3D YE7D YFBD Y10FD Y123D Y137D Y14BD Y15FD
YD3E YE7E YFBE Y10FE Y123E Y137E Y14BE Y15FE
YD3F YE7F YFBF Y10FF Y123F Y137F Y14BF Y15FF
Common ($) Abbrev. Signal name Common ($) Abbrev. Signal name
Y1870 Y1878 Edit/search
Y1871 Y1879
Y1872 Y187A
Y1873 Y187B
Y1874 Y187C
Y1875 Y187D
Y1876 Y187E
Y1877 Y187F

Device No.
1stSP 2ndSP 3rdSP 4thSP 5thSP 6thSP 7thSP 8thSP Abbrev. Signal name
Y1880 Y18E0 Y1940 Y19A0 Y1A00 Y1A60 Y1AC0 Y1B20
Y1881 Y18E1 Y1941 Y19A1 Y1A01 Y1A61 Y1AC1 Y1B21
Y1882 Y18E2 Y1942 Y19A2 Y1A02 Y1A62 Y1AC2 Y1B22
Y1883 Y18E3 Y1943 Y19A3 Y1A03 Y1A63 Y1AC3 Y1B23
Y1884 Y18E4 Y1944 Y19A4 Y1A04 Y1A64 Y1AC4 Y1B24
Y1885 Y18E5 Y1945 Y19A5 Y1A05 Y1A65 Y1AC5 Y1B25 GFIN Gear shift completion
Y1886 Y18E6 Y1946 Y19A6 Y1A06 Y1A66 Y1AC6 Y1B26
Y1887 Y18E7 Y1947 Y19A7 Y1A07 Y1A67 Y1AC7 Y1B27
Device No.
1stSP 2ndSP 3rdSP 4thSP 5thSP 6thSP 7thSP 8thSP Abbrev. Signal name
Y1888 Y18E8 Y1948 Y19A8 Y1A08 Y1A68 Y1AC8 Y1B28 SP1 Spindle speed override code 1
Y1889 Y18E9 Y1949 Y19A9 Y1A09 Y1A69 Y1AC9 Y1B29 SP2 Spindle speed override code 2
Y188A Y18EA Y194A Y19AA Y1A0A Y1A6A Y1ACA Y1B2A SP4 Spindle speed override code 4
Y188B Y18EB Y194B Y19AB Y1A0B Y1A6B Y1ACB Y1B2B
Y188C Y18EC Y194C Y19AC Y1A0C Y1A6C Y1ACC Y1B2C
Y188D Y18ED Y194D Y19AD Y1A0D Y1A6D Y1ACD Y1B2D
Y188E Y18EE Y194E Y19AE Y1A0E Y1A6E Y1ACE Y1B2E
Y188F Y18EF Y194F Y19AF Y1A0F Y1A6F Y1ACF Y1B2F SPS Spindle override method selection
Device No.
1stSP 2ndSP 3rdSP 4thSP 5thSP 6thSP 7thSP 8thSP Abbrev. Signal name
Y1890 Y18F0 Y1950 Y19B0 Y1A10 Y1A70 Y1AD0 Y1B30 GI1 Spindle gear selection code 1
Y1891 Y18F1 Y1951 Y19B1 Y1A11 Y1A71 Y1AD1 Y1B31 GI2 Spindle gear selection code 2
Y1892 Y18F2 Y1952 Y19B2 Y1A12 Y1A72 Y1AD2 Y1B32
Y1893 Y18F3 Y1953 Y19B3 Y1A13 Y1A73 Y1AD3 Y1B33 EXOBS Increase holding power of spindle
Y1894 Y18F4 Y1954 Y19B4 Y1A14 Y1A74 Y1AD4 Y1B34 SSTP Spindle stop
Y1895 Y18F5 Y1955 Y19B5 Y1A15 Y1A75 Y1AD5 Y1B35 SSFT Spindle gear shift
Y1896 Y18F6 Y1956 Y19B6 Y1A16 Y1A76 Y1AD6 Y1B36 SORC Spindle orientation
Y1897 Y18F7 Y1957 Y19B7 Y1A17 Y1A77 Y1AD7 Y1B37 Spindle command invalid
Device No.
1stSP 2ndSP 3rdSP 4thSP 5thSP 6thSP 7thSP 8thSP Abbrev. Signal name
Y1898 Y18F8 Y1958 Y19B8 Y1A18 Y1A78 Y1AD8 Y1B38 SRN Spindle forward run start
Y1899 Y18F9 Y1959 Y19B9 Y1A19 Y1A79 Y1AD9 Y1B39 SRI Spindle reverse run start
Y189A Y18FA Y195A Y19BA Y1A1A Y1A7A Y1ADA Y1B3A TL1 Spindle torque limit 1
Y189B Y18FB Y195B Y19BB Y1A1B Y1A7B Y1ADB Y1B3B TL2 Spindle torque limit 2
Y189C Y18FC Y195C Y19BC Y1A1C Y1A7C Y1ADC Y1B3C WRN Spindle forward run index
Y189D Y18FD Y195D Y19BD Y1A1D Y1A7D Y1ADD Y1B3D WRI Spindle reverse run index
Y189E Y18FE Y195E Y19BE Y1A1E Y1A7E Y1ADE Y1B3E ORC Spindle orientation command
Y189F Y18FF Y195F Y19BF Y1A1F Y1A7F Y1ADF Y1B3F LRSL L coil selection

Device No.
1stSP 2ndSP 3rdSP 4thSP 5thSP 6thSP 7thSP 8thSP Abbrev. Signal name
Y18A0 Y1900 Y1960 Y19C0 Y1A20 Y1A80 Y1AE0 Y1B40
Y18A1 Y1901 Y1961 Y19C1 Y1A21 Y1A81 Y1AE1 Y1B41
Y18A2 Y1902 Y1962 Y19C2 Y1A22 Y1A82 Y1AE2 Y1B42
Y18A3 Y1903 Y1963 Y19C3 Y1A23 Y1A83 Y1AE3 Y1B43

Y18A4 Y1904 Y1964 Y19C4 Y1A24 Y1A84 Y1AE4 Y1B44
Y18A5 Y1905 Y1965 Y19C5 Y1A25 Y1A85 Y1AE5 Y1B45 CMOD Spindle position control (Spindle/C axis con trol): C axis selection
Y18A6 Y1906 Y1966 Y19C6 Y1A26 Y1A86 Y1AE6 Y1B46 LRSM M coil selection
Y18A7 Y1907 Y1967 Y19C7 Y1A27 Y1A87 Y1AE7 Y1B47
Device No.
1stSP 2ndSP 3rdSP 4thSP 5thSP 6thSP 7thSP 8thSP Abbrev. Signal name
Y18A8 Y1908 Y1968 Y19C8 Y1A28 Y1A88 Y1AE8 Y1B48 SWS Spindle selection
Y18A9 Y1909 Y1969 Y19C9 Y1A29 Y1A89 Y1AE9 Y1B49
Y18AA Y190A Y196A Y19CA Y1A2A Y1A8A Y1AEA Y1B4A SPRR Spindle rotation reversal
Y18AB Y190B Y196B Y19CB Y1A2B Y1A8B Y1AEB Y1B4B SPRS Spindle rotation direction switch method se lection
Y18AC Y190C Y196C Y19CC Y1A2C Y1A8C Y1AEC Y1B4C
Y18AD Y190D Y196D Y19CD Y1A2D Y1A8D Y1AED Y1B4D
Y18AE Y190E Y196E Y19CE Y1A2E Y1A8E Y1AEE Y1B4E
Y18AF Y190F Y196F Y19CF Y1A2F Y1A8F Y1AEF Y1B4F MPCSL PLC coil changeover
Device No.
1stSP 2ndSP 3rdSP 4thSP 5thSP 6thSP 7thSP 8thSP Abbrev. Signal name
Y18B0 Y1910 Y1970 Y19D0 Y1A30 Y1A90 Y1AF0 Y1B50 SPSY Spindle synchronization
Y18B1 Y1911 Y1971 Y19D1 Y1A31 Y1A91 Y1AF1 Y1B51 SPPHS Spindle phase synchronization
Y18B2 Y1912 Y1972 Y19D2 Y1A32 Y1A92 Y1AF2 Y1B52 SPSDR Spindle synchronous rotation direction
Y18B3 Y1913 Y1973 Y19D3 Y1A33 Y1A93 Y1AF3 Y1B53 SSPHM Phase shift calculation request
Y18B4 Y1914 Y1974 Y19D4 Y1A34 Y1A94 Y1AF4 Y1B54 SSPHF Phase offset request
Y18B5 Y1915 Y1975 Y19D5 Y1A35 Y1A95 Y1AF5 Y1B55 SPDRPO Error temporary cancel
Y18B6 Y1916 Y1976 Y19D6 Y1A36 Y1A96 Y1AF6 Y1B56
Y18B7 Y1917 Y1977 Y19D7 Y1A37 Y1A97 Y1AF7 Y1B57
Device No.
1stSP 2ndSP 3rdSP 4thSP 5thSP 6thSP 7thSP 8thSP Abbrev. Signal name
Y18B8 Y1918 Y1978 Y19D8 Y1A38 Y1A98 Y1AF8 Y1B58 SPSYC Spindle synchronization/superimposition can cel
Y18B9 Y1919 Y1979 Y19D9 Y1A39 Y1A99 Y1AF9 Y1B59 SPCMPC Chuck close
Y18BA Y191A Y197A Y19DA Y1A3A Y1A9A Y1AFA Y1B5A
Y18BB Y191B Y197B Y19DB Y1A3B Y1A9B Y1AFB Y1B5B
Y18BC Y191C Y197C Y19DC Y1A3C Y1A9C Y1AFC Y1B5C
Y18BD Y191D Y197D Y19DD Y1A3D Y1A9D Y1AFD Y1B5D
Y18BE Y191E Y197E Y19DE Y1A3E Y1A9E Y1AFE Y1B5E
Y18BF Y191F Y197F Y19DF Y1A3F Y1A9F Y1AFF Y1B5F SPOFF Exclude spindle

Device No.
1stSP 2ndSP 3rdSP 4thSP 5thSP 6thSP 7thSP 8thSP Abbrev. Signal name
Y18C0 Y1920 Y1980 Y19E0 Y1A40 Y1AA0 Y1B00 Y1B60
Y18C1 Y1921 Y1981 Y19E1 Y1A41 Y1AA1 Y1B01 Y1B61
Y18C2 Y1922 Y1982 Y19E2 Y1A42 Y1AA2 Y1B02 Y1B62
Y18C3 Y1923 Y1983 Y19E3 Y1A43 Y1AA3 Y1B03 Y1B63
Y18C4 Y1924 Y1984 Y19E4 Y1A44 Y1AA4 Y1B04 Y1B64
Y18C5 Y1925 Y1985 Y19E5 Y1A45 Y1AA5 Y1B05 Y1B65
Y18C6 Y1926 Y1986 Y19E6 Y1A46 Y1AA6 Y1B06 Y1B66
Y18C7 Y1927 Y1987 Y19E7 Y1A47 Y1AA7 Y1B07 Y1B67
Device No.
1stSP 2ndSP 3rdSP 4thSP 5thSP 6thSP 7thSP 8thSP Abbrev. Signal name
Y18C8 Y1928 Y1988 Y19E8 Y1A48 Y1AA8 Y1B08 Y1B68 Spindle oscillation command
Y18C9 Y1929 Y1989 Y19E9 Y1A49 Y1AA9 Y1B09 Y1B69
Y18CA Y192A Y198A Y19EA Y1A4A Y1AAA Y1B0A Y1B6A VGHLDC
Real-time tuning 1:
Speed control gain changeover hold down command
Y18CB Y192B Y198B Y19EB Y1A4B Y1AAB Y1B0B Y1B6B SPFLRQ SPFL: Control request
Y18CC Y192C Y198C Y19EC Y1A4C Y1AAC Y1B0C Y1B6C
Y18CD Y192D Y198D Y19ED Y1A4D Y1AAD Y1B0D Y1B6D
Y18CE Y192E Y198E Y19EE Y1A4E Y1AAE Y1B0E Y1B6E
Y18CF Y192F Y198F Y19EF Y1A4F Y1AAF Y1B0F Y1B6F
Device No.
1stSP 2ndSP 3rdSP 4thSP 5thSP 6thSP 7thSP 8thSP Abbrev. Signal name
Y18D0 Y1930 Y1990 Y19F0 Y1A50 Y1AB0 Y1B10 Y1B70
Y18D1 Y1931 Y1991 Y19F1 Y1A51 Y1AB1 Y1B11 Y1B71
Y18D2 Y1932 Y1992 Y19F2 Y1A52 Y1AB2 Y1B12 Y1B72
Y18D3 Y1933 Y1993 Y19F3 Y1A53 Y1AB3 Y1B13 Y1B73
Y18D4 Y1934 Y1994 Y19F4 Y1A54 Y1AB4 Y1B14 Y1B74
Y18D5 Y1935 Y1995 Y19F5 Y1A55 Y1AB5 Y1B15 Y1B75
Y18D6 Y1936 Y1996 Y19F6 Y1A56 Y1AB6 Y1B16 Y1B76
Y18D7 Y1937 Y1997 Y19F7 Y1A57 Y1AB7 Y1B17 Y1B77
Device No.
1stSP 2ndSP 3rdSP 4thSP 5thSP 6thSP 7thSP 8thSP Abbrev. Signal name
Y18D8 Y1938 Y1998 Y19F8 Y1A58 Y1AB8 Y1B18 Y1B78
Y18D9 Y1939 Y1999 Y19F9 Y1A59 Y1AB9 Y1B19 Y1B79
Y18DA Y193A Y199A Y19FA Y1A5A Y1ABA Y1B1A Y1B7A
Y18DB Y193B Y199B Y19FB Y1A5B Y1ABB Y1B1B Y1B7B
Y18DC Y193C Y199C Y19FC Y1A5C Y1ABC Y1B1C Y1B7C
Y18DD Y193D Y199D Y19FD Y1A5D Y1ABD Y1B1D Y1B7D
Y18DE Y193E Y199E Y19FE Y1A5E Y1ABE Y1B1E Y1B7E
Y18DF Y193F Y199F Y19FF Y1A5F Y1ABF Y1B1F Y1B7F

Common ($) Abbrev. Signal name Common ($) Abbrev. Signal name
Y1C80 MES interface library: Operation trigger Y1C88 ENC1PC
LR
External encoder 1: Position output clear re quest

Y1C81 *KEY_Me
mC Data protect key (memory card) Y1C89
Y1C82 *KEY_DS Data protect key (DS) Y1C8A
Y1C83 BZR Buzzer sound control: Buzzer ON Y1C8B
Y1C84 EQLDWR Spindle protection: Resetting alarm of equiv alent load factor over limit Y1C8C
Y1C85 DSPCRD Image input I/F: Screen selection Y1C8D DSP FLPV Image input I/F: IPC screen vertical inversion
Y1C86 Y1C8E DSP FLPH
Image input I/F: IPC screen horizontal inver sion
Y1C87 Y1C8F
Common ($) Abbrev. Signal name Common ($) Abbrev. Signal name
Y1CA0 Y1CA8
Y1CA1 Y1CA9
Y1CA2 Y1CAA
Y1CA3 Y1CAB
Y1CA4 Y1CAC
Y1CA5 Y1CAD
Y1CA6 Laser: Laser condition change complete Y1CAE
Y1CA7 Laser: Laser beam irradiating Y1CAF
Common ($) Abbrev. Signal name Common ($) Abbrev. Signal name
Y1CB0 Y1CB8 TWR Reservation of tool wear compensation
Y1CB1 Y1CB9
Y1CB2 Y1CBA
Y1CB3 Y1CBB
Y1CB4 Y1CBC
Y1CB5 Y1CBD
Y1CB6 Y1CBE
Y1CB7 Y1CBF
Common ($) Abbrev. Signal name Common ($) Abbrev. Signal name
Y1CD0 Y1CD8 Laser: Height control
Y1CD1 Y1CD9 Laser: Enable height retention in height con trol
Y1CD2 Y1CDA
Y1CD3 Y1CDB
Y1CD4 Y1CDC
Y1CD5 Y1CDD
Y1CD6 Y1CDE
Y1CD7 Y1CDF
Common ($) Abbrev. Signal name Common ($) Abbrev. Signal name
Y1CE0 Laser: Laser beam irradiation ready Y1CE8
Y1CE1 Laser: Axis stop time with beam ON monitor ing OFF Y1CE9
Y1CE2 Y1CEA
Y1CE3 Y1CEB
Y1CE4 Y1CEC
Y1CE5 Y1CED
Y1CE6 Y1CEE
Y1CE7 Y1CEF
M800V/M80V Series PLC Interface Manual
2 Input/Output Signals with Controller
2.3 PLC Output Signals (Bit Type: Y***)
101 IB-1501616-F
Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
Y1D00 Y1D20 Y1D40 Y1D60 Y1D80 Y1DA0 Y1DC0 Y1DE0 Position switch 1 interlock
Y1D01 Y1D21 Y1D41 Y1D61 Y1D81 Y1DA1 Y1DC1 Y1DE1 Position switch 2 interlock
Y1D02 Y1D22 Y1D42 Y1D62 Y1D82 Y1DA2 Y1DC2 Y1DE2 Position switch 3 interlock
Y1D03 Y1D23 Y1D43 Y1D63 Y1D83 Y1DA3 Y1DC3 Y1DE3 Position switch 4 interlock
Y1D04 Y1D24 Y1D44 Y1D64 Y1D84 Y1DA4 Y1DC4 Y1DE4 Position switch 5 interlock
Y1D05 Y1D25 Y1D45 Y1D65 Y1D85 Y1DA5 Y1DC5 Y1DE5 Position switch 6 interlock
Y1D06 Y1D26 Y1D46 Y1D66 Y1D86 Y1DA6 Y1DC6 Y1DE6 Position switch 7 interlock
Y1D07 Y1D27 Y1D47 Y1D67 Y1D87 Y1DA7 Y1DC7 Y1DE7 Position switch 8 interlock
Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
Y1D08 Y1D28 Y1D48 Y1D68 Y1D88 Y1DA8 Y1DC8 Y1DE8 Position switch 9 interlock
Y1D09 Y1D29 Y1D49 Y1D69 Y1D89 Y1DA9 Y1DC9 Y1DE9 Position switch 10 interlock
Y1D0A Y1D2A Y1D4A Y1D6A Y1D8A Y1DAA Y1DCA Y1DEA Position switch 11 interlock
Y1D0B Y1D2B Y1D4B Y1D6B Y1D8B Y1DAB Y1DCB Y1DEB Position switch 12 interlock
Y1D0C Y1D2C Y1D4C Y1D6C Y1D8C Y1DAC Y1DCC Y1DEC Position switch 13 interlock
Y1D0D Y1D2D Y1D4D Y1D6D Y1D8D Y1DAD Y1DCD Y1DED Position switch 14 interlock
Y1D0E Y1D2E Y1D4E Y1D6E Y1D8E Y1DAE Y1DCE Y1DEE Position switch 15 interlock
Y1D0F Y1D2F Y1D4F Y1D6F Y1D8F Y1DAF Y1DCF Y1DEF Position switch 16 interlock
Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
Y1D10 Y1D30 Y1D50 Y1D70 Y1D90 Y1DB0 Y1DD0 Y1DF0 Position switch 17 interlock
Y1D11 Y1D31 Y1D51 Y1D71 Y1D91 Y1DB1 Y1DD1 Y1DF1 Position switch 18 interlock
Y1D12 Y1D32 Y1D52 Y1D72 Y1D92 Y1DB2 Y1DD2 Y1DF2 Position switch 19 interlock
Y1D13 Y1D33 Y1D53 Y1D73 Y1D93 Y1DB3 Y1DD3 Y1DF3 Position switch 20 interlock
Y1D14 Y1D34 Y1D54 Y1D74 Y1D94 Y1DB4 Y1DD4 Y1DF4 Position switch 21 interlock
Y1D15 Y1D35 Y1D55 Y1D75 Y1D95 Y1DB5 Y1DD5 Y1DF5 Position switch 22 interlock
Y1D16 Y1D36 Y1D56 Y1D76 Y1D96 Y1DB6 Y1DD6 Y1DF6 Position switch 23 interlock
Y1D17 Y1D37 Y1D57 Y1D77 Y1D97 Y1DB7 Y1DD7 Y1DF7 Position switch 24 interlock
Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
Y1D18 Y1D38 Y1D58 Y1D78 Y1D98 Y1DB8 Y1DD8 Y1DF8 Position switch 25 interlock
Y1D19 Y1D39 Y1D59 Y1D79 Y1D99 Y1DB9 Y1DD9 Y1DF9 Position switch 26 interlock
Y1D1A Y1D3A Y1D5A Y1D7A Y1D9A Y1DBA Y1DDA Y1DFA Position switch 27 interlock
Y1D1B Y1D3B Y1D5B Y1D7B Y1D9B Y1DBB Y1DDB Y1DFB Position switch 28 interlock
Y1D1C Y1D3C Y1D5C Y1D7C Y1D9C Y1DBC Y1DDC Y1DFC Position switch 29 interlock
Y1D1D Y1D3D Y1D5D Y1D7D Y1D9D Y1DBD Y1DDD Y1DFD Position switch 30 interlock
Y1D1E Y1D3E Y1D5E Y1D7E Y1D9E Y1DBE Y1DDE Y1DFE Position switch 31 interlock

Y1D1F Y1D3F Y1D5F Y1D7F Y1D9F Y1DBF Y1DDF Y1DFF Position switch 32 interlock

2.4 PLC Output Signals (Data Type: R***)
(1) Signals with "" are prepared for a specific machine tool builder.
Common ($) Abbrev. Signal name Common ($) Abbrev. Signal name
R200 AO1 Analog output 1 R208
R201 AO2 Analog output 2 R209
R202 AO3 Analog output 3 R210 Displayed screen No.
R203 AO4 Analog output 4 R211
R204 R212 KEY OUT 1
R205 R213
R206 R214
R207 R215 Power OFF indication Y device No.
Common ($) Abbrev. Signal name Common ($) Abbrev. Signal name
R216 Detailed screen No. R224 User sequence program version code A
R217 R225 User sequence program version code B
R218 R226 User sequence program version code C
R219 R227 User sequence program version code D
R220 R228
R221 R229
R222 R230
R223 R231
Common ($) Abbrev. Signal name Common ($) Abbrev. Signal name
R232 User sequence program version code 2 A R240 APLC version A
R233 User sequence program version code 2 B R241 APLC version B
R234 User sequence program version code 2 C R242 APLC version C
R235 User sequence program version code 2 D R243 APLC version D
R236 User sequence program version code 2 E R244
R237 User sequence program version code 2 F R245
R238 User sequence program version code 2 G R246
R239 User sequence program version code 2 H R247
Common ($) Abbrev. Signal name Common ($) Abbrev. Signal name
R248 OT ignored (Axis 1 to 8 for part system 1,2) R256
R249 OT ignored (Axis 1 to 8 for part system 3,4) R257
R250 R258
R251 R259
R252 R260
R253 R261
R254 R262
R255 PLC axis OT ignored R263
Note

Common ($) Abbrev. Signal name Common ($) Abbrev. Signal name
R264 R272 Near-point dog ignored (Axis 1 to 8 for part
system 1,2)
R265 R273 Near-point dog ignored (Axis 1 to 8 for part
system 3,4)
R266 R274
R267 R275
R268 R276
R269 R277
R270 R278
R271 R279 PLC axis near-point dog ignored
Common ($) Abbrev. Signal name Common ($) Abbrev. Signal name
R280 R288
R281 R289
R282 R290
R283 R291
R284 R292
R285 R293
R286 R294
R287 R295
Common ($) Abbrev. Signal name Common ($) Abbrev. Signal name
R296 SOMD Speed monitor mode R304 NDPC Power consumption computation: Consump tion of devices other than drive system(L)
R297 Handy terminal Data area top address R305 Power consumption computation: Consump tion of devices other than drive system(H)
R298 Handy terminal Data valid number of registers R306 DFPCC Power consumption computation: Drive sys tem's fixed consumption correction(L)
R299 Handy terminal Cause of communication error R307 Power consumption computation: Drive sys tem's fixed consumption correction(H)
R300 R308 Operator message I/F 1
R301 R309 Operator message I/F 2
R302 R310 Operator message I/F 3
R303 R311 Operator message I/F 4
Common ($) Abbrev. Signal name Common ($) Abbrev. Signal name
R312 R320 DSP POSH Image input I/F: Image display position (H)
R313 R321 DSP POSV Image input I/F: Image display position (V)
R314 PLC axis position switch interlock 1 to 16 R322 DSPSZH Image input I/F: Display range (width)
R315 PLC axis position switch interlock 17 to 32 R323 DSPSZV Image input I/F: Display range (height)
R316 R324 IP CPOSH
Image input I/F: IPC screen transfer start posi tion (H)
R317 R325 IP CPOSV
Image input I/F: IPC screen transfer start posi tion (V)
R318 R326 IPCSZH Image input I/F: IPC screen transfer range
(width)

R319 R327 IPCSZV Image input I/F: IPC screen transfer range
(height)

Common ($) Abbrev. Signal name Common ($) Abbrev. Signal name
R328 DSPACT Image input I/F: Behavior at operation R336 Tool I/D R/W pot No. designation
R329 R337 Large diameter tool information
R330 R338 Tool weight (spindle tool)
R331 R339 Tool weight (standby tool)
R332 R340 Unset tool information
R333 R341
R334 R342 Specified shape interference Shape No.
designation
R335 R343
Common ($) Abbrev. Signal name Common ($) Abbrev. Signal name
R344 R352 Remote program input No. (L)
R345 R353 Remote program input No. (H)
R346 R354 Machine tool builder macro password No. (L)
R347 Skip retract valid R355 Machine tool builder macro password No. (H)
R348 Skip retract amount (L) [M] R356 Direct screen selection A
R349 Skip retract amount (H) [M] R357 Direct screen selection B
R350 Skip retract speed (L) [M] R358 Direct screen selection C
R351 Skip retract speed (H) [M] R359 Direct screen selection D
Common ($) Abbrev. Signal name Common ($) Abbrev. Signal name
R360 R368
R361 User level-based data protection: Operation
level R369
R362 R370
R363 R371
R364 Machine parameter lock I/F R372 High-speed simple program check: Time
measurement output (L)
R365 Measures against tool setter chattering Move ment amount R373 High-speed simple program check: Time
measurement output (H)
R366 R374
R367 R375 Manual arbitrary reverse run handle selection
Common ($) Abbrev. Signal name Common ($) Abbrev. Signal name
R376 R384
R377 R385
R378 High-speed simple program check: Time re duction coefficient R386
R379 Manual arbitrary reverse run speed multiplier R387
R380 R388
R381 R389
R382 R390
G/B spindle synchronization: Position error
compensation scale, and the number of times
of compensations
R383 R391
Optimum acceleration/deceleration pa rameter switching axis
(spindle and bit selection)

Common ($) Abbrev. Signal name Common ($) Abbrev. Signal name
R392 R400 Ball screw thermal displacement com pensation: Offset amount 1st axis [M]
R393 R401
Ball screw thermal displacement com pensation: Max. compensation amount
1st axis
[M]
R394 R402 Ball screw thermal displacement com pensation: Part system, axis No. 1st axis
R395 R403 Ball screw thermal displacement com pensation: Offset amount 2nd axis [M]
R396 User PLC info program format info R404
Ball screw thermal displacement com pensation: Max. compensation amount
2nd axis
[M]
R397 R405 Ball screw thermal displacement com pensation: Part system, axis No. 2nd axis
R398 R406 Ball screw thermal displacement com pensation: Offset amount 3rd axis [M]
R399 R407
Ball screw thermal displacement com pensation: Max. compensation amount
3rd axis
[M]
Common ($) Abbrev. Signal name Common ($) Abbrev. Signal name
R408 Ball screw thermal displacement compensa tion: Part system, axis No. 3rd axis R416
R409 Ball screw thermal displacement com pensation: Offset amount 4th axis [M] R417
R410
Ball screw thermal displacement com pensation: Max. compensation amount
4th axis
[M] R418
R411 Ball screw thermal displacement compensa tion: Part system, axis No. 4th axis R419
R412 R420
R413 R421
R414 R422
R415 R423
Common ($) Abbrev. Signal name Common ($) Abbrev. Signal name
R424 PLC window Reading start R register 1 R432 PLC window Reading start R register 3

R425 PLC window Number of read windows 1 R433 PLC window Number of read windows 3
R426 PLC window Writing start R register 1 R434 PLC window Writing start R register 3
R427 PLC window Number of write windows 1 R435 PLC window Number of write windows 3
R428 PLC window Reading start R register 2 R436
R429 PLC window Number of read windows 2 R437
R430 PLC window Writing start R register 2 R438
R431 PLC window Number of write windows 2 R439

Common ($) Abbrev. Signal name Common ($) Abbrev. Signal name
R440 PLC axis control information address 1st axis R448 PLC axis control buffering mode information address
R441 PLC axis control information address 2nd axis R449
R442 PLC axis control information address 3rd axis R450
R443 PLC axis control information address 4th axis R451
R444 PLC axis control information address 5th axis R452
R445 PLC axis control information address 6th axis R453
R446 PLC axis control information address 7th axis R454
R447 PLC axis control information address 8th axis R455
Common ($) Abbrev. Signal name Common ($) Abbrev. Signal name
R456 Encoder 1 arbitrary pulse 1 R464
G/B spindle synchronization: Maximum value
of the relative position error during the steady
state
R457 Encoder 1 arbitrary pulse 2 R465 G/B spindle synchronization: Position error
compensation amount
R458 Encoder 2 arbitrary pulse 1 R466 G/B spindle synchronization: Phase shift
amount
R459 Encoder 2 arbitrary pulse 2 R467
R460 G/B spindle synchronization: Maximum range
of the relative position error R468 Interference check between part systems:
Data address
R461 G/B spindle synchronization: Maximum value
of the relative position error R469 SKPIGN Skip signal ignore
R462
G/B spindle synchronization: Average value of
the relative position error during the steady
state
R470 Modbus block 1 transfer position
R463
G/B spindle synchronization: Maximum range
of the relative position error during the steady
state
R471 Modbus block 1 number of transfer
Common ($) Abbrev. Signal name Common ($) Abbrev. Signal name
R472 Modbus block 2 transfer position R480
R473 Modbus block 2 number of transfer R481
R474 Modbus block 3 transfer position R482
R475 Modbus block 3 number of transfer R483
R476 Modbus block 4 transfer position R484
R477 Modbus block 4 number of transfer R485
R478 Modbus transfer cycle R486
R479 Modbus time-out period R487
Common ($) Abbrev. Signal name Common ($) Abbrev. Signal name
R488 R496
R489 R497
R490 R498
R491 R499
R492
R493
R494
R495

Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
R2500 R2700 R2900 R3100 R3300 R3500 R3700 R3900 1st cutting feedrate override
R2501 R2701 R2901 R3101 R3301 R3501 R3701 R3901 2nd cutting feedrate override
R2502 R2702 R2902 R3102 R3302 R3502 R3702 R3902 Rapid traverse override
R2503 R2703 R2903 R3103 R3303 R3503 R3703 R3903 CHPOV Chopping override
R2504 R2704 R2904 R3104 R3304 R3504 R3704 R3904 Manual feedrate (L) [M]
R2505 R2705 R2905 R3105 R3305 R3505 R3705 R3905 Manual feedrate (H) [M]
R2506 R2706 R2906 R3106 R3306 R3506 R3706 R3906 Manual feedrate B (L) [M]
R2507 R2707 R2907 R3107 R3307 R3507 R3707 R3907 Manual feedrate B (H) [M]
Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
R2508 R2708 R2908 R3108 R3308 R3508 R3708 R3908 1st handle/incremental feed magnification (L)
R2509 R2709 R2909 R3109 R3309 R3509 R3709 R3909 1st handle/incremental feed magnification (H)
R2510 R2710 R2910 R3110 R3310 R3510 R3710 R3910 2nd handle feed magnification (L)
R2511 R2711 R2911 R3111 R3311 R3511 R3711 R3911 2nd handle feed magnification (H)
R2512 R2712 R2912 R3112 R3312 R3512 R3712 R3912 3rd handle feed magnification (L)
R2513 R2713 R2913 R3113 R3313 R3513 R3713 R3913 3rd handle feed magnification (H)
R2514 R2714 R2914 R3114 R3314 R3514 R3714 R3914
R2515 R2715 R2915 R3115 R3315 R3515 R3715 R3915

Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
R2516 R2716 R2916 R3116 R3316 R3516 R3716 R3916
R2517 R2717 R2917 R3117 R3317 R3517 R3717 R3917
R2518 R2718 R2918 R3118 R3318 R3518 R3718 R3918 PLC interrupt program number (L)
R2519 R2719 R2919 R3119 R3319 R3519 R3719 R3919 PLC interrupt program number (H)
R2520 R2720 R2920 R3120 R3320 R3520 R3720 R3920
R2521 R2721 R2921 R3121 R3321 R3521 R3721 R3921
R2522 R2722 R2922 R3122 R3322 R3522 R3722 R3922
R2523 R2723 R2923 R3123 R3323 R3523 R3723 R3923
Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
R2524 R2724 R2924 R3124 R3324 R3524 R3724 R3924 Manual feedrate B override
R2525 R2725 R2925 R3125 R3325 R3525 R3725 R3925 External search device No.
R2526 R2726 R2926 R3126 R3326 R3526 R3726 R3926 External search program No. (L)
R2527 R2727 R2927 R3127 R3327 R3527 R3727 R3927 External search program No. (H)
R2528 R2728 R2928 R3128 R3328 R3528 R3728 R3928 External search sequence No. (L)
R2529 R2729 R2929 R3129 R3329 R3529 R3729 R3929 External search sequence No. (H)
R2530 R2730 R2930 R3130 R3330 R3530 R3730 R3930 External search block No. (L)
R2531 R2731 R2931 R3131 R3331 R3531 R3731 R3931 External search block No. (H)

Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
R2532 R2732 R2932 R3132 R3332 R3532 R3732 R3932
R2533 R2733 R2933 R3133 R3333 R3533 R3733 R3933
R2534 R2734 R2934 R3134 R3334 R3534 R3734 R3934
R2535 R2735 R2935 R3135 R3335 R3535 R3735 R3935
R2536 R2736 R2936 R3136 R3336 R3536 R3736 R3936
R2537 R2737 R2937 R3137 R3337 R3537 R3737 R3937
R2538 R2738 R2938 R3138 R3338 R3538 R3738 R3938
R2539 R2739 R2939 R3139 R3339 R3539 R3739 R3939
Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
R2540 R2740 R2940 R3140 R3340 R3540 R3740 R3940 Handle polarity
R2541 R2741 R2941 R3141 R3341 R3541 R3741 R3941
R2542 R2742 R2942 R3142 R3342 R3542 R3742 R3942
R2543 R2743 R2943 R3143 R3343 R3543 R3743 R3943
R2544 R2744 R2944 R3144 R3344 R3544 R3744 R3944 Manual arbitrary feed 1st axis travel amount (L) [M]
R2545 R2745 R2945 R3145 R3345 R3545 R3745 R3945 Manual arbitrary feed 1st axis travel amount (H) [M]
R2546 R2746 R2946 R3146 R3346 R3546 R3746 R3946
R2547 R2747 R2947 R3147 R3347 R3547 R3747 R3947
Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
R2548 R2748 R2948 R3148 R3348 R3548 R3748 R3948 Manual arbitrary feed 2nd axis travel amount (L) [M]
R2549 R2749 R2949 R3149 R3349 R3549 R3749 R3949 Manual arbitrary feed 2nd axis travel amount (H) [M]
R2550 R2750 R2950 R3150 R3350 R3550 R3750 R3950
R2551 R2751 R2951 R3151 R3351 R3551 R3751 R3951
R2552 R2752 R2952 R3152 R3352 R3552 R3752 R3952 Manual arbitrary feed 3rd axis travel amount (L) [M]
R2553 R2753 R2953 R3153 R3353 R3553 R3753 R3953 Manual arbitrary feed 3rd axis travel amount (H) [M]
R2554 R2754 R2954 R3154 R3354 R3554 R3754 R3954
R2555 R2755 R2955 R3155 R3355 R3555 R3755 R3955
Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
R2556 R2756 R2956 R3156 R3356 R3556 R3756 R3956 Alarm message I/F 1
R2557 R2757 R2957 R3157 R3357 R3557 R3757 R3957 Alarm message I/F 2
R2558 R2758 R2958 R3158 R3358 R3558 R3758 R3958 Alarm message I/F 3
R2559 R2759 R2959 R3159 R3359 R3559 R3759 R3959 Alarm message I/F 4
R2560 R2760 R2960 R3160 R3360 R3560 R3760 R3960 Operator message I/F
R2561 R2761 R2961 R3161 R3361 R3561 R3761 R3961
R2562 R2762 R2962 R3162 R3362 R3562 R3762 R3962 Search & start program No. (L)
R2563 R2763 R2963 R3163 R3363 R3563 R3763 R3963 Search & start program No. (H)

Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
R2564 R2764 R2964 R3164 R3364 R3564 R3764 R3964 Manual skip I/F 1 (Manual skip control)
R2565 R2765 R2965 R3165 R3365 R3565 R3765 R3965 Manual skip I/F 2 (Manual skip axis stop/read request)
R2566 R2766 R2966 R3166 R3366 R3566 R3766 R3966 Manual skip I/F 3 (Manual skip axis stop mode)
R2567 R2767 R2967 R3167 R3367 R3567 R3767 R3967 Encoder selection
R2568 R2768 R2968 R3168 R3368 R3568 R3768 R3968 C axis selection
R2569 R2769 R2969 R3169 R3369 R3569 R3769 R3969
R2570 R2770 R2970 R3170 R3370 R3570 R3770 R3970
R2571 R2771 R2971 R3171 R3371 R3571 R3771 R3971
Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
R2572 R2772 R2972 R3172 R3372 R3572 R3772 R3972
R2573 R2773 R2973 R3173 R3373 R3573 R3773 R3973
R2574 R2774 R2974 R3174 R3374 R3574 R3774 R3974
R2575 R2775 R2975 R3175 R3375 R3575 R3775 R3975
R2576 R2776 R2976 R3176 R3376 R3576 R3776 R3976
R2577 R2777 R2977 R3177 R3377 R3577 R3777 R3977
R2578 R2778 R2978 R3178 R3378 R3578 R3778 R3978
R2579 R2779 R2979 R3179 R3379 R3579 R3779 R3979

Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
R2580 R2780 R2980 R3180 R3380 R3580 R3780 R3980 Load monitoring I: Axis selection
R2581 R2781 R2981 R3181 R3381 R3581 R3781 R3981 Load monitoring I: Load change rate detection axis
R2582 R2782 R2982 R3182 R3382 R3582 R3782 R3982 Load monitoring I: Teaching data sub-No.
R2583 R2783 R2983 R3183 R3383 R3583 R3783 R3983 Load monitoring I: Adaptive control reference axis se lection
R2584 R2784 R2984 R3184 R3384 R3584 R3784 R3984 Each axis reference position selection
R2585 R2785 R2985 R3185 R3385 R3585 R3785 R3985
R2586 R2786 R2986 R3186 R3386 R3586 R3786 R3986
R2587 R2787 R2987 R3187 R3387 R3587 R3787 R3987 Chopping control data address
Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
R2588 R2788 R2988 R3188 R3388 R3588 R3788 R3988 Tool life management data sort
R2589 R2789 R2989 R3189 R3389 R3589 R3789 R3989 Synchronous control operation method
R2590 R2790 R2990 R3190 R3390 R3590 R3790 R3990 Tool group No. designation (L)
R2591 R2791 R2991 R3191 R3391 R3591 R3791 R3991 Tool group No. designation (H)
R2592 R2792 R2992 R3192 R3392 R3592 R3792 R3992 Reference position adjustment completion
R2593 R2793 R2993 R3193 R3393 R3593 R3793 R3993 Current limit changeover
R2594 R2794 R2994 R3194 R3394 R3594 R3794 R3994 Wear compensation No. (tool presetter)
R2595 R2795 R2995 R3195 R3395 R3595 R3795 R3995

(*1) When the chuck barrier is checked, "Selected tool compensation No.(main): R2600, R2601" and "Selected tool No.(main): R2602, R2603" are applied.
Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
R2596 R2796 R2996 R3196 R3396 R3596 R3796 R3996 Turret interference object tool No. designation
R2597 R2797 R2997 R3197 R3397 R3597 R3797 R3997
R2598 R2798 R2998 R3198 R3398 R3598 R3798 R3998
R2599 R2799 R2999 R3199 R3399 R3599 R3799 R3999 Workpiece coordinate selection
R2600 R2800 R3000 R3200 R3400 R3600 R3800 R4000
Workpiece coordinate offset measurement: Tool compensation No./Selected tool compensation No. (main) (L) (*1)
R2601 R2801 R3001 R3201 R3401 R3601 R3801 R4001
Workpiece coordinate offset measurement: Tool compensation No./Selected tool compensation No. (main) (H)
R2602 R2802 R3002 R3202 R3402 R3602 R3802 R4002 Workpiece coordinate offset measurement: Tool No./Selected tool No. (main) (L) (*1)
R2603 R2803 R3003 R3203 R3403 R3603 R3803 R4003 Workpiece coordinate offset measurement: Tool No./Selected tool No. (main) (H)
Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
R2604 R2804 R3004 R3204 R3404 R3604 R3804 R4004 Selected tool compensation No. (sub) (L)
R2605 R2805 R3005 R3205 R3405 R3605 R3805 R4005 Selected tool compensation No. (sub) (H)
R2606 R2806 R3006 R3206 R3406 R3606 R3806 R4006 Selected tool wear No. (sub) (L)
R2607 R2807 R3007 R3207 R3407 R3607 R3807 R4007 Selected tool wear No. (sub) (H)
R2608 R2808 R3008 R3208 R3408 R3608 R3808 R4008 Tool mounting information 1-16
R2609 R2809 R3009 R3209 R3409 R3609 R3809 R4009 Tool mounting information 17-32
R2610 R2810 R3010 R3210 R3410 R3610 R3810 R4010 Tool mounting information 33-48
R2611 R2811 R3011 R3211 R3411 R3611 R3811 R4011 Tool mounting information 49-64
Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
R2612 R2812 R3012 R3212 R3412 R3612 R3812 R4012 Tool mounting information 65-80
R2613 R2813 R3013 R3213 R3413 R3613 R3813 R4013
R2614 R2814 R3014 R3214 R3414 R3614 R3814 R4014 SLSPNO Multiple-spindle control I: Selected spindle No.
R2615 R2815 R3015 R3215 R3415 R3615 R3815 R4015 RPARCH
G Rotary axis configuration parameter switch
R2616 R2816 R3016 R3216 R3416 R3616 R3816 R4016 Ext. machine coordinate: Compensation No.
R2617 R2817 R3017 R3217 R3417 R3617 R3817 R4017 Optimum acceleration/deceleration: Parameter switching axis (axis and bit selection)
R2618 R2818 R3018 R3218 R3418 R3618 R3818 R4018 Tool length measurement 2 Tool No. (L)
R2619 R2819 R3019 R3219 R3419 R3619 R3819 R4019 Tool length measurement 2 Tool No. (H)
Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
R2620 R2820 R3020 R3220 R3420 R3620 R3820 R4020 Constant torque control: Constant torque/proportional torque stopper control request axis
R2621 R2821 R3021 R3221 R3421 R3621 R3821 R4021 Constant torque control: Constant torque droop cancel request axis
R2622 R2822 R3022 R3222 R3422 R3622 R3822 R4022
R2623 R2823 R3023 R3223 R3423 R3623 R3823 R4023
R2624 R2824 R3024 R3224 R3424 R3624 R3824 R4024
R2625 R2825 R3025 R3225 R3425 R3625 R3825 R4025 Servo ready completion output designation
R2626 R2826 R3026 R3226 R3426 R3626 R3826 R4026 Thread recutting command
R2627 R2827 R3027 R3227 R3427 R3627 R3827 R4027 Thread recutting execution operation

Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
R2628 R2828 R3028 R3228 R3428 R3628 R3828 R4028 Mechanical axis specifications 1st rotary axis angle (L)
R2629 R2829 R3029 R3229 R3429 R3629 R3829 R4029 Mechanical axis specifications 1st rotary axis angle (H)
R2630 R2830 R3030 R3230 R3430 R3630 R3830 R4030 Mechanical axis specifications 2nd rotary axis angle (L)

R2631 R2831 R3031 R3231 R3431 R3631 R3831 R4031 Mechanical axis specifications 2nd rotary axis angle (H)
R2632 R2832 R3032 R3232 R3432 R3632 R3832 R4032
R2633 R2833 R3033 R3233 R3433 R3633 R3833 R4033
R2634 R2834 R3034 R3234 R3434 R3634 R3834 R4034 TAN GOFS
Simple inclined surface machining command: Tool axis
R2635 R2835 R3035 R3235 R3435 R3635 R3835 R4035 rotation angle compensation amount
Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
R2636 R2836 R3036 R3236 R3436 R3636 R3836 R4036 Circular feed in manual mode Operation mode data (L)
R2637 R2837 R3037 R3237 R3437 R3637 R3837 R4037 Circular feed in manual mode Operation mode data (H)
R2638 R2838 R3038 R3238 R3438 R3638 R3838 R4038 Circular feed in manual mode Part system designation
R2639 R2839 R3039 R3239 R3439 R3639 R3839 R4039
R2640 R2840 R3040 R3240 R3440 R3640 R3840 R4040 Circular feed in manual mode Horizontal axis designation
R2641 R2841 R3041 R3241 R3441 R3641 R3841 R4041 Circular feed in manual mode Vertical axis designation
R2642 R2842 R3042 R3242 R3442 R3642 R3842 R4042
R2643 R2843 R3043 R3243 R3443 R3643 R3843 R4043
Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
R2644 R2844 R3044 R3244 R3444 R3644 R3844 R4044 Circular feed in manual mode Reference point H data (L)
R2645 R2845 R3045 R3245 R3445 R3645 R3845 R4045 Circular feed in manual mode Reference point H data (H)
R2646 R2846 R3046 R3246 R3446 R3646 R3846 R4046
R2647 R2847 R3047 R3247 R3447 R3647 R3847 R4047
R2648 R2848 R3048 R3248 R3448 R3648 R3848 R4048 Circular feed in manual mode Reference point V data (L)
R2649 R2849 R3049 R3249 R3449 R3649 R3849 R4049 Circular feed in manual mode Reference point V data (H)
R2650 R2850 R3050 R3250 R3450 R3650 R3850 R4050
R2651 R2851 R3051 R3251 R3451 R3651 R3851 R4051
Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
R2652 R2852 R3052 R3252 R3452 R3652 R3852 R4052 Circular feed in manual mode Travel range H (+) data (L)
R2653 R2853 R3053 R3253 R3453 R3653 R3853 R4053 Circular feed in manual mode Travel range H (+) data (H)
R2654 R2854 R3054 R3254 R3454 R3654 R3854 R4054
R2655 R2855 R3055 R3255 R3455 R3655 R3855 R4055
R2656 R2856 R3056 R3256 R3456 R3656 R3856 R4056 Circular feed in manual mode Travel range H (-) data (L)
R2657 R2857 R3057 R3257 R3457 R3657 R3857 R4057 Circular feed in manual mode Travel range H (-) data (H)
R2658 R2858 R3058 R3258 R3458 R3658 R3858 R4058
R2659 R2859 R3059 R3259 R3459 R3659 R3859 R4059
M800V/M80V Series PLC Interface Manual
2 Input/Output Signals with Controller
2.4 PLC Output Signals (Data Type: R***)
IB-1501616-F 112
Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
R2660 R2860 R3060 R3260 R3460 R3660 R3860 R4060 Circular feed in manual mode Travel range V (+) data (L)
R2661 R2861 R3061 R3261 R3461 R3661 R3861 R4061 Circular feed in manual mode Travel range V (+) data (H)
R2662 R2862 R3062 R3262 R3462 R3662 R3862 R4062
R2663 R2863 R3063 R3263 R3463 R3663 R3863 R4063
R2664 R2864 R3064 R3264 R3464 R3664 R3864 R4064 Circular feed in manual mode Travel range V (-) data (L)
R2665 R2865 R3065 R3265 R3465 R3665 R3865 R4065 Circular feed in manual mode Travel range V (-) data (H)
R2666 R2866 R3066 R3266 R3466 R3666 R3866 R4066
R2667 R2867 R3067 R3267 R3467 R3667 R3867 R4067
Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
R2668 R2868 R3068 R3268 R3468 R3668 R3868 R4068 Circular feed in manual mode Gradient/arc center H data (L)
R2669 R2869 R3069 R3269 R3469 R3669 R3869 R4069 Circular feed in manual mode Gradient/arc center H data (H)
R2670 R2870 R3070 R3270 R3470 R3670 R3870 R4070
R2671 R2871 R3071 R3271 R3471 R3671 R3871 R4071
R2672 R2872 R3072 R3272 R3472 R3672 R3872 R4072 Circular feed in manual mode Gradient/arc center V data (L)
R2673 R2873 R3073 R3273 R3473 R3673 R3873 R4073 Circular feed in manual mode Gradient/arc center V data (H)
R2674 R2874 R3074 R3274 R3474 R3674 R3874 R4074
R2675 R2875 R3075 R3275 R3475 R3675 R3875 R4075
Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
R2676 R2876 R3076 R3276 R3476 R3676 R3876 R4076
R2677 R2877 R3077 R3277 R3477 R3677 R3877 R4077
R2678 R2878 R3078 R3278 R3478 R3678 R3878 R4078
R2679 R2879 R3079 R3279 R3479 R3679 R3879 R4079
R2680 R2880 R3080 R3280 R3480 R3680 R3880 R4080 CAXSVF Spindle position control (spindle/C axis control): Ser vo OFF request during Spindle/C axis mode
R2681 R2881 R3081 R3281 R3481 R3681 R3881 R4081 SPGNCO Spindle position control (spindle/C axis control): Po sition loop gain switch at C axis mode
R2682 R2882 R3082 R3282 R3482 R3682 R3882 R4082 UAC U-axis tool control: U-axis tool zero point reaching re quest
R2683 R2883 R3083 R3283 R3483 R3683 R3883 R4083
Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
R2684 R2884 R3084 R3284 R3484 R3684 R3884 R4084 For specific users NC control signal 1
R2685 R2885 R3085 R3285 R3485 R3685 R3885 R4085
R2686 R2886 R3086 R3286 R3486 R3686 R3886 R4086
R2687 R2887 R3087 R3287 R3487 R3687 R3887 R4087
R2688 R2888 R3088 R3288 R3488 R3688 R3888 R4088 Specific users Manual skip motion direction (-)
R2689 R2889 R3089 R3289 R3489 R3689 R3889 R4089 Specific users Manual skip motion direction (+)
R2690 R2890 R3090 R3290 R3490 R3690 R3890 R4090
R2691 R2891 R3091 R3291 R3491 R3691 R3891 R4091
M800V/M80V Series PLC Interface Manual
2 Input/Output Signals with Controller
2.4 PLC Output Signals (Data Type: R***)
113 IB-1501616-F

Common ($) Abbrev. Signal name Common ($) Abbrev. Signal name
R4400 3D Machine Interference Check: Enabled
shape group No.1
R4401 3D Machine Interference Check: Enabled
shape group No.2
R4402 3D Machine Interference Check: Enabled
shape group No.3
R4403 3D Machine Interference Check: Enabled
shape group No.4
R4404
R4405
R4406
R4407
Device No.
$1 $2 $3 $4 Abbrev. Signal name
R5700 R5716 R5732 R5748 Ext. machine coordinate system offset data 1st axis (L) [M]
R5701 R5717 R5733 R5749 Ext. machine coordinate system offset data 1st axis (H) [M]
R5702 R5718 R5734 R5750 Ext. machine coordinate system offset data 2nd axis (L) [M]
R5703 R5719 R5735 R5751 Ext. machine coordinate system offset data 2nd axis (H) [M]
R5704 R5720 R5736 R5752 Ext. machine coordinate system offset data 3rd axis (L) [M]
R5705 R5721 R5737 R5753 Ext. machine coordinate system offset data 3rd axis (H) [M]
R5706 R5722 R5738 R5754 Ext. machine coordinate system offset data 4th axis (L) [M]
R5707 R5723 R5739 R5755 Ext. machine coordinate system offset data 4th axis (H) [M]
Device No.
$1 $2 $3 $4 Abbrev. Signal name
R5708 R5724 R5740 R5756 Ext. machine coordinate system offset data 5th axis (L) [M]
R5709 R5725 R5741 R5757 Ext. machine coordinate system offset data 5th axis (H) [M]
R5710 R5726 R5742 R5758 Ext. machine coordinate system offset data 6th axis (L) [M]
R5711 R5727 R5743 R5759 Ext. machine coordinate system offset data 6th axis (H) [M]
R5712 R5728 R5744 R5760 Ext. machine coordinate system offset data 7th axis (L) [M]
R5713 R5729 R5745 R5761 Ext. machine coordinate system offset data 7th axis (H) [M]
R5714 R5730 R5746 R5762 Ext. machine coordinate system offset data 8th axis (L) [M]
R5715 R5731 R5747 R5763 Ext. machine coordinate system offset data 8th axis (H) [M]
Device No.
$1 $2 $3 $4 Abbrev. Signal name
R5764 R5780 R5796 R5812 Each axis manual feedrate B 1st axis (L) [M]
R5765 R5781 R5797 R5813 Each axis manual feedrate B 1st axis (H) [M]
R5766 R5782 R5798 R5814 Each axis manual feedrate B 2nd axis (L) [M]
R5767 R5783 R5799 R5815 Each axis manual feedrate B 2nd axis (H) [M]
R5768 R5784 R5800 R5816 Each axis manual feedrate B 3rd axis (L) [M]
R5769 R5785 R5801 R5817 Each axis manual feedrate B 3rd axis (H) [M]
R5770 R5786 R5802 R5818 Each axis manual feedrate B 4th axis (L) [M]
R5771 R5787 R5803 R5819 Each axis manual feedrate B 4th axis (H) [M]

Device No.
$1 $2 $3 $4 Abbrev. Signal name
R5772 R5788 R5804 R5820 Each axis manual feedrate B 5th axis (L) [M]
R5773 R5789 R5805 R5821 Each axis manual feedrate B 5th axis (H) [M]
R5774 R5790 R5806 R5822 Each axis manual feedrate B 6th axis (L) [M]
R5775 R5791 R5807 R5823 Each axis manual feedrate B 6th axis (H) [M]
R5776 R5792 R5808 R5824 Each axis manual feedrate B 7th axis (L) [M]
R5777 R5793 R5809 R5825 Each axis manual feedrate B 7th axis (H) [M]
R5778 R5794 R5810 R5826 Each axis manual feedrate B 8th axis (L) [M]
R5779 R5795 R5811 R5827 Each axis manual feedrate B 8th axis (H) [M]
Device No.
$1 $2 $3 $4 Abbrev. Signal name
R5828 R5836 R5844 R5852
R5829 R5837 R5845 R5853
R5830 R5838 R5846 R5854
R5831 R5839 R5847 R5855
R5832 R5840 R5848 R5856
R5833 R5841 R5849 R5857
R5834 R5842 R5850 R5858
R5835 R5843 R5851 R5859
Device No.
$1 $2 $3 $4 Abbrev. Signal name
R5860 R5868 R5876 R5884
R5861 R5869 R5877 R5885
R5862 R5870 R5878 R5886
R5863 R5871 R5879 R5887
R5864 R5872 R5880 R5888
R5865 R5873 R5881 R5889
R5866 R5874 R5882 R5890
R5867 R5875 R5883 R5891
Device No.
$1 $2 $3 $4 Abbrev. Signal name
R5892 R5900 R5908 R5916
R5893 R5901 R5909 R5917
R5894 R5902 R5910 R5918
R5895 R5903 R5911 R5919
R5896 R5904 R5912 R5920
R5897 R5905 R5913 R5921
R5898 R5906 R5914 R5922
R5899 R5907 R5915 R5923
Device No.

$1 $2 $3 $4 Abbrev. Signal name
R5924 R5940 R5956 R5972 CRSAX1 Mixed control (cross axis control): Target axis (1st axis)
R5925 R5941 R5957 R5973 CRSAX2 Mixed control (cross axis control): Target axis (2nd axis)
R5926 R5942 R5958 R5974 CRSAX3 Mixed control (cross axis control): Target axis (3rd axis)
R5927 R5943 R5959 R5975 CRSAX4 Mixed control (cross axis control): Target axis (4th axis)
R5928 R5944 R5960 R5976 CRSAX5 Mixed control (cross axis control): Target axis (5th axis)
R5929 R5945 R5961 R5977 CRSAX6 Mixed control (cross axis control): Target axis (6th axis)
R5930 R5946 R5962 R5978 CRSAX7 Mixed control (cross axis control): Target axis (7th axis)
R5931 R5947 R5963 R5979 CRSAX8 Mixed control (cross axis control): Target axis (8th axis)

Device No.
$1 $2 $3 $4 Abbrev. Signal name
R6052 R6060 R6068 R6076
R6053 R6061 R6069 R6077
R6054 R6062 R6070 R6078
R6055 R6063 R6071 R6079
R6056 R6064 R6072 R6080
R6057 R6065 R6073 R6081
R6058 R6066 R6074 R6082
R6059 R6067 R6075 R6083
Device No.
$1 $2 $3 $4 Abbrev. Signal name
R6084 R6092 R6100 R6108 Optimum acceleration/deceleration: Parameter group selection 1st axis
R6085 R6093 R6101 R6109 Optimum acceleration/deceleration: Parameter group selection 2nd axis
R6086 R6094 R6102 R6110 Optimum acceleration/deceleration: Parameter group selection 3rd axis
R6087 R6095 R6103 R6111 Optimum acceleration/deceleration: Parameter group selection 4th axis
R6088 R6096 R6104 R6112 Optimum acceleration/deceleration: Parameter group selection 5th axis
R6089 R6097 R6105 R6113 Optimum acceleration/deceleration: Parameter group selection 6th axis
R6090 R6098 R6106 R6114 Optimum acceleration/deceleration: Parameter group selection 7th axis
R6091 R6099 R6107 R6115 Optimum acceleration/deceleration: Parameter group selection 8th axis
Device No.
$1 $2 $3 $4 Abbrev. Signal name
R6116 R6124 R6132 R6140 Target machining time 1st axis
R6117 R6125 R6133 R6141 Target machining time 2nd axis
R6118 R6126 R6134 R6142 Target machining time 3rd axis
R6119 R6127 R6135 R6143 Target machining time 4th axis
R6120 R6128 R6136 R6144 Target machining time 5th axis
R6121 R6129 R6137 R6145 Target machining time 6th axis
R6122 R6130 R6138 R6146 Target machining time 7th axis
R6123 R6131 R6139 R6147 Target machining time 8th axis
Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
R6436 R6444 R6452 R6460 R6468 R6476 R6484 R6492 User macro input #1032 (PLC -> NC) (L)
R6437 R6445 R6453 R6461 R6469 R6477 R6485 R6493 User macro input #1032 (PLC -> NC) (H)
R6438 R6446 R6454 R6462 R6470 R6478 R6486 R6494 User macro input #1033 (PLC -> NC) (L)
R6439 R6447 R6455 R6463 R6471 R6479 R6487 R6495 User macro input #1033 (PLC -> NC) (H)
R6440 R6448 R6456 R6464 R6472 R6480 R6488 R6496 User macro input #1034 (PLC -> NC) (L)
R6441 R6449 R6457 R6465 R6473 R6481 R6489 R6497 User macro input #1034 (PLC -> NC) (H)
R6442 R6450 R6458 R6466 R6474 R6482 R6490 R6498 User macro input #1035 (PLC -> NC) (L)
R6443 R6451 R6459 R6467 R6475 R6483 R6491 R6499 User macro input #1035 (PLC -> NC) (H)

Device No.
1stSP 2ndSP 3rdSP 4thSP 5thSP 6thSP 7thSP 8thSP Abbrev. Signal name
R7000 R7050 R7100 R7150 R7200 R7250 R7300 R7350 Spindle command rotation speed output (L)
R7001 R7051 R7101 R7151 R7201 R7251 R7301 R7351 Spindle command rotation speed output (H)
R7002 R7052 R7102 R7152 R7202 R7252 R7302 R7352 SLSP Spindle command selection
R7003 R7053 R7103 R7153 R7203 R7253 R7303 R7353 Optimum acceleration/deceleration param eter group selection [spindle]
R7004 R7054 R7104 R7154 R7204 R7254 R7304 R7354 Spindle target machining time
R7005 R7055 R7105 R7155 R7205 R7255 R7305 R7355
R7006 R7056 R7106 R7156 R7206 R7256 R7306 R7356
R7007 R7057 R7107 R7157 R7207 R7257 R7307 R7357
Device No.
1stSP 2ndSP 3rdSP 4thSP 5thSP 6thSP 7thSP 8thSP Abbrev. Signal name
R7008 R7058 R7108 R7158 R7208 R7258 R7308 R7358 S command override
R7009 R7059 R7109 R7159 R7209 R7259 R7309 R7359 Multi-point orientation position data
R7010 R7060 R7110 R7160 R7210 R7260 R7310 R7360 ORDIR Orientation rotation direction
R7011 R7061 R7111 R7161 R7211 R7261 R7311 R7361
R7012 R7062 R7112 R7162 R7212 R7262 R7312 R7362 ANSLD Interface of load meter for analog I/F spin dle
R7013 R7063 R7113 R7163 R7213 R7263 R7313 R7363
R7014 R7064 R7114 R7164 R7214 R7264 R7314 R7364
R7015 R7065 R7115 R7165 R7215 R7265 R7315 R7365
Device No.
1stSP 2ndSP 3rdSP 4thSP 5thSP 6thSP 7thSP 8thSP Abbrev. Signal name
R7016 R7066 R7116 R7166 R7216 R7266 R7316 R7366 Spindle synchronization: Reference spindle se lection

R7017 R7067 R7117 R7167 R7217 R7267 R7317 R7367 Spindle synchronization: Synchronized spindle selection
R7018 R7068 R7118 R7168 R7218 R7268 R7318 R7368 Spindle synchronization: Phase shift amount
R7019 R7069 R7119 R7169 R7219 R7269 R7319 R7369 Spindle synchronization: Phase error toler ance
R7020 R7070 R7120 R7170 R7220 R7270 R7320 R7370 Spindle oscillation amplitude
R7021 R7071 R7121 R7171 R7221 R7271 R7321 R7371 Spindle oscillation frequency
R7022 R7072 R7122 R7172 R7222 R7272 R7322 R7372 SPFLAMP SPFL: Amplitude
R7023 R7073 R7123 R7173 R7223 R7273 R7323 R7373 SPFLCYC SPFL: Cycle
Device No.
1stSP 2ndSP 3rdSP 4thSP 5thSP 6thSP 7thSP 8thSP Abbrev. Signal name
R7026 R7076 R7126 R7176 R7226 R7276 R7326 R7376 SPCHGC MD
Tool head hot swapping: Spindle switch
R7027 R7077 R7127 R7177 R7227 R7277 R7327 R7377
R7028 R7078 R7128 R7178 R7228 R7278 R7328 R7378
R7029 R7079 R7129 R7179 R7229 R7279 R7329 R7379
R7030 R7080 R7130 R7180 R7230 R7280 R7330 R7380
R7031 R7081 R7131 R7181 R7231 R7281 R7331 R7381
Common ($) Abbrev. Signal name Common ($) Abbrev. Signal name
R10600
to
R11779
Refer to "2.7 Classified for Each Application".
Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
R12200 R12210 R12220 R12230 R12240 R12250 R12260 R12270 Spindle tool No. (L)
R12201 R12211 R12221 R12231 R12241 R12251 R12261 R12271 Spindle tool No. (H)
R12202 R12212 R12222 R12232 R12242 R12252 R12262 R12272 Standby tool No. (L)
R12203 R12213 R12223 R12233 R12243 R12253 R12263 R12273 Standby tool No. (H)

Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
R14700 R14950 R15200 R15450 R15700 R15950 R16200 R16450
MES interface library: Machining start time R14701 R14951 R15201 R15451 R15701 R15951 R16201 R16451
R14702 R14952 R15202 R15452 R15702 R15952 R16202 R16452
MES interface library: Machining end time R14703 R14953 R15203 R15453 R15703 R15953 R16203 R16453
R14704 R14954 R15204 R15454 R15704 R15954 R16204 R16454
MES interface library: Cycle time R14705 R14955 R15205 R15455 R15705 R15955 R16205 R16455
R14706 R14956 R15206 R15456 R15706 R15956 R16206 R16456
MES interface library: Program number at machining start R14707 R14957 R15207 R15457 R15707 R15957 R16207 R16457
Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
R14708 R14958 R15208 R15458 R15708 R15958 R16208 R16458
MES interface library: Program number at machining start
R14709 R14959 R15209 R15459 R15709 R15959 R16209 R16459
R14710 R14960 R15210 R15460 R15710 R15960 R16210 R16460
R14711 R14961 R15211 R15461 R15711 R15961 R16211 R16461
R14712 R14962 R15212 R15462 R15712 R15962 R16212 R16462
R14713 R14963 R15213 R15463 R15713 R15963 R16213 R16463
R14714 R14964 R15214 R15464 R15714 R15964 R16214 R16464
R14715 R14965 R15215 R15465 R15715 R15965 R16215 R16465
Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
R14716 R14966 R15216 R15466 R15716 R15966 R16216 R16466
MES interface library: Program number at machining start
R14717 R14967 R15217 R15467 R15717 R15967 R16217 R16467
R14718 R14968 R15218 R15468 R15718 R15968 R16218 R16468
R14719 R14969 R15219 R15469 R15719 R15969 R16219 R16469
R14720 R14970 R15220 R15470 R15720 R15970 R16220 R16470
R14721 R14971 R15221 R15471 R15721 R15971 R16221 R16471
R14722 R14972 R15222 R15472 R15722 R15972 R16222 R16472
MES interface library: N number at machining start R14723 R14973 R15223 R15473 R15723 R15973 R16223 R16473
Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
R14724 R14974 R15224 R15474 R15724 R15974 R16224 R16474
MES interface library: B number at machining start R14725 R14975 R15225 R15475 R15725 R15975 R16225 R16475
R14726 R14976 R15226 R15476 R15726 R15976 R16226 R16476 MES interface library: Spindle 1 maximum load
R14727 R14977 R15227 R15477 R15727 R15977 R16227 R16477 MES interface library: Spindle 2 maximum load
R14728 R14978 R15228 R15478 R15728 R15978 R16228 R16478
MES interface library: Power consumption amount R14729 R14979 R15229 R15479 R15729 R15979 R16229 R16479
R14730 R14980 R15230 R15480 R15730 R15980 R16230 R16480
MES interface library: Power regeneration amount R14731 R14981 R15231 R15481 R15731 R15981 R16231 R16481
Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
R14732 R14982 R15232 R15482 R15732 R15982 R16232 R16482
MES interface library: Tool number 1 R14733 R14983 R15233 R15483 R15733 R15983 R16233 R16483
R14734 R14984 R15234 R15484 R15734 R15984 R16234 R16484
MES interface library: Tool number 2 R14735 R14985 R15235 R15485 R15735 R15985 R16235 R16485
R14736 R14986 R15236 R15486 R15736 R15986 R16236 R16486
MES interface library: Tool number 3 R14737 R14987 R15237 R15487 R15737 R15987 R16237 R16487
R14738 R14988 R15238 R15488 R15738 R15988 R16238 R16488
MES interface library: Tool number 4 R14739 R14989 R15239 R15489 R15739 R15989 R16239 R16489

Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
R14740 R14990 R15240 R15490 R15740 R15990 R16240 R16490
MES interface library: Tool number 5 R14741 R14991 R15241 R15491 R15741 R15991 R16241 R16491
R14742 R14992 R15242 R15492 R15742 R15992 R16242 R16492 MES interface library: Tool offset number 1
R14743 R14993 R15243 R15493 R15743 R15993 R16243 R16493 MES interface library: Tool offset number 2
R14744 R14994 R15244 R15494 R15744 R15994 R16244 R16494 MES interface library: Tool offset number 3
R14745 R14995 R15245 R15495 R15745 R15995 R16245 R16495 MES interface library: Tool offset number 4
R14746 R14996 R15246 R15496 R15746 R15996 R16246 R16496 MES interface library: Tool offset number 5
R14747 R14997 R15247 R15497 R15747 R15997 R16247 R16497
Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
R14748 R14998 R15248 R15498 R15748 R15998 R16248 R16498
MES interface library: Tool length offset 1 R14749 R14999 R15249 R15499 R15749 R15999 R16249 R16499
R14750 R15000 R15250 R15500 R15750 R16000 R16250 R16500
MES interface library: Tool length offset 2 R14751 R15001 R15251 R15501 R15751 R16001 R16251 R16501
R14752 R15002 R15252 R15502 R15752 R16002 R16252 R16502
MES interface library: Tool length offset 3 R14753 R15003 R15253 R15503 R15753 R16003 R16253 R16503
R14754 R15004 R15254 R15504 R15754 R16004 R16254 R16504
MES interface library: Tool length offset 4 R14755 R15005 R15255 R15505 R15755 R16005 R16255 R16505
Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
R14756 R15006 R15256 R15506 R15756 R16006 R16256 R16506
MES interface library: Tool length offset 5 R14757 R15007 R15257 R15507 R15757 R16007 R16257 R16507
R14758 R15008 R15258 R15508 R15758 R16008 R16258 R16508
MES interface library: Tool radius offset 1 R14759 R15009 R15259 R15509 R15759 R16009 R16259 R16509
R14760 R15010 R15260 R15510 R15760 R16010 R16260 R16510
MES interface library: Tool radius offset 2 R14761 R15011 R15261 R15511 R15761 R16011 R16261 R16511
R14762 R15012 R15262 R15512 R15762 R16012 R16262 R16512
MES interface library: Tool radius offset 3 R14763 R15013 R15263 R15513 R15763 R16013 R16263 R16513
Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
R14764 R15014 R15264 R15514 R15764 R16014 R16264 R16514
MES interface library: Tool radius offset 4 R14765 R15015 R15265 R15515 R15765 R16015 R16265 R16515
R14766 R15016 R15266 R15516 R15766 R16016 R16266 R16516
MES interface library: Tool radius offset 5 R14767 R15017 R15267 R15517 R15767 R16017 R16267 R16517
R14768 R15018 R15268 R15518 R15768 R16018 R16268 R16518
MES interface library: Tool length wear amount 1 R14769 R15019 R15269 R15519 R15769 R16019 R16269 R16519
R14770 R15020 R15270 R15520 R15770 R16020 R16270 R16520
MES interface library: Tool length wear amount 2 R14771 R15021 R15271 R15521 R15771 R16021 R16271 R16521
Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
R14772 R15022 R15272 R15522 R15772 R16022 R16272 R16522
MES interface library: Tool length wear amount 3 R14773 R15023 R15273 R15523 R15773 R16023 R16273 R16523
R14774 R15024 R15274 R15524 R15774 R16024 R16274 R16524
MES interface library: Tool length wear amount 4 R14775 R15025 R15275 R15525 R15775 R16025 R16275 R16525
R14776 R15026 R15276 R15526 R15776 R16026 R16276 R16526
MES interface library: Tool length wear amount 5 R14777 R15027 R15277 R15527 R15777 R16027 R16277 R16527
R14778 R15028 R15278 R15528 R15778 R16028 R16278 R16528
MES interface library: Tool radius wear amount 1 R14779 R15029 R15279 R15529 R15779 R16029 R16279 R16529

Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
R14780 R15030 R15280 R15530 R15780 R16030 R16280 R16530
MES interface library: Tool radius wear amount 2 R14781 R15031 R15281 R15531 R15781 R16031 R16281 R16531
R14782 R15032 R15282 R15532 R15782 R16032 R16282 R16532
MES interface library: Tool radius wear amount 3 R14783 R15033 R15283 R15533 R15783 R16033 R16283 R16533
R14784 R15034 R15284 R15534 R15784 R16034 R16284 R16534
MES interface library: Tool radius wear amount 4 R14785 R15035 R15285 R15535 R15785 R16035 R16285 R16535
R14786 R15036 R15286 R15536 R15786 R16036 R16286 R16536
MES interface library: Tool radius wear amount 5 R14787 R15037 R15287 R15537 R15787 R16037 R16287 R16537
Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
R14788 R15038 R15288 R15538 R15788 R16038 R16288 R16538
MES interface library: Tool life 1 R14789 R15039 R15289 R15539 R15789 R16039 R16289 R16539
R14790 R15040 R15290 R15540 R15790 R16040 R16290 R16540
MES interface library: Tool life 2 R14791 R15041 R15291 R15541 R15791 R16041 R16291 R16541
R14792 R15042 R15292 R15542 R15792 R16042 R16292 R16542
MES interface library: Tool life 3 R14793 R15043 R15293 R15543 R15793 R16043 R16293 R16543
R14794 R15044 R15294 R15544 R15794 R16044 R16294 R16544
MES interface library: Tool life 4 R14795 R15045 R15295 R15545 R15795 R16045 R16295 R16545
Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
R14796 R15046 R15296 R15546 R15796 R16046 R16296 R16546
MES interface library: Tool life 5 R14797 R15047 R15297 R15547 R15797 R16047 R16297 R16547
R14798 R15048 R15298 R15548 R15798 R16048 R16298 R16548
MES interface library: Time of alarm occurrence R14799 R15049 R15299 R15549 R15799 R16049 R16299 R16549
R14800 R15050 R15300 R15550 R15800 R16050 R16300 R16550
MES interface library: Alarm number 1
R14801 R15051 R15301 R15551 R15801 R16051 R16301 R16551
R14802 R15052 R15302 R15552 R15802 R16052 R16302 R16552
R14803 R15053 R15303 R15553 R15803 R16053 R16303 R16553
Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
R14804 R15054 R15304 R15554 R15804 R16054 R16304 R16554

MES interface library: Alarm number 1
R14805 R15055 R15305 R15555 R15805 R16055 R16305 R16555
R14806 R15056 R15306 R15556 R15806 R16056 R16306 R16556
R14807 R15057 R15307 R15557 R15807 R16057 R16307 R16557
R14808 R15058 R15308 R15558 R15808 R16058 R16308 R16558
R14809 R15059 R15309 R15559 R15809 R16059 R16309 R16559
R14810 R15060 R15310 R15560 R15810 R16060 R16310 R16560
R14811 R15061 R15311 R15561 R15811 R16061 R16311 R16561
Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
R14812 R15062 R15312 R15562 R15812 R16062 R16312 R16562
MES interface library: Alarm number 1
R14813 R15063 R15313 R15563 R15813 R16063 R16313 R16563
R14814 R15064 R15314 R15564 R15814 R16064 R16314 R16564
R14815 R15065 R15315 R15565 R15815 R16065 R16315 R16565
R14816 R15066 R15316 R15566 R15816 R16066 R16316 R16566
MES interface library: Alarm number 2
R14817 R15067 R15317 R15567 R15817 R16067 R16317 R16567
R14818 R15068 R15318 R15568 R15818 R16068 R16318 R16568
R14819 R15069 R15319 R15569 R15819 R16069 R16319 R16569

Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
R14820 R15070 R15320 R15570 R15820 R16070 R16320 R16570
MES interface library: Alarm number 2
R14821 R15071 R15321 R15571 R15821 R16071 R16321 R16571
R14822 R15072 R15322 R15572 R15822 R16072 R16322 R16572
R14823 R15073 R15323 R15573 R15823 R16073 R16323 R16573
R14824 R15074 R15324 R15574 R15824 R16074 R16324 R16574
R14825 R15075 R15325 R15575 R15825 R16075 R16325 R16575
R14826 R15076 R15326 R15576 R15826 R16076 R16326 R16576
R14827 R15077 R15327 R15577 R15827 R16077 R16327 R16577
Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
R14828 R15078 R15328 R15578 R15828 R16078 R16328 R16578
MES interface library: Alarm number 2
R14829 R15079 R15329 R15579 R15829 R16079 R16329 R16579
R14830 R15080 R15330 R15580 R15830 R16080 R16330 R16580
R14831 R15081 R15331 R15581 R15831 R16081 R16331 R16581
R14832 R15082 R15332 R15582 R15832 R16082 R16332 R16582
MES interface library: Alarm number 3
R14833 R15083 R15333 R15583 R15833 R16083 R16333 R16583
R14834 R15084 R15334 R15584 R15834 R16084 R16334 R16584
R14835 R15085 R15335 R15585 R15835 R16085 R16335 R16585
Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
R14836 R15086 R15336 R15586 R15836 R16086 R16336 R16586
MES interface library: Alarm number 3
R14837 R15087 R15337 R15587 R15837 R16087 R16337 R16587
R14838 R15088 R15338 R15588 R15838 R16088 R16338 R16588
R14839 R15089 R15339 R15589 R15839 R16089 R16339 R16589
R14840 R15090 R15340 R15590 R15840 R16090 R16340 R16590
R14841 R15091 R15341 R15591 R15841 R16091 R16341 R16591
R14842 R15092 R15342 R15592 R15842 R16092 R16342 R16592
R14843 R15093 R15343 R15593 R15843 R16093 R16343 R16593
Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
R14844 R15094 R15344 R15594 R15844 R16094 R16344 R16594
MES interface library: Alarm number 3
R14845 R15095 R15345 R15595 R15845 R16095 R16345 R16595
R14846 R15096 R15346 R15596 R15846 R16096 R16346 R16596
R14847 R15097 R15347 R15597 R15847 R16097 R16347 R16597
R14848 R15098 R15348 R15598 R15848 R16098 R16348 R16598
MES interface library: Alarm number 4
R14849 R15099 R15349 R15599 R15849 R16099 R16349 R16599
R14850 R15100 R15350 R15600 R15850 R16100 R16350 R16600
R14851 R15101 R15351 R15601 R15851 R16101 R16351 R16601
Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
R14852 R15102 R15352 R15602 R15852 R16102 R16352 R16602
MES interface library: Alarm number 4
R14853 R15103 R15353 R15603 R15853 R16103 R16353 R16603
R14854 R15104 R15354 R15604 R15854 R16104 R16354 R16604
R14855 R15105 R15355 R15605 R15855 R16105 R16355 R16605
R14856 R15106 R15356 R15606 R15856 R16106 R16356 R16606
R14857 R15107 R15357 R15607 R15857 R16107 R16357 R16607
R14858 R15108 R15358 R15608 R15858 R16108 R16358 R16608
R14859 R15109 R15359 R15609 R15859 R16109 R16359 R16609

Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
R14860 R15110 R15360 R15610 R15860 R16110 R16360 R16610

MES interface library: Alarm number 4
R14861 R15111 R15361 R15611 R15861 R16111 R16361 R16611
R14862 R15112 R15362 R15612 R15862 R16112 R16362 R16612
R14863 R15113 R15363 R15613 R15863 R16113 R16363 R16613
R14864 R15114 R15364 R15614 R15864 R16114 R16364 R16614
MES interface library: Power ON time R14865 R15115 R15365 R15615 R15865 R16115 R16365 R16615
R14866 R15116 R15366 R15616 R15866 R16116 R16366 R16616
MES interface library: Program number at alarm R14867 R15117 R15367 R15617 R15867 R16117 R16367 R16617
Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
R14868 R15118 R15368 R15618 R15868 R16118 R16368 R16618
MES interface library: Program number at alarm
R14869 R15119 R15369 R15619 R15869 R16119 R16369 R16619
R14870 R15120 R15370 R15620 R15870 R16120 R16370 R16620
R14871 R15121 R15371 R15621 R15871 R16121 R16371 R16621
R14872 R15122 R15372 R15622 R15872 R16122 R16372 R16622
R14873 R15123 R15373 R15623 R15873 R16123 R16373 R16623
R14874 R15124 R15374 R15624 R15874 R16124 R16374 R16624
R14875 R15125 R15375 R15625 R15875 R16125 R16375 R16625
Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
R14876 R15126 R15376 R15626 R15876 R16126 R16376 R16626
MES interface library: Program number at alarm
R14877 R15127 R15377 R15627 R15877 R16127 R16377 R16627
R14878 R15128 R15378 R15628 R15878 R16128 R16378 R16628
R14879 R15129 R15379 R15629 R15879 R16129 R16379 R16629
R14880 R15130 R15380 R15630 R15880 R16130 R16380 R16630
R14881 R15131 R15381 R15631 R15881 R16131 R16381 R16631
R14882 R15132 R15382 R15632 R15882 R16132 R16382 R16632
MES interface library: Subprogram number at alarm R14883 R15133 R15383 R15633 R15883 R16133 R16383 R16633
Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
R14884 R15134 R15384 R15634 R15884 R16134 R16384 R16634
MES interface library: Subprogram number at alarm
R14885 R15135 R15385 R15635 R15885 R16135 R16385 R16635
R14886 R15136 R15386 R15636 R15886 R16136 R16386 R16636
R14887 R15137 R15387 R15637 R15887 R16137 R16387 R16637
R14888 R15138 R15388 R15638 R15888 R16138 R16388 R16638
R14889 R15139 R15389 R15639 R15889 R16139 R16389 R16639
R14890 R15140 R15390 R15640 R15890 R16140 R16390 R16640
R14891 R15141 R15391 R15641 R15891 R16141 R16391 R16641
Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
R14892 R15142 R15392 R15642 R15892 R16142 R16392 R16642
MES interface library: Subprogram number at alarm
R14893 R15143 R15393 R15643 R15893 R16143 R16393 R16643
R14894 R15144 R15394 R15644 R15894 R16144 R16394 R16644
R14895 R15145 R15395 R15645 R15895 R16145 R16395 R16645
R14896 R15146 R15396 R15646 R15896 R16146 R16396 R16646
R14897 R15147 R15397 R15647 R15897 R16147 R16397 R16647
R14898 R15148 R15398 R15648 R15898 R16148 R16398 R16648
MES interface library: N number at alarm R14899 R15149 R15399 R15649 R15899 R16149 R16399 R16649

Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
R14900 R15150 R15400 R15650 R15900 R16150 R16400 R16650
MES interface library: B number at alarm R14901 R15151 R15401 R15651 R15901 R16151 R16401 R16651
R14902 R15152 R15402 R15652 R15902 R16152 R16402 R16652
MES interface library: G code modal status
R14903 R15153 R15403 R15653 R15903 R16153 R16403 R16653
R14904 R15154 R15404 R15654 R15904 R16154 R16404 R16654
R14905 R15155 R15405 R15655 R15905 R16155 R16405 R16655
R14906 R15156 R15406 R15656 R15906 R16156 R16406 R16656
R14907 R15157 R15407 R15657 R15907 R16157 R16407 R16657
Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
R14908 R15158 R15408 R15658 R15908 R16158 R16408 R16658
MES interface library: G code modal status
R14909 R15159 R15409 R15659 R15909 R16159 R16409 R16659
R14910 R15160 R15410 R15660 R15910 R16160 R16410 R16660
R14911 R15161 R15411 R15661 R15911 R16161 R16411 R16661
R14912 R15162 R15412 R15662 R15912 R16162 R16412 R16662
R14913 R15163 R15413 R15663 R15913 R16163 R16413 R16663
R14914 R15164 R15414 R15664 R15914 R16164 R16414 R16664
R14915 R15165 R15415 R15665 R15915 R16165 R16415 R16665
Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
R14916 R15166 R15416 R15666 R15916 R16166 R16416 R16666
MES interface library: G code modal status
R14917 R15167 R15417 R15667 R15917 R16167 R16417 R16667
R14918 R15168 R15418 R15668 R15918 R16168 R16418 R16668
R14919 R15169 R15419 R15669 R15919 R16169 R16419 R16669
R14920 R15170 R15420 R15670 R15920 R16170 R16420 R16670
R14921 R15171 R15421 R15671 R15921 R16171 R16421 R16671
R14922 R15172 R15422 R15672 R15922 R16172 R16422 R16672

R14923 R15173 R15423 R15673 R15923 R16173 R16423 R16673
Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
R14924 R15174 R15424 R15674 R15924 R16174 R16424 R16674
MES interface library: G code modal status
R14925 R15175 R15425 R15675 R15925 R16175 R16425 R16675
R14926 R15176 R15426 R15676 R15926 R16176 R16426 R16676
R14927 R15177 R15427 R15677 R15927 R16177 R16427 R16677
R14928 R15178 R15428 R15678 R15928 R16178 R16428 R16678
R14929 R15179 R15429 R15679 R15929 R16179 R16429 R16679
R14930 R15180 R15430 R15680 R15930 R16180 R16430 R16680
R14931 R15181 R15431 R15681 R15931 R16181 R16431 R16681
Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
R14932 R15182 R15432 R15682 R15932 R16182 R16432 R16682
MES interface library: G code modal status R14933 R15183 R15433 R15683 R15933 R16183 R16433 R16683
R14934 R15184 R15434 R15684 R15934 R16184 R16434 R16684 MES interface library: Spindle 1 load value
R14935 R15185 R15435 R15685 R15935 R16185 R16435 R16685 MES interface library: Spindle 2 load value
R14936 R15186 R15436 R15686 R15936 R16186 R16436 R16686
MES interface library: Tool number R14937 R15187 R15437 R15687 R15937 R16187 R16437 R16687
R14938 R15188 R15438 R15688 R15938 R16188 R16438 R16688 MES interface library: Tool offset number
R14939 R15189 R15439 R15689 R15939 R16189 R16439 R16689

Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
R14940 R15190 R15440 R15690 R15940 R16190 R16440 R16690
MES interface library: Tool length offset R14941 R15191 R15441 R15691 R15941 R16191 R16441 R16691
R14942 R15192 R15442 R15692 R15942 R16192 R16442 R16692
MES interface library: Tool radius offset R14943 R15193 R15443 R15693 R15943 R16193 R16443 R16693
R14944 R15194 R15444 R15694 R15944 R16194 R16444 R16694
MES interface library: Tool length wear amount R14945 R15195 R15445 R15695 R15945 R16195 R16445 R16695
R14946 R15196 R15446 R15696 R15946 R16196 R16446 R16696
MES interface library: Tool radius wear amount R14947 R15197 R15447 R15697 R15947 R16197 R16447 R16697
Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
R14948 R15198 R15448 R15698 R15948 R16198 R16448 R16698
MES interface library: Tool life R14949 R15199 R15449 R15699 R15949 R16199 R16449 R16699
Common ($) Abbrev. Signal name Common ($) Abbrev. Signal name
R20200 Skip coordinate (PLC axis 1st axis) R20208 Skip coordinate (PLC axis 3rd axis)
R20201 R20209
R20202 R20210
R20203 R20211
R20204 Skip coordinate (PLC axis 2nd axis) R20212 Skip coordinate (PLC axis 4th axis)
R20205 R20213
R20206 R20214
R20207 R20215
Common ($) Abbrev. Signal name Common ($) Abbrev. Signal name
R20216 Skip coordinate (PLC axis 5th axis) R20224
R20217 R20225
R20218 R20226
R20219 R20227
R20220 Skip coordinate (PLC axis 6th axis) R20228
R20221 R20229
R20222 R20230
R20223 R20231
Common ($) Abbrev. Signal name Common ($) Abbrev. Signal name
R20232 Feedback machine position (PLC axis 1st
axis) R20240 Feedback machine position (PLC axis
3rd axis)
R20233 R20241
R20234 R20242
R20235 R20243
R20236 Feedback machine position (PLC axis
2nd axis) R20244 Feedback machine position (PLC axis 4th
axis)
R20237 R20245
R20238 R20246
R20239 R20247

Common ($) Abbrev. Signal name Common ($) Abbrev. Signal name
R20248 Feedback machine position (PLC axis 5th
axis) R20256
R20249 R20257
R20250 R20258
R20251 R20259
R20252 Feedback machine position (PLC axis 6th
axis) R20260
R20253 R20261
R20254 R20262
R20255 R20263
Common ($) Abbrev. Signal name Common ($) Abbrev. Signal name
R20264 Servo deflection amount (PLC axis 1st

axis) R20272 Servo deflection amount (PLC axis 5th
axis)
R20265 R20273
R20266 Servo deflection amount (PLC axis 2nd
axis) R20274 Servo deflection amount (PLC axis 6th
axis)
R20267 R20275
R20268 Servo deflection amount (PLC axis 3rd
axis) R20276
R20269 R20277
R20270 Servo deflection amount (PLC axis 4th
axis) R20278
R20271 R20279
Common ($) Abbrev. Signal name Common ($) Abbrev. Signal name
R20280 RNASP FL-net: Reference node address desig nation R20288 EcoMonitorLight connection: Read start
bit
R20281 PNASP FL-net: Participating node top address
designation R20289 EcoMonitorLight connection: Station No.
R20282 R20290 EcoMonitorLight connection: Register ad dress
R20283 R20291 EcoMonitorLight connection: Size of data
to read
R20284 R20292
R20285 R20293
R20286 R20294
R20287 R20295
Common ($) Abbrev. Signal name Common ($) Abbrev. Signal name
R20296 R20304 Interference check III: Interfering object
enable/disable designation
R20297 R20305 Spare
R20298 R20306 Interference check III: 1st interfering ob ject selection
R20299 R20307 Interference check III: 1st interfering ob ject specification
R20300 R20308
Interference check III: 1st interfering
model coordinate system I axis offset 1
(L)
R20301 R20309
Interference check III: 1st interfering
model coordinate system I axis offset 1
(H)
R20302 R20310
Interference check III: 1st interfering
model coordinate system J axis offset 1
(L)
R20303 R20311
Interference check III: 1st interfering
model coordinate system J axis offset 1
(H)

Common ($) Abbrev. Signal name Common ($) Abbrev. Signal name
R20312 Interference check III: 1st interfering model
coordinate system K axis offset 1 (L) R20320 Interference check III: 2nd interfering mod el coordinate system K axis offset 1 (L)
R20313 Interference check III: 1st interfering model
coordinate system K axis offset 1 (H) R20321 Interference check III: 2nd interfering mod el coordinate system K axis offset 1 (H)
R20314 Interference check III: 2nd interfering ob ject selection R20322 Interference check III: 3rd interfering object
selection
R20315 Interference check III: 2nd interfering ob ject specification R20323 Interference check III: 3rd interfering object
specification
R20316 Interference check III: 2nd interfering mod el coordinate system I axis offset 1 (L) R20324 Interference check III: 3rd interfering model
coordinate system I axis offset 1 (L)
R20317 Interference check III: 2nd interfering mod el coordinate system I axis offset 1 (H) R20325 Interference check III: 3rd interfering model
coordinate system I axis offset 1 (H)
R20318 Interference check III: 2nd interfering mod el coordinate system J axis offset 1 (L) R20326 Interference check III: 3rd interfering model
coordinate system J axis offset 1 (L)
R20319 Interference check III: 2nd interfering mod el coordinate system J axis offset 1 (H) R20327 Interference check III: 3rd interfering model
coordinate system J axis offset 1 (H)
Common ($) Abbrev. Signal name Common ($) Abbrev. Signal name
R20328 Interference check III: 3rd interfering model
coordinate system K axis offset 1 (L) R20336 Interference check III: 4th interfering model
coordinate system K axis offset 1 (L)
R20329 Interference check III: 3rd interfering model
coordinate system K axis offset 1 (H) R20337 Interference check III: 4th interfering model
coordinate system K axis offset 1 (H)
R20330 Interference check III: 4th interfering object
selection R20338 Interference check III: 5th interfering object
selection
R20331 Interference check III: 4th interfering object
specification R20339 Interference check III: 5th interfering object
specification
R20332 Interference check III: 4th interfering model
coordinate system I axis offset 1 (L) R20340 Interference check III: 5th interfering model
coordinate system I axis offset 1 (L)
R20333 Interference check III: 4th interfering model
coordinate system I axis offset 1 (H) R20341 Interference check III: 5th interfering model
coordinate system I axis offset 1 (H)
R20334 Interference check III: 4th interfering model

coordinate system J axis offset 1 (L) R20342 Interference check III: 5th interfering model
coordinate system J axis offset 1 (L)
R20335 Interference check III: 4th interfering model
coordinate system J axis offset 1 (H) R20343 Interference check III: 5th interfering model
coordinate system J axis offset 1 (H)
Common ($) Abbrev. Signal name Common ($) Abbrev. Signal name
R20344 Interference check III: 5th interfering model
coordinate system K axis offset 1 (L) R20352 Interference check III: 6th interfering model
coordinate system K axis offset 1 (L)
R20345 Interference check III: 5th interfering model
coordinate system K axis offset 1 (H) R20353 Interference check III: 6th interfering model
coordinate system K axis offset 1 (H)
R20346 Interference check III: 6th interfering object
selection R20354 Interference check III: 7th interfering object
selection
R20347 Interference check III: 6th interfering object
specification R20355 Interference check III: 7th interfering object
specification
R20348 Interference check III: 6th interfering model
coordinate system I axis offset 1 (L) R20356 Interference check III: 7th interfering model
coordinate system I axis offset 1 (L)
R20349 Interference check III: 6th interfering model
coordinate system I axis offset 1 (H) R20357 Interference check III: 7th interfering model
coordinate system I axis offset 1 (H)
R20350 Interference check III: 6th interfering model
coordinate system J axis offset 1 (L) R20358 Interference check III: 7th interfering model
coordinate system J axis offset 1 (L)
R20351 Interference check III: 6th interfering model
coordinate system J axis offset 1 (H) R20359 Interference check III: 7th interfering model
coordinate system J axis offset 1 (H)

Common ($) Abbrev. Signal name Common ($) Abbrev. Signal name
R20360 Interference check III: 7th interfering model
coordinate system K axis offset 1 (L) R20368 Interference check III: 8th interfering model
coordinate system K axis offset 1 (L)
R20361 Interference check III: 7th interfering model
coordinate system K axis offset 1 (H) R20369 Interference check III: 8th interfering model
coordinate system K axis offset 1 (H)
R20362 Interference check III: 8th interfering object
selection R20370 Interference check III: 9th interfering object
selection
R20363 Interference check III: 8th interfering object
specification R20371 Interference check III: 9th interfering object
specification
R20364 Interference check III: 8th interfering model
coordinate system I axis offset 1 (L) R20372 Interference check III: 9th interfering model
coordinate system I axis offset 1 (L)
R20365 Interference check III: 8th interfering model
coordinate system I axis offset 1 (H) R20373 Interference check III: 9th interfering model
coordinate system I axis offset 1 (H)
R20366 Interference check III: 8th interfering model
coordinate system J axis offset 1 (L) R20374 Interference check III: 9th interfering model
coordinate system J axis offset 1 (L)
R20367 Interference check III: 8th interfering model
coordinate system J axis offset 1 (H) R20375 Interference check III: 9th interfering model
coordinate system J axis offset 1 (H)
Common ($) Abbrev. Signal name Common ($) Abbrev. Signal name
R20376 Interference check III: 9th interfering model
coordinate system K axis offset 1 (L) R20384 Interference check III: 10th interfering mod el coordinate system K axis offset 1 (L)
R20377 Interference check III: 9th interfering model
coordinate system K axis offset 1 (H) R20385 Interference check III: 10th interfering mod el coordinate system K axis offset 1 (H)
R20378 Interference check III: 10th interfering ob ject selection R20386 Interference check III: 11th interfering ob ject selection
R20379 Interference check III: 10th interfering ob ject specification R20387 Interference check III: 11th interfering ob ject specification
R20380 Interference check III: 10th interfering mod el coordinate system I axis offset 1 (L) R20388 Interference check III: 11th interfering mod el coordinate system I axis offset 1 (L)
R20381 Interference check III: 10th interfering mod el coordinate system I axis offset 1 (H) R20389 Interference check III: 11th interfering mod el coordinate system I axis offset 1 (H)
R20382 Interference check III: 10th interfering mod el coordinate system J axis offset 1 (L) R20390 Interference check III: 11th interfering mod el coordinate system J axis offset 1 (L)
R20383 Interference check III: 10th interfering mod el coordinate system J axis offset 1 (H) R20391 Interference check III: 11th interfering mod el coordinate system J axis offset 1 (H)
Common ($) Abbrev. Signal name Common ($) Abbrev. Signal name
R20392 Interference check III: 11th interfering mod el coordinate system K axis offset 1 (L) R20400 Interference check III: 12th interfering mod el coordinate system K axis offset 1 (L)
R20393 Interference check III: 11th interfering mod el coordinate system K axis offset 1 (H) R20401 Interference check III: 12th interfering mod el coordinate system K axis offset 1 (H)
R20394 Interference check III: 12th interfering ob ject selection R20402 Interference check III: 13th interfering ob ject selection
R20395 Interference check III: 12th interfering ob ject specification R20403 Interference check III: 13th interfering ob ject specification
R20396 Interference check III: 12th interfering mod el coordinate system I axis offset 1 (L) R20404 Interference check III: 13th interfering mod el coordinate system I axis offset 1 (L)
R20397 Interference check III: 12th interfering mod el coordinate system I axis offset 1 (H) R20405 Interference check III: 13th interfering mod el coordinate system I axis offset 1 (H)
R20398 Interference check III: 12th interfering mod el coordinate system J axis offset 1 (L) R20406 Interference check III: 13th interfering mod el coordinate system J axis offset 1 (L)
R20399 Interference check III: 12th interfering mod el coordinate system J axis offset 1 (H) R20407 Interference check III: 13th interfering mod el coordinate system J axis offset 1 (H)

Common ($) Abbrev. Signal name Common ($) Abbrev. Signal name
R20408 Interference check III: 13th interfering mod el coordinate system K axis offset 1 (L) R20416 Interference check III: 14th interfering mod el coordinate system K axis offset 1 (L)
R20409 Interference check III: 13th interfering mod el coordinate system K axis offset 1 (H) R20417 Interference check III: 14th interfering mod el coordinate system K axis offset 1 (H)
R20410 Interference check III: 14th interfering ob ject selection R20418 Interference check III: 15th interfering ob ject selection
R20411 Interference check III: 14th interfering ob ject specification R20419 Interference check III: 15th interfering ob ject specification

R20412 Interference check III: 14th interfering mod el coordinate system I axis offset 1 (L) R20420 Interference check III: 15th interfering mod el coordinate system I axis offset 1 (L)
R20413 Interference check III: 14th interfering mod el coordinate system I axis offset 1 (H) R20421 Interference check III: 15th interfering mod el coordinate system I axis offset 1 (H)
R20414 Interference check III: 14th interfering mod el coordinate system J axis offset 1 (L) R20422 Interference check III: 15th interfering mod el coordinate system J axis offset 1 (L)
R20415 Interference check III: 14th interfering mod el coordinate system J axis offset 1 (H) R20423 Interference check III: 15th interfering mod el coordinate system J axis offset 1 (H)
Common ($) Abbrev. Signal name Common ($) Abbrev. Signal name
R20424 Interference check III: 15th interfering mod el coordinate system K axis offset 1 (L) R20432 Interference check III: 16th interfering mod el coordinate system K axis offset 1 (L)
R20425 Interference check III: 15th interfering mod el coordinate system K axis offset 1 (H) R20433 Interference check III: 16th interfering mod el coordinate system K axis offset 1 (H)
R20426 Interference check III: 16th interfering ob ject selection R20434 1st interfering object: Specifying disabled
object with interference check III
R20427 Interference check III: 16th interfering ob ject specification R20435 2nd interfering object: Specifying disabled
object with interference check III
R20428 Interference check III: 16th interfering mod el coordinate system I axis offset 1 (L) R20436 3rd interfering object: Specifying disabled
object with interference check III
R20429 Interference check III: 16th interfering mod el coordinate system I axis offset 1 (H) R20437 4th interfering object: Specifying disabled
object with interference check III
R20430 Interference check III: 16th interfering mod el coordinate system J axis offset 1 (L) R20438 5th interfering object: Specifying disabled
object with interference check III
R20431 Interference check III: 16th interfering mod el coordinate system J axis offset 1 (H) R20439 6th interfering object: Specifying disabled
object with interference check III
Common ($) Abbrev. Signal name Common ($) Abbrev. Signal name
R20440 7th interfering object: Specifying disabled
object with interference check III R20448 15th interfering object: Specifying disabled
object with interference check III
R20441 8th interfering object: Specifying disabled
object with interference check III R20449 16th interfering object: Specifying disabled
object with interference check III
R20442 9th interfering object: Specifying disabled
object with interference check III R20450 SVIDDD
AX
Diagnosis data output: Select axis for ser vomotor insulation degradation detection
(PLC axis)
R20443 10th interfering object: Specifying disabled
object with interference check III R20451 SPIDDD
AX
Diagnosis data output: Select spindle for
motor insulation degradation detection
R20444 11th interfering object: Specifying disabled
object with interference check III R20452
R20445 12th interfering object: Specifying disabled
object with interference check III R20453 Laser: Laser output override
R20446 13th interfering object: Specifying disabled
object with interference check III R20454
R20447 14th interfering object: Specifying disabled
object with interference check III R20455

Common ($) Abbrev. Signal name Common ($) Abbrev. Signal name
R20456 Arbitrary-assigned PSW for each part sys tem 1 to 16 interlock R20464
R20457 Arbitrary-assigned PSW for each part sys tem 17 to 32 interlock R20465
R20458 Arbitrary-assigned PSW for each part sys tem 33 to 48 interlock R20466
R20459 Arbitrary-assigned PSW for each part sys tem 49 to 64 interlock R20467
R20460 R20468
R20461 R20469
R20462 R20470
R20463 R20471
Common ($) Abbrev. Signal name Common ($) Abbrev. Signal name
R20472 R20480 TP_IN VALID Touchscreen operation disabled
R20473 R20481 IDDD Diagnosis data output: Motor insulation
degradation detection request
R20474 R20482
R20475 R20483
R20476 R20484
R20477 R20485
R20478 R20486
R20479 R20487
Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
R22500 R22700 R22900 R23100 R23300 R23500 R23700 R23900 Program restart: Restart position return check invalid
R22501 R22701 R22901 R23101 R23301 R23501 R23701 R23901 SVIDDD
AX
Diagnosis data output: Select axis for servomotor insu lation degradation detection
R22502 R22702 R22902 R23102 R23302 R23502 R23702 R23902
PTPS Manual arbitrary feed: Dedicated feedrate R22503 R22703 R22903 R23103 R23303 R23503 R23703 R23903
R22504 R22704 R22904 R23104 R23304 R23504 R23704 R23904
R22505 R22705 R22905 R23105 R23305 R23505 R23705 R23905
R22506 R22706 R22906 R23106 R23306 R23506 R23706 R23906
R22507 R22707 R22907 R23107 R23307 R23507 R23707 R23907
Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
R22508 R22708 R22908 R23108 R23308 R23508 R23708 R23908
R22509 R22709 R22909 R23109 R23309 R23509 R23709 R23909
R22510 R22710 R22910 R23110 R23310 R23510 R23710 R23910
R22511 R22711 R22911 R23111 R23311 R23511 R23711 R23911
R22512 R22712 R22912 R23112 R23312 R23512 R23712 R23912
R22513 R22713 R22913 R23113 R23313 R23513 R23713 R23913
R22514 R22714 R22914 R23114 R23314 R23514 R23714 R23914

R22515 R22715 R22915 R23115 R23315 R23515 R23715 R23915

Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
R22532 R22732 R22932 R23132 R23332 R23532 R23732 R23932 VCC_IN VAX VCC: Temporary cancel of axis vibration
R22533 R22733 R22933 R23133 R23333 R23533 R23733 R23933
R22534 R22734 R22934 R23134 R23334 R23534 R23734 R23934
R22535 R22735 R22935 R23135 R23335 R23535 R23735 R23935
R22536 R22736 R22936 R23136 R23336 R23536 R23736 R23936
R22537 R22737 R22937 R23137 R23337 R23537 R23737 R23937
R22538 R22738 R22938 R23138 R23338 R23538 R23738 R23938
R22539 R22739 R22939 R23139 R23339 R23539 R23739 R23939
Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
R22540 R22740 R22940 R23140 R23340 R23540 R23740 R23940 CLC: Spindle selection
R22541 R22741 R22941 R23141 R23341 R23541 R23741 R23941
R22542 R22742 R22942 R23142 R23342 R23542 R23742 R23942
R22543 R22743 R22943 R23143 R23343 R23543 R23743 R23943
R22544 R22744 R22944 R23144 R23344 R23544 R23744 R23944
R22545 R22745 R22945 R23145 R23345 R23545 R23745 R23945
R22546 R22746 R22946 R23146 R23346 R23546 R23746 R23946
R22547 R22747 R22947 R23147 R23347 R23547 R23747 R23947
Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
R22564 R22764 R22964 R23164 R23364 R23564 R23764 R23964 MCSLSA Machining condition selection I: Selection of machining application
R22565 R22765 R22965 R23165 R23365 R23565 R23765 R23965 MCSLSC Machining condition selection I: Selection of machining condition
R22566 R22766 R22966 R23166 R23366 R23566 R23766 R23966
R22567 R22767 R22967 R23167 R23367 R23567 R23767 R23967
R22568 R22768 R22968 R23168 R23368 R23568 R23768 R23968
R22569 R22769 R22969 R23169 R23369 R23569 R23769 R23969
R22570 R22770 R22970 R23170 R23370 R23570 R23770 R23970
R22571 R22771 R22971 R23171 R23371 R23571 R23771 R23971
Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
R22692 R22892 R23092 R23292 R23492 R23692 R23892 R24092 Load monitor I: Cutting torque estimation target axis
R22693 R22893 R23093 R23293 R23493 R23693 R23893 R24093 Hob machining: Work piece axis selection
R22694 R22894 R23094 R23294 R23494 R23694 R23894 R24094 SPPWS Tool spindle synchronization IB: Spindle-spindle poly gon cut workpiece axis selection
R22695 R22895 R23095 R23295 R23495 R23695 R23895 R24095
R22696 R22896 R23096 R23296 R23496 R23696 R23896 R24096
R22697 R22897 R23097 R23297 R23497 R23697 R23897 R24097
R22698 R22898 R23098 R23298 R23498 R23698 R23898 R24098
R22699 R22899 R23099 R23299 R23499 R23699 R23899 R24099

Device No.
$1 $2 $3 $4 Abbrev. Signal name
R25684 R25692 R25700 R25708 AXCHGC MD1
Tool head hot swapping: NC axis switch 1st axis
R25685 R25693 R25701 R25709 AXCHGC MD2
Tool head hot swapping: NC axis switch 2nd axis
R25686 R25694 R25702 R25710 AXCHGC MD3
Tool head hot swapping: NC axis switch 3rd axis
R25687 R25695 R25703 R25711 AXCHGC MD4
Tool head hot swapping: NC axis switch 4th axis
R25688 R25696 R25704 R25712 AXCHGC MD5
Tool head hot swapping: NC axis switch 5th axis
R25689 R25697 R25705 R25713 AXCHGC MD6
Tool head hot swapping: NC axis switch 6th axis
R25690 R25698 R25706 R25714 AXCHGC MD7
Tool head hot swapping: NC axis switch 7th axis
R25691 R25699 R25707 R25715 AXCHGC MD8
Tool head hot swapping: NC axis switch 8th axis

Device Abbrev. Signal name Device Abbrev. Signal name
SM00 SM08
SM01 SM09
SM02 SM10
SM03 SM11
SM04 SM12
SM05 SM13
SM06 SM14
SM07 SM15
Device Abbrev. Signal name Device Abbrev. Signal name
SM16 Temperature rise SM24
SM17 SM25
SM18 SM26
SM19 SM27

SM20 SM28
SM21 SM29
SM22 SM30
SM23 SM31
Device Abbrev. Signal name Device Abbrev. Signal name
SM32 SM40
SM33 SM41
SM34 SM42
SM35 SM43
SM36 SM44
SM37 SM45
SM38 SM46
SM39 SM47
Device Abbrev. Signal name Device Abbrev. Signal name
SM48 SM56
SM49 SM57
SM50 SM58
SM51 SM59
SM52 SM60
SM53 SM61
SM54 SM62
SM55 SM63

(*1) The data link status with the master station can be confirmed.
SM1800 can be referred to from all the PLC projects.
Refer to "PLC Programming Manual" for details.
Device Abbrev. Signal name Device Abbrev. Signal name
SM64 SM72
SM65 SM73
SM66 SM74
SM67 SM75
SM68 SM76
SM69 SM77
SM70 SM78
SM71 SM79
Device Abbrev. Signal name Device Abbrev. Signal name
SM80 SM88
SM81 SM89
SM82 SM90
SM83 SM91
SM84 SM92
SM85 SM93
SM86 SM94
SM87 SM95
Device Abbrev. Signal name Device Abbrev. Signal name
SM96 SM104
SM97 SM105
SM98 SM106
SM99 SM107
SM100 SM108
SM101 SM109
SM102 SM110
SM103 SM111
Device Abbrev. Signal name Device Abbrev. Signal name
SM112 SM120
SM113 SM121
SM114 SM122
SM115 SM123
SM116 SM124
SM117 SM125
SM118 SM126
SM119 SM127
Device Abbrev. Signal name
SM1800 CC-Link IE TSN remote data link status
(*1)
SM1801
SM1802
SM1803
SM1804
SM1805
SM1806
SM1807

Smart safety observation
[PLC -> CNC]
Device Abbrev. Signal name
ZR256 *SLSRm SLS observation request (control axis) 1st axis to 16th axis
ZR257 *SLSRm SLS observation request (control axis) 17th axis to 32nd axis
ZR258 *SLPRm SLP observation request (control axis) 1st axis to 16th axis
ZR259 *SLPRm SLP observation request (control axis) 17th axis to 32nd axis
ZR260 *SSMRm SSM request (control axis) 1st axis to 16th axis

ZR261 *SSMRm SSM request (control axis) 17th axis to 32nd axis
ZR262 *SCARm Safe cam request (control axis) 1st axis to 16th axis
ZR263 *SCARm Safe cam request (control axis) 17th axis to 32nd axis
ZR264 *SOSRm SOS observation request (control axis) 1st axis to 16th axis
ZR265 *SOSRm SOS observation request (control axis) 17th axis to 32nd axis
ZR266 *SS1Rm Safe stop 1 request (control axis) 1st axis to 16th axis
ZR267 *SS1Rm Safe stop 1 request (control axis) 17th axis to 32nd axis
ZR268 *SS2Rm Safe stop 2 request (control axis) 1st axis to 16th axis
ZR269 *SS2Rm Safe stop 2 request (control axis) 17th axis to 32nd axis
ZR270 *STORm Safe torque OFF request (control axis) 1st axis to 16th axis
ZR271 *STORm Safe torque OFF request (control axis) 17th axis to 32nd axis
ZR272 *SBCRm SBC motor brake starting request (control axis) 1st axis to 16th axis
ZR273 *SBCRm SBC motor brake starting request (control axis) 17th axis to 32nd axis
ZR274 SBTSTEXm External brake SBT start (control axis) 1st axis to 16th axis
ZR275 SBTSTEXm External brake SBT start (control axis) 17th axis to 32nd axis
ZR276 SBTSTMOm Motor brake SBT start (control axis) 1st axis to 16th axis
ZR277 SBTSTMOm Motor brake SBT start (control axis) 17th axis to 32nd axis
ZR278 SFABSPFXm Safety absolute position confirm (control axis) 1st axis to 16th axis
ZR279 SFABSPFXm Safety absolute position confirm (control axis) 17th axis to 32nd axis
ZR280 SRSTm Safety reset (control axis) 1st axis to 16th axis
ZR281 SRSTm Safety reset (control axis) 17th axis to 32nd axis
Device Abbrev. bit Signal name
ZR312 to
ZR343
SLSMImn bit0 SLS speed change input (control axis) 1st axis to 32nd axis
SLSMImn bit1 SLS speed change input (control axis) 1st axis to 32nd axis
bit2 vacant
bit3 vacant
SLSOVRImn bit4 SLS speed override input (control axis) 1st axis to 32nd axis
SLSOVRImn bit5 SLS speed override input (control axis) 1st axis to 32nd axis
SLSOVRImn bit6 SLS speed override input (control axis) 1st axis to 32nd axis
SLSOVRImn bit7 SLS speed override input (control axis) 1st axis to 32nd axis
bit8 vacant
bit9 vacant
bitA vacant
bitB vacant
bitC vacant
bitD vacant
bitE vacant
bitF vacant
M800V/M80V Series PLC Interface Manual
2 Input/Output Signals with Controller
2.6 ZR Devices
IB-1501616-F 134
Device Abbrev. bit Signal name
ZR344 to
ZR375
SLPMImn bit0 SLP position change input (control axis) 1st axis to 32nd axis
SLPMImn bit1 SLP position change input (control axis) 1st axis to 32nd axis
bit2 vacant
bit3 vacant
bit4 vacant
bit5 vacant
bit6 vacant
bit7 vacant
bit8 vacant
bit9 vacant
bitA vacant
bitB vacant
bitC vacant
bitD vacant
bitE vacant
bitF vacant
Device Abbrev. Signal name
ZR440 *SLSSRm SLS observation request (spindle) 1st SP to 8th SP
ZR442 *SSMSRm SSM request (spindle) 1st SP to 8th SP
ZR444 *SOSSRm SOS observation request (spindle) 1st SP to 8th SP
ZR445 *SS1SRm Safe stop 1 request (spindle) 1st SP to 8th SP
ZR446 *SS2SRm Safe stop 2 request (spindle) 1st SP to 8th SP
ZR447 *STOSRm Safe torque OFF request (spindle) 1st SP to 8th SP
ZR452 SRSTSm Safety request (spindle) 1st SP to 8th SP
Device Abbrev. bit Signal name
ZR468 to
ZR475
SLSSMImn bit0 SLS speed change input (spindle) 1st SP to 8th SP
SLSSMImn bit1 SLS speed change input (spindle) 1st SP to 8th SP
bit2 vacant
bit3 vacant
SLSSOVRImn bit4 SLS speed override input (spindle) 1st SP to 8th SP
SLSSOVRImn bit5 SLS speed override input (spindle) 1st SP to 8th SP
SLSSOVRImn bit6 SLS speed override input (spindle) 1st SP to 8th SP
SLSSOVRImn bit7 SLS speed override input (spindle) 1st SP to 8th SP
bit8 vacant
bit9 vacant
bitA vacant
bitB vacant
bitC vacant
bitD vacant

bitE vacant
bitF vacant
Device Abbrev. Signal name
ZR532 SARLS Special safety alarm cancel (system common)
ZR1280 SIOOFFCHK Output off check request
- SIOREQ Safety I/O observation request
- SCNSNDDAT Safety communication send data
- SCNCMD Safety communication command

[CNC -> PLC]
Device Abbrev. Signal name
ZR544 SLSEm SLS observation is active (control axis) 1st axis to 16th axis
ZR545 SLSEm SLS observation is active (control axis) 17th axis to 32nd axis
ZR546 SLSSm Under SLS limit (control axis) 1st axis to 16th axis
ZR547 SLSSm Under SLS limit (control axis) 17th axis to 32nd axis
ZR548 SLPEm SLP observation is active (control axis) 1st axis to 16th axis
ZR549 SLPEm SLP observation is active (control axis) 17th axis to 32nd axis
ZR550 SLPSm In SLP range (control axis) 1st axis to 16th axis
ZR551 SLPSm In SLP range (control axis) 17th axis to 32nd axis
ZR552 SSMEm SSM is active (control axis) 1st axis to 16th axis
ZR553 SSMEm SSM is active (control axis) 17th axis to 32nd axis
ZR554 SCAEm Safe cam is active (control axis) 1st axis to 16th axis
ZR555 SCAEm Safe cam is active (control axis) 17th axis to 32nd axis
ZR556 SOSEm SOS is active (control axis) 1st axis to 16th axis
ZR557 SOSEm SOS is active (control axis) 17th axis to 32nd axis
ZR558 SOSSm In SOS stop (control axis) 1st axis to 16th axis
ZR559 SOSSm In SOS stop (control axis) 17th axis to 32nd axis
ZR560 SS1Em SS1 is active (control axis) 1st axis to 16th axis
ZR561 SS1Em SS1 is active (control axis) 17th axis to 32nd axis
ZR562 SS1Sm In safe stop 1 (control axis) 1st axis to 16th axis
ZR563 SS1Sm In safe stop 1 (control axis) 17th axis to 32nd axis
ZR564 SS2Em SS2 is active (control axis) 1st axis to 16th axis
ZR565 SS2Em SS2 is active (control axis) 17th axis to 32nd axis
ZR566 STOEm STO is active (control axis) 1st axis to 16th axis
ZR567 STOEm STO is active (control axis) 17th axis to 32nd axis
ZR568 STOSm In safe torque OFF (control axis) 1st axis to 16th axis
ZR569 STOSm In safe torque OFF (control axis) 17th axis to 32nd axis
ZR570 SBCEm In SBC motor brake enabled (control axis) 1st axis to 16th axis
ZR571 SBCEm In SBC motor brake enabled (control axis) 17th axis to 32nd axis
ZR572 SBCSm In SBC motor brake start (control axis) 1st axis to 16th axis
ZR573 SBCSm In SBC motor brake start (control axis) 17th axis to 32nd axis
ZR574 SBTNFEXm External brake SBT incomplete (control axis) 1st axis to 16th axis
ZR575 SBTNFEXm External brake SBT incomplete (control axis) 17th axis to 32nd axis
ZR576 SBTEXBRm In SBT external brake test (control axis) 1st axis to 16th axis
ZR577 SBTEXBRm In SBT external brake test (control axis) 17th axis to 32nd axis
ZR578 SBTNFMOm Motor brake SBT incomplete (control axis) 1st axis to 16th axis
ZR579 SBTNFMOm Motor brake SBT incomplete (control axis) 17th axis to 32nd axis
ZR580 SFABSPESTm In safety absolute position establishing (control axis) 1st axis to 16th axis
ZR581 SFABSPESTm In safety absolute position establishing (control axis) 17th axis to 32nd axis
ZR582 SFERR_SVm Smart safety observation error occurring servo axis (control axis) 1st axis to 16th axis
ZR583 SFERR_SVm Smart safety observation error occurring servo axis (control axis) 17th axis to 32nd axis
ZR584 SFWRG_SVm Smart safety observation warning occurring servo axis (control axis) 1st axis to 16th axis
ZR585 SFWRG_SVm Smart safety observation warning occurring servo axis (control axis) 17th axis to 32nd axis

Device Abbrev. bit Signal name
ZR608 to
ZR639
SLSMOmn bit0 SLS speed change output (control axis) 1st axis to 32nd axis
SLSMOmn bit1 SLS speed change output (control axis) 1st axis to 32nd axis
bit2 vacant
bit3 vacant
SLSOVROmn bit4 SLS speed override output (control axis) 1st axis to 32nd axis
SLSOVROmn bit5 SLS speed override output (control axis) 1st axis to 32nd axis
SLSOVROmn bit6 SLS speed override output (control axis) 1st axis to 32nd axis
SLSOVROmn bit7 SLS speed override output (control axis) 1st axis to 32nd axis
bit8 vacant
bit9 vacant
bitA vacant
bitB vacant
bitC vacant
bitD vacant
bitE vacant
bitF vacant
Device Abbrev. Signal name
ZR640 to
ZR671 SLPMOmn SLP position change output (control axis) 1st axis to 32nd axis
ZR672 to
ZR703 SSMSmn Under SSM safe speed (control axis) 1st axis to 32nd axis
ZR704 to
ZR767 SCASmn Safe cam position (control axis) 1st axis to 32nd axis

ZR768 to
ZR893 SBTPOSm SBT start position (control axis) 1st axis to 32nd axis
Device Abbrev. Signal name
ZR1024 SLSSEm SLS observation is active (spindle) 1st SP to 8th SP
ZR1025 SLSSSm Under SLS limit (spindle) 1st SP to 8th SP
ZR1028 SSMSEm SSM is active (spindle) 1st SP to 8th SP
ZR1030 SOSSEm SOS is active (spindle) 1st SP to 8th SP
ZR1031 SOSSSm In SOS stop (spindle) 1st SP to 8th SP
ZR1032 SS1SEm SS1 is active (spindle) 1st SP to 8th SP
ZR1033 SS1SSm In safe stop (spindle) 1st SP to 8th SP
ZR1034 SS2SEm SS2 is active (spindle) 1st SP to 8th SP
ZR1035 STOSEm STO is active (spindle) 1st SP to 8th SP
ZR1036 STOSSm In safe torque OFF (spindle) 1st SP to 8th SP
ZR1043 SFERR_SPm Smart safety observation error occurring spindle (spindle) 1st SP to 8th SP
ZR1044 SFWRG_SPm Smart safety observation warning occurring spindle (spindle) 1st SP to 8th SP

Device Abbrev. bit Signal name
ZR1056 to
ZR1063
SLSSMOmn bit0 SLS speed change output (spindle) 1st SP to 8th SP
SLSSMOmn bit1 SLS speed change output (spindle) 1st SP to 8th SP
bit2 vacant
bit3 vacant
SLSSOV ROmn bit4 SLS speed override output (spindle) 1st SP to 8th SP
SLSSOV ROmn bit5 SLS speed override output (spindle) 1st SP to 8th SP
SLSSOV ROmn bit6 SLS speed override output (spindle) 1st SP to 8th SP
SLSSOV ROmn bit7 SLS speed override output (spindle) 1st SP to 8th SP
bit8 vacant
bit9 vacant
bitA vacant
bitB vacant
bitC vacant
bitD vacant
bitE vacant
bitF vacant
Device Abbrev. Signal name
ZR1088 to
ZR1095 SSMSSmn Under SSM safe speed (spindle) 1st SP to 8th SP
Device Abbrev. Signal name
ZR1264 SEXTEMG In safety external emergency stop (system common)
ZR1268 SFERR_VNO V number of smart safety observation error (system common)
ZR1269 SFERR_ENO E number of smart safety observation error (system common)
ZR1270 SFWRG_VNO V number of smart safety observation warning (system common)
ZR1271 SFWRG_ENO W number of smart safety observation warning (system common)
Device Abbrev. Signal name
ZR1536 SIOERRSTS Safety I/O observation state
ZR1538 SIOERRUNIT Safety I/O unit observation state
ZR1540 SIOERRUNIT STS1n Safety I/O unit observation error details Unit1
ZR1541 SIOERRUNIT STS2n Safety I/O unit observation error details Unit2
ZR1542 SIOERRUNIT STS3n Safety I/O unit observation error details Unit3
ZR1543 SIOERRUNIT STS4n Safety I/O unit observation error details Unit4
ZR1544 SIOERRUNIT STS5n Safety I/O unit observation error details Unit5
ZR1545 SIOERRUNIT STS6n Safety I/O unit observation error details Unit6
ZR1546 SIOERRUNIT STS7n Safety I/O unit observation error details Unit7
ZR1547 SIOERRUNIT STS8n Safety I/O unit observation error details Unit8

Memory switch (PLC switch)
MES interface library
Device Abbrev. Signal name
- SIOERRUNITSIG Safety I/O device observation error signal Unit1
- SIOERRUNITSIG Safety I/O device observation error signal Unit2
- SIOERRUNITSIG Safety I/O device observation error signal Unit3
- SIOWRGUNIT Safety I/O device observation warning status
- SIOWRGUNIT STS Safety I/O device observation warning details Unit1
- SIOWRGUNIT STS Safety I/O device observation warning details Unit2
- SIOWRGUNIT STS Safety I/O device observation warning details Unit3
- SIOWRGUNITSIG Safety I/O device observation warning signal Unit1
- SIOWRGUNITSIG Safety I/O device observation warning signal Unit2
- SIOWRGUNITSIG Safety I/O device observation warning signal Unit3
Device Abbrev. Signal name
- SCNRCVDAT Safety communication receipt data
- SCNSTS Safety communication status
- SCNCOMSTS Safety station communication status
Device Signal name
ZR3200 to ZR3205 PLC switch non-display
Device Signal name
ZR10000 to ZR10031 MES interface library: Common user area C1
ZR10032 to ZR10051 MES interface library: Common user area L1 to L10
ZR10054 MES interface library: Condition register (Extract sort condition)
ZR10055 MES interface library: Condition register (Combination condition)
ZR10056 MES interface library: Condition register (Field value) 1st set
ZR10057 MES interface library: Condition register (Comparison condition) 1st set

ZR10058 to ZR10089 MES interface library: Condition register (Condition value) 1st set
ZR10090 MES interface library: Condition register (Field value) 2nd set
ZR10091 MES interface library: Condition register (Comparison condition) 2nd set
ZR10092 to ZR10123 MES interface library: Condition register (Condition value) 2nd set
ZR10330 to ZR10913 Data I/O register for MES interface library (For update/extract)
ZR10940 to ZR10971 MES interface library: User area C1 at machining end
ZR10972 to ZR10991 MES interface library: User area L1 to L10 at machining end
ZR10994 to ZR11025 MES interface library: User area C1 at alarm
ZR11026 to ZR11045 MES interface library: User area L1 to L10 at alarm
ZR11048 to ZR11079 MES interface library: Arbitrary user area C1
ZR11080 to ZR11099 MES interface library: Arbitrary user area S1 to S20
ZR11100 to ZR11119 MES interface library: Arbitrary user area L1 to L10

Diagnosis data output
Spindle protection
External encoder position output I/F
Machine contact input/output I/F
Device Signal name
ZR12404, ZR12405 Diagnosis data output: Battery exchange
ZR12608, ZR12609
to
ZR12670, ZR12671
Diagnosis data output: Battery exchange (drive) (servo)
ZR12784, ZR12785
to
ZR12846, ZR12847
Diagnosis data output: Motor insulation resistance (motor) (servo)
ZR12848, ZR12849
to
ZR12862, ZR12863
Diagnosis data output: Motor insulation resistance (motor) (spindle)
ZR12945 Diagnosis data output: Automatic log clear time
ZR12946, ZR12947
to
ZR13008, ZR13009
Diagnosis data output: Accumulated travel distance (motor) (servo)
Device Abbrev. Signal name
ZR13010 SPEQLD Spindle protection: Motor equivalent load factor
ZR13018 PRSPERR Spindle protection: Number of times log output error occurred
Device Abbrev. Signal name
ZR13020 ENC1POS External encoder 1: Position output
Device Abbrev. Signal name
ZR5000 to ZR6711 Fixed-assignment devices for remote I/O unit 9th to 64th channel
(When the parameter "#53001 RIO dev assign" is set to "0")
ZR5000 to ZR5711 (input)
ZR6000 to ZR6711 (output)
ZR13028 to ZR13039 TIn Thermistor input n
ZR13040 TIOPN Thermistor disconnection
ZR13041 TISRT Thermistor short-circuit
ZR13050 to ZR13065 MAn Multi-analog input ch n
ZR13066 to ZR13081 MASTSn Multi-analog input status ch n

PROFIBUS-DP
[PLC -> CNC]
Device Abbrev. Signal name
ZR3613 PROFIBUS-DP: Diagnosis data acquisition request start/end flag
ZR3614 PROFIBUS-DP: Station No. of slave requesting diagnosis data acquisition
ZR3615 PROFIBUS-DP: Diagnosis data acquisition request command No.
ZR3616 PROFIBUS-DP: Diagnosis data-storing device type
ZR3617 PROFIBUS-DP: Top device No. for storing diagnosis data
ZR3623 PROFIBUS-DP: Aperiodic data communication (Acyclic communication): Request start/end flag
ZR3624 PROFIBUS-DP: Aperiodic data communication (Acyclic communication): Request command No.
ZR3625 PROFIBUS-DP: Aperiodic data communication (Acyclic communication): Request source slave station No.
ZR3626 PROFIBUS-DP: Aperiodic data communication (Acyclic communication): Request source slave station slot No.
ZR3627 PROFIBUS-DP: Aperiodic data communication (Acyclic communication): Request source slave station index
ZR3628 PROFIBUS-DP: Aperiodic data communication (Acyclic communication): Request source data length
ZR3629 PROFIBUS-DP: Aperiodic data communication (Acyclic communication): Send time-out
ZR3630 PROFIBUS-DP: Aperiodic data communication (Acyclic communication): Features supported
ZR3631 PROFIBUS-DP: Aperiodic data communication (Acyclic communication): Features supported 2
ZR3632 PROFIBUS-DP: Aperiodic data communication (Acyclic communication): Profile features sup ported
ZR3633 PROFIBUS-DP: Aperiodic data communication (Acyclic communication): Profile features sup ported 2
ZR3634 PROFIBUS-DP: Aperiodic data communication (Acyclic communication): Profile ID number
ZR3635 PROFIBUS-DP: Aperiodic data communication (Acyclic communication): S_Type
ZR3636 PROFIBUS-DP: Aperiodic data communication (Acyclic communication): S_Len
ZR3637 PROFIBUS-DP: Aperiodic data communication (Acyclic communication): D_Type
ZR3638 PROFIBUS-DP: Aperiodic data communication (Acyclic communication): D_Len
ZR3639 PROFIBUS-DP: Aperiodic data communication (Acyclic communication): Destination connection No.

ZR3642 PROFIBUS-DP: Aperiodic data communication (Acyclic communication): Type of device for stor ing data to write
ZR3643 PROFIBUS-DP: Aperiodic data communication (Acyclic communication): Top device No. for stor ing data to write
ZR3644 PROFIBUS-DP: Aperiodic data communication (Acyclic communication): Type of device for stor ing additional address parameter table
ZR3645 PROFIBUS-DP: Aperiodic data communication (Acyclic communication): Top device No. for stor ing additional address parameter table
ZR3646 PROFIBUS-DP: Aperiodic data communication (Acyclic communication): Subnet
ZR3647 PROFIBUS-DP: Aperiodic data communication (Acyclic communication): Instance
ZR3648 PROFIBUS-DP: Aperiodic data communication (Acyclic communication): Reason Code
ZR3664 PROFIBUS-DP: Alarm data acquisition request start/end flag
ZR3665 PROFIBUS-DP: Alarm data acquisition request command No.
ZR3666 PROFIBUS-DP: Station No. of slave requesting alarm data acquisition
ZR3667 PROFIBUS-DP: Alarm data-storing device type
ZR3668 PROFIBUS-DP: Top device No. for storing alarm data
ZR3673 PROFIBUS-DP:ACK send request start/end flag
ZR3674 PROFIBUS-DP:ACK send request command No.
ZR3675 PROFIBUS-DP:ACK send request destination slave station No.
ZR3676 PROFIBUS-DP: Type of alarm occurring on ACK send request destination slave station
ZR3677 PROFIBUS-DP: Slot No. of ACK send request destination slave station
ZR3678 PROFIBUS-DP: Alarm specifier of ACK send request destination slave station

[CNC -> PLC]
Device Abbrev. Signal name
ZR3600 PROFIBUS-DP: Startup complete (*1)
ZR3601 PROFIBUS-DP: Diagnosis data acquisition in progress
ZR3602 PROFIBUS-DP: Aperiodic data communication (Acyclic communication) in progress
ZR3603 PROFIBUS-DP: Alarm data acquisition active flag
ZR3604 PROFIBUS-DP: Alarm ACK send active flag
ZR3605 PROFIBUS-DP: Error occurrence state in the slave station (Station No. 0 to 15)
ZR3606 PROFIBUS-DP: Error occurrence state in the slave station (Station No. 16 to 31)
ZR3607 PROFIBUS-DP: Error occurrence state in the slave station (Station No. 32 to 47)
ZR3608 PROFIBUS-DP: Error occurrence state in the slave station (Station No. 48 to 63)
ZR3609 PROFIBUS-DP: Error occurrence state in the slave station (Station No. 64 to 79)
ZR3610 PROFIBUS-DP: Error occurrence state in the slave station (Station No. 80 to 95)
ZR3611 PROFIBUS-DP: Error occurrence state in the slave station (Station No. 96 to 111)
ZR3612 PROFIBUS-DP: Error occurrence state in the slave station (Station No. 112 to 125)
ZR3618 PROFIBUS-DP: Diagnosis data acquisition response command No.
ZR3619 PROFIBUS-DP: Diagnosis data acquisition status (H)
ZR3620 PROFIBUS-DP: Diagnosis data acquisition status (L)
ZR3621 PROFIBUS-DP: Station No. of slave that acquired diagnosis data
ZR3622 PROFIBUS-DP: Diagnosis data length
ZR3630 PROFIBUS-DP: Aperiodic data communication (Acyclic communication): Features supported
ZR3631 PROFIBUS-DP: Aperiodic data communication (Acyclic communication): Features supported 2
ZR3632 PROFIBUS-DP: Aperiodic data communication (Acyclic communication): Profile features sup ported
ZR3633 PROFIBUS-DP: Aperiodic data communication (Acyclic communication): Profile features sup ported 2
ZR3634 PROFIBUS-DP: Aperiodic data communication (Acyclic communication): Profile ID number
ZR3635 PROFIBUS-DP: Aperiodic data communication (Acyclic communication): S_Type
ZR3636 PROFIBUS-DP: Aperiodic data communication (Acyclic communication): S_Len
ZR3637 PROFIBUS-DP: Aperiodic data communication (Acyclic communication): D_Type
ZR3638 PROFIBUS-DP: Aperiodic data communication (Acyclic communication): D_Len
ZR3640 PROFIBUS-DP: Aperiodic data communication (Acyclic communication): Type of devices for
storing read data
ZR3641 PROFIBUS-DP: Aperiodic data communication (Acyclic communication): Top device No. for stor ing read data
ZR3649 PROFIBUS-DP: Aperiodic data communication (Acyclic communication): Response command
No.
ZR3650 PROFIBUS-DP: Aperiodic data communication (Acyclic communication): Execution status (H)
ZR3651 PROFIBUS-DP: Aperiodic data communication (Acyclic communication): Execution status (L)
ZR3652 PROFIBUS-DP: Aperiodic data communication (Acyclic communication): Execution station No.
ZR3653 PROFIBUS-DP: Aperiodic data communication (Acyclic communication): Execution slot
ZR3654 PROFIBUS-DP: Aperiodic data communication (Acyclic communication): Execution index
ZR3655 PROFIBUS-DP: Aperiodic data communication (Acyclic communication): Execution data length
ZR3656 PROFIBUS-DP: Aperiodic data communication (Acyclic communication): Connection-estab lished connection No.
ZR3657 PROFIBUS-DP: Aperiodic data communication (Acyclic communication): Maximum data unit
length
ZR3658 PROFIBUS-DP: Aperiodic data communication (Acyclic communication): Connection reference
value
ZR3659 PROFIBUS-DP: Aperiodic data communication (Acyclic communication): Error decode
ZR3660 PROFIBUS-DP: Aperiodic data communication (Acyclic communication): Error code 1
ZR3661 PROFIBUS-DP: Aperiodic data communication (Acyclic communication): Error code 2
ZR3662 PROFIBUS-DP: Aperiodic data communication (Acyclic communication): Additional error data
ZR3663 PROFIBUS-DP: Alarm-occurring station No.
ZR3669 PROFIBUS-DP: Alarm data acquisition response command No.
ZR3670 PROFIBUS-DP: Alarm data acquisition status (H)
ZR3671 PROFIBUS-DP: Alarm data acquisition status (L)
ZR3672 PROFIBUS-DP: Acquired alarm data length

(*1) NC checks for the presence of slave stations for two times: when PROFIBUS-DP function extension unit is turned ON
and when the time set to the parameter "#1332 Fieldbus" has elapsed since the startup. As a result of the check, if no
slave stations is detected, the "Startup complete" signal (ZR3600) does not turn ON.
When ZR3600 does not turn ON, check the communication status of slave stations with ZR3702 to ZR3709, and adjust
the slave stations and review the setting time of the parameter (#1332).
BiSS encoder I/F
ATC control parameter
Refer to "2.7 Classified for Each Application".

ZR3679 PROFIBUS-DP:ACK send response command No.
ZR3680 PROFIBUS-DP:ACK send status (H)
ZR3681 PROFIBUS-DP:ACK send status (L)
ZR3682 PROFIBUS-DP:ACK send execution station No.
ZR3683 PROFIBUS-DP:ACK send execution alarm type
ZR3684 PROFIBUS-DP:ACK send execution slot No.
ZR3685 PROFIBUS-DP:ACK send execution alarm specifier
ZR3686 PROFIBUS-DP:ACK send error decode
ZR3687 PROFIBUS-DP:ACK send error code 1
ZR3688 PROFIBUS-DP:ACK send error code 2
ZR3692 PROFIBUS-DP: Communication error flag
ZR3693 PROFIBUS-DP: Global error bit
ZR3694 PROFIBUS-DP: Configuration status of slave station (Station No. 0 to 15)
ZR3695 PROFIBUS-DP: Configuration status of slave station (Station No. 16 to 31)
ZR3696 PROFIBUS-DP: Configuration status of slave station (Station No. 32 to 47)
ZR3697 PROFIBUS-DP: Configuration status of slave station (Station No. 48 to 63)
ZR3698 PROFIBUS-DP: Configuration status of slave station (Station No. 64 to 79)
ZR3699 PROFIBUS-DP: Configuration status of slave station (Station No. 80 to 95)
ZR3700 PROFIBUS-DP: Configuration status of slave station (Station No. 96 to 111)
ZR3701 PROFIBUS-DP: Configuration status of slave station (Station No. 112 to 125)
ZR3702 PROFIBUS-DP: Communication status of slave station (Station No. 0 to 15)
ZR3703 PROFIBUS-DP: Communication status of slave station (Station No. 16 to 31)
ZR3704 PROFIBUS-DP: Communication status of slave station (Station No. 32 to 47)
ZR3705 PROFIBUS-DP: Communication status of slave station (Station No. 48 to 63)
ZR3706 PROFIBUS-DP: Communication status of slave station (Station No. 64 to 79)
ZR3707 PROFIBUS-DP: Communication status of slave station (Station No. 80 to 95)
ZR3708 PROFIBUS-DP: Communication status of slave station (Station No. 96 to 111)
ZR3709 PROFIBUS-DP: Communication status of slave station (Station No. 112 to 125)
Device Abbrev. Signal name
ZR13090 BENCSTS BiSS encoder I/F: Communication status
ZR13091 to
ZR13094
BENC1DATn BiSS encoder I/F: Encoder 1 data output n
Device Abbrev. Signal name
ZR4000 to
ZR4639
Magazine tool data (Pot 121 to Pot 200)
ZR4160 to
ZR4719
Magazine tool data (AUX.D) (Pot 121 to Pot 200)
Device Abbrev. Signal name
M800V/M80V Series PLC Interface Manual
2 Input/Output Signals with Controller
2.6 ZR Devices
143 IB-1501616-F
Variable torsion compensation
Brake wear diagnostics
[PLC -> CNC]
[CNC -> PLC]
Device Abbrev. Signal name
ZR9800
ZR9801
:
ZR9800+n*4
ZR9800+n*4+1
(n = 1 to 31)
Variable torsion compensation: Acceleration rate at change of direction
ZR9802
ZR9803
:
R9802+n*4
R9802+n*4+1
(n = 1 to 31)
Variable torsion compensation: History of acceleration rate at change of direction
Device Abbrev. Signal name
ZR9600 BWDSTm Brake wear diagnostics: Diagnosis start (control axis) 1st axis to 16th axis
ZR9601 BWDSTm Brake wear diagnostics: Diagnosis start (control axis) 17th axis to 32nd axis
ZR9602 BWDRSTm Brake wear diagnostics: Alarm reset (control axis) 1st axis to 16th axis
ZR9603 BWDRSTm Brake wear diagnostics: Alarm reset (control axis) 17th axis to 32nd axis
Device Abbrev. Signal name
ZR9604 BWDNFm Brake wear diagnostics: Diagnosis incomplete (control axis) 1st axis to 16th axis
ZR9605 BWDNFm Brake wear diagnostics: Diagnosis incomplete (control axis) 17th axis to 32nd axis
ZR9606 BWDBRm Brake wear diagnostics: Diagnosis in progress (control axis) 1st axis to 16th axis
ZR9607 BWDBRm Brake wear diagnostics: Diagnosis in progress (control axis) 17th axis to 32nd axis
ZR9608 to
ZR9733
BWDPOSm Brake wear diagnostics: Start position (control axis) 1st axis to 32nd axis
ZR9736 BWD WRG_SVm
Brake wear diagnostics: Servo axis in warning (control axis) 1st axis to 16th axis
ZR9737 BWD WRG_SVm
Brake wear diagnostics: Servo axis in warning (control axis) 17th axis to 32nd axis
ZR9738 BWDWRG_W NO
Brake wear diagnostics: Warning No. (system common)
M800V/M80V Series PLC Interface Manual
2 Input/Output Signals with Controller
2.6 ZR Devices
IB-1501616-F 144
High speed processing unit I/F

For details of high speed processing unit, refer to "High Speed Processing Unit User's Manual".
<Note>
HPU stands for "High Speed Processing Unit".
[PLC -> CNC]
[CNC -> PLC]
Device Abbrev. Signal name
ZR4800 HPU I/F: Request (HPU custom module 1)
ZR4801 HPU I/F: Request (HPU custom module 2)
ZR4802 HPU I/F: Request (HPU custom module 3)
ZR4803 HPU I/F: Request (HPU custom module 4)
ZR4804 HPU I/F: Request (HPU custom module 5)
Device Abbrev. Signal name
ZR4820 HPU I/F: Response (HPU custom module 1)
ZR4821 HPU I/F: Response (HPU custom module 2)
ZR4822 HPU I/F: Response (HPU custom module 3)
ZR4823 HPU I/F: Response (HPU custom module 4)
ZR4824 HPU I/F: Response (HPU custom module 5)
ZR4840 HPU I/F: Status (HPU custom module 1)
ZR4841 HPU I/F: Status (HPU custom module 2)
ZR4842 HPU I/F: Status (HPU custom module 3)
ZR4843 HPU I/F: Status (HPU custom module 4)
ZR4844 HPU I/F: Status (HPU custom module 5)
ZR4860 HPU I/F: Error status (HPU custom module 1)
ZR4861 HPU I/F: Error status (HPU custom module 2)
ZR4862 HPU I/F: Error status (HPU custom module 3)
ZR4863 HPU I/F: Error status (HPU custom module 4)
ZR4864 HPU I/F: Error status (HPU custom module 5)
ZR4880 to
ZR4959
HPUCMDAT HPU custom module: Arbitrary data
Device
Abbrev. Signal name $1 $2 $3 $4 $5 $6 $7 $8
ZR4960 ZR4962 ZR4964 ZR4966 ZR4968 ZR4970 ZR4972 ZR4974 HPUFOVSTSm HPU custom module: Cutting feed override under compensation
ZR4961 ZR4963 ZR4965 ZR4967 ZR4969 ZR4971 ZR4973 ZR4975 HPUROVSTSm HPU custom module: Rapid traverse override under compensation
Device Abbrev. Signal name
ZR4976 HPUMECSTSm HPU custom module: Machine error compensation amount under compensation 1st axis to 16th axis
ZR4977 HPUMECSTSm HPU custom module: Machine error compensation amount under compensation 17th axis to 32nd axis
Device
Abbrev. Signal name 1stSP 2ndSP 3rdSP 4thSP 5thSP 6thSP 7thSP 8thSP
ZR4978 ZR4979 ZR4980 ZR4981 ZR4982 ZR4983 ZR4984 ZR4985 HPUSOVSTSm HPU custom module: Spindle override under com pensation

(1) Signals with " " are prepared for specific machine tool builders.
PLC axis indexing interfaces
Device No.
Abbrev. Signal name bit
R8098 bit0 PLC indexing axis operation adjustment mode valid (common for all axes)
PLC indexing axis Abbrev. Signal name 1st axis 2nd axis 3rd axis 4th axis 5th axis 6th axis 7th axis 8th axis
R8050 R8056 R8062 R8068 R8074 R8080 R8086 R8092 AUX CM4 PLC axis indexing control command 4
R8051 R8057 R8063 R8069 R8075 R8081 R8087 R8093 AUX CM3 PLC axis indexing control command 3
R8052 R8058 R8064 R8070 R8076 R8082 R8088 R8094 AUX CM2 PLC axis indexing control command 2
R8053 R8059 R8065 R8071 R8077 R8083 R8089 R8095 AUX CM1 PLC axis indexing control command 1
R8054 R8060 R8066 R8072 R8078 R8084 R8090 R8096 PLC axis indexing control command position (L)
R8055 R8061 R8067 R8073 R8079 R8085 R8091 R8097 PLC axis indexing control command position (H)
Device No.
Abbrev. Signal name bit
R8048 bit0 PLC indexing axis in operation adjustment mode 1st axis
bit1 PLC indexing axis in operation adjustment mode 2nd axis
bit2 PLC indexing axis in operation adjustment mode 3rd axis
bit3 PLC indexing axis in operation adjustment mode 4th axis
bit4 PLC indexing axis in operation adjustment mode 5th axis
bit5 PLC indexing axis in operation adjustment mode 6th axis
PLC indexing axis Abbrev. Signal name 1st axis 2nd axis 3rd axis 4th axis 5th axis 6th axis 7th axis 8th axis
R8000 R8006 R8012 R8018 R8024 R8030 R8036 R8042 AUXST4 PLC axis indexing control status 4
R8001 R8007 R8013 R8019 R8025 R8031 R8037 R8043 AUXST3 PLC axis indexing control status 3
R8002 R8008 R8014 R8020 R8026 R8032 R8038 R8044 AUXST2 PLC axis indexing control status 2
R8003 R8009 R8015 R8021 R8027 R8033 R8039 R8045 AUXST1 PLC axis indexing control status 1
R8004 R8010 R8016 R8022 R8028 R8034 R8040 R8046 PLC axis indexing control machine position (L)
R8005 R8011 R8017 R8023 R8029 R8035 R8041 R8047 PLC axis indexing control machine position (H)
Note

Other file registers (R)
Memory switch (PLC switch)
Fixed (semi-fixed) devices
Up to NC 8th axis can be set for fixed devices. The 9th axis or later cannot be set.
Device No. Signal name
R2100 to R2397 Pallet program data (Drive unit -> PLC)
R4100 to R4103 Pallet program data (PLC -> Drive unit)

R7500 to R7799 PLC constant parameters (corresponds to parameters #18001 to #18150)
R7800 to R7897 PLC bit selection parameters (corresponds to parameters #6401 to #6596)
R7898 to R7947 PLC bit selection parameters (corresponds to parameters #59001 to #59100)
R8260 to R8289 Option status export to PLC
R8290 to R8299 Optimum acceleration/deceleration estimated inertia level (spindle)
R12800 to R13099 Computer link interfaces
R13200 to R13299 Special table interfaces
R17300 to R18299 Modbus input/outpu device
M system L system
R10600 to R11779 ATC command control information R10600 and lat er Tool life management interfaces I, II R11800 and later Tool life management interfaces
R24884 to R25011 Total distance traveled by n-th axis during automatic operation
R27500 to R28099 PLC constant parameters (corresponds to parameters #59301 to #59600)
R30544 to R30575 R registers for the high-speed input designation/high-speed output designation
Device No. Signal name
X680 to X6BF PLC switch #1 to 64
X1C40 to X1C5F PLC switch #65 to 96
X6F8 to X6FF Skip input 1 to 8 for monitor
Y680 to Y6BF PLC switch reversed display #1 to 64
Y1C40 to Y1C5F PLC switch reversed display #65 to 96
Y6C0 to Y6FF PLC switch for reverse #1 to 64
Y1C60 to Y1C7F PLC switch for reverse #65 to 96
ZR3200 to ZR3205 PLC switch non-display
Device No. Signal name
X18 to X1B Reference position return near-point detection 1 to 4
X20 to X23 Stroke end (-) 1 to 4
X28 to X2B Stroke end (+) 1 to 4
X5C to X5F Reference position return near-point detection 5 to 8
X64 to X67 Stroke end (-) 5 to 8
X6C to X6F Stroke end (+) 5 to 8
M800V/M80V Series PLC Interface Manual
2 Input/Output Signals with Controller
2.7 Classified for Each Application
147 IB-1501616-F
Maintenance
Spindle related devices
[CNC -> PLC]
Device No. Signal name
R13170 CRC count (servo #1)
R13171 CRC count (servo #2)
R13172 Address illegal (servo #1)
R13173 Address illegal (servo #2)
R13174 CRC count (display unit)
R13175 Address illegal (display unit)
R13176 CRC count (servo #3)
R13177 Address illegal (servo #3)
Device No.
1stSP 2ndSP 3rdSP 4thSP 5thSP 6thSP 7thSP 8thSP Abbrev. Signal name
X1882 X18E2 X1942 X19A2 X1A02 X1A62 X1AC2 X1B22 SIGE S command gear No. illegal
X1883 X18E3 X1943 X19A3 X1A03 X1A63 X1AC3 X1B23 SOVE S command max./min. command value over
X1884 X18E4 X1944 X19A4 X1A04 X1A64 X1AC4 X1B24 SNGE S command no gear selected
X1885 X18E5 X1945 X19A5 X1A05 X1A65 X1AC5 X1B25 GR1 Spindle gear shift command 1
X1886 X18E6 X1946 X19A6 X1A06 X1A66 X1AC6 X1B26 GR2 Spindle gear shift command 2
X1887 X18E7 X1947 X19A7 X1A07 X1A67 X1AC7 X1B27 - (Always "0")
X1888 X18E8 X1948 X19A8 X1A08 X1A68 X1AC8 X1B28 ORAO2 Spindle 2nd in-position
X1889 X18E9 X1949 X19A9 X1A09 X1A69 X1AC9 X1B29 CDO Current detection
X188A X18EA X194A X19AA X1A0A X1A6A X1ACA X1B2A VRO Speed detection
X188B X18EB X194B X19AB X1A0B X1A6B X1ACB X1B2B FLO In spindle alarm
X188C X18EC X194C X19AC X1A0C X1A6C X1ACC X1B2C ZSO Zero speed
X188D X18ED X194D X19AD X1A0D X1A6D X1ACD X1B2D USO Spindle up-to-speed
X188E X18EE X194E X19AE X1A0E X1A6E X1ACE X1B2E ORAO Spindle in-position
X188F X18EF X194F X19AF X1A0F X1A6F X1ACF X1B2F LCSA In L coil selection
X1890 X18F0 X1950 X19B0 X1A10 X1A70 X1AD0 X1B30 SMA Spindle ready-ON
X1891 X18F1 X1951 X19B1 X1A11 X1A71 X1AD1 X1B31 SSA Spindle servo-ON
X1892 X18F2 X1952 X19B2 X1A12 X1A72 X1AD2 X1B32 SEMG In spindle emergency stop
X1893 X18F3 X1953 X19B3 X1A13 X1A73 X1AD3 X1B33 SSRN In spindle forward run
X1894 X18F4 X1954 X19B4 X1A14 X1A74 X1AD4 X1B34 SSRI In spindle reverse run
X1895 X18F5 X1955 X19B5 X1A15 X1A75 X1AD5 X1B35 Z phase passed
X1896 X18F6 X1956 X19B6 X1A16 X1A76 X1AD6 X1B36 SIMP Position loop in-position
X1897 X18F7 X1957 X19B7 X1A17 X1A77 X1AD7 X1B37 STLQ In spindle torque limit
X1898 X18F8 X1958 X19B8 X1A18 X1A78 X1AD8 X1B38
X1899 X18F9 X1959 X19B9 X1A19 X1A79 X1AD9 X1B39
X189A X18FA X195A X19BA X1A1A X1A7A X1ADA X1B3A Spindle torque limit reached
X189D X18FD X195D X19BD X1A1D X1A7D X1ADD X1B3D SD2 Speed detection 2
X189E X18FE X195E X19BE X1A1E X1A7E X1ADE X1B3E MCSA In M coil selection
X189F X18FF X195F X19BF X1A1F X1A7F X1ADF X1B3F Index positioning completion
M800V/M80V Series PLC Interface Manual
2 Input/Output Signals with Controller
2.7 Classified for Each Application
IB-1501616-F 148
Device No.
1stSP 2ndSP 3rdSP 4thSP 5thSP 6thSP 7thSP 8thSP Abbrev. Signal name
X18A0 X1900 X1960 X19C0 X1A20 X1A80 X1AE0 X1B40 ENB Spindle enable
X18A8 X1908 X1968 X19C8 X1A28 X1A88 X1AE8 X1B48 SPSYN1 In spindle synchronization
X18A9 X1909 X1969 X19C9 X1A29 X1A89 X1AE9 X1B49 FSPRV Spindle rotation speed synchronization com pletion
X18AA X190A X196A X19CA X1A2A X1A8A X1AEA X1B4A FSPPH Spindle phase synchronization completion
X18AB X190B X196B X19CB X1A2B X1A8B X1AEB X1B4B SPSYN2 In spindle synchronization 2
X18AC X190C X196C X19CC X1A2C X1A8C X1AEC X1B4C SPCMP Chuck close confirmation
X18AD X190D X196D X19CD X1A2D X1A8D X1AED X1B4D TSS1 In tool spindle synchronization I (Polygon)

X18AE X190E X196E X19CE X1A2E X1A8E X1AEE X1B4E SPSYN3 In tool spindle synchronization II
X18AF X190F X196F X19CF X1A2F X1A8F X1AEF X1B4F SPNCH Spindle superimposition control: Speed
change disabled
X18B0 X1910 X1970 X19D0 X1A30 X1A90 X1AF0 X1B50 SP PHOV Spindle synchronization phase error over
X18B1 X1911 X1971 X19D1 X1A31 X1A91 X1AF1 X1B51 SPILE Spindle superimposition control ON
X18B2 X1912 X1972 X19D2 X1A32 X1A92 X1AF2 X1B52 SPLCR Spindle superimposition control: Spindle su perimposition clamped
X18B3 X1913 X1973 X19D3 X1A33 X1A93 X1AF3 X1B53 PHOVR Hob axis delay excess
X18B5 X1915 X1975 X19D5 X1A35 X1A95 X1AF5 X1B55 EXOFN Holding power of spindle increased
X18B6 X1916 X1976 X19D6 X1A36 X1A96 X1AF6 X1B56 SPOFFA In spindle off
X18C1 X1921 X1981 X19E1 X1A41 X1AA1 X1B01 X1B61 SVMD Spindle position control (Spindle/C axis con trol): C axis mode ON
X18C2 X1922 X1982 X19E2 X1A42 X1AA2 X1B02 X1B62 GO1 Spindle gear selection output 1
X18C3 X1923 X1983 X19E3 X1A43 X1AA3 X1B03 X1B63 GO2 Spindle gear selection output 2
X18C8 X1928 X1988 X19E8 X1A48 X1AA8 X1B08 X1B68 Spindle oscillation in progress
X18C9 X1929 X1989 X19E9 X1A49 X1AA9 X1B09 X1B69 SPRTCT Spindle protection: Mode in progress
X18CA X192A X198A X19EA X1A4A X1AAA X1B0A X1B6A VGHLD Real-time tuning 1: Speed control gain
changeover hold-down ON
Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
XC64 XDA4 XEE4 X1024 X1164 X12A4 X13E4 X1524 SF1 S function strobe 1
XC65 XDA5 XEE5 X1025 X1165 X12A5 X13E5 X1525 SF2 S function strobe 2
XC66 XDA6 XEE6 X1026 X1166 X12A6 X13E6 X1526 SF3 S function strobe 3
XC67 XDA7 XEE7 X1027 X1167 X12A7 X13E7 X1527 SF4 S function strobe 4
XC70 XDB0 XEF0 X1030 X1170 X12B0 X13F0 X1530 SF5 S function strobe 5
XC71 XDB1 XEF1 X1031 X1171 X12B1 X13F1 X1531 SF6 S function strobe 6
XC72 XDB2 XEF2 X1032 X1172 X12B2 X13F2 X1532 SF7 S function strobe 7
XC73 XDB3 XEF3 X1033 X1173 X12B3 X13F3 X1533 SF8 S function strobe 8
XCB0 XDF0 XF30 X1070 X11B0 X12F0 X1430 X1570 In spindle-NC axis polygon mode
XCB2 XDF2 XF32 X1072 X11B2 X12F2 X1432 X1572 In spindle-spindle polygon mode
XCB3 XDF3 XF33 X1073 X11B3 X12F3 X1433 X1573 Spindle-spindle polygon synchronization com pletion

[CNC -> PLC]
Device No.
1stSP 2ndSP 3rdSP 4thSP 5thSP 6thSP 7thSP 8thSP Abbrev. Signal name
R6500 R6550 R6600 R6650 R6700 R6750 R6800 R6850 Spindle command rotation speed input (L)
R6501 R6551 R6601 R6651 R6701 R6751 R6801 R6851 Spindle command rotation speed input (H)
R6502 R6552 R6602 R6652 R6702 R6752 R6802 R6852 Spindle command final data (rotation speed) (L)
R6503 R6553 R6603 R6653 R6703 R6753 R6803 R6853 Spindle command final data (rotation speed) (H)
R6504 R6554 R6604 R6654 R6704 R6754 R6804 R6854 Spindle command final data (12-bit binary) (L)
R6505 R6555 R6605 R6655 R6705 R6755 R6805 R6855 Spindle command final data (12-bit binary) (H)
R6506 R6556 R6606 R6656 R6706 R6756 R6806 R6856 Spindle actual speed (L)
R6507 R6557 R6607 R6657 R6707 R6757 R6807 R6857 Spindle actual speed (H)
R6508 R6558 R6608 R6658 R6708 R6758 R6808 R6858
R6514 R6564 R6614 R6664 R6714 R6764 R6814 R6864 Optimum acceleration/deceleration estimat ed inertia ratio (spindle)
R6515 R6565 R6615 R6665 R6715 R6765 R6815 R6865 Optimum acceleration/deceleration param eter group currently selected (spindle)
R6516 R6566 R6616 R6666 R6716 R6766 R6816 R6866 Spindle synchronization: Phase error /Hob axis
delay angle
R6517 R6567 R6617 R6667 R6717 R6767 R6817 R6867 Spindle synchronization: Maximum phase error/
Maximum hob axis delay angle
R6518 R6568 R6618 R6668 R6718 R6768 R6818 R6868 Spindle synchronization: Phase offset data
R6519 R6569 R6619 R6669 R6719 R6769 R6819 R6869 Spindle synchronization: Phase error monitor
R6520 R6570 R6620 R6670 R6720 R6770 R6820 R6870 Spindle synchronization: Phase error monitor
(lower limit)
R6521 R6571 R6621 R6671 R6721 R6771 R6821 R6871 Spindle synchronization: Phase error monitor
(upper limit)
R6522 R6572 R6622 R6672 R6722 R6772 R6822 R6872 Spindle synchronization: Phase error 1
R6523 R6573 R6623 R6673 R6723 R6773 R6823 R6873 Spindle synchronization: Phase error 2
R6525 R6575 R6625 R6675 R6725 R6775 R6825 R6875 Spindle motor load ratio
R6526 R6576 R6626 R6676 R6726 R6776 R6826 R6876 SP TEMP Spindle temperature output
R6527 R6577 R6627 R6677 R6727 R6777 R6827 R6877 Spindle actual machining time
R6528 R6578 R6628 R6678 R6728 R6778 R6828 R6878 Load monitor I: Spindle cutting torque out put value
R6529 R6579 R6629 R6679 R6729 R6779 R6829 R6879 Spindle alarm/warning No.
R6532 R6582 R6632 R6682 R6732 R6782 R6832 R6882 Synchronous tapping Current error width (L)
R6533 R6583 R6633 R6683 R6733 R6783 R6833 R6883 Synchronous tapping Current error width (H)
R6534 R6584 R6634 R6684 R6734 R6784 R6834 R6884 Synchronous tapping Maximum error width (L)
R6535 R6585 R6635 R6685 R6735 R6785 R6835 R6885 Synchronous tapping Maximum error width (H)
R6536 R6586 R6636 R6686 R6736 R6786 R6836 R6886 Synchronous tapping Current error angle (L)
R6537 R6587 R6637 R6687 R6737 R6787 R6837 R6887 Synchronous tapping Current error angle (H)
R6538 R6588 R6638 R6688 R6738 R6788 R6838 R6888 Synchronous tapping Maximum error angle (L)
R6539 R6589 R6639 R6689 R6739 R6789 R6839 R6889 Synchronous tapping Maximum error angle (H)
R6541 R6591 R6641 R6691 R6741 R6791 R6841 R6891 Load monitoring I: Estimated spindle disturbance
torque output
R6542 R6592 R6642 R6692 R6742 R6792 R6842 R6892 Load monitoring I: Effective spindle torque output

Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
R512 R712 R912 R1112 R1312 R1512 R1712 R1912 S code data 1 (L)
R513 R713 R913 R1113 R1313 R1513 R1713 R1913 S code data 1 (H)
R514 R714 R914 R1114 R1314 R1514 R1714 R1914 S code data 2 (L)
R515 R715 R915 R1115 R1315 R1515 R1715 R1915 S code data 2 (H)
R516 R716 R916 R1116 R1316 R1516 R1716 R1916 S code data 3 (L)
R517 R717 R917 R1117 R1317 R1517 R1717 R1917 S code data 3 (H)
R518 R718 R918 R1118 R1318 R1518 R1718 R1918 S code data 4 (L)

R519 R719 R919 R1119 R1319 R1519 R1719 R1919 S code data 4 (H)
R520 R720 R920 R1120 R1320 R1520 R1720 R1920 S code data 5 (L)
R521 R721 R921 R1121 R1321 R1521 R1721 R1921 S code data 5 (H)
R522 R722 R922 R1122 R1322 R1522 R1722 R1922 S code data 6 (L)
R523 R723 R923 R1123 R1323 R1523 R1723 R1923 S code data 6 (H)
R524 R724 R924 R1124 R1324 R1524 R1724 R1924 S code data 7 (L)
R525 R725 R925 R1125 R1325 R1525 R1725 R1925 S code data 7 (H)
R526 R726 R926 R1126 R1326 R1526 R1726 R1926 S code data 8 (L)
R527 R727 R927 R1127 R1327 R1527 R1727 R1927 S code data 8 (H)

[PLC -> CNC]
Device No.
1stSP 2ndSP 3rdSP 4thSP 5thSP 6thSP 7thSP 8thSP Abbrev. Signal name
Y1885 Y18E5 Y1945 Y19A5 Y1A05 Y1A65 Y1AC5 Y1B25 GFIN Gear shift completion
Y1888 Y18E8 Y1948 Y19A8 Y1A08 Y1A68 Y1AC8 Y1B28 SP1 Spindle speed override code 1
Y1889 Y18E9 Y1949 Y19A9 Y1A09 Y1A69 Y1AC9 Y1B29 SP2 Spindle speed override code 2
Y188A Y18EA Y194A Y19AA Y1A0A Y1A6A Y1ACA Y1B2A SP4 Spindle speed override code 4
Y188F Y18EF Y194F Y19AF Y1A0F Y1A6F Y1ACF Y1B2F SPS Spindle override method selection
Y1890 Y18F0 Y1950 Y19B0 Y1A10 Y1A70 Y1AD0 Y1B30 GI1 Spindle gear selection code 1
Y1891 Y18F1 Y1951 Y19B1 Y1A11 Y1A71 Y1AD1 Y1B31 GI2 Spindle gear selection code 2
Y1893 Y18F3 Y1953 Y19B3 Y1A13 Y1A73 Y1AD3 Y1B33 EXOBS Increase holding power of spindle
Y1894 Y18F4 Y1954 Y19B4 Y1A14 Y1A74 Y1AD4 Y1B34 SSTP Spindle stop
Y1895 Y18F5 Y1955 Y19B5 Y1A15 Y1A75 Y1AD5 Y1B35 SSFT Spindle gear shift
Y1896 Y18F6 Y1956 Y19B6 Y1A16 Y1A76 Y1AD6 Y1B36 SORC Spindle orientation
Y1897 Y18F7 Y1957 Y19B7 Y1A17 Y1A77 Y1AD7 Y1B37 Spindle command invalid
Y1898 Y18F8 Y1958 Y19B8 Y1A18 Y1A78 Y1AD8 Y1B38 SRN Spindle forward run start
Y1899 Y18F9 Y1959 Y19B9 Y1A19 Y1A79 Y1AD9 Y1B39 SRI Spindle reverse run start
Y189A Y18FA Y195A Y19BA Y1A1A Y1A7A Y1ADA Y1B3A TL1 Spindle torque limit 1
Y189B Y18FB Y195B Y19BB Y1A1B Y1A7B Y1ADB Y1B3B TL2 Spindle torque limit 2
Y189C Y18FC Y195C Y19BC Y1A1C Y1A7C Y1ADC Y1B3C WRN Spindle forward run index
Y189D Y18FD Y195D Y19BD Y1A1D Y1A7D Y1ADD Y1B3D WRI Spindle reverse run index
Y189E Y18FE Y195E Y19BE Y1A1E Y1A7E Y1ADE Y1B3E ORC Spindle orientation command
Y189F Y18FF Y195F Y19BF Y1A1F Y1A7F Y1ADF Y1B3F LRSL L coil selection
Y18A2 Y1902 Y1962 Y19C2 Y1A22 Y1A82 Y1AE2 Y1B42
Y18A3 Y1903 Y1963 Y19C3 Y1A23 Y1A83 Y1AE3 Y1B43
Y18A5 Y1905 Y1965 Y19C5 Y1A25 Y1A85 Y1AE5 Y1B45 CMOD Spindle position control (Spindle/C axis con trol): C axis selection
Y18A6 Y1906 Y1966 Y19C6 Y1A26 Y1A86 Y1AE6 Y1B46 LRSM M coil selection
Y18A8 Y1908 Y1968 Y19C8 Y1A28 Y1A88 Y1AE8 Y1B48 SWS Spindle selection
Y18AA Y190A Y196A Y19CA Y1A2A Y1A8A Y1AEA Y1B4A SPRR Spindle rotation reversal
Y18AB Y190B Y196B Y19CB Y1A2B Y1A8B Y1AEB Y1B4B SPRS Spindle rotation direction switch method selec tion
Y18AF Y190F Y196F Y19CF Y1A2F Y1A8F Y1AEF Y1B4F MPCSL PLC coil changeover
Y18B0 Y1910 Y1970 Y19D0 Y1A30 Y1A90 Y1AF0 Y1B50 SPSY Spindle synchronization
Y18B1 Y1911 Y1971 Y19D1 Y1A31 Y1A91 Y1AF1 Y1B51 SPPHS Spindle phase synchronization
Y18B2 Y1912 Y1972 Y19D2 Y1A32 Y1A92 Y1AF2 Y1B52 SPSDR Spindle synchronous rotation direction
Y18B3 Y1913 Y1973 Y19D3 Y1A33 Y1A93 Y1AF3 Y1B53 SSPHM Phase shift calculation request
Y18B4 Y1914 Y1974 Y19D4 Y1A34 Y1A94 Y1AF4 Y1B54 SSPHF Phase offset request
Y18B5 Y1915 Y1975 Y19D5 Y1A35 Y1A95 Y1AF5 Y1B55 SP DRPO Error temporary cancel
Y18B8 Y1918 Y1978 Y19D8 Y1A38 Y1A98 Y1AF8 Y1B58 SPSYC Spindle synchronization/superimposition can cel
Y18B9 Y1919 Y1979 Y19D9 Y1A39 Y1A99 Y1AF9 Y1B59 SPC MPC Chuck close
Y18BF Y191F Y197F Y19DF Y1A3F Y1A9F Y1AFF Y1B5F SPOFF Spindle off request
Y18C8 Y1928 Y1988 Y19E8 Y1A48 Y1AA8 Y1B08 Y1B68 Spindle oscillation command
Y18C9 Y1929 Y1989 Y19E9 Y1A49 Y1AA9 Y1B09 Y1B69
Y18CA Y192A Y198A Y19EA Y1A4A Y1AAA Y1B0A Y1B6A VGH LDC
Real-time tuning 1:
Speed control gain changeover hold-down
command

[PLC -> CNC]
[PLC -> CNC]
ATC file register (PLC dedicated instruction)
Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
YCD1 YE11 YF51 Y1091 Y11D1 Y1311 Y1451 Y1591 Spindle-spindle polygon cancel
YCD2 YE12 YF52 Y1092 Y11D2 Y1312 Y1452 Y1592 Synchronous tapping command polarity rever sal
YCD3 YE13 YF53 Y1093 Y11D3 Y1313 Y1453 Y1593 Spindle OFF mode
YCE1 YE21 YF61 Y10A1 Y11E1 Y1321 Y1461 Y15A1 Door open II
YCE2 YE22 YF62 Y10A2 Y11E2 Y1322 Y1462 Y15A2 Door open signal input (spindle speed monitor)
YCE3 YE23 YF63 Y10A3 Y11E3 Y1323 Y1463 Y15A3 Door interlock spindle speed clamp
Device No.
1stSP 2ndSP 3rdSP 4thSP 5thSP 6thSP 7thSP 8thSP Abbrev. Signal name
R7000 R7050 R7100 R7150 R7200 R7250 R7300 R7350 Spindle command rotation speed output (L)
R7001 R7051 R7101 R7151 R7201 R7251 R7301 R7351 Spindle command rotation speed output (H)
R7002 R7052 R7102 R7152 R7202 R7252 R7302 R7352 SLSP Spindle command selection
R7003 R7053 R7103 R7153 R7203 R7253 R7303 R7353 Optimum acceleration/deceleration param eter group selection [spindle]
R7004 R7054 R7104 R7154 R7204 R7254 R7304 R7354 Spindle target machining time
R7008 R7058 R7108 R7158 R7208 R7258 R7308 R7358 S command override
R7009 R7059 R7109 R7159 R7209 R7259 R7309 R7359 Multi-point orientation position data
R7010 R7060 R7110 R7160 R7210 R7260 R7310 R7360 ORDIR Orientation rotation direction
R7016 R7066 R7116 R7166 R7216 R7266 R7316 R7366 Spindle synchronization: Reference spindle se lection
R7017 R7067 R7117 R7167 R7217 R7267 R7317 R7367 Spindle synchronization: Synchronized spindle
selection
R7018 R7068 R7118 R7168 R7218 R7268 R7318 R7368 Spindle synchronization: Phase shift amount

R7019 R7069 R7119 R7169 R7219 R7269 R7319 R7369 Spindle synchronization: Phase error tolerance
R7020 R7070 R7120 R7170 R7220 R7270 R7320 R7370 Spindle oscillation amplitude
R7021 R7071 R7121 R7171 R7221 R7271 R7321 R7371 Spindle oscillation frequency
Device No.
$1 $2 $3 $4 $5 $6 $7 $8 Abbrev. Signal name
R2567 R2767 R2967 R3167 R3367 R3567 R3767 R3967 Encoder selection
Device Abbrev. Signal name Device Abbrev. Signal name
R10600 ATC control parameter R10610 No.1 magazine: number of magazines des ignation
R10601 R10611 No.2 magazine: number of magazines des ignation
R10602 R10612 No.3 magazine: number of magazines des ignation
R10603 Display tool selection parameter R10613 No.4 magazine: number of magazines des ignation
R10604 AUX data R10614 No.5 magazine: number of magazines des ignation
R10605 R10615 No.1 magazine: pointer designation
R10606 R10616 No.2 magazine: pointer designation
R10607 R10617 No.3 magazine: pointer designation
R10608 R10618 No.4 magazine: pointer designation
R10609 R10619 No.5 magazine: pointer designation

Tool data
T4-digit com- Signal name
mand T8-digit command Aux. D
R10620 R10620/R10621 R10670 No.1 magazine: spindle tool
R10621 R10622/R10623 R10671 No.1 magazine: standby 1 tool
R10622 R10624/R10625 R10672 No.1 magazine: standby 2 tool
R10623 R10626/R10627 R10673 No.1 magazine: standby 3 tool
R10624 R10628/R10629 R10674 No.1 magazine: standby 4 tool
R10630 R10630/R10631 R10675 No.2 magazine: spindle tool
R10631 R10632/R10633 R10676 No.2 magazine: standby 1 tool
R10632 R10634/R10635 R10677 No.2 magazine: standby 2 tool
R10633 R10636/R10637 R10678 No.2 magazine: standby 3 tool
R10634 R10638/R10639 R10679 No.2 magazine: standby 4 tool
Tool data
T4-digit com- Signal name
mand T8-digit command Aux. D
R10640 R10640/R10641 R10680 No.3 magazine: spindle tool
R10641 R10642/R10643 R10681 No.3 magazine: standby 1 tool
R10642 R10644/R10645 R10682 No.3 magazine: standby 2 tool
R10643 R10646/R10647 R10683 No.3 magazine: standby 3 tool
R10644 R10648/R10649 R10684 No.3 magazine: standby 4 tool
R10650 R10650/R10651 R10685 No.4 magazine: spindle tool
R10651 R10652/R10653 R10686 No.4 magazine: standby 1 tool
R10652 R10654/R10655 R10687 No.4 magazine: standby 2 tool
R10653 R10656/R10657 R10688 No.4 magazine: standby 3 tool
R10654 R10658/R10659 R10689 No.4 magazine: standby 4 tool
R10660 R10660/R10661 R10690 No.5 magazine: spindle tool
R10661 R10662/R10663 R10691 No.5 magazine: standby 1 tool
R10662 R10664/R10665 R10692 No.5 magazine: standby 2 tool
R10663 R10666/R10667 R10693 No.5 magazine: standby 3 tool
R10664 R10668/R10669 R10694 No.5 magazine: standby 4 tool
Device Abbrev. Signal name
R10695 No.1 magazine: pot head No.
R10696 No.2 magazine: pot head No.
R10697 No.3 magazine: pot head No.
R10698 No.4 magazine: pot head No.
R10699 No.5 magazine: pot head No.

[Not assigned arbitrarily (No.1 magazine)] (common to part systems)
Tool data (No.1 magazine)
Pot
Tool data (No.1 magazine)
T4-digit Pot
command T8-digit command Aux. D T4-digit
command T8-digit command Aux. D
R10700 R10700/R10701 R10940 Pot 1 R10740 R10780/R10781 R10980 Pot 41
R10701 R10702/R10703 R10941 Pot 2 R10741 R10782/R10783 R10981 Pot 42
R10702 R10704/R10705 R10942 Pot 3 R10742 R10784/R10785 R10982 Pot 43
R10703 R10706/R10707 R10943 Pot 4 R10743 R10786/R10787 R10983 Pot 44
R10704 R10708/R10709 R10944 Pot 5 R10744 R10788/R10789 R10984 Pot 45
R10705 R10710/R10711 R10945 Pot 6 R10745 R10790/R10791 R10985 Pot 46
R10706 R10712/R10713 R10946 Pot 7 R10746 R10792/R10793 R10986 Pot 47
R10707 R10714/R10715 R10947 Pot 8 R10747 R10794/R10795 R10987 Pot 48
R10708 R10716/R10717 R10948 Pot 9 R10748 R10796/R10797 R10988 Pot 49
R10709 R10718/R10719 R10949 Pot 10 R10749 R10798/R10799 R10989 Pot 50
R10710 R10720/R10721 R10950 Pot 11 R10750 R10800/R10801 R10990 Pot 51
R10711 R10722/R10723 R10951 Pot 12 R10751 R10802/R10803 R10991 Pot 52
R10712 R10724/R10725 R10952 Pot 13 R10752 R10804/R10805 R10992 Pot 53
R10713 R10726/R10727 R10953 Pot 14 R10753 R10806/R10807 R10993 Pot 54
R10714 R10728/R10729 R10954 Pot 15 R10754 R10808/R10809 R10994 Pot 55
R10715 R10730/R10731 R10955 Pot 16 R10755 R10810/R10811 R10995 Pot 56
R10716 R10732/R10733 R10956 Pot 17 R10756 R10812/R10813 R10996 Pot 57
R10717 R10734/R10735 R10957 Pot 18 R10757 R10814/R10815 R10997 Pot 58
R10718 R10736/R10737 R10958 Pot 19 R10758 R10816/R10817 R10998 Pot 59

R10719 R10738/R10739 R10959 Pot 20 R10759 R10818/R10819 R10999 Pot 60
R10720 R10740/R10741 R10960 Pot 21 R10760 R10820/R10821 R11000 Pot 61
R10721 R10742/R10743 R10961 Pot 22 R10761 R10822/R10823 R11001 Pot 62
R10722 R10744/R10745 R10962 Pot 23 R10762 R10824/R10825 R11002 Pot 63
R10723 R10746/R10747 R10963 Pot 24 R10763 R10826/R10827 R11003 Pot 64
R10724 R10748/R10749 R10964 Pot 25 R10764 R10828/R10829 R11004 Pot 65
R10725 R10750/R10751 R10965 Pot 26 R10765 R10830/R10831 R11005 Pot 66
R10726 R10752/R10753 R10966 Pot 27 R10766 R10832/R10833 R11006 Pot 67
R10727 R10754/R10755 R10967 Pot 28 R10767 R10834/R10835 R11007 Pot 68
R10728 R10756/R10757 R10968 Pot 29 R10768 R10836/R10837 R11008 Pot 69
R10729 R10758/R10759 R10969 Pot 30 R10769 R10838/R10839 R11009 Pot 70
R10730 R10760/R10761 R10970 Pot 31 R10770 R10840/R10841 R11010 Pot 71
R10731 R10762/R10763 R10971 Pot 32 R10771 R10842/R10843 R11011 Pot 72
R10732 R10764/R10765 R10972 Pot 33 R10772 R10844/R10845 R11012 Pot 73
R10733 R10766/R10767 R10973 Pot 34 R10773 R10846/R10847 R11013 Pot 74
R10734 R10768/R10769 R10974 Pot 35 R10774 R10848/R10849 R11014 Pot 75
R10735 R10770/R10771 R10975 Pot 36 R10775 R10850/R10851 R11015 Pot 76
R10736 R10772/R10773 R10976 Pot 37 R10776 R10852/R10853 R11016 Pot 77
R10737 R10774/R10775 R10977 Pot 38 R10777 R10854/R10855 R11017 Pot 78
R10738 R10776/R10777 R10978 Pot 39 R10778 R10856/R10857 R11018 Pot 79
R10739 R10778/R10779 R10979 Pot 40 R10779 R10858/R10859 R11019 Pot 80

Tool data (No.1 magazine)
Pot
Tool data (No.1 magazine)
T4-digit Pot
command T8-digit command Aux. D T4-digit
command T8-digit command Aux. D
R10780 R10860/R10861 R11020 Pot 81 ZR4000 ZR4000/ZR4001 ZR4160 Pot 121
R10781 R10862/R10863 R11021 Pot 82 ZR4001 ZR4002/ZR4003 ZR4161 Pot 122
R10782 R10864/R10865 R11022 Pot 83 ZR4002 ZR4004/ZR4005 ZR4162 Pot 123
R10783 R10866/R10867 R11023 Pot 84 ZR4003 ZR4006/ZR4007 ZR4163 Pot 124
R10784 R10868/R10869 R11024 Pot 85 ZR4004 ZR4008/ZR4009 ZR4164 Pot 125
R10785 R10870/R10871 R11025 Pot 86 ZR4005 ZR4010/ZR4011 ZR4165 Pot 126
R10786 R10872/R10873 R11026 Pot 87 ZR4006 ZR4012/ZR4013 ZR4166 Pot 127
R10787 R10874/R10875 R11027 Pot 88 ZR4007 ZR4014/ZR4015 ZR4167 Pot 128
R10788 R10876/R10877 R11028 Pot 89 ZR4008 ZR4016/ZR4017 ZR4168 Pot 129
R10789 R10878/R10879 R11029 Pot 90 ZR4009 ZR4018/ZR4019 ZR4169 Pot 130
R10790 R10880/R10881 R11030 Pot 91 ZR4010 ZR4020/ZR4021 ZR4170 Pot 131
R10791 R10882/R10883 R11031 Pot 92 ZR4011 ZR4022/ZR4023 ZR4171 Pot 132
R10792 R10884/R10885 R11032 Pot 93 ZR4012 ZR4024/ZR4025 ZR4172 Pot 133
R10793 R10886/R10887 R11033 Pot 94 ZR4013 ZR4026/ZR4027 ZR4173 Pot 134
R10794 R10888/R10889 R11034 Pot 95 ZR4014 ZR4028/ZR4029 ZR4174 Pot 135
R10795 R10890/R10891 R11035 Pot 96 ZR4015 ZR4030/ZR4031 ZR4175 Pot 136
R10796 R10892/R10893 R11036 Pot 97 ZR4016 ZR4032/ZR4033 ZR4176 Pot 137
R10797 R10894/R10895 R11037 Pot 98 ZR4017 ZR4034/ZR4035 ZR4177 Pot 138
R10798 R10896/R10897 R11038 Pot 99 ZR4018 ZR4036/ZR4037 ZR4178 Pot 139
R10799 R10898/R10899 R11039 Pot 100 ZR4019 ZR4038/ZR4039 ZR4179 Pot 140
R10800 R10900/R10901 R11040 Pot 101 ZR4020 ZR4040/ZR4041 ZR4180 Pot 141
R10801 R10902/R10903 R11041 Pot 102 ZR4021 ZR4042/ZR4043 ZR4181 Pot 142
R10802 R10904/R10905 R11042 Pot 103 ZR4022 ZR4044/ZR4045 ZR4182 Pot 143
R10803 R10906/R10907 R11043 Pot 104 ZR4023 ZR4046/ZR4047 ZR4183 Pot 144
R10804 R10908/R10909 R11044 Pot 105 ZR4024 ZR4048/ZR4049 ZR4184 Pot 145
R10805 R10910/R10911 R11045 Pot 106 ZR4025 ZR4050/ZR4051 ZR4185 Pot 146
R10806 R10912/R10913 R11046 Pot 107 ZR4026 ZR4052/ZR4053 ZR4186 Pot 147
R10807 R10914/R10915 R11047 Pot 108 ZR4027 ZR4054/ZR4055 ZR4187 Pot 148
R10808 R10916/R10917 R11048 Pot 109 ZR4028 ZR4056/ZR4057 ZR4188 Pot 149
R10809 R10918/R10919 R11049 Pot 110 ZR4029 ZR4058/ZR4059 ZR4189 Pot 150
R10810 R10920/R10921 R11050 Pot 111 ZR4030 ZR4060/ZR4061 ZR4190 Pot 151
R10811 R10922/R10923 R11051 Pot 112 ZR4031 ZR4062/ZR4063 ZR4191 Pot 152
R10812 R10924/R10925 R11052 Pot 113 ZR4032 ZR4064/ZR4065 ZR4192 Pot 153
R10813 R10926/R10927 R11053 Pot 114 ZR4033 ZR4066/ZR4067 ZR4193 Pot 154
R10814 R10928/R10929 R11054 Pot 115 ZR4034 ZR4068/ZR4069 ZR4194 Pot 155
R10815 R10930/R10931 R11055 Pot 116 ZR4035 ZR4070/ZR4071 ZR4195 Pot 156
R10816 R10932/R10933 R11056 Pot 117 ZR4036 ZR4072/ZR4073 ZR4196 Pot 157
R10817 R10934/R10935 R11057 Pot 118 ZR4037 ZR4074/ZR4075 ZR4197 Pot 158
R10818 R10936/R10937 R11058 Pot 119 ZR4038 ZR4076/ZR4077 ZR4198 Pot 159
R10819 R10938/R10939 R11059 Pot 120 ZR4039 ZR4078/ZR4079 ZR4199 Pot 160

Tool data (No.1 magazine)
T4-digit Pot
command T8-digit command Aux. D
ZR4040 ZR4080/ZR4081 ZR4200 Pot 161
ZR4041 ZR4082/ZR4083 ZR4201 Pot 162
ZR4042 ZR4084/ZR4085 ZR4202 Pot 163
ZR4043 ZR4086/ZR4087 ZR4203 Pot 164
ZR4044 ZR4088/ZR4089 ZR4204 Pot 165
ZR4045 ZR4090/ZR4091 ZR4205 Pot 166
ZR4046 ZR4092/ZR4093 ZR4206 Pot 167
ZR4047 ZR4094/ZR4095 ZR4207 Pot 168
ZR4048 ZR4096/ZR4097 ZR4208 Pot 169
ZR4049 ZR4098/ZR4099 ZR4209 Pot 170

ZR4050 ZR4100/ZR4101 ZR4210 Pot 171
ZR4051 ZR4102/ZR4103 ZR4211 Pot 172
ZR4052 ZR4104/ZR4105 ZR4212 Pot 173
ZR4053 ZR4106/ZR4107 ZR4213 Pot 174
ZR4054 ZR4108/ZR4109 ZR4214 Pot 175
ZR4055 ZR4110/ZR4111 ZR4215 Pot 176
ZR4056 ZR4112/ZR4113 ZR4216 Pot 177
ZR4057 ZR4114/ZR4115 ZR4217 Pot 178
ZR4058 ZR4116/ZR4117 ZR4218 Pot 179
ZR4059 ZR4118/ZR4119 ZR4219 Pot 180
ZR4060 ZR4120/ZR4121 ZR4220 Pot 181
ZR4061 ZR4122/ZR4123 ZR4221 Pot 182
ZR4062 ZR4124/ZR4125 ZR4222 Pot 183
ZR4063 ZR4126/ZR4127 ZR4223 Pot 184
ZR4064 ZR4128/ZR4129 ZR4224 Pot 185
ZR4065 ZR4130/ZR4131 ZR4225 Pot 186
ZR4066 ZR4132/ZR4133 ZR4226 Pot 187
ZR4067 ZR4134/ZR4135 ZR4227 Pot 188
ZR4068 ZR4136/ZR4137 ZR4228 Pot 189
ZR4069 ZR4138/ZR4139 ZR4229 Pot 190
ZR4070 ZR4140/ZR4141 ZR4230 Pot 191
ZR4071 ZR4142/ZR4143 ZR4231 Pot 192
ZR4072 ZR4144/ZR4145 ZR4232 Pot 193
ZR4073 ZR4146/ZR4147 ZR4233 Pot 194
ZR4074 ZR4148/ZR4149 ZR4234 Pot 195
ZR4075 ZR4150/ZR4151 ZR4235 Pot 196
ZR4076 ZR4152/ZR4153 ZR4236 Pot 197
ZR4077 ZR4154/ZR4155 ZR4237 Pot 198
ZR4078 ZR4156/ZR4157 ZR4238 Pot 199
ZR4079 ZR4158/ZR4159 ZR4239 Pot 200

[Not assigned arbitrarily (No.2 magazine)] (common to part systems)
Tool data (No.2 magazine)
Pot
Tool data (No.2 magazine)
T4-digit Pot
command T8-digit command Aux. D T4-digit
command T8-digit command Aux. D
R11060 R11060/R11061 R11300 Pot 1 R11100 R11140/R11141 R11340 Pot 41
R11061 R11062/R11063 R11301 Pot 2 R11101 R11142/R11143 R11341 Pot 42
R11062 R11064/R11065 R11302 Pot 3 R11102 R11144/R11145 R11342 Pot 43
R11063 R11066/R11067 R11303 Pot 4 R11103 R11146/R11147 R11343 Pot 44
R11064 R11068/R11069 R11304 Pot 5 R11104 R11148/R11149 R11344 Pot 45
R11065 R11070/R11071 R11305 Pot 6 R11105 R11150/R11151 R11345 Pot 46
R11066 R11072/R11073 R11306 Pot 7 R11106 R11152/R11153 R11346 Pot 47
R11067 R11074/R11075 R11307 Pot 8 R11107 R11154/R11155 R11347 Pot 48
R11068 R11076/R11077 R11308 Pot 9 R11108 R11156/R11157 R11348 Pot 49
R11069 R11078/R11079 R11309 Pot 10 R11109 R11158/R11159 R11349 Pot 50
R11070 R11080/R11081 R11310 Pot 11 R11110 R11160/R11161 R11350 Pot 51
R11071 R11082/R11083 R11311 Pot 12 R11111 R11162/R11163 R11351 Pot 52
R11072 R11084/R11085 R11312 Pot 13 R11112 R11164/R11165 R11352 Pot 53
R11073 R11086/R11087 R11313 Pot 14 R11113 R11166/R11167 R11353 Pot 54
R11074 R11088/R11089 R11314 Pot 15 R11114 R11168/R11169 R11354 Pot 55
R11075 R11090/R11091 R11315 Pot 16 R11115 R11170/R11171 R11355 Pot 56
R11076 R11092/R11093 R11316 Pot 17 R11116 R11172/R11173 R11356 Pot 57
R11077 R11094/R11095 R11317 Pot 18 R11117 R11174/R11175 R11357 Pot 58
R11078 R11096/R11097 R11318 Pot 19 R11118 R11176/R11177 R11358 Pot 59
R11079 R11098/R11099 R11319 Pot 20 R11119 R11178/R11179 R11359 Pot 60
R11080 R11100/R11101 R11320 Pot 21 R11120 R11180/R11181 R11360 Pot 61
R11081 R11102/R11103 R11321 Pot 22 R11121 R11182/R11183 R11361 Pot 62
R11082 R11104/R11105 R11322 Pot 23 R11122 R11184/R11185 R11362 Pot 63
R11083 R11106/R11107 R11323 Pot 24 R11123 R11186/R11187 R11363 Pot 64
R11084 R11108/R11109 R11324 Pot 25 R11124 R11188/R11189 R11364 Pot 65
R11085 R11110/R11111 R11325 Pot 26 R11125 R11190/R11191 R11365 Pot 66
R11086 R11112/R11113 R11326 Pot 27 R11126 R11192/R11193 R11366 Pot 67
R11087 R11114/R11115 R11327 Pot 28 R11127 R11194/R11195 R11367 Pot 68
R11088 R11116/R11117 R11328 Pot 29 R11128 R11196/R11197 R11368 Pot 69
R11089 R11118/R11119 R11329 Pot 30 R11129 R11198/R11199 R11369 Pot 70
R11090 R11120/R11121 R11330 Pot 31 R11130 R11200/R11201 R11370 Pot 71
R11091 R11122/R11123 R11331 Pot 32 R11131 R11202/R11203 R11371 Pot 72
R11092 R11124/R11125 R11332 Pot 33 R11132 R11204/R11205 R11372 Pot 73
R11093 R11126/R11127 R11333 Pot 34 R11133 R11206/R11207 R11373 Pot 74
R11094 R11128/R11129 R11334 Pot 35 R11134 R11208/R11209 R11374 Pot 75
R11095 R11130/R11131 R11335 Pot 36 R11135 R11210/R11211 R11375 Pot 76
R11096 R11132/R11133 R11336 Pot 37 R11136 R11212/R11213 R11376 Pot 77
R11097 R11134/R11135 R11337 Pot 38 R11137 R11214/R11215 R11377 Pot 78
R11098 R11136/R11137 R11338 Pot 39 R11138 R11216/R11217 R11378 Pot 79
R11099 R11138/R11139 R11339 Pot 40 R11139 R11218/R11219 R11379 Pot 80

Tool data (No.2 magazine)
Pot
Tool data (No.2 magazine)

T4-digit Pot
command T8-digit command Aux. D T4-digit
command T8-digit command Aux. D
R11140 R11220/R11221 R11380 Pot 81 ZR4240 ZR4240/ZR4241 ZR4400 Pot 121
R11141 R11222/R11223 R11381 Pot 82 ZR4241 ZR4242/ZR4243 ZR4401 Pot 122
R11142 R11224/R11225 R11382 Pot 83 ZR4242 ZR4244/ZR4245 ZR4402 Pot 123
R11143 R11226/R11227 R11383 Pot 84 ZR4243 ZR4246/ZR4247 ZR4403 Pot 124
R11144 R11228/R11229 R11384 Pot 85 ZR4244 ZR4248/ZR4249 ZR4404 Pot 125
R11145 R11230/R11231 R11385 Pot 86 ZR4245 ZR4250/ZR4251 ZR4405 Pot 126
R11146 R11232/R11233 R11386 Pot 87 ZR4246 ZR4252/ZR4253 ZR4406 Pot 127
R11147 R11234/R11235 R11387 Pot 88 ZR4247 ZR4254/ZR4255 ZR4407 Pot 128
R11148 R11236/R11237 R11388 Pot 89 ZR4248 ZR4256/ZR4257 ZR4408 Pot 129
R11149 R11238/R11239 R11389 Pot 90 ZR4249 ZR4258/ZR4259 ZR4409 Pot 130
R11150 R11240/R11241 R11390 Pot 91 ZR4250 ZR4260/ZR4261 ZR4410 Pot 131
R11151 R11242/R11243 R11391 Pot 92 ZR4251 ZR4262/ZR4263 ZR4411 Pot 132
R11152 R11244/R11245 R11392 Pot 93 ZR4252 ZR4264/ZR4265 ZR4412 Pot 133
R11153 R11246/R11247 R11393 Pot 94 ZR4253 ZR4266/ZR4267 ZR4413 Pot 134
R11154 R11248/R11249 R11394 Pot 95 ZR4254 ZR4268/ZR4269 ZR4414 Pot 135
R11155 R11250/R11251 R11395 Pot 96 ZR4255 ZR4270/ZR4271 ZR4415 Pot 136
R11156 R11252/R11253 R11396 Pot 97 ZR4256 ZR4272/ZR4273 ZR4416 Pot 137
R11157 R11254/R11255 R11397 Pot 98 ZR4257 ZR4274/ZR4275 ZR4417 Pot 138
R11158 R11256/R11257 R11398 Pot 99 ZR4258 ZR4276/ZR4277 ZR4418 Pot 139
R11159 R11258/R11259 R11399 Pot 100 ZR4259 ZR4278/ZR4279 ZR4419 Pot 140
R11160 R11260/R11261 R11400 Pot 101 ZR4260 ZR4280/ZR4281 ZR4420 Pot 141
R11161 R11262/R11263 R11401 Pot 102 ZR4261 ZR4282/ZR4283 ZR4421 Pot 142
R11162 R11264/R11265 R11402 Pot 103 ZR4262 ZR4284/ZR4285 ZR4422 Pot 143
R11163 R11266/R11267 R11403 Pot 104 ZR4263 ZR4286/ZR4287 ZR4423 Pot 144
R11164 R11268/R11269 R11404 Pot 105 ZR4264 ZR4288/ZR4289 ZR4424 Pot 145
R11165 R11270/R11271 R11405 Pot 106 ZR4265 ZR4290/ZR4291 ZR4425 Pot 146
R11166 R11272/R11273 R11406 Pot 107 ZR4266 ZR4292/ZR4293 ZR4426 Pot 147
R11167 R11274/R11275 R11407 Pot 108 ZR4267 ZR4294/ZR4295 ZR4427 Pot 148
R11168 R11276/R11277 R11408 Pot 109 ZR4268 ZR4296/ZR4297 ZR4428 Pot 149
R11169 R11278/R11279 R11409 Pot 110 ZR4269 ZR4298/ZR4299 ZR4429 Pot 150
R11170 R11280/R11281 R11410 Pot 111 ZR4270 ZR4300/ZR4301 ZR4430 Pot 151
R11171 R11282/R11283 R11411 Pot 112 ZR4271 ZR4302/ZR4303 ZR4431 Pot 152
R11172 R11284/R11285 R11412 Pot 113 ZR4272 ZR4304/ZR4305 ZR4432 Pot 153
R11173 R11286/R11287 R11413 Pot 114 ZR4273 ZR4306/ZR4307 ZR4433 Pot 154
R11174 R11288/R11289 R11414 Pot 115 ZR4274 ZR4308/ZR4309 ZR4434 Pot 155
R11175 R11290/R11291 R11415 Pot 116 ZR4275 ZR4310/ZR4311 ZR4435 Pot 156
R11176 R11292/R11293 R11416 Pot 117 ZR4276 ZR4312/ZR4313 ZR4436 Pot 157
R11177 R11294/R11295 R11417 Pot 118 ZR4277 ZR4314/ZR4315 ZR4437 Pot 158
R11178 R11296/R11297 R11418 Pot 119 ZR4278 ZR4316/ZR4317 ZR4438 Pot 159
R11179 R11298/R11299 R11419 Pot 120 ZR4279 ZR4318/ZR4319 ZR4439 Pot 160

Tool data (No.2 magazine)
T4-digit Pot
command T8-digit command Aux. D
ZR4280 ZR4320/ZR4321 ZR4440 Pot 161
ZR4281 ZR4322/ZR4323 ZR4441 Pot 162
ZR4282 ZR4324/ZR4325 ZR4442 Pot 163
ZR4283 ZR4326/ZR4327 ZR4443 Pot 164
ZR4284 ZR4328/ZR4329 ZR4444 Pot 165
ZR4285 ZR4330/ZR4331 ZR4445 Pot 166
ZR4286 ZR4332/ZR4333 ZR4446 Pot 167
ZR4287 ZR4334/ZR4335 ZR4447 Pot 168
ZR4288 ZR4336/ZR4337 ZR4448 Pot 169
ZR4289 ZR4338/ZR4339 ZR4449 Pot 170
ZR4290 ZR4340/ZR4341 ZR4450 Pot 171
ZR4291 ZR4342/ZR4343 ZR4451 Pot 172
ZR4292 ZR4344/ZR4345 ZR4452 Pot 173
ZR4293 ZR4346/ZR4347 ZR4453 Pot 174
ZR4294 ZR4348/ZR4349 ZR4454 Pot 175
ZR4295 ZR4350/ZR4351 ZR4455 Pot 176
ZR4296 ZR4352/ZR4353 ZR4456 Pot 177
ZR4297 ZR4354/ZR4355 ZR4457 Pot 178
ZR4298 ZR4356/ZR4357 ZR4458 Pot 179
ZR4299 ZR4358/ZR4359 ZR4459 Pot 180
ZR4300 ZR4360/ZR4361 ZR4460 Pot 181
ZR4301 ZR4362/ZR4363 ZR4461 Pot 182
ZR4302 ZR4364/ZR4365 ZR4462 Pot 183
ZR4303 ZR4366/ZR4367 ZR4463 Pot 184
ZR4304 ZR4368/ZR4369 ZR4464 Pot 185
ZR4305 ZR4370/ZR4371 ZR4465 Pot 186
ZR4306 ZR4372/ZR4373 ZR4466 Pot 187
ZR4307 ZR4374/ZR4375 ZR4467 Pot 188
ZR4308 ZR4376/ZR4377 ZR4468 Pot 189
ZR4309 ZR4378/ZR4379 ZR4469 Pot 190
ZR4310 ZR4380/ZR4381 ZR4470 Pot 191
ZR4311 ZR4382/ZR4383 ZR4471 Pot 192
ZR4312 ZR4384/ZR4385 ZR4472 Pot 193
ZR4313 ZR4386/ZR4387 ZR4473 Pot 194
ZR4314 ZR4388/ZR4389 ZR4474 Pot 195
ZR4315 ZR4390/ZR4391 ZR4475 Pot 196
ZR4316 ZR4392/ZR4393 ZR4476 Pot 197
ZR4317 ZR4394/ZR4395 ZR4477 Pot 198

ZR4318 ZR4396/ZR4397 ZR4478 Pot 199
ZR4319 ZR4398/ZR4399 ZR4479 Pot 200

[Not assigned arbitrarily (No.3 magazine)] (common to part systems)
Tool data (No.3 magazine)
Pot
Tool data (No.3 magazine)
T4-digit Pot
command T8-digit command Aux. D T4-digit
command T8-digit command Aux. D
R11420 R11420/R11421 R11660 Pot 1 R11460 R11500/R11501 R11700 Pot 41
R11421 R11422/R11423 R11661 Pot 2 R11461 R11502/R11503 R11701 Pot 42
R11422 R11424/R11425 R11662 Pot 3 R11462 R11504/R11505 R11702 Pot 43
R11423 R11426/R11427 R11663 Pot 4 R11463 R11506/R11507 R11703 Pot 44
R11424 R11428/R11429 R11664 Pot 5 R11464 R11508/R11509 R11704 Pot 45
R11425 R11430/R11431 R11665 Pot 6 R11465 R11510/R11511 R11705 Pot 46
R11426 R11432/R11433 R11666 Pot 7 R11466 R11512/R11513 R11706 Pot 47
R11427 R11434/R11435 R11667 Pot 8 R11467 R11514/R11515 R11707 Pot 48
R11428 R11436/R11437 R11668 Pot 9 R11468 R11516/R11517 R11708 Pot 49
R11429 R11438/R11439 R11669 Pot 10 R11469 R11518/R11519 R11709 Pot 50
R11430 R11440/R11441 R11670 Pot 11 R11470 R11520/R11521 R11710 Pot 51
R11431 R11442/R11443 R11671 Pot 12 R11471 R11522/R11523 R11711 Pot 52
R11432 R11444/R11445 R11672 Pot 13 R11472 R11524/R11525 R11712 Pot 53
R11433 R11446/R11447 R11673 Pot 14 R11473 R11526/R11527 R11713 Pot 54
R11434 R11448/R11449 R11674 Pot 15 R11474 R11528/R11529 R11714 Pot 55
R11435 R11450/R11451 R11675 Pot 16 R11475 R11530/R11531 R11715 Pot 56
R11436 R11452/R11453 R11676 Pot 17 R11476 R11532/R11533 R11716 Pot 57
R11437 R11454/R11455 R11677 Pot 18 R11477 R11534/R11535 R11717 Pot 58
R11438 R11456/R11457 R11678 Pot 19 R11478 R11536/R11537 R11718 Pot 59
R11439 R11458/R11459 R11679 Pot 20 R11479 R11538/R11539 R11719 Pot 60
R11440 R11460/R11461 R11680 Pot 21 R11480 R11540/R11541 R11720 Pot 61
R11441 R11462/R11463 R11681 Pot 22 R11481 R11542/R11543 R11721 Pot 62
R11442 R11464/R11465 R11682 Pot 23 R11482 R11544/R11545 R11722 Pot 63
R11443 R11466/R11467 R11683 Pot 24 R11483 R11546/R11547 R11723 Pot 64
R11444 R11468/R11469 R11684 Pot 25 R11484 R11548/R11549 R11724 Pot 65
R11445 R11470/R11471 R11685 Pot 26 R11485 R11550/R11551 R11725 Pot 66
R11446 R11472/R11473 R11686 Pot 27 R11486 R11552/R11553 R11726 Pot 67
R11447 R11474/R11475 R11687 Pot 28 R11487 R11554/R11555 R11727 Pot 68
R11448 R11476/R11477 R11688 Pot 29 R11488 R11556/R11557 R11728 Pot 69
R11449 R11478/R11479 R11689 Pot 30 R11489 R11558/R11559 R11729 Pot 70
R11450 R11480/R11481 R11690 Pot 31 R11490 R11560/R11561 R11730 Pot 71
R11451 R11482/R11483 R11691 Pot 32 R11491 R11562/R11563 R11731 Pot 72
R11452 R11484/R11485 R11692 Pot 33 R11492 R11564/R11565 R11732 Pot 73
R11453 R11486/R11487 R11693 Pot 34 R11493 R11566/R11567 R11733 Pot 74
R11454 R11488/R11489 R11694 Pot 35 R11494 R11568/R11569 R11734 Pot 75
R11455 R11490/R11491 R11695 Pot 36 R11495 R11570/R11571 R11735 Pot 76
R11456 R11492/R11493 R11696 Pot 37 R11496 R11572/R11573 R11736 Pot 77
R11457 R11494/R11495 R11697 Pot 38 R11497 R11574/R11575 R11737 Pot 78
R11458 R11496/R11497 R11698 Pot 39 R11498 R11576/R11577 R11738 Pot 79
R11459 R11498/R11499 R11699 Pot 40 R11499 R11578/R11579 R11739 Pot 80

Tool data (No.3 magazine)
Pot
Tool data (No.3 magazine)
T4-digit Pot
command T8-digit command Aux. D T4-digit
command T8-digit command Aux. D
R11500 R11580/R11581 R11740 Pot 81 ZR4480 ZR4480/ZR4481 ZR4640 Pot 121
R11501 R11582/R11583 R11741 Pot 82 ZR4481 ZR4482/ZR4483 ZR4641 Pot 122
R11502 R11584/R11585 R11742 Pot 83 ZR4482 ZR4484/ZR4485 ZR4642 Pot 123
R11503 R11586/R11587 R11743 Pot 84 ZR4483 ZR4486/ZR4487 ZR4643 Pot 124
R11504 R11588/R11589 R11744 Pot 85 ZR4484 ZR4488/ZR4489 ZR4644 Pot 125
R11505 R11590/R11591 R11745 Pot 86 ZR4485 ZR4490/ZR4491 ZR4645 Pot 126
R11506 R11592/R11593 R11746 Pot 87 ZR4486 ZR4492/ZR4493 ZR4646 Pot 127
R11507 R11594/R11595 R11747 Pot 88 ZR4487 ZR4494/ZR4495 ZR4647 Pot 128
R11508 R11596/R11597 R11748 Pot 89 ZR4488 ZR4496/ZR4497 ZR4648 Pot 129
R11509 R11598/R11599 R11749 Pot 90 ZR4489 ZR4498/ZR4499 ZR4649 Pot 130
R11510 R11600/R11601 R11750 Pot 91 ZR4490 ZR4500/ZR4501 ZR4650 Pot 131
R11511 R11602/R11603 R11751 Pot 92 ZR4491 ZR4502/ZR4503 ZR4651 Pot 132
R11512 R11604/R11605 R11752 Pot 93 ZR4492 ZR4504/ZR4505 ZR4652 Pot 133
R11513 R11606/R11607 R11753 Pot 94 ZR4493 ZR4506/ZR4507 ZR4653 Pot 134
R11514 R11608/R11609 R11754 Pot 95 ZR4494 ZR4508/ZR4509 ZR4654 Pot 135
R11515 R11610/R11611 R11755 Pot 96 ZR4495 ZR4510/ZR4511 ZR4655 Pot 136
R11516 R11612/R11613 R11756 Pot 97 ZR4496 ZR4512/ZR4513 ZR4656 Pot 137
R11517 R11614/R11615 R11757 Pot 98 ZR4497 ZR4514/ZR4515 ZR4657 Pot 138
R11518 R11616/R11617 R11758 Pot 99 ZR4498 ZR4516/ZR4517 ZR4658 Pot 139
R11519 R11618/R11619 R11759 Pot 100 ZR4499 ZR4518/ZR4519 ZR4659 Pot 140
R11520 R11620/R11621 R11760 Pot 101 ZR4500 ZR4520/ZR4521 ZR4660 Pot 141
R11521 R11622/R11623 R11761 Pot 102 ZR4501 ZR4522/ZR4523 ZR4661 Pot 142
R11522 R11624/R11625 R11762 Pot 103 ZR4502 ZR4524/ZR4525 ZR4662 Pot 143
R11523 R11626/R11627 R11763 Pot 104 ZR4503 ZR4526/ZR4527 ZR4663 Pot 144
R11524 R11628/R11629 R11764 Pot 105 ZR4504 ZR4528/ZR4529 ZR4664 Pot 145

R11525 R11630/R11631 R11765 Pot 106 ZR4505 ZR4530/ZR4531 ZR4665 Pot 146
R11526 R11632/R11633 R11766 Pot 107 ZR4506 ZR4532/ZR4533 ZR4666 Pot 147
R11527 R11634/R11635 R11767 Pot 108 ZR4507 ZR4534/ZR4535 ZR4667 Pot 148
R11528 R11636/R11637 R11768 Pot 109 ZR4508 ZR4536/ZR4537 ZR4668 Pot 149
R11529 R11638/R11639 R11769 Pot 110 ZR4509 ZR4538/ZR4539 ZR4669 Pot 150
R11530 R11640/R11641 R11770 Pot 111 ZR4510 ZR4540/ZR4541 ZR4670 Pot 151
R11531 R11642/R11643 R11771 Pot 112 ZR4511 ZR4542/ZR4543 ZR4671 Pot 152
R11532 R11644/R11645 R11772 Pot 113 ZR4512 ZR4544/ZR4545 ZR4672 Pot 153
R11533 R11646/R11647 R11773 Pot 114 ZR4513 ZR4546/ZR4547 ZR4673 Pot 154
R11534 R11648/R11649 R11774 Pot 115 ZR4514 ZR4548/ZR4549 ZR4674 Pot 155
R11535 R11650/R11651 R11775 Pot 116 ZR4515 ZR4550/ZR4551 ZR4675 Pot 156
R11536 R11652/R11653 R11776 Pot 117 ZR4516 ZR4552/ZR4553 ZR4676 Pot 157
R11537 R11654/R11655 R11777 Pot 118 ZR4517 ZR4554/ZR4555 ZR4677 Pot 158
R11538 R11656/R11657 R11778 Pot 119 ZR4518 ZR4556/ZR4557 ZR4678 Pot 159
R11539 R11658/R11659 R11779 Pot 120 ZR4519 ZR4558/ZR4559 ZR4679 Pot 160

Tool data (No.3 magazine)
T4-digit Pot
command T8-digit command Aux. D
ZR4520 ZR4560/ZR4561 ZR4680 Pot 161
ZR4521 ZR4562/ZR4563 ZR4681 Pot 162
ZR4522 ZR4564/ZR4565 ZR4682 Pot 163
ZR4523 ZR4566/ZR4567 ZR4683 Pot 164
ZR4524 ZR4568/ZR4569 ZR4684 Pot 165
ZR4525 ZR4570/ZR4571 ZR4685 Pot 166
ZR4526 ZR4572/ZR4573 ZR4686 Pot 167
ZR4527 ZR4574/ZR4575 ZR4687 Pot 168
ZR4528 ZR4576/ZR4577 ZR4688 Pot 169
ZR4529 ZR4578/ZR4579 ZR4689 Pot 170
ZR4530 ZR4580/ZR4581 ZR4690 Pot 171
ZR4531 ZR4582/ZR4583 ZR4691 Pot 172
ZR4532 ZR4584/ZR4585 ZR4692 Pot 173
ZR4533 ZR4586/ZR4587 ZR4693 Pot 174
ZR4534 ZR4588/ZR4589 ZR4694 Pot 175
ZR4535 ZR4590/ZR4591 ZR4695 Pot 176
ZR4536 ZR4592/ZR4593 ZR4696 Pot 177
ZR4537 ZR4594/ZR4595 ZR4697 Pot 178
ZR4538 ZR4596/ZR4597 ZR4698 Pot 179
ZR4539 ZR4598/ZR4599 ZR4699 Pot 180
ZR4540 ZR4600/ZR4601 ZR4700 Pot 181
ZR4541 ZR4602/ZR4603 ZR4701 Pot 182
ZR4542 ZR4604/ZR4605 ZR4702 Pot 183
ZR4543 ZR4606/ZR4607 ZR4703 Pot 184
ZR4544 ZR4608/ZR4609 ZR4704 Pot 185
ZR4545 ZR4610/ZR4611 ZR4705 Pot 186
ZR4546 ZR4612/ZR4613 ZR4706 Pot 187
ZR4547 ZR4614/ZR4615 ZR4707 Pot 188
ZR4548 ZR4616/ZR4617 ZR4708 Pot 189
ZR4549 ZR4618/ZR4619 ZR4709 Pot 190
ZR4550 ZR4620/ZR4621 ZR4710 Pot 191
ZR4551 ZR4622/ZR4623 ZR4711 Pot 192
ZR4552 ZR4624/ZR4625 ZR4712 Pot 193
ZR4553 ZR4626/ZR4627 ZR4713 Pot 194
ZR4554 ZR4628/ZR4629 ZR4714 Pot 195
ZR4555 ZR4630/ZR4631 ZR4715 Pot 196
ZR4556 ZR4632/ZR4633 ZR4716 Pot 197
ZR4557 ZR4634/ZR4635 ZR4717 Pot 198
ZR4558 ZR4636/ZR4637 ZR4718 Pot 199
ZR4559 ZR4638/ZR4639 ZR4719 Pot 200

In addition to X, Y and R devices described above, the following devices exist:
The assignment tables are on the following pages. Copy and use them as necessary.
Name Symbol Description
Internal relay
Latch relay
M
F
L
Internal and latch relays are auxiliary relays in the sequence that cannot directly be out put to the external.
The latch relay L will be backed up even if the power is turned OFF.
The internal relay F may be used as the interface for the alarm message display.
Timer
T
ST
Timers T are count-up timers.
Timer T and ST can set the timer value from either the sequence program or setting
and display unit.
The 100ms, 10ms and 100ms integral timer are available.
Counter
C Counters C are count-up counters.

Counter C can set the counter value from either the sequence program or setting and display unit.

Data register

D The data register stores sequence data.

One data register consists of 16 bits and can be read or written in 16-bit units.

To handle 32-bit data, two data registers are used. The data register addressed by a 32-bit command is used as the low-order 16 bits; the data register addressed by the specified data register number +1 is used as the high-order 16 bits.

File register

R The file register release area can be used in the same manner as the data register.

One file register consists of 16 bits and can be read or written in 16-bit units.

To handle 32-bit data, two data registers are used. The file register addressed by a 32-bit command is used as the low-order 16 bits; the file register addressed by the spec ified file register number +1 is used as the high-order 16 bits.

[Format]

Device Abbrev. Signal name Device Abbrev. Signal name

Device Abbrev. Signal name Device Abbrev. Signal name

Device Abbrev. Signal name Device Abbrev. Signal name

Device Abbrev. Signal name Device Abbrev. Signal name

How to read the signals

No. Description

(1) Types of contact

A : Becomes valid when turned ON (A contact)

B : Becomes valid when turned OFF (B contact)

<Note>

An asterisk "*" is prefixed to a B-contact signal abbreviation.

(2) Signal name

(3) Signal abbreviation

(4) Device No.

Common($) : Device No. common for part systems

$1 $n : Device No. per part system or axis device No.

1st SP 8th SP : Device No. per spindle

(1) (2) (3) (4)

Cont. Signal name Abbrev. Common($)

B DATA PROTECT KEY 1 * KEY1 Y708

4.1 PLC Input Signals (Bit Type: X***)

[Function]

This signal indicates that the NC keyboard or the soft keyboard reset button is pressed.

[Operation]

When the NC keyboard or the soft keyboard reset button is pressed, this signal turns ON; and then it turns OFF after 10ms.

NC will not be reset even if this signal is turned ON. In order to reset the NC, check the status of this signal with ladder, and turn NC reset (NRST1), etc. ON/OFF.

[Related signals]

(1) NC reset 1 (NRST1)

(2) NC reset 2 (NRST2)

(3) Reset & rewind (RRW)

[Function]

This signal notifies that "Power consumption computation: Enable consumption accumulation 1 to 4" is ON.

[Operation]

When the "Power consumption computation: Enable consumption accumulation 1 to 4" signal (Y724 or later) is turned ON, this signal turns ON.

When the "Power consumption computation: Enable consumption accumulation 1 to 4" signal (Y724 or later) is turned OFF, this signal turns OFF.

[Related signals]

(1) Power consumption computation: Enable consumption accumulation 1 to 4 (IPCE1 to 4: Y724 to 7)

[Function] [Operation]

This signal notifies that the power OFF processing is in execution.

This signal remains ON until the control unit's power is turned OFF.

Refer to the section of the "Automatic power OFF request" signal (Y75D) for details.

0: Not executed

1: During execution

[Related signals]

(1) Automatic power OFF request (Y75D)

(2) Power OFF indication Y device No. (R215)

[Function]

This signal notifies that "Power consumption computation: Clear consumption accumulation 1 to 4" is completed.

[Operation]

When the "Power consumption computation: Clear consumption accumulation 1 to 4" signal (Y700 or later) is turned ON, this signal turns ON.

When the "Power consumption computation: Clear consumption accumulation 1 to 4" signal (Y700 or later) is turned OFF, this signal turns OFF.

[Caution]

(1) When this signal is ON, turn OFF the "Power consumption computation: Clear consumption accumulation 1 to 4" sig nal (Y700 or later) OFF.
[Related signals]
(1) Power consumption computation: Clear consumption accumulation 1 to 4 (IPCC1 to 4: Y700 to 3)
Cont. Signal name Abbrev. Common ($)
A Board reset BRST X2F0
Cont. Signal name Abbrev. Common ($)
A Power consumption computation: Consumption accumula tion ON 1 to 4 IPCEI1 to 4 X700 to 3
Cont. Signal name Abbrev. Common ($)
A Power OFF processing X707
Cont. Signal name Abbrev. Common ($)
A Power consumption computation: Clearing consumption ac cumulation 1 to 4 complete IPCCC1 to 4 X708 to B

[Function]
This signal indicates that the battery voltage that is supplied to the control equipment (NC controller or graphic control unit) to save data and to the absolute encoders has dropped below the battery warning detection threshold.
[Operation]
This signal turns ON when:
The battery voltage for saving data, which is checked constantly, has dropped below the battery warning detection threshold.
The alarm message "Z52 Battery fault 0001" is displayed for NC control unit; "Z52 Battery fault 0010" for graphic control unit; and "Z52 Battery fault 0011" for both units.
The alarm display is cleared by reset, but the signal does not turn OFF.
A drop in the battery voltage that is supplied to the absolute encoder is detected.
The alarm messages "Z73 Battery for abs data fault 0001" and "S52 Servo warning 009F" are displayed.
Even if this signal is ON, it is possible to start cycle operation.
This signal turns OFF when:
The battery voltage drops below the battery alarm detection threshold, and the battery alarm signal (BATAL) turns ON.
If the alarm was triggered by the (1) of conditions to turn the signal ON, this signal is turned OFF by reset after battery replacement.
[Caution]
(1) When this signal (X70E) turns ON, battery replacement is recommended.
(2) When the detection of battery alarm or battery warning is disabled (#6449 bit4=1), this signal will not turn ON, and no alarm messages are displayed.
[Related signals]
(1) Battery alarm (BATAL: X70F)
(2) Battery drop cause (R56)
Cont. Signal name Abbrev. Common ($)
A Battery warning BATWR X70E

[Function]
This signal indicates that the battery voltage that is supplied to the control equipment (NC controller or graphic control unit) to save data and to the absolute encoders has dropped below the battery alarm detection threshold.
[Operation]
The signal turns ON when:
(1) The battery voltage for saving data, which is checked constantly, has dropped below the battery alarm detection threshold.
The alarm message "Z52 Battery fault 0003" is displayed for NC control unit, "Z52 Battery fault 0030" is displayed for graphic control unit, and "Z52 Battery fault 0033" is displayed for both units.
(2) An error is detected in the circuit to monitor the battery voltage for saving data. The alarm message "Z52 Battery fault 0002" is displayed for NC control unit, "Z52 Battery fault 0020" is displayed for graphic control unit, and "Z52 Battery fault 0022" is displayed for both units.
(3) The drop in the voltage of backup power supply (battery voltage) in an absolute encoder is detected. The alarm mes sage "Z71 AbsEncoder: Backup voltage drop 0001" is displayed.
(4) The absolute position is lost due to the drop in the voltage of backup power supply (battery voltage) in an absolute encoder.
The alarm message "Z70 Abs posn error (servo alm 25) 0101" is displayed.
When this signal is ON, cycle operation cannot be started.
The signal turns OFF when:
Reset was done after battery replacement (if the alarm is caused by the ON condition (1)).
After the error in power supply voltage is eliminated, the power was turned ON again (if the alarm is caused by the ON conditions (2) and (3)).
[Caution]
(1) When the battery alarm occurs, especially due to the ON condition (1), turning OFF the power of the control equip ment without battery replacement may corrupt stored data such as machining programs. Replace the battery and con firm that this signal is turned OFF before turning OFF the power of the control equipment.
If the battery alarm has already occurred when the power of the control equipment is turned ON, especially due to the ON condition (1), consider that the stored data such as machining programs have been corrupted.
(2) If detection of battery alarm or battery warning is disabled (#6449/bit4 = 1), this signal is not turned ON and no alarm messages is displayed.
(3) As a precaution against this alarm, ensure that data in control equipment are backed up.
[Related signals]
(1) Battery warning (BATWR: X70E)
(2) Battery drop cause (R56)
[Function]
This signal indicates that the high-speed simple program check mode has been entered.
[Operation]
This signal turns ON when the "High-speed simple program check mode" signal (SMLK: Y73E) is input.
[Related signals]
(1) High-speed simple program check mode (SMLK: Y73E)
Cont. Signal name Abbrev. Common ($)
A Battery alarm BATAL X70F
Cont. Signal name Abbrev. Common ($)
A High-speed simple program check mode ON SMLKO X712

[Function]
This signal informs that the coordinate position check is enabled during the high-speed simple program check.
[Operation]
This signal turns ON when the "High-speed simple program check: Enable coordinate position check" signal (Y76B) is ON.
This signal turns OFF when the "High-speed simple program check: Enable coordinate position check" signal (Y76B) is OFF.
[Related signals]
(1) High-speed simple program check mode (SMLK: Y73E)
(2) High-speed simple program check mode ON (SMLKO: X712)
(3) High-speed simple program check: Enable coordinate position check (SPSC: Y76B)
[Function]
When the parameter "#1260 set32/bit0" (Switching to actual cutting mode during automatic operation) is set to "1", this signal indicates that the actual cutting mode in manual arbitrary reverse run is valid.
When the parameter "#1260 set32/bit0" is set to "0", this signal does not turn ON/OFF.
[Operation]
This signal turns ON when:
Except for the specific movement block during thread cutting, thread cutting cycle and tapping cycle, the "Manual arbi trary reverse run mode ON" (X715) is turned ON and the "Actual cutting mode (thread, tap) in manual arbitrary reverse run" (Y761) is turned ON.
This signal turns OFF when:
Except for the specific movement block during thread cutting, thread cutting cycle and tapping cycle, the "Manual arbi trary reverse run mode ON" (X715) is turned OFF and the "Actual cutting mode (thread, tap) in manual arbitrary reverse run" (Y761) is turned OFF.
For the specific movement block, refer to the section "Actual cutting mode (thread, tap) in manual arbitrary reverse run (Y761)".
[Related signals]
(1) Manual arbitrary reverse run mode (MORR: Y73C)
(2) Manual arbitrary reverse run mode ON (PCHKO: X715)
(3) Manual arbitrary reverse run speed selection (MORSP: Y73D)
(4) Actual cutting mode (thread, tap) in manual arbitrary reverse run (MRCMD: Y761)
(5) Manual arbitrary reverse run: MSTB reverse run prohibited (MRPSG: YCFC)
(6) Manual arbitrary reverse run speed multiplier (R379)
(7) Manual arbitrary reverse run: Reverse run ON (MOREV: X716)
(8) Manual arbitrary reverse run handle selection (R375)
Cont. Signal name Abbrev. Common ($)
A High-speed simple program check: Coordinate position check ON SPSCO X713
Cont. Signal name Abbrev. Common ($)
A Manual arbitrary reverse run: Actual cutting mode ON PNCMDO X714

[Function]
This signal informs that the manual arbitrary reverse run mode is in operation.
[Operation]
This signal is turned ON while the manual arbitrary reverse run mode is in operation.
This signal is turned OFF when the manual arbitrary reverse run mode is cancelled.
[Operation sequence]
[Related signals]
(1) Manual arbitrary reverse run: Reverse run ON (MOREV: X716)
(2) Thread, tap block stopping in manual arbitrary reverse run (MBSTP: X74D)
(3) Thread, tap reverse run prohibition alarm in manual arbitrary reverse run (MRVNG: X74E)
(4) Manual arbitrary reverse run mode (MORR: Y73C)
(5) Manual arbitrary reverse run speed selection (MORSP: Y73D)
(6) Manual arbitrary reverse run: Actual cutting mode ON (thread, tap) (MRCMD: Y761)
(7) Manual arbitrary reverse run: Reverse run block stop designated part system (RBSSY: YD01)
(8) Manual arbitrary reverse run: MSTB reverse run prohibited (MRPSG: YCFC)
(9) Manual arbitrary reverse run handle selection (R375)
(10)Manual arbitrary reverse run speed multiplier (R379)
[Function]
This signal indicates the forward/reverse status during the manual arbitrary reverse run.
[Operation]
This signal turns ON when reverse run is performed during the manual arbitrary reverse run.
This signal is OFF during forward run.
[Related signals]
(1) Manual arbitrary reverse run mode ON (PCHKO: X715)
(2) Thread, tap block stopping in manual arbitrary reverse run (MBSTP: X74D)
(3) Thread, tap reverse run prohibition alarm in manual arbitrary reverse run (MRVNG: X74E)
(4) Manual arbitrary reverse run mode (MORR: Y73C)
(5) Manual arbitrary reverse run speed selection (MORSP: Y73D)
(6) Actual cutting mode (thread, tap) in manual arbitrary reverse run (MRCMD: Y761)
(7) Manual arbitrary reverse run: MSTB reverse run prohibited (MRPSG: YCFC)
(8) Manual arbitrary reverse run: Reverse run block stop designated part system (RBSSY: YD01)
(9) Manual arbitrary reverse run handle selection (R375)
(10)Manual arbitrary reverse run speed multiplier (R379)
[Function]
This signal informs that collecting history data is being executed by the operation history function.
[Operation]
This signal turns ON while collecting history data is executed.
[Related signals]
(1) Collecting diagnosis data stop (Y72B)
Cont. Signal name Abbrev. Common ($)
A Manual arbitrary reverse run mode ON PCHKO X715
Cont. Signal name Abbrev. Common ($)
A Manual arbitrary reverse run: Reverse run ON MOREV X716

Cont. Signal name Abbrev. Common ($)
A Collecting diagnosis data X723
(MORR Y73C)
(PCHKO X715)
ON
ON
ON
OFF
OFF
OFF
Memory or MDI mode
(Part system 1 +
operation part system)
Manual arbitrary reverse
run mode
Manual arbitrary reverse
run mode ON

[Function]
This signal informs that the set parameter is not valid unless the power is turned OFF and ON.
[Operation]
When the following operation is executed, the "Power OFF required after parameter change" signal is output, and the display symbol "PR" is displayed in the operation status section.
When you set the parameters or input data to them that become valid after the power is turned OFF and ON.
When you set the auxiliary axis parameters or input data to them that become valid after the power is turned OFF and ON.
The maintenance data for the ALL1 is input.
The backup data is input with the SRAM backup function.
When the power is turned OFF and ON, the "Power OFF required after parameter change" signal turns OFF, and the "PR" display disappears.
(1) Even if the same value is set to the parameter which requires the power OFF and ON, the "Power OFF required parameter change" signal is output, and the "PR" is displayed.
(2) Even if the value is returned to the original value after setting the parameter which requires the power OFF and ON, the "Power OFF required after parameter change" signal remains ON, and the "PR" also remains displayed.
(3) When the parameters with DDB or G10 are rewritten, the "Power OFF required after parameter change" signal is not output, and the "PR" is not displayed. Because they do not require the power OFF and ON.
[Function]
This signal notifies the PLC that a block stop occurred before moving to thread cutting or tapping during the manual arbitrary reverse run.
[Operation]
When the "Actual cutting mode (thread, tap) in manual arbitrary reverse run" signal (MRCMD) is ON, a block stop occurs before moving to thread cutting and tapping.
This signal turns ON when this block stop occurs.
If cycle start is executed in this state, thread cutting and tapping start and this signal turns OFF.
[Related signals]
(1) Manual arbitrary reverse run mode ON (PCHKO: X715)
(2) Manual arbitrary reverse run: Reverse run ON (MOREV: X716)
(3) Thread, tap reverse run prohibition alarm in manual arbitrary reverse run (MRVNG: X74E)
(4) Manual arbitrary reverse run mode (MORR: Y73C)
(5) Manual arbitrary reverse run speed selection (MORSP: Y73D)
(6) Actual cutting mode (thread, tap) in manual arbitrary reverse run (MRCMD: Y761)
(7) Manual arbitrary reverse run: MSTB reverse run prohibited (MRPSG: YCFC)
(8) Manual arbitrary reverse run: Reverse run block stop designated part system (RBSSY: YD01)
(9) Manual arbitrary reverse run handle selection (R375)
(10)Manual arbitrary reverse run speed multiplier (R379)
Cont. Signal name Abbrev. Common ($)
A Power OFF required after parameter change X72F
Cont. Signal name Abbrev. Common ($)
A Thread, tap block stopping in manual arbitrary reverse run MBSTP X74D
Note

[Function]
This signal notifies the PLC that the reverse run prohibition alarm occurred at the thread cutting or tapping block during the manual arbitrary reverse run.
[Operation]
If the "Actual cutting mode (thread, tap) in manual arbitrary reverse run" signal (MRCMD) is ON, the thread cutting and tapping blocks are not executed when reverse run is performed.
This reverse run prohibition alarm turns ON at these blocks.
The alarm signal is kept ON and turned OFF when forward run is executed.
[Related signals]
(1) Manual arbitrary reverse run mode ON (PCHKO: X715)
(2) Manual arbitrary reverse run: Reverse run ON (MOREV: X716)
(3) Thread, tap block stopping in manual arbitrary reverse run (MBSTP: X74D)
(4) Manual arbitrary reverse run mode (MORR: Y73C)
(5) Manual arbitrary reverse run speed selection (MORSP: Y73D)
(6) Actual cutting mode (thread, tap) in manual arbitrary reverse run (MRCMD: Y761)
(7) Manual arbitrary reverse run: MSTB reverse run prohibited (MRPSG: YCFC)
(8) Manual arbitrary reverse run: Reverse run block stop designated part system (RBSSY: YD01)
(9) Manual arbitrary reverse run handle selection (R375)
(10)Manual arbitrary reverse run speed multiplier (R379)
[Function]
This signal notifies that one of the update, delete, or extraction operation requests is being sent to the database.

[Operation]
0: This signal notifies that update, delete, or extraction operation request is not being sent to the database.
1: This signal notifies that update, delete, or extraction operation request is being sent to the database.
[Related signals]
(1) MES interface library: DB operation selection (R14598)
(2) MES interface library: Operation table selection (R14599)
(3) MES interface library: Operation trigger (Y1C80)
[Function]
This signal notifies that the connector status of the drive power has been ON for over 24 hours.
[Operation]
When the "Contactor shutoff test" signal (Y742) is turned ON and the contactor shutoff is confirmed by the contactor shutoff test, the "24 hours continuous operation" signal (X752) turns OFF.
[Caution]
There is a possibility that the contactor is welded and so your safety may not be secured when "24 hours continuous operation" signal is output. Thus, under this condition, do not input "speed monitor mode" signal to open the door.
[Related signals]
(1) Contactor shutoff test (MCT: Y742)
(2) Speed monitor mode (SOMD: R296)
Cont. Signal name Abbrev. Common ($)
A Thread, tap reverse run prohibition alarm in manual arbitrary
reverse run MRVNG X74E
Cont. Signal name Abbrev. Common ($)
A MES interface library: Operation trigger status X74F
Cont. Signal name Abbrev. Common ($)
A 24 hours continuous operation CNOP X752

[Function]
This signal turns ON when the multi-step speed monitor is valid and the speed monitor mode is enabled.
[Operation]
When the "Contactor shutoff test" signal (Y742) is turned ON and the contactor shutoff is confirmed by the contactor shutoff test, the "24 hours continuous operation" signal (X752) turns OFF.
When the multi-step speed monitor is valid and one of the door groups (bit) of the "Door open enable" signal turns ON, this signal turns ON.
When the speed monitor mode turns OFF and all the "Door open enable" signals turn OFF, this signal turns OFF.
While the multi-step speed monitor is invalid, even in the speed monitor mode, this signal does not turn ON.
[Related signals]
(1) Speed monitor mode (SOMD: R296)
(2) Speed monitor door open possible (SMDOEN: R96)
(3) Multi-step speed monitor selected speed output (SOPFN: R98)
[Function] [Operation]
Completion of transfer from extension workpiece coordinate to external workpiece coordinate offset (EXT) during pallet 4 page registration is displayed.
This signal turns ON at the completion of transfer processing.
This signal turns OFF when external workpiece coordinate transfer ready is turned OFF.
The transferred external workpiece coordinate offset (EXT) becomes effective when this signal is turned ON.
[Timing chart]
[Related signals]
(1) Pallet program registration Ext. workpiece coordinate transfer ready (Y72F)
Cont. Signal name Abbrev. Common ($)
A In multi-step speed monitor MSOE X753
Cont. Signal name Abbrev. Common ($)
A Pallet program registration Ext. workpiece coordinate trans fer completion X758
Speed monitor mode signal
(Door group 1)
(SOMD: R296/bit0)
Speed monitor mode signal
(Door group 2)
(SOMD: R296/bit1)
Speed monitor door open
possible signal (Door group 1)
(SMDOEN: R96/bit0)
Speed monitor door open
possible signal (Door group 2)
(SMDOEN: R96/bit1)
In multi-step speed monitor
signal (MSOE: X753)
Ext. workpiece coordinate transfer
ready (Y72F)
Ext. workpiece coordinate transfer
completion (X758)
Transfer processing Extension workpiece
External workpiece

[Function]
This signal notifies that the graphic check (check method II) is in progress.
[Operation]
The signal turns ON when:
The program check is in operation by the graphic check (check method II).
The signal turns OFF when:
The program check by the graphic check (check method II) is completed.
(Except for the program stop by check step)
[Function]

This signal indicates the part system displayed on the screen.
[Operation]
This signal turns ON when the part-system display has been changed by pressing the part system changeover key, by turning ON the "Display changeover $1 to $8" signal (DISP1 to 8), or with the touchscreen.
[Related signals]
(1) Display changeover $1 to $8 (DISP1 to 8: Y730 to 737)
[Function]
This signal notifies that the interference check III interfering object selection data setting is enabled.
[Operation]
This signal turns ON when the interfering object selection data defined in the system variables (#40000 to #40097) or the "Interference check III: interfering object selection" (R20304 to R20449) has successfully been imported into NC as the interference check III execution data.
This signal turns OFF once the "Interference check III: Enable interfering object selection data" (Y769) is turned OFF.
[Related signals]
(1) Interference check III: Enable interfering object selection data (ITF3VLDT: Y769)
[Function]
This signal notifies that the interference check III is in execution.
[Operation]
This signal turns ON while the interference check III is in execution.
This signal turns OFF once the "Interference check III: mode" (Y76A) is turned OFF.
(1) While the operation error (M03 0001) is occurring, this signal is not turned OFF even though the "Interference check III: mode" (Y76A) is turned OFF.
[Related signals]
(1) Interference check III: Interference check III mode (ITF3CMD: Y76A)
[Function]
This signal notifies that the interference check between part systems is in execution.
[Operation]
This signal turns ON while the interference check between part systems is in execution.
This signal turns OFF once the "Interference check between part systems: Interference check enabled" (Y73F) is turned OFF.
[Related signals]
(1) Interference check between part systems: Interference check enabled (Y73F)
Cont. Signal name Abbrev. Common ($)
A Graphic check (check method II) in progress X759
Cont. Signal name Abbrev. Common ($)
A $1 to $8 display X760 to 7
Cont. Signal name Abbrev. Common ($)
A Interference check III: Interfering object selection data set ting completed ITF3DTF X771
Cont. Signal name Abbrev. Common ($)
A Interference check III: In interference check III mode ITF3MD X772
Cont. Signal name Abbrev. Common ($)
A Interference check between part systems: Mode is active X773
Note

[Function]
This signal notifies that the guide bushing (G/B) spindle synchronization mode is in execution.
[Operation]
This signal is ON while the "G/B spindle synchronization valid" (GBON) is ON.
This signal turns OFF at an emergency stop or when the "G/B spindle synchronization: Temporary cancel" (GBOFF) turns ON.
[Related signals]
(1) G/B spindle synchronization valid (GBON: Y778)
(2) G/B spindle synchronization: Temporary cancel (GBOFF: Y77D)
[Function]
This signal notifies that the reference spindle and the guide bushing (G/B) spindle are in the spindle synchronization state.
[Operation]
This signal is ON while the reference spindle and the guide bushing spindle are in the spindle synchronization state.
This signal turns OFF at an emergency stop or when the "G/B spindle synchronization: Temporary cancel" (GBOFF) turns ON.
[Related signals]
(1) G/B spindle synchronization valid (GBON: Y778)
(2) G/B spindle synchronization: Temporary cancel (GBOFF: Y77D)
[Function]
This signal notifies that the phase alignment between the reference spindle and the guide bushing (G/B) spindle is completed.
[Operation]
This signal turns ON when the phase alignment of the phase gap (relative position) between the reference spindle and the guide bushing spindle saved in advance is completed.
[Related signals]
(1) G/B spindle synchronization valid (GBON: Y778)
(2) G/B spindle synchronization: Phase alignment (GBPHS: Y77A)
[Function]
This signal notifies that guide bushing (G/B) spindle synchronization position error compensation is in execution.
[Operation]
This signal turns ON when the guide bushing spindle synchronization position error compensation becomes in execution and when refreshing the compensation amount is completed to be repeated by the number of times set in R390 (Guide bushing spindle synchronization position error compensation scale and the number of times of compensations).
This signal turns OFF:
When both the "G/B spindle synchronization: Keep position error compensation amount" signal (GBCMKP) and the "G/B spindle synchronization: Position error compensation" signal (GBCMON) are turned OFF
When the guide bushing spindle synchronization mode is canceled
When the guide bushing spindle synchronization position error compensation amount is being measured
[Related signals]
(1) G/B spindle synchronization valid (GBON: Y778)
(2) G/B spindle synchronization: Position error compensation (GBCMON: Y77C)

(3) G/B spindle synchronization: Keep position error compensation amount (GBCMKP: Y77E)
(4) G/B spindle synchronization: Position error compensation scale and the number of times of compensations (R390)
(5) G/B spindle synchronization: Position error compensation amount (R465)
Cont. Signal name Abbrev. Common ($)
A G/B spindle synchronizing mode GBMOD X778
Cont. Signal name Abbrev. Common ($)
A G/B spindle synchronization: Position control synchronizing GBSYN X779
Cont. Signal name Abbrev. Common ($)
A G/B spindle synchronization: Phase alignment complete GBPHF X77A
Cont. Signal name Abbrev. Common ($)
A G/B spindle synchronization: Position error compensating GBPCM X77B

[Function]
This signal indicates that the drive section of the nth axis is ready for operation.
[Operation]
This signal turns ON when:
The power supply of the controller is turned ON and the diagnosis on the servo system has been completed success fully.
Servo alarm has been reset.
Emergency stop has been reset.
Servo off signal (*SVFn) is reset.
This signal turns OFF when:
Servo alarm occurs.
Emergency stop is issued.
Servo off signal (*SVFn) is input.
[Operation sequence]
[Related signals]
(1) Servo ready completion (SA: XC11)
Cont. Signal name Abbrev. $1 $2 $3 $4
A Servo ready n-th axis RDY1 to 8 X780 to 7 X788 to F X790 to 7 X798 to F
Controller power
supply
Controller ready
completion
Servo ready
n-th axis
3s
0.5s
0.7s
0.5s 0.5s
0.7s 0.7s
In reset
Emergency stop
Servo alarm
Reset & rewind

[Function]
This signal indicates that motion command is issued to the control axis.
[Operation]
This signal turns ON when:
<Automatic operation>
The signal is ON while the motion command is issued to the end of movement, or to when automatic operation pause turns ON.
<Manual operation>
For JOG mode
The signal is ON while "Feed axis selection +/-" signal (+Jn and -Jn) is ON.
For handle mode
When "1st to 3rd handle axis selection code m" (HS1mn to HS3mn) and "Handle valid" signal (HS1Sn, HS2Sn, HS3Sn) have been selected, the "Axis selected" signal for the axis specified by the "1st to 3rd handle axis selection code m" sig nal (HS1mn to HS3mn) is ON.
For incremental mode
The signal turns ON when "Feed axis selection +/-" signal (+Jn, -Jn) turns ON, and turns OFF when the specified motion is completed.
For manual arbitrary feed mode
The signal turns ON when "Manual arbitrary feed strobe" signal (CXS8n) turns ON, and turns OFF when the specified motion is completed.
For reference position return mode
The signal is ON while "Feed axis selection +/-" signal (+Jn and -Jn) is ON. After "Reference position return near point detection" signal is detected, and the motion speed changes to approach (creeping) speed, the "Axis selected" signal remains ON until the motion stops at the reference position, even when "Feed axis selection +/-" signal (+Jn and -Jn) turns OFF.
<Other conditions>
The signal can turn ON even during machine lock (Z-axis is in cancellation). However, it does not turn ON during machine lock in manual operation mode.
The signal remains on even when motion stops due to feedrate override set at 0%, manual control feedrate set at 0 mm/min, or 0 inch/min.
Interlock does not affect status of this signal (the signal remains ON, or turns ON).
Servo off signal does not affect status of this signal.
The signal cannot be turned ON by G04 and G92.
The signal turns OFF with "controller Reset & Rewind", or "Emergency stop".
(Example)
Cont. Signal name Abbrev. $1 $2 $3 $4
A Axis selection n-th axis AX1 to 8 X7A0 to 7 X7A8 to F X7B0 to 7 X7B8 to F
Axial motion

Feed axis selection
Axis selected

[Function]
This signal indicates that the specified axial motion is in plus (+) direction.
These signals are for each control axis. The last number (n = 1, 2, 3...) of the signal abbreviation indicates the control axis No.
[Operation]
The signal turns ON when the specified control axis starts moving in the plus direction or when it is moving.
The signal turns OFF when the specified control axis stops moving or when it moves in the minus direction.
An example of the timing chart for the jog mode is shown below.
(1) This signal operates regardless of the operation mode.
(2) The real movement direction is indicated.
(3) The signal does not turn ON during machine lock.
[Related signals]
(1) In axis minus motion n-th axis (MVM1 to 8: X7E0 to 7)
[Function]
This signal indicates that the control axis is moving in the minus direction
[Operation]
This motion direction is the reverse of the plus motion, and the operation is the same as "In axis motion (+)" signal (MVPn).
[Related signals]
(1) In axis plus motion n-th axis (MVP1 to 8: X7C0 to 7)
Cont. Signal name Abbrev. $1 $2 $3 $4
A In axis motion (+) n-th axis MVP1 to 8 X7C0 to 7 X7C8 to F X7D0 to 7 X7D8 to F
Cont. Signal name Abbrev. $1 $2 $3 $4
A In axis motion (-) n-th axis MVM1 to 8 X7E0 to 7 X7E8 to F X7F0 to 7 X7F8 to F
Feed axis selection- (-J1)
1st axis motion [+]
Feed axis selection+ (+J1)
1st axis motion [-]
In axis plus motion (MVP1)
In axis minus motion (MVM1)
Note

[Function]
This signal indicates that the axial component of the nth axis is ON the 1st reference position.
These signals are for each control axis. The last number (n = 1, 2, 3...) of the signal abbreviation indicates the control axis No.
[Operation]
This signal turns ON when:
1st reference position reached is attained with reference position return mode in manual operation.
Refer to the "Reference position return" (ZRNn) section for details on returning.
1st reference position reached is attained with G28 command in automatic operation.
(1) If "1st reference position reached" is achieved in other operation mode, or by other command, the signal does not turn ON.
This signal turns OFF when:
The axial component in position is relocated from the 1st reference position by motion command.
Emergency stop signal is input or servo alarm occurs, causing stop to the machine.
<Reference position return operation pattern>
[Related signals]
(1) 2nd reference position reached n-th axis (ZP21 to 28: X820 to 7)
(2) 3rd reference position reached n-th axis (ZP31 to 38: X840 to 7)
(3) 4th reference position reached n-th axis (ZP41 to 48: X860 to 7)
Cont. Signal name Abbrev. $1 $2 $3 $4
A 1st reference position reached n-th axis ZP11 to 18 X800 to 7 X808 to F X810 to 7 X818 to F
Note
(Note)
Reference position return will be the
high-speed return when the basic machine
coordinate system is established
(2nd time and following).
When basic machine coordinate system is not
established.
When dog-type return is selected with setup
parameters, basic specification parameter "#1063
mandog" in the manual mode.
Dog-type reference position return
Near-point dog
Reference position
High-speed reference position return
Near-point dog
Reference position
When basic machine coordinate system is
established.
When high-speed return is selected with setup
parameters, basic specification parameter "#1063
mandog" in the manual mode.

[Function]
This signal indicates that the axial component of the nth axis is on the 2nd reference position.
These signals are for each control axis. The last number (n = 1, 2, 3...) of the signal abbreviation indicates the control axis No.
[Operation]
This signal turns ON when:
2nd reference position reached is attained with G30 command (G30 P2) in automatic operation.
2nd reference position reached is attained with reference position return mode of automatic operation (Reference posi tion selection code 1, 2).
(1) If "2nd reference position reached" is achieved in other operation mode, or by other command, the signal does not turn ON.
This signal turns OFF when:
The axial component in position is relocated from the 1st reference position by motion command.
Emergency stop signal is input or servo alarm occurs, causing stop to the machine.
[Related signals]
(1) 1st reference position reached n-th axis (ZP11 to 18: X800 to 7)
(2) 3rd reference position reached n-th axis (ZP31 to 38: X840 to 7)
(3) 4th reference position reached n-th axis (ZP41 to 48: X860 to 7)
(4) Reference position selection code m (ZSLmn: YC190,1)
[Function] [Operation]
This signal informs that the control axis is on the 3rd reference position.
Function and operation are the same as the 2nd reference position reached, but the reference position and G command are different.
Reference position: 3rd reference position
G command: G30 P3
[Function] [Operation]
This signal informs that the control axis is on the 4th reference position.
Function and operation are the same as the 2nd reference position reached, but the reference position and G command are different.
Reference position: 4th reference position
G command: G30 P4
Cont. Signal name Abbrev. $1 $2 $3 $4
A 2nd reference position reached n-th axis ZP21 to 28 X820 to 7 X828 to F X830 to 7 X838 to F
Cont. Signal name Abbrev. $1 $2 $3 $4
A 3rd reference position reached n-th axis ZP31 to 38 X840 to 7 X848 to F X850 to 7 X858 to F
Cont. Signal name Abbrev. $1 $2 $3 $4
A 4th reference position reached n-th axis ZP41 to 48 X860 to 7 X868 to F X870 to 7 X878 to F
Note

[Function]
This signal indicates that the control axis is near the 1st reference position in the absolute position detection system.
[Operation]
This signal turns ON when the control axis is in the range of the parameter set using the 1st reference position as a base point, and turns OFF when the range is exceeded. The parameter is set with #2057 (nrefp) and #2058 (nrefn) in the [ABS. POSI PARAM] screen.
(1) The "Near reference position" signal is output even while the axis is moving, but there may be deviation with the actual machine position.
Rapid traverse: approximately 19 mm at 20 m/min
Cutting feed: approximately 9.5 mm at 10 m/min
If the distance of the setting value is shorter than the value indicated above, this signal may not be output.
(2) This signal is valid only with the absolute position detection system.
(3) When 0 is set for #2057 (nrefp) and #2058 (nrefn) in the [ABS. POSI PARAM] screen, it will be same as when the grid width is set.
[Function]
This signal indicates that which axis is controlled as the superimposition axis during the arbitrary axis superimposition control.
0: Axis not in the arbitrary axis superimposition control
1: Axis in the arbitrary axis superimposition control
[Operation]
This signal turns ON when the arbitrary axis superimposition control is established after the arbitrary axis superimposition control "start" is commanded.
This signal turns OFF when the arbitrary axis superimposition control "end" is commanded.
Cont. Signal name Abbrev. $1 $2 $3 $4
A Near reference position n-th axis NRF1 to 8 X880 to 7 X888 to F X890 to 7 X898 to F
Cont. Signal name Abbrev. $1 $2 $3 $4
A Arbitrary axis superimposition complete n-th axis PLFN1 to 8 X8A0 to 7 X8A8 to F X8B0 to 7 X8B8 to F
+ direction - direction
#2057 setting value
1st reference position
#2058 setting value
Near reference position
(NRFn)
Note

[Function]
This signal notifies that the basic machine coordinate system has been set (established) during zero point initialization set using the marked point alignment method in the absolute position detection system.
[Operation]
This signal is valid when "#2049 TYPE" on the [ABS. POSI PARAM] screen is set to "2", and turns ON when the basic machine coordinate system is set (established).
This signal will turn OFF if initializing is carried out again or if the power is turned ON again.
<Zero point initialization set method using marked point alignment method, and timing chart>
[Related signals]

(1) Zero point initialization set error completed (ZSE1 to 8: X8E0 to 7)
(2) In initialization (R574)
(3) Initialization incompletion (R575)
(4) Zero point initialization set mode (AZS1 to 8: Y960 to 7)
(5) Zero point initialization set start (ZST1 to 8: Y980 to 7)
Cont. Signal name Abbrev. $1 $2 $3 $4
A Zero point initialization set completed n-th axis ZSF1 to 8 X8C0 to 7 X8C8 to F X8D0 to 7 X8D8 to F
[Time chart] ((a) to (e) in the figure correspond to (a) to (e) above)
(a)
(b)
(d)
(e)
(c)
(e)
(c)
(e)
(a) (b)
[Outline of zero point initialization set method]
Start point
Machine basic position
Completion
(Note) The axis movement for
(b) and (d) is carried out
with jogging or handle
operation.
Basic machine coordinate system
zero point
Zero point return parameter
(d)
Grid point
(absolute position
basic point)
Screen
[TO END]
display value
Either one is [ZERO] value
set on the screen.
Zero point initialization set mode
(AZSn)
In initialization
(R574)
Zero point initialization set start
(ZSTn)
Zero point initialization set completed
(ZSFn)
Initialization incompletion
([#2037 G53ofs])
Reference position
(When #2059 zerbas=1)
(When #2059 zerbas=0)
Coordinate

[Function]
This signal is output when initializing is not possible during the marked point alignment method of the absolute position detection system.
[Operation]
This signal turns ON when the initializing is not possible as follows at the rising edge of the "Zero point initialization set start" signal (Y980: ZSTn).
During emergency stop
In "reset"
When the "Zero point initialization set start" signal (Y980: ZSTn) is turned ON before the "Zero point initialization set mode" signal (Y960: AZSn).
When grid has not been passed even once after the power has been turned ON. (Depends on the encoder type)
This signal turns OFF when the initializing is possible at the rising edge of the the "Zero point initialization set start" signal (Y980: ZSTn).
[Related signals]
(1) Zero point initialization set completed (X8C0: ZSFn)
(2) In initialization (R574)
(3) Initialization incompletion (R575)
(4) Zero point initialization set mode (Y960: AZSn)
(5) Zero point initialization set start (Y980: ZSTn)
[Function] [Operation]
This signal turns ON during the current limit.
[Related signals]
(1) Current limit reached n-th axis (ILA1 to 8: X920 to 7)
(2) Current limit changeover n-th axis (ILC1 to 8: Y9A0 to 7)
(3) Droop cancel request n-th axis (DOR1 to 8: Y9C0 to 7)
(4) Current limit mode 1 and 2 (ILM1,2: YCC0,1)
(5) Current limit changeover (R2593)
[Function] [Operation]
This signal turns ON when the current reaches its limit during the current limit control.
[Related signals]
(1) In current limit n-th axis (ILI1 to 8: X900 to 7)
(2) Current limit changeover n-th axis (ILC1 to 8: Y9A0 to 7)
(3) Droop cancel request n-th axis (DOR1 to 8: Y9C0 to 7)

(4) Current limit mode 1 and 2 (ILM1,2: YCC0,1)
(5) Current limit changeover (R2593)
Cont. Signal name Abbrev. $1 $2 $3 $4
A Zero point initialization set error completed n-th axis ZSE1 to 8 X8E0 to 7 X8E8 to F X8F0 to 7 X8F8 to F
Cont. Signal name Abbrev. $1 $2 $3 $4
A In current limit n-th axis ILI1 to 8 X900 to 7 X908 to F X910 to 7 X918 to F
Cont. Signal name Abbrev. $1 $2 $3 $4
A Current limit reached n-th axis ILA1 to 8 X920 to 7 X928 to F X930 to 7 X938 to F

[Function]
This signal indicates that the actual axis feedrate has reached the feedrate commanded for each axis.
[Operation]
This signal turns ON when the difference of the speed commanded for each axis and the motor feedback feedrate is within a set range (approximately 15%).
This signal turns OFF when the speed difference exceeds the set range.
[Related signals]
(1) In axis plus motion n-th axis (MVP1 to 8: X7C0 to 7)
(2) In axis minus motion n-th axis (MVM1 to 8: X7E0 to 7)
Cont. Signal name Abbrev. $1 $2 $3 $4
A NC axis up-to-speed n-th axis ARRFn X940 to 7 X948 to F X950 to 7 X958 to F
15%
Axis start
Axis feedrate
NC axis up-to-speed
In axis plus motion/
In axis minus motion

[Function]
This signal is output when movement of the axis selected as the index table indexing axis is commanded.
[Operation]
"Type A" or "Type B" is selected by the parameter "#1282 ext18/bit3" (Index table clamp type).
<Type A ("#1282 ext18/bit3" is set to "0")>
When this signal turns ON, the index table indexing axis clamp is released by the PLC, and the "Unclamp completion" signal (UCLPFn) is set.
This signal turns OFF when movement of the index table indexing axis is completed.
This signal does not turn OFF if the axis movement is interrupted with an interlock or automatic operation suspension, etc.
When the "Unclamp completion" signal turns OFF during the movement of index table indexing axis in automatic operation, the "Unclamp command" remains ON and the index table indexing axis decelerates and stops.
Other axes commanded in the same block decelerate and stop in the same manner except for non-interpolation commands.
When the axis movement is stopped due to reset or emergency stop, etc., the "Unclamp command" is turned OFF even if the axis is not in the indexing position. Make sure not to clamp it.
<This signal turns ON in the following case>
Movement of the indexing axis is commanded during automatic operation.
<This signal turns ON in the following case>
Movement of the index table indexing axis is completed during automatic operation.
The axis movement is forcibly terminated by reset or emergency stop, etc.
<Type B ("#1282 ext18/bit3" is set to "1")>
When this signal turns ON, the index table indexing axis clamp is released by the PLC, and the "Unclamp completion" signal (UCLPFn) is set.
<This signal turns ON in the following case>
Movement of the index table indexing axis is commanded during automatic operation.
<This signal turns ON in the following case>
The "Unclamp completion" signal turns ON by PLC. (Including during the axis movement.)
The axis movement is forcibly terminated by reset or emergency stop, etc.
(1) This signal is turned ON and OFF when the index table indexing axis acceleration/deceleration has completed. There fore, if the in-position has to be confirmed during the clamp and unclamp operation, confirm with the PLC.
(2) Refer to the "Programming Manual" for operation details of each type A and type B.
[Related signals]
(1) Unclamp completion (UCLPFn: YA20 to 7)
(2) Clamp command (CLPn: XB00 to XB07)
(3) Clamp completion (CLPFn: YB00 to YB07)
[Function]
This signal is a status signal that indicates a state commanded by the "mixed control (cross axis control) request" signal.
[Operation]
The axis for which "in mixed control (cross axis control)" is "1".
(Example)
[Related signals]
(1) Mixed control (cross axis control) request n-th axis (YA60 to 7)
Cont. Signal name Abbrev. $1 $2 $3 $4
A Unclamp command n-th axis UCLPn X960 to 7 X968 to F X970 to 7 X978 to F
Cont. Signal name Abbrev. $1 $2 $3 $4
A In mixed control (cross axis control) n-th axis X980 to 7 X988 to F X990 to 7 X998 to F
Note
2nd part system
X2
Z2
(1) Mixed control (cross axis control) between X1 and X2:
X980 and X988 are "1".
(2) When C1 is controlled in 2nd part system:
X982 and X98A are "1".
1st part system
X1

Z1
C1
Y1

[Function]
This signal informs the axis in the control axis synchronization between part systems/superimposition control.
0: Axis not in control axis synchronization between part systems/superimposition control
1: Axis in control axis synchronization between part systems/superimposition control
[Operation]
The synchronized axis/superimposed axis and synchronized reference axis/superimposed reference axis are indicated.
[Caution]
(1) Since the control axis synchronization between part systems and the control axis superimposition control functions cannot be used simultaneously, when this signal is set to "1", it indicates that the axis is always in either synchronous control or superimposition control.
[Related signals]
(1) Synchronous control request n-th axis (YA80 to 7)
(2) Superimposition control request n-th axis (YAA0 to 7)
[Function]
This signal indicates that a control axis is in mirror image.
There is a signal for each control axis. The number at the end of the signal name indicates the control axis No.
[Operation]
This signal turns ON when:
Programmable mirror image
Parameter setting mirror image
External input mirror image
Facing turret mirror image
This signal turns OFF when:
The mirror image above is canceled.
[Function]
This signal indicates that a reference position has been established.
There is a signal for each control axis. The number at the end of the signal name indicates the control axis No.
[Operation]
This signal turns ON when:
Manual reference position return is completed and a reference position is established.
A reference position is established by the absolute encoder when the power is turned ON.
This signal turns OFF when:
The reference position is lost.
Cont. Signal name Abbrev. $1 $2 $3 $4
A In synchronous/superimposition control n-th axis X9A0 to 7 X9A8 to F X9B0 to 7 X9B8 to F
Cont. Signal name Abbrev. $1 $2 $3 $4
A In mirror image n-th axis MIRn X9C0 to 7 X9C8 to F X9D0 to 7 X9D8 to F
Cont. Signal name Abbrev. $1 $2 $3 $4
A Reference position establishment n-th axis X9E0 to 7 X9E8 to F X9F0 to 7 X9F8 to F

[Function]
This signal indicates that whether the reference position selected by the "Reference position selection code 1, 2" or the "Each axis reference position selection" is in the positive direction or negative direction with respect to the current position.
[Operation]
This signal turns ON when:
The reference position selected by the "Reference position selection code 1, 2" (ZSL1, ZSL2: YC90, YC91) or the "Each axis reference position selection" (R2584) is in the minus direction while reference position is established.
This signal turns OFF when:
The reference position is in the plus direction.
The current position is on the reference position
The reference position is lost
(1) If the rotation axis type is other than all coordinate linear type, this signal turns ON when 0< 180, and turns OFF when 180 < 360 (0).
(2) The "Reference position return direction" signal is not output for the reference position commanded by the machining program in an automatic operation.
(3) The "Reference position selection code 1, 2" and the "Each axis reference position selection" hold the state of the ref erence position return start in the reference position return mode.
(4) When the zero point is changed during reference position return while the "Reference position selection code 1, 2" is valid, the "Reference position return direction" is output to the zero point prior to the change.
(5) When the zero point is changed during reference position return while the "Each axis reference position selection" is valid, the "Reference position return direction" is output to the zero point after the change.
[Related signals]
(1) Reference position establishment (X9E0 to X9E7)
(2) Reference position selection method (M: YC97)
(3) Reference position selection code 1, 2 (ZSL1, 2: YC90, YC91)
(4) Each axis reference position selection (R2584)
[Function]
This signal indicates the control status (NC control or PLC control) of the NC axis which can be operated under PLC control.
[Operation]
This signal turns ON when the NC axis is under NC control.
This signal turns OFF when the NC axis is under the PLC control.
The following shows the correspondence of axis Nos. and device Nos.
[Caution]
(1) The NC axis which can be operated under PLC control is the NC axis for which the axis No. for PLC axis indexing is set by the parameter "#12800 chgauxno".
(2) If the axis is moving, turning ON/OFF the "NC axis control selection n-th axis" results in an operation error. After the axis decelerates and stops, the signal changes to ON/OFF.
[Related signals]

(1) NC axis control selection n-th axis (YAC0 to YAC7)
Cont. Signal name Abbrev. $1 $2 $3 $4
A Reference position return direction n-th axis XA00 to 7 XA08 to F XA10 to 7 XA18 to F
Cont. Signal name Abbrev. $1 $2 $3 $4
A In NC axis control n-th axis - XA20 to 7 XA28 to F XA30 to 7 XA38 to F
Device No. Signal name Device No. Signal name
XA20 In NC axis control 1st axis XA24 In NC axis control 5th axis
XA21 In NC axis control 2nd axis XA25 In NC axis control 6th axis
XA22 In NC axis control 3rd axis XA26 In NC axis control 7th axis
XA23 In NC axis control 4th axis XA27 In NC axis control 8th axis
Note

[Function]
This signal indicates that the external machine coordinate system offset data is illegal, as the changed amount by the data will exceed the rapid traverse feedrate.
[Operation]
This signal turns ON when the external machine coordinate system offset data is illegal.
Then the change of the external machine coordinate system offset data is ignored. The compensation is executed with the set value unchanged.
[Related signals]
(1) Ext. machine coordinate system offset data n-th axis (R5700 to R5715)
[Function]
This signal indicates that the vertical axis pull-up function has been prevented.
[Operation]
This signal is ON while the vertical axis pull-up function is prevented.
[Related signals]
(1) Vertical axis pull-up prevention request (YAE0 to YAE7)
[Function]
This signal is output when movement of the axis selected as the index table indexing axis is completed.
[Operation]
"Type A" or "Type B" is selected by the parameter "#1282 ext18/bit3" (Index table clamp type).
<Type A ("#1282 ext18/bit3" is set to "0")>
This signal is not used.
<Type B ("#1282 ext18/bit3" is set to "1")>
When this signal is turned ON, the index table indexing axis is clamped by the PLC, and the "Clamp completion" signal turns ON.
<This signal turns ON in the following case>
The movement of the index table indexing axis is completed by automatic operation.
<This signal turns ON in the following case>
The "Clamp completion" signal is turned ON by PLC.
At reset or emergency stop
(1) This signal is turned ON and OFF when acceleration/deceleration of the index table indexing axis is completed. Thus, if it is necessary to confirm the in-position during the clamp or unclamp operation, confirm with the PLC.
(2) When this is stopped by reset while the index table indexing axis is moving in automatic operation, the clamp com mand is not output. Perform the necessary processing by PLC.
(3) Refer to "Programming Manual" for operation details of each type A and type B.
[Related signals]
(1) Unclamp command (UCLPn: X960 to X967)
(2) Unclamp completion (UCLPFn: YA20 to YA27)
(3) Clamp completion (CLPFn: YB00 to YB07)
[Function]
This signal indicates that the control axis for which the rotary axis spindle control is enabled in the parameter setting is currently in the spindle mode.
This signal is a signal for each control axis, and the number at the end of the signal name indicates the control axis No.
[Related signals]
(1) Spindle-mode rotary axis control command n-th axis (ROTSPCn: YB40 and following)
Cont. Signal name Abbrev. $1 $2 $3 $4
A Ext. machine coordinate system offset data illegal n-th axis ECIL1 to 8 XA40 to 7 XA48 to F XA50 to 7 XA58 to F
Cont. Signal name Abbrev. $1 $2 $3 $4
A Vertical axis pull-up prevented n-th axis XA60 to 7 XA68 to F XA70 to 7 XA78 to F
Cont. Signal name Abbrev. $1 $2 $3 $4
A Clamp command n-th axis CLPn XB00 to 7 XB08 to F XB10 to 7 XB18 to F
Cont. Signal name Abbrev. $1 $2 $3 $4
A Spindle-mode rotary axis control mode n-th axis ROTSPM1 to
8 XB40 to 7 XB48 to F XB50 to 7 XB58 to F
Note

[Function]
This signal informs the PLC that the control axis of the control unit is in-position state.
[Operation]
This signal turns ON when:
There is no acceleration/deceleration delay on the control axis, and servo errors (remaining pulses) in positioning are within the range set by the parameter.
This signal turns OFF when:
There is an acceleration/deceleration delay on the control axis.
Servo positioning error (remaining pulses) of the control axis exceeds the range set by the parameter.
(1) The "Each axis in-position" signal may turn ON even while moving if the feedrate is extremely slow.
When all "Each axis in-position" signals in the part system turn ON, the "All axes in-position" signal turns ON.
[Caution]
(1) When the operation with machine lock is performed and variable-acceleration pre-interpolation acceleration/decelera tion is enabled by the function such as high-accuracy control, the "Each axis in-position" signal is always ON.
(2) The "Each axis in-position" signal can not be used during the synchronous operation.
[Related signals]
(1) All axes in-position (TIMP: XC19)

Cont. Signal name Abbrev. $1 $2 $3 $4
A Each axis in-position n-th axis AXINP1 to 8 XB60 to 7 XB68 to F XB70 to 7 XB78 to F
Note
Axis motion (1st axis)
Axis motion (2nd axis)
All axes in-position (TIMPn)
Each axis in-position 1st axis (AXIMP 1)
Each axis in-position 2nd axis (AXIMP 2)

[Function]
This signal indicates that speed control gain switching is currently stopped in the real-time tuning 1 function.
[Operation]
This signal indicates that speed control gain switching is stopped and the value of speed control gain is retained.
This signal is output when the "Speed control gain changeover hold-down command" is ON or when the cutting command modal is effective, regardless of whether this function is enabled or disabled.
This signal is not output when speed control gain switching is performed. Also, the signal is not output when the additional specification of real-time tuning 1 is set to OFF.
[Related signals]
(1) Real-time tuning 1: Speed control gain changeover hold-down command (VGHLDC1: YB80)
Cont. Signal name Abbrev. $1 $2 $3 $4
A Real-time tuning 1: Speed control gain changeover hold down ON VGHLD1 to 8 XB80 to 7 XB88 to F XB90 to 7 XB98 to F
G0 G1 G0
In cutting command
Speed control gain
changeover prevented
command
In speed control gain
changeover prevented
Inertia value
Speed control gain
Value
maintained
Switch restart
Switch restart
Value
maintained

[Function]
This signal indicates that the NC axis/PLC axis switchover is disabled on the axis that is subject to the NC axis/PLC axis switchover.
This signal is available for each control axis.
[Operation]
This signal turns ON when the axis for which the NC axis/PLC axis switchover is valid is under the following conditions.
When the NC axis/PLC axis switchover is performed while this signal is ON, the operation error (M01 1250) occurs.
- While the axis is moving(*1)
- When the movement is stopped by the override zero or feed hold
- During the servo OFF
- While the axis is being removed
- While the axis is stopped for interlock
- During the current limit
- During the droop cancel
- During the H/W OT or soft limit
- During the manual machine lock
- The reference axis or superimposed axis that is under the control axis superimposition
- The reference axis or synchronized axis that is under the control axis synchronization between part systems
- The chopping axis during the chopping
- The rotary tool axis during the tool spindle synchronization II (polygon)
- The workpiece axis during the tool spindle synchronization II (hobbing)
- The axis of the part system which is during the high-speed machining mode II/high-speed high-accuracy control II

(*1) When a movement command is given to multiple axes in the same program block, even if the movement of the swi tchover target axis is completed and stopped, the switchover is disabled if the other axes are still moving.
[Related signals]
(1) NC axis/PLC axis switchover in process (NPCHGMOD1 to 8: XBC0 to 7)
(2) NC axis/PLC axis switchover request (NPCHGREQ1 to 8: YBC0 to 7)
[Function]
This signal notifies that the NC axis/PLC axis switching axis is in a controllable state as a PLC axis.
This signal is available for each control axis.
[Operation]
This signal turns OFF while the NC axis is controlled and turns ON while the PLC axis is controlled.
[Related signals]
(1) NC axis/PLC axis switchover invalid status (NPCHGIS1 to 8: XBA0 to 7)
(2) NC axis/PLC axis switchover request (NPCHGREQ1 to 8: YBC0 to 7)
Cont. Signal name Abbrev. $1 $2 $3 $4
A NC axis/PLC axis switchover invalid status NPCHGIS1
to 8 XBA0 to 7 XBA8 to F XBB0 to 7 XBB8 to F
Cont. Signal name Abbrev. $1 $2 $3 $4
A NC axis/PLC axis switchover n-th axis in process NPCHG MOD1 to 8 XBC0 to 7 XBC8 to F XBD0 to 7 XBD8 to F

[Function]
This signal indicates that operation is stopped by the machine group-based PLC interlock.

[Operation]
This signal indicates that operation is stopped by the machine group-based alarm stop function.
This signal is not output when the axis is not stopped or when the axis is stopped by an alarm other than that caused by the machine group-based alarm stop function.
The signal assignments for each group are as follows:
[Function]
This signal indicates that the JOG mode is selected.
[Operation]
After the "All axes smoothing zero" (TSMZ) (command acceleration/deceleration delay is zero) is verified, the mode changes from other mode to the JOG mode.
[Related signals]
(1) All axes smoothing zero (TSMZ: XC1A)
[Function]
This signal indicates that the handle mode is selected.
[Operation]
After the "All axes smoothing zero" (TSMZn) (command acceleration/deceleration delay is zero) is verified, the mode changes from other mode to the handle mode.
[Related signals]
(1) All axes smoothing zero (TSMZ: XC1A)
Cont. Signal name Abbrev. Device
A Machine group-based alarm stop:
Machine group-based PLC interlock ON GQEMGOn XBE0 to 7 XBE8 to F XBF0 to 7 XBF8 to F
Group 1 Group 2 Group 3 Group 4 Group 5 Group 6 Group 7 Group 8
XBE0 XBE1 XBE2 XBE3 XBE4 XBE5 XBE6 XBE7
Group 9 Group 10 Group 11 Group 12 Group 13 Group 14 Group 15 Group 16
XBE8 XBE9 XBEA XBEB XBEC XBED XBEE XBEF
Group 17 Group 18 Group 19 Group 20 Group 21 Group 22 Group 23 Group 24
XBF0 XBF1 XBF2 XBF3 XBF4 XBF5 XBF6 XBF7
Group 25 Group 26 Group 27 Group 28 Group 29 Group 30 Group 31 Group 32
XBF8 XBF9 XBFA XBFB XBFC XBFD XBFE XBFF
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A In jog mode JO XC00 XD40 XE80 XFC0 X1100 X1240 X1380 X14C0
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A In handle mode HO XC01 XD41 XE81 XFC1 X1101 X1241 X1381 X14C1
Mode input JOG mode Other mode
All axes smoothing zero
(TSMZ)
Other mode
In jog mode
(JO)
Mode input Handle mode Other mode
All axes smoothing zero
(TSMZ)
Other mode
In handle mode
(H0)

[Function]
This signal indicates that the incremental mode is selected.
[Operation]
After the "All axes smoothing zero" (command acceleration/deceleration delay is zero) is verified, the mode changes from other mode to the incremental mode.
[Related signals]
(1) All axes smoothing zero (TSMZ: XC1A)
[Function]
This signal indicates that the manual arbitrary feed mode is selected.
[Operation]
After the "All axes smoothing zero" (command acceleration/deceleration delay is zero) is verified, the mode changes from other mode to the manual arbitrary feed mode.
[Related signals]
(1) All axes smoothing zero (TSMZ: XC1A)
[Function]
This signal indicates that the reference position return mode is selected.
[Operation]
After the "All axes smoothing zero" (command acceleration/deceleration delay is zero) is verified, the mode changes from other mode to the reference position return mode.
[Related signals]
(1) All axes smoothing zero (TSMZ: XC1A)
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A In incremental mode SO XC02 XD42 XE82 XFC2 X1102 X1242 X1382 X14C2
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A In manual arbitrary feed mode PTPO XC03 XD43 XE83 XFC3 X1103 X1243 X1383 X14C3
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A In reference position return mode ZRNO XC04 XD44 XE84 XFC4 X1104 X1244 X1384 X14C4
Mode input Incremental mode Other mode
All axes smoothing zero
(TSMZ)
Other mode
In incremental mode
(SO)
Mode input Manual arbitrary feed mode Other mode
All axes smoothing zero
(TSMZ)
Other mode
In manual arbitrary feed mode

(PTP0)
Mode input Reference positon return mode Other mode
All axes smoothing zero
(TSMZ)
Other mode
In reference position return mode
(ZRN0)

[Function]
This signal indicates that automatic initial set mode is selected.
[Operation]
After the "All axes smoothing zero" (command acceleration/deceleration delay is zero) is verified, the mode changes from other mode to the automatic initial set mode.
[Related signals]
(1) All axes smoothing zero (TSMZ: XC1A)
[Function]
This signal indicates that the simultaneous operation of JOG and handle mode has been entered.
[Operation]
This signal turns ON regardless of the "All axes smoothing zero" signal (TSMZ) which informs there is no delay caused by the acceleration/deceleration time constants.
This signal will not turn ON when the "Jog mode" signal (J) is OFF, even if the "Jog handle synchronous" signal (JHAN) is ON.
[Timing chart]
[Related signals]
(1) Jog mode (J: YC00)
(2) Jog handle synchronous (JHAN: YC7B)
(3) All axes smoothing zero (TSMZ: XC1A)
[Function]
This signal indicates that memory mode is selected.
[Operation]
When the "All axes smoothing zero" (command acceleration/deceleration delay is zero) is verified, the mode changes from other mode to memory mode.
[Related signals]
(1) All axes smoothing zero (TSMZ: XC1A)
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A In automatic initial set mode ASTO XC05 XD45 XE85 XFC5 X1105 X1245 X1385 X14C5
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A In JOG-handle simultaneous mode JHANO XC06 XD46 XE86 XFC6 X1106 X1246 X1386 X14C6
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A In memory mode MEMO XC08 XD48 XE88 XFC8 X1108 X1248 X1388 X14C8
Mode input Automatic initial set mode Other mode
All axes smoothing zero
(TSMZ)
Other mode
In automatic initial set mode
(ASTO)
In Jog-handle simultaneous mode (JHANO)
Jog handle synchronous (JHAN)
Jog mode (J)
Feed axis selection (+J1 to +J8,-J1 to -J8)
All axes smoothing zero (TSMZ)
Mode input Memory mode Other mode
All axes smoothing zero
(TSMZ)
Other mode
In memory mode
(MEMO)

[Function]
This signal indicates tape mode is selected.
[Operation]
When the "All axes smoothing zero" (TSMZ) (command acceleration/deceleration delay is zero) is verified, the mode changes from other mode to tape mode.
[Related signals]
(1) All axes smoothing zero (TSMZ: XC1A)
[Function]
This signal indicates that MDI mode is selected.
[Operation]
After the "All axes smoothing zero" (command acceleration/deceleration delay is zero) is verified, the mode changes from other mode to MDI mode.
[Related signals]
(1) All axes smoothing zero (TSMZ: XC1A)
[Function]
This signal indicates that the sub part system control I mode is selected for the operation mode.
The sub part system can be started by the sub part system control I command (G122) when this signal is ON.
[Operation]
This signal turns ON in the sub part system while the "Sub part system control: Sub part system control I mode" signal (SBSM) is ON.
[Related signals]
(1) Sub part system control: Sub part system control I mode (SBSM: YC0E)
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A In tape mode TO XC09 XD49 XE89 XFC9 X1109 X1249 X1389 X14C9

Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A In MDI mode DO XC0B XD4B XE8B XFCB X110B X124B X138B X14CB
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Sub part system control:
Sub part system control I mode ON SBSMO XC0E XD4E XE8E XFCE X110E X124E X138E X14CE
Mode input Tape mode Other mode
All axes smoothing zero
(TSMZ)
Other mode
In tape mode
(TO)
Mode input MDI mode Other mode
All axes smoothing zero
(TSMZn)
Other mode
In MDI mode
(DOn)

[Function]
This signal indicates that the controller is ready for normal operation.
[Operation]
This signal turns ON when:
The controller starts operating normally after the power of controller is turned ON or when no OFF-condition exists.
This signal turns OFF when:
The controller is turned OFF.
An error in the control device itself such as a CPU error or memory error is detected.
A servo alarm which cannot be reset without turning OFF the power of the controller has occurred.
[Function]
This signal indicates that the servo system is in a state where it can operate normally.
When this signal is OFF, it indicates that the servo system (position control) is not operating.
[Operation]
This signal turns ON when:
The diagnosis on the servo system is completed successfully after the control unit is turned ON.
The servo alarm occurs and then the alarm is canceled by reset. (Resetting may not be possible depending on the servo alarm contents.)
Emergency stop input is canceled.
The power is turned OFF and ON again by entering the decryption code upon expiration set in the system lock.
This signal turns OFF when:
A servo alarm has occurred.
An emergency stop occurs.
The power of the controller is turned OFF.
An error in the control device itself such as a CPU error or memory error is detected.
The decryption code has not been entered to the controller by the specified expiration date in the system lock.
(1) This signal (SA) cannot be turned OFF only with the "Servo OFF" signal (*SVFn).
[Related signals]
(1) Servo ready completion output designation (R2625)
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Controller ready completion MA XC10 XD50 XE90 XFD0 X1110 X1250 X1390 X14D0
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Servo ready completion SA XC11 XD51 XE91 XFD1 X1111 X1251 X1391 X14D1
Do not refer to this signal on the PLC of the machine on which the system lock function is enabled. Reference to this signal can lead to unexpected operation after the expiration date.
Note
CAUTION

[Function]
This signal indicates that the controller is in automatic operation by the "Auto operation "start" command" signal.
[Operation]
This signal stays ON from when automatic operation starts with the "Automatic operation "start" command (ST)" signal in the memory, MDI or tape mode, until the operation is reset.
Reset conditions include the followings:
The "Reset & rewind" signal (RRW) is input.
An emergency stop is entered due to an emergency stop input, servo alarm, etc.
Signals that indicates status of automatic operation include the "In automatic operation "start"" (STL) and the "In automatic operation "pause"" (SPL) besides the "In automatic operation "run"" (OP). The ON/OFF status of these three signals in each state is shown below.
Each state refers to the following states.
Reset condition
Automatic operation is stopped by one of reset conditions described above.
(All states not in automatic operation are this state.)
Automatic operation stop condition
The execution of one block is completed and the automatic operation is stopped.
(This state is entered during single block stop.)
Automatic operation pause condition
Automatic operation is stopped in the middle of execution of one block.
(This state is entered when the "Automatic operation "pause" command" signal (*SP) is OFF.)
Automatic operation start condition
Automatic operation is being executed.
[Related signals]
(1) In automatic operation "start" (STL: XC13)
(2) In automatic operation "pause" (SPL: XC14)
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8

A In automatic operation "run" OP XC12 XD52 XE92 XFD2 X1112 X1252 X1392 X14D2
In automatic oper ation (OP)
In automatic oper ation "start" (STL)
In automatic oper ation "pause"
(SPL)
Reset condition 000
Automatic operation stop
condition 100
Automatic operation
pause condition 101
Automatic operation start
condition 110
Automatic operation
start command (ST)
In automatic operation
run (OP)
Reset conditions

[Function]
This signal informs the PLC that the controller is activated by the automatic operation start and the movement command and M, S, T, B processing is in execution.
[Operation]
In memory, MDI, or tape mode, this signal is turned ON by the "Automatic operation "start" command" signal (ST) from the start of automatic operation until the automatic operation is stopped, the block is stopped, or the reset state is reached.
The timing chart of the "In automatic operation "start"" signal (STL), including automatic operation suspension and block stop, is shown below.
(1) For reset conditions, refer to the section on "In automatic operation "run"" (OP).
[Related signals]
(1) In automatic operation "run" (OP: XC12)
(2) In automatic operation "pause" (SPL: XC14)
(3) Automatic operation "start" command (ST: YC10)
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A In automatic operation "start" STL XC13 XD53 XE93 XFD3 X1113 X1253 X1393 X14D3
Automatic operation "start"
command (ST)
STL is OFF after the
block was completed.
In automatic operation "run"
(OP)
In automatic operation "start"
(STL)
In automatic operation "pause"
(SPL)
Automatic operation "pause"
command (*SP)
Single block (SBK)
Reset conditions
(Reset & rewind (RRW))
Note

[Function]
This signal informs that the controller is inactive due to the factors such as the "Automatic operation "pause" command" signal while the movement command or miscellaneous function command is being executed by automatic operation.
[Operation]
The "In automatic operation "pause"" signal (SPL) turns ON during automatic operation in the memory, MDI or tape mode in the following cases.
When the "Automatic operation "pause" command" signal (*SP) turns OFF.
When the mode is changed to the manual operation mode (jog, handle, incremental, reference position return mode, etc.).
(1) This signal turns ON even during machine lock or a miscellaneous function (M, S, T, B) command.
This signal turns OFF in the following cases.
When the "Automatic operation "start" command" signal (ST) turns from ON to OFF. However, this is invalid if the "Auto matic operation "pause" command" signal (*SP) is not turned back ON or when the mode is not automatic operation (memory, MDI, tape).
When reset conditions are input.
The timing chart for the "In automatic operation "pause"" signal (SPL) is shown below.
(1) For reset conditions, refer to the section on "In automatic operation "run"" (OP).
[Related signals]
(1) In automatic operation "run" (OP: XC12)
(2) In automatic operation "start" (STL: XC13)
(3) Automatic operation "start" command (ST: YC10)
(4) Automatic operation "pause" command (*SP: YC11)
[Function]
This signal informs that the controller is in the process of reset.
[Operation]
This signal turns ON when:
For approximately 4 to 5 seconds after the power is turned ON.
While the "Reset & rewind" signal (RRWn) is ON, and for approximately 0.5 to 1 second after the "Reset & rewind" sig nal (RRWn) turns OFF.
While the "Emergency stop" signal is being input, and for approximately 1 to 1.5 seconds after the "Emergency stop" signal turns OFF.
During the servo alarm, and for approximately 1 to 1.5 seconds after the servo alarm is released.
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A In automatic operation "pause" SPL XC14 XD54 XE94 XFD4 X1114 X1254 X1394 X14D4

Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A In "reset" RST XC15 XD55 XE95 XFD5 X1115 X1255 X1395 X14D5
Note
Automatic operation
"start" command (ST)
G00X100 G00X100
In automatic operation
"start" (STL)
In automatic operation
"pause" (SPL)
Automatic operation
"pause" command (*SP)
Axis motion
Reset condition
(Reset & rewind (RRW))
Invalid
Note

[Function]
This signal is output during execution of the manual arbitrary feed command.
[Operation]
This signal turns ON when:
 The "Manual arbitrary feed strobe" signal (CXS8n) turns ON in the manual arbitrary feed mode.
This signal turns OFF when:
 The feed in the manual arbitrary feed mode is completed.
 The "Reset 1", "Reset 2", or "Reset & Rewind" signal is input during execution of the manual arbitrary feed command.
[Timing chart]
[Related signals]
(1) Manual arbitrary feed strobe (CXS8: YCBF)
(2) In manual arbitrary feed (CXFIN: XC1C)
[Function]
This signal informs that the controller is indexing the memory mode.
[Operation]
This signal turns ON when the "Reset & rewind" signal (RRWn) is turned ON by the PLC in memory mode (with M02 or
M30 command), and turns OFF when the controller completes indexing the program in execution.
(1) Since the time to index a program in memory mode is instantaneous, it may not be verified by user PLC.
[Related signals]
(1) Reset & rewind (RRW: YC1A)
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A In manual arbitrary feed CXN XC16 XD56 XE96 XFD6 X1116 X1256 X1396 X14D6
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A In rewind RWD XC17 XD57 XE97 XFD7 X1117 X1257 X1397 X14D7
Manual arbitrary feed strobe
(CXS8)
In manual arbitrary feed
(CXN)
Manual arbitrary feed
completion (CXFIN)
Rise of strobe signal is detected and
"In manual arbitrary feed" signal
(CXN) turns ON.
When the specified feed is completed
successfully, the "In manual arbitrary
feed" signal turns OFF and the "Manual
arbitrary feed completion" signal turns
ON.
Note

[Function]
This signal notifies that the axis movement command has completed by the controller.
When the movement command and the miscellaneous function (M, S, T, B) command are specified in the same block in
the machining program, this signal can be used as a synchronization signal to determine whether the miscellaneous
function command is processed at the same time as the movement command or after the movement command is
completed.
[Operation]
This signal turns ON when:
 The system is initialized after the power is turned ON.
 The movement command in automatic operation is completed.
 Reset condition occurs.
(For reset conditions, refer to the section on "In automatic operation "run"" signal (OPn).)
The timing chart for the "Motion command completion" signal (DENn) is shown below.
(1) The "Motion command completion" signal is output even during machine lock.
(2) Even if the movement is stopped due to interlock or automatic operation suspension, the "Motion command comple tion" signal does not turn ON as long as there is remaining distance.
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Motion command completion DEN XC18 XD58 XE98 XFD8 X1118 X1258 X1398 X14D8
Command program G00X100.; G00X200.M08;
Axis motion state
Motion command
completion (DEN)
M function strobe (MF)
M code data
M code decode (user process)

M function finish 1 (FIN1)
Detection not
possible
Machine side control
DEN process
Note

[Function]
This signal informs the PLC that all control axes of the controller are in commanded positions.
[Operation]
This signal turns ON when:
There is no acceleration/deceleration delay in all control axes, and servo errors (remaining pulses) are within the range
set by the parameter.
This signal turns OFF when:
There is an axis with acceleration/deceleration delay among the control axes.
There is a control axis in which the servo error (remaining pulses) exceeds the range set by the parameter.
(1) The "All axes in-position" signal may turn ON even while moving if the feedrate is extremely slow.
(2) The condition that the servo errors must be within a certain limit to turn ON this signal can be disabled with parame ters. In that case, this signal changes to ON/OFF only depending on whether the acceleration/deceleration delay is zero.
[Related signals]
(1) All axes smoothing zero (TSMZ: XC1A)
[Function]
This signal informs the PLC that there is no delay (caused by the acceleration/deceleration time constants) in any of the
controller control axis command system.
The PLC axis is not included in the control axis.
[Operation]
This signal turns ON when all the output processing the movement amount commanded by automatic operation or manual
operation, including the delay amount of acceleration/deceleration time constant, is completed. This signal turns OFF
during execution of the movement command and when there is a delay amount of acceleration/deceleration time constant.
(1) The "All axes smoothing zero" signal operates even during machine lock.
(2) The "All axes smoothing zero" signal may turn ON even while moving when the moving speed is extremely slow.
(3) In axis plus/minus motion signals are all turned OFF while the "All axes smoothing zero" is ON.
[Related signals]
(1) All axes in-position (TIMP: XC19)
(2) In axis plus motion n-th axis (MVP1 to MVP8: X7C0 to 7)
(3) In axis minus motion n-th axis (MVM1 to MVM8: X7E0 to 7)
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A All axes in-position TIMP XC19 XD59 XE99 XFD9 X1119 X1259 X1399 X14D9
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A All axes smoothing zero TSMZ XC1A XD5A XE9A XFDA X111A X125A X139A X14DA
Note
Accel./Decel.
Time constant
Positioning loop
Time constant
Smoothing circuit Servo drive unit
Accel./Decel. delay Motor servo control error
Motor
Feed axis selection (+J1)
Axis motion
(Position loop delay
is not included.)
All axes smoothing zero
Acceleration/deceleration
time constant
Note

[Function]
This signal is output when the movement commanded by the manual arbitrary feed mode is completed.
[Operation]
This signal turns ON when:
The movement commanded by the manual arbitrary feed mode is completed.
This signal turns OFF when:
Moving in manual arbitrary feed mode. (This signal remains OFF when the movement is interrupted while moving by the
"Reset 1", "Reset 2", "Reset & Rewind", etc.)
This signal is OFF when the power is turned ON.
[Timing chart]
[Related signals]
(1) Manual arbitrary feed strobe (CXS8: YCBF)
(2) In manual arbitrary feed (CXN: XC16)
[Function] [Operation]
This signal turns ON when the external search is completed. It also turns ON when an error occurs.
This signal turns OFF when the "External search strobe" signal (YC1D) is turned OFF from the user PLC.
[Timing chart]
[Related signals]
(1) External search strobe (YC1D)
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Manual arbitrary feed completion CXFIN XC1C XD5C XE9C XFDC X111C X125C X139C X14DC
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A External search finished XC1D XD5D XE9D XFDD X111D X125D X139D X14DD
Manual arbitrary feed strobe
(CXS8)

In manual arbitrary feed
(CXN)
Manual arbitrary feed completion
(CXFIN)
When manual arbitrary feed is completed
successfully, "Manual arbitrary feed
completion" signal turns ON.
At the rising edge of strobe signal is
detected and "In manual arbitrary feed"
signal is output. "Manual arbitrary feed
completion" signal turns OFF.
External search strobe
(PLC NC)
Processing external search
(NC internal state)
External search finished signal
(NC PLC)
External search status
(NC PLC)
search completed

[Function]
This signal notifies that the operation is in high-speed machining mode.
[Operation]
This signal turns ON when:
The high-speed machining mode is commanded in the machining program.
This signal turns OFF when:
Cancellation of the high-speed machining mode is commanded in the machining program.
The high-speed machining mode ended due to an operation such as NC reset.
[Function]
This signal notifies that the movement command in automatic operation (memory, MDI, tape) is being performed in rapid traverse.
[Operation]
This signal turns ON when:
The movement command in automatic operation is given in rapid traverse.
Fixed cycle positioning and reference position return (G28), etc., are included in the automatic operation rapid traverse besides the motion command by the G00 command.
This signal turns OFF when:
The block in rapid traverse motion is completed during automatic operation.
Rapid traverse motion is stopped by the "Automatic operation "pause" command (Feed hold)" signal (*SPn) during automatic operation.
Rapid traverse motion axis is stopped by interlock during automatic operation.
The ratio of the "Cutting feedrate override code m" (*FVmn) becomes 0% during automatic rapid traverse operation.
A stroke end (hardware or software) occurs during automatic rapid traverse operation.
Reset condition occurs.
(1) The "In rapid traverse" signal (RPNn) can turn ON and OFF even during machine lock.
(2) The signal is not output in manual operation.
(3) For reset condition, refer to the section on "In automatic operation "run"" signal (OPn).
The timing chart of the "In rapid traverse" signal (RPNn) is shown below.
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A In high-speed machining mode (G05) XC1F XD5F XE9F XFDF X111F X125F X139F X14DF
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A In rapid traverse RPN XC20 XD60 XEA0 XFE0 X1120 X1260 X13A0 X14E0
Note
Command program
Axis motion state
In rapid traverse
(RPN)
G00X100.; M08 ;

[Function]
This signal informs that given motion command is executed for cutting feed in automatic operation (memory, MDI, tape).
[Operation]
This signal turns ON when:
Motion command is given for cutting feed in automatic operation.
This signal turns OFF when:
The block in cutting feed in automatic operation is completed.
Execution of cutting feed in automatic operation is stopped by the "Automatic operation "pause" command" signal (*SP).
Execution of cutting feed is stopped by interlock during automatic operation.
The ratio of the cutting feedrate override becomes 0% during automatic cutting feed operation.
A stroke end (hardware or software) occurs during automatic cutting feed operation.
Reset condition occurs.
(1) The "In cutting feed" signal (CUT) turns ON and OFF even when the machine lock is applied.
(2) Cutting feed commands in automatic operation include G01, G02, G03 and G31.
(3) This signal is not output in manual operation.
(4) For reset condition, refer to the section on "In automatic operation "run"" signal (OP).
[Function]
This signal informs that the movement command in automatic operation (memory, MDI, tape) is in the tapping cycle of the fixed cycle or in the tapping mode.
[Operation]
This signal turns ON when:

The movement command in automatic operation is performed in the tapping cycle of the fixed cycle.
The movement command in automatic operation is in tapping mode (G63).
This signal turns OFF when:
The movement command is not in the tapping cycle and no longer in tapping mode.
This signal is canceled by G80 or G command (G00, G01, G02, G03, G33) of 01 group during the tapping cycle of the fixed cycle, and is canceled by G61, G62 or G64 during the tapping mode.
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A In cutting feed CUT XC21 XD61 XEA1 XFE1 X1121 X1261 X13A1 X14E1
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A In tapping TAP XC22 XD62 XEA2 XFE2 X1122 X1262 X13A2 X14E2
Note
In cutting feed (CUT)
Axis motion
Cutting feed (G01)
Motion
command
In tapping
(TAP)
(Note 1) This signal is output even during machine lock.
G00 G84; G80; G63; G01; G61;

[Function]
This signal is output during execution of the thread cutting command.
[Operation]
This signal turns ON when:
The thread cutting command is given.
This signal turns OFF when:
A movement command other than the thread cutting command is given.
A reset is applied for some reason during thread cutting.
(1) Spindle override is invalid (100%) during thread cutting.
[Function]
This signal is output during execution of the synchronous feed command.
[Operation]
The signal turns ON when the synchronous feed command (G95) is given.
The signal turns OFF when the asynchronous feed command (G94) is given.
[Function]
This signal informs that automatic operation is under constant circumferential (surface) speed control.
[Operation]
This signal turns ON when the constant surface speed control mode (G96) is selected during automatic operation.
This signal turns OFF when the constant surface speed control off command (G97) is issued.
(1) The "In constant surface speed" signal (CSS) is output even during machine lock.
[Function]
This signal is output while the skip command (G31) is being executed.
[Operation]
The signal turns ON when the skip command (G31) is being executed by automatic operation.
The signal turns OFF when the block where the skip command is issued completes.
[Function]
This signal is output while the reference position return command is being executed.
[Operation]
This signal turns ON when:
G28 command is executed.
G30 command is executed.
The manual reference position return mode is selected.
This signal turns OFF when:
All cases other than above.
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A In thread cutting THRD XC23 XD63 XEA3 XFE3 X1123 X1263 X13A3 X14E3
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A In synchronous feed SYN XC24 XD64 XEA4 XFE4 X1124 X1264 X13A4 X14E4
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A In constant surface speed CSS XC25 XD65 XEA5 XFE5 X1125 X1265 X13A5 X14E5
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A In skip SKIP XC26 XD66 XEA6 XFE6 X1126 X1266 X13A6 X14E6
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A In reference position return ZRNN XC27 XD67 XEA7 XFE7 X1127 X1267 X13A7 X14E7
Note
G00 G0Z-10.; Motion
command
In constant surface
speed (CSS)
G96 G1 X30. S30; G0 X- ; G97 G01
Note

[Function]
This signal informs that the controller uses inch unit for data input.
[Operation]
This signal turns ON when inch unit is selected.
During G20 (Inch unit command) modal, the "In inch unit selection" signal turns ON.
This signal does not change with the machine parameter "#1041 I_inch".
[Function]
This signal informs that the results of the movement command executed by the control unit are not reflected in the POSITION screen (display is locked).

[Operation]
This signal turns ON while the "Display lock" signal (DLK) is input.
The display lock operation is enabled immediately after the "Display lock" signal (DLK) turns ON.
[Related signals]
(1) Display lock (DLK: YC29)
[Function]
This signal informs that the controller is in operation by the F1-digit commands (F1 to F5).
[Operation]
This signal turns ON when:
F1-digit command (F1 to F5) is selected for feedrate command currently being executed.
This signal turns OFF when:
Block having a motion command specified with F1-digit code is completed.
Operation is stopped by the "Automatic operation "pause" command" signal (*SP) during execution of motion command by F1-digit command.
Operation is stopped by the "Interlock" signal during execution of motion command by F1-digit command.
Reset condition occurs.
(For details of reset conditions, refer to the section on "In automatic operation "run"" signal (OP).)
(1) To enable the F1-digit command, enable either the parameter #1079 F1digt" or "#8145 Validate F1 digit".
[Related signals]
(1) F1-digit No. code (F11 to 18: XC30 to XC33)
[Function]
This signal is output during the tool life management.
[Operation]
The "In tool life management" signal turns ON when the parameter of tool life management (#1103 T_Life) is ON.
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A In inch unit selection INCH XC28 XD68 XEA8 XFE8 X1128 X1268 X13A8 X14E8
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A In display lock DLNK XC29 XD69 XEA9 XFE9 X1129 X1269 X13A9 X14E9
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A F1-digit commanded F1DN XC2A XD6A XEAA XFEA X112A X126A X13AA X14EA
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A In tool life management TLFO XC2B XD6B XEAB XFEB X112B X126B X13AB X14EB
Note

[Function]
This signal indicates that the "Tool life over" signal is being temporarily canceled.
[Operation]
This signal turns ON when:
The "Temporary cancel of tool life expiration" signal turns ON.
This signal turns OFF when:
The "Tool life over" signal is OFF at the falling edge of the "Temporary cancel of tool life expiration" signal.
(However, when the "Tool life over" signal is ON, this signal remains ON because it is canceled temporarily.)
The NC is reset.
The "Tool life over" signal turns OFF while this signal is output.
[Related signals]
(1) Tool life over (TLOV: XC2E)
(2) Tool life management: Temporary cancel of tool life expiration (YC98)
[Function]
This signal indicates that the "Tool group life over" signal is being temporarily canceled.
[Operation]
This signal turns ON when:
The "Temporary cancel of tool group life expiration" signal turns ON.
This signal turns OFF when:
The "Tool group life over" signal is OFF at the falling edge of the "Temporary cancel of tool group life expiration" signal.
(However, when the "Tool group life over" signal is ON, this signal remains OFF because it is canceled temporarily.)
The NC is reset.
The "Tool group life over" signal turns OFF while this signal is output.
[Related signals]
(1) Tool group life over (XC2F)
(2) Tool life management: Temporary cancel of tool group life expiration (YC99)
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A
Tool life management:
Temporary cancel of tool life expiration
ON
XC2C XD6C XEAC XFEC X112C X126C X13AC X14EC
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A
Tool life management:
Temporary cancel of tool group life ex piration ON
XC2D XD6D XEAD XFED X112D X126D X13AD X14ED

[Function]
This signal notifies that a tool has reached the end of tool life (cumulative tool usage data estimated tool life data).
[Operation]
The signal turns ON when cumulative tool usage data of tool is same as or has exceeded estimated tool life data. Note that this signal is only output and automatic operation or other operations of the controller does not stop.
<For Tool life management I or III for M system>
<For Tool life management I for L system>
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Tool life over TLOV XC2E XD6E XEAE XFEE X112E X126E X13AE X14EE
ON condi tion

#1246 set18/bit4 = 0
The currently selected tool has reached the end of tool life (cumulative tool usage data
estimated tool life data).
(Time-count type: during cutting feed)
(Number of cuttings-count type: at the start of cutting feed for Type 1 and at Reset for
Type 2)
The selected tool has already reached the end of tool life at the time of tool selection.
(Same timing as the "T function strobe 1" signal)
#1246 set18/bit4 = 1
Even one of the tools in the currently selected group (or all the registered tool for Tool
life management III) has reached the end of tool life (cumulative tool usage data es timated tool life data).
(Time-count type: during cutting feed)
(Number of cuttings-count type: at the start of cutting feed for Type 1 and at Reset for
Type 2)
Even one of the tools in the group has reached the end of tool life at the time of group
selection.
(Same timing as the "T function strobe 1" signal)
OFF condi tion
#1246 set18/bit4 = 0
The tool selection has been completed.
(At a T command. Note that the signal remains ON if the next tool has reached the end
of tool life.)
The tool status of the currently selected tool is cleared.
#1246 set18/bit4 = 1
The group selection has been completed.
(At a T command. Note that the signal remains ON if the next selected group contains
any expired tool.)
The cumulative tool usage data is smaller than the estimated tool life data (cumulative
tool usage data < estimated tool life data).
At the falling edge (1 -> 0) of the "Temporary cancel of tool life expiration" signal of corresponding part system.
(However, this signal is turned ON again if the spindle tool used has reached the end of tool life when the NC
is reset.)
ON condi tion
T command is given after a currently selected tool has reached the end of tool life (cumulative tool usage data
estimated tool life data)
The selected tool has already reached the end of tool life at the time of tool selection.
(Same timing as the "T function strobe 1" signal)
OFF condi tion
#1262 set34/bit3 = 0 The "M function finish" signal (FIN) is turned ON.
#1262 set34/bit3 = 1
The tool selection has been completed.
(At a T command. Note that the signal remains ON if the next tool has reached the end
of tool life.)
At the falling edge (1 -> 0) of the "Temporary cancel of tool life expiration" signal of corresponding part system.
(However, this signal is turned ON again if the tool currently being used has reached the end of tool life when
the NC is reset.)

<For Tool life management II for M and L system>
[Related signals]
(1) Temporary cancel of tool life expiration signal (YC98 to Y1558)
[Function]
This signal notifies that all tools in the tool group have reached the end of tool lives.
This signal is valid only for tool life management II.
The output condition can be selected by the parameter "#1277 ext13/bit0". The count method of usage count will also be
switched by this parameter.
[Operation]
This signal turns ON when all tools in the group mounted on the spindle have reached the end of tool lives or malfunction.
<Parameter "#1277 ext13/bit0" is set to "0">
This signal notifies that all tools in a group have reached the end of tool lives.
(1) The criterion to judge the end of tool life depends on the parameter "#1220 aux04/bit0".
<Parameter "#1277 ext13/bit0" is set to "1">
This signal notifies that there is a life-expired group among all the registered groups.
(Life-expired group: a group in which there is no usable tool (no "Unused" and "Used" tools).)
[Caution]
(1) When this signal is used in the tool life management II, refer to the next ladder cycle after the spindle tool is changed.
(This signal will not change in the same cycle in which the spindle tool was changed.)
(2) This signal is only output and does not stop automatic operation or other operations of the controller.
ON condi tion
The currently selected tool has reached the end of tool life (cumulative tool usage data estimated tool life
data).
(Time-count type: during cutting feed)
(Number of cuttings-count type: at the start of cutting feed for Type 1 and at Reset for Type 2)
All tools in the group have reached the end of tool lives at the time of group selection.
(Same timing as the "T function strobe 1" signal)
OFF condi tion
The group selection has been completed.
(At a T command. Note that the signal remains ON if the next group is an expired group.)
The cumulative tool usage data for the currently selected group is cleared.
At the falling edge (1 -> 0) of the "Temporary cancel of tool life expiration" signal of corresponding part system.
(However, this signal is turned ON again if the tool currently being used has reached the end of tool life when
the NC is reset.)
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Tool group life over XC2F XD6F XEAF XFEF X112F X126F X13AF X14EF
ON condi tion
The last tool of a currently selected group is determined as life-expired. (Note)

(Time-count type: While cutting feed is performed)
(Number of cuttings-count type: At the start of cutting feed for the Type 1, and at the Reset for the Type 2)
Tool skip signal (to be described) is input to the last tool of a currently selected group.
All the tools of the selected group are life-expired at the time of group selection.
(Same timing as TF output)
OFF condi tion
The group currently selected is canceled.
(When T command is issued. Note that this signal remains ON if the next group is an expired group.)
The cumulative usage data of the currently selected group is cleared. (When the "Tool change reset" signal
(to be described) is input, for example)
The tool life management is disabled.
At the falling edge (1 -> 0) of the "Temporary cancel of tool group life expiration" signal of corresponding part
system.
(However, this signal is turned ON again if all the tools in the mounted group have reached the end of tool
lives when the NC is reset.)
ON condi tion There is any life-expired group among all the registered groups.
OFF condi tion
The life-expired group is cleared.
(The condition when life-expired state of a group is canceled is the same as for Type 1.)
Note

[Function]
F1-digit feed function No. is output.
[Operation]
When the F1-digit command is executed in memory, MDI, or tape operation, F1-digit No. is set with a code.
[Function]
This signal informs that the timing synchronization between part systems is being executed.
[Operation]
This signal is output while the timing synchronization between part systems is commanded in one part system to when the
corresponding timing synchronization between system command is commanded in the other part system (during the
timing synchronization between part systems).
This signal is not output when the timing synchronization between part systems is not executed.
[Function] [Operation]
This signal turns ON at the beginning of a PLC interruption and turns OFF at the end of the PLC interruption by M99 or
reset.
[Related signals]
(1) PLC interrupt (PIT: YC2E)
(2) PLC interrupt program number (R2518, R2519)
[Function]
This signal is output if axis No. selected in the handle mode or the manual arbitrary feed mode is illegal.
[Operation]
This signal turns ON when:
The handle axis No. exceeds the maximum number of control axes in the system in the handle mode.
The manual arbitrary feed axis No. exceeds the maximum number of control axes in the system in the manual arbitrary
feed mode.
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A F1-digit No. code (1, 2, 4, 8) F11 to
F18
XC30 to
3
XD70 to
3
XEB0 to
3
XFF0 to
3
X1130 to
3
X1270 to
3
X13B0 to
3
X14F0 to
3
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Timing synchronization between part
systems XC34 XD74 XEB4 XFF4 X1134 X1274 X13B4 X14F4
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A In PLC interrupt PCINO XC35 XD75 XEB5 XFF5 X1135 X1275 X13B5 X14F5
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Illegal axis selected ASLE XC37 XD77 XEB7 XFF7 X1137 X1277 X13B7 X14F7

[Function]
This signal informs that a specific miscellaneous function (M00) is output among the miscellaneous functions. Even with a
specific M function, the normal miscellaneous function strobe and M code data are output.
As a similar signal, M code independent output includes M01, M02 and M30. This section explains details for these codes.
[Operation]
This signal turns ON during operation by automatic operation (memory, MDI, tape) or when M00, M01, M02, or M30 is
commanded by a manual numerical command. This signal turns OFF when the "M function finish" signal or the "Reset &
rewind" signal is given.
If motion command and/or dwell is present in the same block, the signal turns ON after completion of dwell. However, the
signal is not output if M function finish signal turns ON before completion of motion command or dwell.

Generally, each M code is used for the following purpose:
M00 Program stop
M01 Optional stop
M02, M30Program end
<Operation on user PLC side>
For M00
When M00 is input, the "Single block" signal (SBK) is turned ON and the "M function finish" signal (FIN1 or FIN2) is sent back.
For M01
When M01 is input, the optional stop switch is checked whether its setting is ON or OFF. If the setting is "ON", the "Sin gle block" signal is turned ON and the "M function finish" signal is sent back, like the case with M00. If the setting is "OFF", the "M function finish" signal is sent back immediately.
For M02, M30
When motion where M02 or M30 was input (spindle stop, coolant stop, etc.) is completed, the "Reset & rewind" signal (RRW) is sent back instead of the "M function finish" signal. If the "M function finish" signal (FIN1 or FIN2) is sent back, a program error may occur.
[Related signals]
(1) M code independent output M01 (DM01: XC41)
(2) M code independent output M02 (DM02: XC42)
(3) M code independent output M30 (DM30: XC43)
[Function] [Operation]
Refer to the section on "M code independent output M00".
[Function] [Operation]
Refer to the section on "M code independent output M00".
[Function] [Operation]
Refer to the section on "M code independent output M00".
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A M code independent output M00 DM00 XC40 XD80 XEC0 X1000 X1140 X1280 X13C0 X1500
Machining program M code indepen dent output Abbrev. Answer back to controller
M00 M00 DM00 FIN1 or FIN2
M01 M01 DM01 FIN1 or FIN2
M02 M02 DM02 Reset & rewind signal ("Fin" is not sent back)
M30 M30 DM30 Reset & rewind signal ("Fin" is not sent back)
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A M code independent output M01 DM01 XC41 XD81 XEC1 X1001 X1141 X1281 X13C1 X1501
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A M code independent output M02 DM02 XC42 XD82 XEC2 X1002 X1142 X1282 X13C2 X1502
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A M code independent output M30 DM30 XC43 XD83 XEC3 X1003 X1143 X1283 X13C3 X1503

[Function]
This signal indicates that the manual speed command is valid in the controller by the "Manual speed command valid" signal.
[Operation]
This signal turns ON when the "Manual speed command valid" signal is turned ON and the manual speed command is enabled in the NC.
This signal turns OFF when the "Manual speed command valid" signal is turned OFF and the manual speed command is disabled in the NC.
[Related signals]
(1) Manual speed command valid (YC9D)
[Function]
This signal informs that the M, S, T or B (2nd miscellaneous function) command has been issued on the specific screen of the setting display unit. With this signal, the user PLC determines whether or not it is the M, S, T, B command commanded by normal automatic operation.
[Operation]
In the manual and automatic operation (except during cycle start), this signal turns ON when any of M, S, T, and B commands is issued on the specific screen of the setting display unit.
Similar to the "M function strobe" signal, this signal turns OFF when the "M function finish 1" signal or the "M function finish 2" signal turns ON, or reset.
(Example)
[Related signals]
(1) M function strobe (MFn: XC60)
(2) S function strobe (SFn: XC64)
(3) T function strobe 1 (TF1: XC68)
(4) 2nd M function strobe 1 (BF1: XC6C)
(5) M function finish 1 (FIN1: YC1E)
(6) M function finish 2 (FIN2: YC1F)
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A In manual speed command valid XC48 XD88 XEC8 X1008 X1148 X1288 X13C8 X1508
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Manual numerical command MMS XC49 XD89 XEC9 X1009 X1149 X1289 X13C9 X1509
M03 manual numerical command
Manual numerical command (MMS)
M function strobe 1 (MF1)
M function finish 1 (FIN1)

[Function]
This signal indicates the tool escape and return mode is in progress.
[Operation]
To designate a halted point, turn ON a transit point switch while the operation is stopped by feed hold or single block.
When recognition of the halted point is completed, this signal turns ON and the tool escape and return mode will be established.
Statuses of each signal after the machining program is halted are explained below.

The following (a) to (e) correspond to (a) to (e) in the figure below.
(a) The recognition of the transit point is performed in automatic operation but not in automatic operation start.
(b) When the user turns ON the "Tool escape and return transit point designation" signal (YC8D), the NC turns ON the "Tool escape and return transit point recognition finish" signal (XC87) and recognition will be completed.
(c) When the "Tool escape and return transit point recognition finish" signal (XC87) turns ON, the user turns OFF the "Tool escape and return transit point designation" signal (YC8D).
(d) When the "Tool escape and return transit point designation" signal (YC8D) turns OFF, the NC also turns OFF the "Tool escape and return transit point recognition finish" signal (XC87).
(e) The "In tool escape and return mode" signal turns OFF when a tool reaches the halted point, or when one of reset1, reset2, reset & rewind, or emergency stop is performed.
(1) When one of reset1, reset2, reset & rewind, or emergency stop is attempted during the escape and return mode, the memorized transit point and halted point will be canceled. The escape and return mode will be ended with reset.
[Related signals]
(1) Tool escape and return transit point recognition finish (XC87)
(2) Tool escape and return transit point designation (YC8D)
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A In tool escape and return mode XC4A XD8A XECA X100A X114A X128A X13CA X150A

In automatic operation "start"
Automatic operation "start"
In retract return mode
Transit point recognition finish
Transit point designation
(Halted point reached)
(a)
Halted point designation Transit point #1 designation
(b)
(c) (d)
(e)
YC8D
XC87
XC4A
YC10
XC13
Note

[Function]
This signal notifies that the system is started as a sub part system.
If there is a PLC processing to be executed only when the sub part system is started, use this signal to check whether the sub part system is already started or not.
[Operation]
This signal turns ON at the sub part system when the system is started with the sub part system "start" command.
The PLC input signals related to the sub part system control return "0" when the "Sub part system control: Sub part system processing" signal (SBS) is OFF.
The following shows which part system outputs PLC input signals related to the sub part system control. Also, the output values and operation examples are given.
(*1) The "Sub part system control: Sub part system control II identification No." signal (SBSID) is used only for the sub part system control II.
The signal is not output from a sub part system started with the sub part system control I.
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Sub part system control: Sub part sys tem processing SBS XC4E XD8E XECE X100E X114E X128E X13CE X150E
PLC input signal Part system that out puts signals Output signal value
Sub part system control: Sub part system processing (SBS: XC4E) Sub part system 1: ON / 0: OFF
Sub part system control: Sub part system control II identification No.
(SBSID: R616) (*1)
Sub part system Sub part system identification No.
Sub part system control: Calling sub part system (SBSCL: R617) Caller of part system System bit of sub part system
Sub part system control: Waiting for sub part system completion
(SBSWT: R618)
Caller of part system System bit of sub part system
Sub part system control: Caller of sub part system (SBSSY: R619) Sub part system System bit of calling part system

[Related signals]
(1) Sub part system control: Sub part system control II identification No. (SBSID: R616)
(2) Sub part system control: Calling sub part system (SBSCL: R617)
(3) Sub part system control: Waiting for sub part system completion (SBSWT: R618)
(4) Sub part system control: Caller of sub part system (SBSSY: R619)
OFF
OFF
0000
0004
0001 0001 0002
0004 0004
0004
0004
0000
0000
0000
0000
0000
0000
0000 0000

0000
0000 0000
0000
(7)
(7)
(7)
(4)
(4)
(4)
(3)
(3)
(3)
(2)
(2)
(2)
(1)
(1)
(1)
(6)
(6)
(6)
(5)
(5)
(5)
0000
0000 0000
OFF
ON ON
OFF OFF
ON
($1)
M99 ;
G122 A300 D0 B2 ;
G144 A300 D0 B2 ;
:
:
:
:
:
:
:
:
:
:
:
:
:
:
:
:
:
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:
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:
:
:
:
:
:
:
:
:
:
($2)
($2)
($3)
($3)
($1)
G122 A100 D0 B2;
G144 A100 D0 B2 ;
G144 A200 D1 B2 ;
G122 A200 D1 B2 ;
M99 ;
M99 ;
M99 ;
M99 ;
M99 ;
SBS
SBSSY
SBS
SBSCL
SBSWT
SBSSY
SBSCL
SBSCL

SBSWT
SBSWT
Command format of sub part system control I
Main part system 1
Waiting for
completion
Waiting for
completion
Waiting for sub part
system vacant
Waiting for
completion
method
Parallel
processing
method
The value is R register value
hexadecimal
Command format of sub part system control II
Main part system 1
Main part system 2
Main part system 2
Waiting for sub part
system vacant
For Main part system: 1st part system, 2nd part system, Sub part system: 3rd part system
Sub part system
Waiting for
completion
method
Parallel
processing
method
Sub part system
Waiting for
completion
method
Waiting for
completion
method
Main part system 1, 2
Main part system 1, 2
Main part system 1
Main part system 1
Main part system 2
Main part system 2
Sub part system
Sub part system
Sub part system
Sub part system

[Function]
This signal indicates that the circular feed in manual mode is valid.
[Operation]
This signal turns ON when the "Circular feed in manual mode valid" signal turns ON.
[Caution]
This signal does not turn ON in the following conditions.
Either H axis or V axis is in machine lock. (In this case, even machine lock is not performed.)
The reference position return of either H axis or V axis is not completed.
Either H axis or V axis is in servo OFF.
Either H axis or V axis detached.
The NC is in one of the following states.
- In automatic operation (OP)
- Emergency stop
- Reset
The current position is outside of the specified movable range.
The setting value which is specified with R register is illegal.
[Related signals]
(1) Circular feed in manual mode valid (YC7E)
(2) Circular feed in manual mode Operation mode data (R2636,7)
(3) Circular feed in manual mode Reference point H data (R2644,5)
(4) Circular feed in manual mode Reference point V data (R2648,9)
(5) Circular feed in manual mode Gradient/arc center H data (R2668,9)
(6) Circular feed in manual mode Gradient/arc center V data (R2672,3)
(7) Circular feed in manual mode Travel range H (+) data (R2652,3)
(8) Circular feed in manual mode Travel range H (-) data (R2656,7)
(9) Circular feed in manual mode Travel range V (+) data (R2660,1)
(10)Circular feed in manual mode Travel range V (-) data (R2664,5)
(11)Circular feed in manual mode Current position H (R636,7)
(12)Circular feed in manual mode Current position V (R640,1)
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A In circular feed in manual mode XC4F XD8F XECF X100F X114F X128F X13CF X150F

[Function]
This signal notifies the coordinate system which operates with the manual operation (jog feed, incremental feed and manual handle feed) during the coordinate rotation by parameter.
[Operation]
When this signal is turned OFF, the manual operation will be operated with the machine coordinate system.
When this signal is turned ON, the manual operation will be operated with the coordinate system rotated by the coordinate rotation by parameter.
When the coordinate rotation by parameter is invalid, this signal will be turned OFF even though the "Coordinate rotation by parameter: Coordinate switch for manual feed" (YC7F) is turned ON.
[Related signals]
(1) Coordinate rotation by parameter: Coordinate switch for manual feed (YC7F)
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Coordinate rotation by parameter: Man ual feed coordinate system XC5F XD9F XEDF X101F X115F X129F X13DF X151F
Coordinate rotation by parameter: Coordinate switch for manual
feed OFF
Coordinate rotation by parameter: Coordinate switch for manual
feed ON
XM
YM
XW
YW
Machine coordinate zero point
X axis movement in
manual operation
Workpiece coordinate
zero point
XM
YM
XW
YW
Machine coordinate zero point
X axis movement in
manual operation
Workpiece coordinate
zero point

[Function]
This signal informs that the miscellaneous functions (M code) is commanded with the automatic operation (memory, MDI or tape) machining program or manual numerical command input.
The miscellaneous function, also called the M function, is used to issue miscellaneous functions of the target machine, such as ON/OFF of the cutting oil and forward rotation/reverse rotation/stop of the spindle.
[Operation]
<Normal method (when the parameter "#1278 ext14/bit1" is set to "0")>
This signal turns ON when:
The M function (M code) is specified in automatic operation (memory, MDI or tape mode).
M function (M code) is specified by manual numerical command input.
This signal turns OFF when:
The "M function finish 1" signal (YC1E) or the "M function finish 2" signal (YC1F) turns ON.
Reset condition occurs. (Refer to the "In automatic operation "run"" signal (XC12) section for details on the reset condi tions.)
(1) Up to four miscellaneous functions (M functions) can be commanded in one block at the same time. It depends on the setting of the parameter "#12005 Mfig".
The relation of the machining program and M function strobe is shown below.
(2) During operation with miscellaneous function lock (YC5A is ON), the "M function strobe 1 to 4" signal (XC60 to XC63) will not be output. However, this signal will be output when the M code is commanded independently (M00, M01, M02, M30).
(3) Since M98 (read of subprogram call), M99 (return from subprogram), etc. are handled within the controller, the "M function strobe 1 to 4" signal (XC60 to XC63) is not output.
(4) The M command for M code macro call is internally processed in the control unit and the "M function strobe 1 to 4" sig nal (XC60 to XC63) is not output.
(5) The "M function strobe 1 to 4" signal (XC60 to XC63) will not be output when the M function is output while the "M function finish 1" signal (YC1E) or "M function finish 2" signal (YC1F) is ON.
(6) When the miscellaneous function command (M command) is issued with the manual numerical command, the "M function strobe 1" signal (XC60) is output.
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A M function strobe 1 MF1 XC60 XDA0 XEE0 X1020 X1160 X12A0 X13E0 X1520
A M function strobe 2 MF2 XC61 XDA1 XEE1 X1021 X1161 X12A1 X13E1 X1521
A M function strobe 3 MF3 XC62 XDA2 XEE2 X1022 X1162 X12A2 X13E2 X1522
A M function strobe 4 MF4 XC63 XDA3 XEE3 X1023 X1163 X12A3 X13E3 X1523
Note
Machining program M03 M08 M10 M18
(1st set) (2nd set) (3rd set) (4th set)
Corresponds to M function strobe 1 (MF1),
1st set of M code
Corresponds to M function strobe 2 (MF2),
2nd set of M code
Corresponds to M function strobe 3 (MF3),
3rd set of M code
Corresponds to M function strobe 4 (MF4),
4th set of M code

An example of the timing chart for the M function strobe signal (MF1, MF2 and MF3) is shown below.
Point: The following points must be observed in the sequence processing.
When the M function is commanded, the MFn and M code data "n" is output.

In sequence processsing, MFn is always used as a trigger to start processing of the M function.
When the designated M function processing is completed, the "M function finish" signal is returned to the controller.
The controller waits for the rising edge of the "M function finish" signal and then turns MFn OFF.
In the sequence processing, after the MFn is confirmed to be OFF, the "M function finish" signal is turned OFF.
This completes a series of M function processing.
In sequence processing, by always including the condition of MFn in the start and completion signals of the M function,
handshaking with the controller and an accurate sequence processing becomes possible.
<High-speed method (when the parameter "#1278 ext14/bit1" is set to "1")>
Refer to the section of the "Miscellaneous function command high-speed output: M function finish 1 to 4" signal (YD28 to
YD2B).
[Related signals]
(1) M function finish 1 (FIN1: YC1E)
(2) M function finish 2 (FIN2: YC1F)
(3) M code data n (R504)
(4) Miscellaneous function command high-speed output: M function finish n (MFINn: YD28)
Command program
M code data 1
M code data 2
M function strobe 1 (MF1)
M function strobe 2 (MF2)
M code data 3
M function strobe 3 (MF3)
M function finish 1 (FIN1)
M22; M03M08; M10M25M05;
22 3 10
8 25
5
G00 ;
M decode circuit
MFn
M1
Designated M function process
M function finish confirmation
MFn M2
FIN1
M2
M1 Relay meaning a designated
M function
Relay meaning completion of a
Designated M function
M function finish 1
M800V/M80V Series PLC Interface Manual
4 Explanation of Interface Signals
4.1 PLC Input Signals (Bit Type: X***)
IB-1501616-F 224
[Function]
This signal informs that the spindle function (S code) is specified by the machining program of automatic operation
(memory, MDI or tape mode) or a manual numerical command.
The spindle function is also called the S function, and is used to command the spindle speed.
The user PLC receives the corresponding "S code data 1 to 8" signal (R512 to R527) with the signal.
[Operation]
<Normal method (when the parameter "#1278 ext14/bit1" is set to "0")>
This signal turns ON when:
S function (S code) is specified in automatic operation (memory, MDI or tape mode).
S function is specified by manual numerical command input.
This signal turns OFF when:
The "M function finish 1" signal (YC1E) or the "M function finish 2" signal (YC1F) is turned ON.
Reset condition occurs. (Refer to the "In automatic operation "run"" signal (XC12) section for details on the reset condi tions.)
(1) The "S function strobe 1 to 8" signal (XC64 to XC67, XC70 to XC73) is not output during operation with M function
lock (YC5A is ON).
(2) When the S function is commanded, the "Spindle gear shift command" signal (X1885, X1886) and the "S command
no gear selected" signal (X1884) are output in addition to this signal (SFn). Refer to the sections of each signal for
details.
(3) By combining this signal (SFn), the "Spindle gear selection code" signal (Y1890, Y1891) and the "Gear shift comple tion" signal (Y1885), the data can be converted into S command data.
(Data is transferred when the spindle controller is the high-speed serial connection specification type.)
(4) The "S function strobe 1 to 8" signal (XC64 to XC67, XC70 to XC73) correspond to the spindle function (S code) com mands for the 1st to 8th spindles, respectively.
An example of the timing chart for the "S function strobe 1" signal (XC64) is shown below.
<High-speed method (when the parameter "#1278 ext14/bit1" is set to "1")>
Refer to the section on "Miscellaneous Function Command High-speed Output: S function finish" signal (YD2C to YD2F,
YD38 to YD3B).
[Related signals]
(1) S code data 1 to 8 (R512 to 27)
(2) Spindle gear shift command (GR1, GR2: X1885, 6)
(3) S command no gear selected (SNGE: X1884)
(4) Spindle gear selection code 1, 2 (GI1, GI2: Y1890, Y1891)
(5) Gear shift completion (GFIN: Y1885)
(6) M function finish 1 (FIN1: YC1E)
(7) M function finish 2 (FIN2: YC1F)
(8) Miscellaneous Function Command High-speed Output: S function finish 1 to 8 (SFIN1 to 4, SFIN5 to 8: YD2C to F,
YD38 to B)
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A S function strobe 1 to 8
SF1 to 4
SF5 to 8
XC64 to
7
XC70 to
3

XDA4 to
7
XDB0 to
3
XEE4 to
7
XEF0 to
3
X1024 to
7
X1030 to
3
X1164 to
7
X1170 to
3
X12A4 to
7
X12B0 to
3
X13E4 to
7
X13F0 to
3
X1524 to
7
X1530 to
3
Note
Command program
S code data
S function strobe 1 (SF1)
M function finish 1 (FIN1)
S1000; G00X100.;
1000

[Function]
This signal informs that the tool function (T code) is specified by the machining program in automatic operation (memory, MDI or tape mode) or by manual numerical command.
The tool function is also called the T function, and is used to command the tool No. In the lathe specification controller, the tool compensation (tool length compensation, tool nose wear compensation) Nos. are also indicated.
The user PLC receives the "T code data 1 to 4" signal (R536 to R543) with this signal.
[Operation]
<Normal method (when the parameter "#1278 ext14/bit1" is set to "0")>
This signal turns ON when:
The T function (T code) is specified in automatic operation (memory, MDI or tape mode).
T function (T) is specified by manual numerical command.
This signal turns OFF when:
The "M function finish 1" signal (YC1E) or the "M function finish 2" signal (YC1F) is turned ON.
Reset condition occurs. (Refer to the section on "In automatic operation "run"" signal (XC12) for details on the reset conditions.)
(1) Up to four tool functions (T functions) can be commanded in one block at the same time. It depends on the setting of the parameter "#12009 Tfig".
The relationship between machining program and T function strobe is shown below.
(2) The "T function strobe 1 to 4" signal (XC68 to XC6B) is not output during operation with the M function lock (YC5A is ON).
(3) When a command is issued with the manual numerical command, the "T function strobe 1" signal (XC68) is output.
An example of the timing chart for the "T function strobe 1" signal (XC68) is shown below.
<High-speed method (when the parameter "#1278 ext14/bit1" is set to "1")>
Refer to the section on "Miscellaneous Function Command High-speed Output: T function finish 1 to 4" signal (YD30 to YD33).
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A T function strobe 1 to 4 TF1 to 4 XC68 to
B
XDA8 to
B
XEE8 to
B
X1028 to
B
X1168 to
B
X12A8 to
B
X13E8 to
B
X1528 to
B
Note
Machining program T03
(1st set)
T08
(2nd set)
T10
(3rd set)

T18;
(4th set)
T function strobe 1 (TF1)
Corresponding to T command in 1st set
T function strobe 2 (TF2)
Corresponding to T command in 2nd set
T function strobe 3 (TF3)
Corresponding to T command in 3rd set
T function strobe 4 (TF4)
Corresponding to T command in 4th set
Command program
T code data
T function strobe 1 (TF1)
M function finish 1 (FIN1)
T01; G00X100.;

[Related signals]
(1) T code data 1 to 4 (R536 to 43)
(2) M function finish 1 (FIN1: YC1E)
(3) M function finish 2 (FIN2: YC1F)
(4) Miscellaneous Function Command High-speed Output: T function finish 1 to 4 (TFIN1 to 4: YD30 to 3)
[Function]
This signal informs that the 1st set of 2nd M function is selected by the machining program in automatic operation (memory, MDI or tape) or by manual numerical command.
The 2nd M function is also called the B function.
The user PLC receives the "2nd M function data 1 to 4" signal (R544 to R551) with this signal.
[Operation]
<Normal method (when the parameter "#1278 ext14/bit1" is set to "0")>
This signal turns ON when:
The 2nd M function (B code) is specified in automatic operation (memory, MDI or tape).
2nd M function (B code) is issued by manual numerical command input.
This signal turns OFF when:
The "M function finish 1" signal (YC1E) or the "M function finish 2" signal (YC1F) is turned ON.
Reset condition occurs. (Refer to the section on "In automatic operation "run"" signal (XC12) for details on the reset conditions.)
(1) Up to four 2nd M functions (B functions) can be commanded in one block at the same time. It depends on the setting of the parameter "#12011 Bfig".
The relationship between machining program and 2nd M function strobe is shown below.
(2) The "2nd M function strobe 1 to 4" signal (XC6C to XC6F) is not output during operation with M function lock (YC5A is ON).
(3) When a command is issued with the manual numerical command, the "2nd M function strobe 1" signal (XC6C) is out put.
(4) Address for 2nd M function can be selected from addresses A, B and C by using machine parameter. Set so that the address is different from the axis address.
<High-speed method (when the parameter "#1278 ext14/bit1" is set to "1")>
Refer to the section on "Miscellaneous Function Command High-speed Output: 2nd M function finish 1 to 4" signal (YD34 to YD37).
[Related signals]
(1) M function finish 1 (FIN1: YC1E)
(2) M function finish 2 (FIN2: YC1F)
(3) Miscellaneous Function Command High-speed Output: 2nd M function finish 1 to 4 (BFIN1 to 4: YD34 to 7)
(4) 2nd M function data 1 to 4 (R544 to R551)
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A 2nd M function strobe 1 to 4 BF1 to 4 XC6C to
F
XDAC to
F
XEEC to
F
X102C to
F
X116C to
F
X12AC
to F
X13EC
to F
X152C to
F
Note
Machining program B03
(1st set)
B08
(2nd set)
B10
(3rd set)
B18;
(4th set)
2nd M function strobe1 (BF1)
Corresponding to B command in1st set
2nd M function strobe2 (BF2)
Corresponding to B command in 2nd set
2nd M function strobe3 (BF3)
Corresponding to B command in 3rd set
2nd M function strobe4 (BF4)

Corresponding to B command in 4th set

[Function]
This signal indicates that the machine is in the state where it does not update the chopping compensation amount.
[Operation]
While this signal is turned ON:
The chopping compensation amount is not updated.
The "Stroke compensation completion" signal is not turned OFF.
When the control data is updated, turn this signal OFF and then update the chopping compensation amount.
[Related signals]
(1) Chopping compensation update prevention request (CHPRCR: YCD7)
[Function] [Operation]
This signal turns ON in the state of chopping start.
[Function] [Operation]
This signal turns ON while moving from the basic position to the upper dead center point.
[Function] [Operation]
This signal turns ON while moving from the upper dead center point to the bottom dead center point.
[Function] [Operation]
This signal turns ON while moving from the bottom dead center point to the upper dead center point.
[Function] [Operation]
This signal turns ON while moving from the upper dead center point to the basic position.
[Function] [Operation]
This signal turns ON in the state of chopping mode.
[Function] [Operation]
This signal turns ON when the command stroke is compensated and the difference between the commanded stroke and the actual stroke becomes less than or equal to the tolerance specified with the parameter (#2080 chwid).
This signal turns OFF when the speed fluctuates, such as when the movement is stopped or the chopping control data is changed.
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Chopping compensation update pre vented CHPRCC XC7F XDBF XEFF X103F X117F X12BF X13FF X153F
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A In chopping start CHOP XC80 XDC0 XF00 X1040 X1180 X12C0 X1400 X1540
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Basic position -> upper dead point path
flag CHP1 XC81 XDC1 XF01 X1041 X1181 X12C1 X1401 X1541
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Upper dead point -> bottom dead point
path flag CHP2 XC82 XDC2 XF02 X1042 X1182 X12C2 X1402 X1542
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Bottom dead point -> upper dead point
path flag CHP3 XC83 XDC3 XF03 X1043 X1183 X12C3 X1403 X1543
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Upper dead point -> basic position path
flag CHP4 XC84 XDC4 XF04 X1044 X1184 X12C4 X1404 X1544
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A In chopping mode CHPMD XC85 XDC5 XF05 X1045 X1185 X12C5 X1405 X1545
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Stroke compensation completion XC86 XDC6 XF06 X1046 X1186 X12C6 X1406 X1546

[Function]
With the tool escape and return function, a transit point can be designated by pressing the transit point switch while tool escapes. The tool returns to the position where machining was interrupted via the designated transit point.
This signal notifies that NC memorized the transit point.
[Operation]
Refer to the section on "In tool escape and return mode signal" (XC4A).
[Related signals]
(1) In tool escape and return mode (XC4A)
(2) Tool escape and return transit point designation (YC8D)
[Function]
This signal is output when the program No. to be searched with search & start is illegally designated.
[Operation]
This signal is output when the program No. to be searched with search & start is illegal. Cycle start will not be carried out if this signal is output. This signal turns OFF by performing search & start again after normalizing the program No. input or by the reset signal.
Refer to the "Search & start" signal (RSST) for details.
When the multi-part system program management is valid, the signal for the 1st part system is output common to all part systems.
[Related signals]
(1) Search & start (RSST: YC31)
[Function]
This signal is output when searching for a program is started with search & start.
[Operation]
Informs the PLC that the controller is searching for a program with search & start.
Holds the "Search & start" signal until the "Search & start Search" signal turns ON.
If the program No. to be searched is illegal, the "Search & start Error" signal (SSE) is output.
When the multi-part system program management is valid, the signal for $1 is output as common signal for all part systems.
[Related signals]
(1) Search & start program No. (R2562, 2563)
(2) Search & start Error (SSE: XC8A)
(3) Search & start (RSST: YC31)
[Function]

This signal indicates that the Punchtap cycle is executed during the automatic operation (memory, MDI).
[Operation]
The signal turns ON when:
The travel command of automatic operation is executed during the Punchtap cycle.
This signal turns ON also during the machine lock.
The signal turns OFF when:
The machining status is no longer in the Punchtap cycle.
The Punchtap cycle is canceled by G80 or G command which is belonged in the G code group 01 (G00, G01, G02, G03, G33).
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Tool escape and return transit point rec ognition completed XC87 XDC7 XF07 X1047 X1187 X12C7 X1407 X1547
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Search & start Error SSE XC8A XDCA XF0A X104A X118A X12CA X140A X154A
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Search & start Search SSG XC8B XDCB XF0B X104B X118B X12CB X140B X154B
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Punchtap cycle in progress PTAPn XC8E XDCE XF0E X104E X118E X12CE X140E X154E

[Function]
This signal notifies that the axis commanded with the tool change position return command has completed return to the tool change position.
[Operation]
This signal turns ON when all axes commanded with the tool change position return command (G30.n) have moved to the tool change position.
This signal turns OFF when even one of the axes moved to the tool change position with the command has moved from the tool change position.
Refer to the "Programming Manual" for details on the tool change return command.
[Timing chart]
[Function]
This signal notifies that a new tool (unused tool) in the group is selected in the tool life management II.
[Operation]
The signal turns ON when the tool selected by T command is unused (status is "0").
The signal turns OFF when T command is completed by inputting the M function finish signal (FIN1, FIN2).
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Tool change position return completion TCP XC93 XDD3 XF13 X1053 X1193 X12D3 X1413 X1553
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A New tool change TCRQ XC94 XDD4 XF14 X1054 X1194 X12D4 X1414 X1554
Example: When G30.1 command, additional axis tool change position return is valid
Machining program
Z axis tool change
position reached
X, Y axis tool change
position reached
Additional axis tool change
position reached
Tool change position return
completed (TCP)
G30.1; G00 T02; X-100.

[Function]
This signal notifies that the tool in use or the last tool in a group has reached the end of tool life. "Tool has reached the end of tool life" means that the value obtained by subtracting usage data from estimated tool life data has reached the remaining tool life prediction setting value.
[Operation]
The life prediction is valid when the parameter "#1277 ext13/bit1" is set to "1".
The signal will not be output when the remaining tool life prediction setting value is "0" or larger than the estimated tool life data.
Signal output judgment condition varies depending on the following parameter setting.
#1277 ext13/bit2 (Tool life management II life end signal timing)
Select the timing when the "Tool life prediction" signal (XC96) is output with the tool life management II.
0: Estimated tool life data - Cumulative usage data = Remaining tool life prediction setting value
1: Estimated tool life data - Cumulative usage data Remaining tool life prediction setting value
#1277 ext13/bit3 (Tool life management II life end signal tool)
Select the tool to which the "Tool life prediction" signal (XC96) is output with the tool life management II.
0: This signal is output for each tool.
1: This signal is output for the last tool of a group.
The signal turns ON when:
Remaining tool life data (Estimated tool life data - Cumulative usage data) reached its remaining tool life prediction set ting value.
(Same timing as count up of cumulative usage data)
Remaining tool life data (Estimated tool life data - Cumulative usage data) has reached its remaining tool life prediction setting value at the time of tool selection.
(Same timing as TF output)
This signal turns OFF when:
The group currently selected is canceled.
(When the T command was issued. Note that if the next selected group has a condition of turning ON the signal, the sig nal remains ON.)
Tool has reached the end of its tool life.
(Same timing as count up of cumulative usage data)
The cumulative usage data of the currently selected group is cleared.
(e.g., when the "Tool change reset" signal (YC8C: TRST) is input)
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Tool life prediction XC96 XDD6 XF16 X1056 X1196 X12D6 X1416 X1556

[Function]
This signal informs that a system error has occurred in the controller.
[Operation]
This signal turns ON when "watch dog error", "memory parity check error", etc. occurs in the controller.
The system error can be reset by turning OFF the power.
(1) The "NC alarm 1" (AL1) may not be detected as a signal.
(2) For details of system alarms, refer to the relevant "Instruction Manual" or "Alarm/Parameter Manual".
[Function]
This signal informs that the controller is in servo alarm condition.
If servo alarm occurs, the "Servo ready completion" signal (SA) turns OFF.
[Operation]
The signal turns ON when the following servo alarms occur:
Servo failure (overcurrent, overvoltage, etc.)
Initial parameter error (parameter transferred to drive unit when the power is turned ON is illegal)
Drive unit not mounted (cable is not connected between controller and servo controller).
Parameter error (a parameter that will disrupt movement of the control axis was found).
Alarm can be canceled depending on the content of the alarm, such as turning OFF the power, resetting the controller, or resetting the parameters.
For details on how to reset the alarm and the contents of the servo alarm, refer to the Instruction Manual or Alarm/Parameter Manual for each model.
[Function]
This signal informs that the controller is in a program error state.
[Operation]
This type of alarm occurs during automatic operation in memory, MDI or tape mode, mainly due to use of faulty machining program, or program incompatible with the controller specifications.
Some typical examples of program error are shown below. For details, refer to the relevant "Instruction Manual" or "Alarm/Parameter Manual".
Illegal address (An address that is not in the specifications was used.)
Absence of F command
Arc end point excessive deviation
Return incomplete axis found (A motion command was issued to an axis for which the reference position return has not been completed.)
Program end error (M02 or M30 command is not inserted, or reset & rewind processing is not performed.)
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A NC alarm 1 AL1 XC98 XDD8 XF18 X1058 X1198 X12D8 X1418 X1558
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A NC alarm 2 (Servo alarm) AL2 XC99 XDD9 XF19 X1059 X1199 X12D9 X1419 X1559
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A NC alarm 3 (Program error) AL3 XC9A XDDA XF1A X105A X119A X12DA X141A X155A
Note

[Function]
This signal informs that the controller is in operation alarm (error) condition.
[Operation]
The signal turns ON when an operation alarm occurs and turns OFF when the alarm condition is removed.
Some typical examples of operation errors are shown below. For details, refer to the operation manual or "Alarm/Parameter Manual" for each model.
Hardware axis motion stroke end
Software axis motion stroke end
No operation mode set
Cutting override zero
Manual feedrate zero
External interlock axis exists
Warning regarding absolute position detection
(1) When the parameter "#1238 set10/bit7" is valid (when the "NC alarm 5" (XCB1) is valid), the following alarms are not output to the "NC alarm 4".
[Function]
This signal notifies that the servo waring (S52) occurs in the drive unit.
[Operation]
<For servo drive unit>
This signal turns ON when a warning in servo drive unit is occurring on one or more axes within the part system.
This signal turns OFF when no warning in servo drive unit is occurring on any axis within the part system.
<For spindle/PLC axis drive unit>
When a warning occurs, the signal of the 1st part system is output.
(1) This signal is not output if the servo warning "S52 00E6" (Control axis detachment warning) or "S52 00E7" (In NC emergency stop state) occurs.
[Related signals]
(1) Servo alarm/warning No. (R5332 to R5339)
(2) Spindle alarm/warning No. (R6529)
(3) PLC axis alarm warning No. n-th axis (R168 to R175)
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A NC alarm 4 (Operation error) AL4 XC9B XDDB XF1B X105B X119B X12DB X141B X155B
Error No. Details
0004 External interlock axis exists
0102 Cutting override zero
0103 External feed speed zero
0109 Block start interlock
0110 Cutting block start interlock
0125 Rapid traverse override zero
0200 Interference check disabled
0205 Tool interfere. check disabled
1033 Spindle-Spindle polygon (G51.2/G251) cutting interlock

Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A NC warning (Servo warning) WR1 XC9C XDDC XF1C X105C X119C X12DC X141C X155C
Note
Note

[Function]
This signal notifies that the feed forward control is valid in the thread cutting command.
[Operation]
This signal is turned ON when all the following conditions are met.
During the cutting mode (G64) modal.
While the "Thread cutting: Feed-forward control request" signal (FFC: YC94) is ON.
While any of the commands in the table below is commanded.
This signal turns OFF when:
Any of the conditions listed above for turning ON the signal are not satisfied.
However, when the "Thread cutting: Feed-forward control request" signal (FFC: YC94) is turned ON to OFF during the thread cutting command (G32 to G36) under the feed forward control, the "Thread cutting: Feed-forward control ON" signal (FFCO: XCA4) is held until the cutting up of the thread cutting command ends.
[Related signals]
(1) Thread cutting: Feed-forward control request (FFC: YC94)
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Thread cutting: Feed-forward control
ON FFCO XCA4 XDE4 XF24 X1064 X11A4 X12E4 X1424 X1564
G code Function name
G32, G33 Thread cutting
G34 Variable lead thread cutting
G35 Arc thread cutting CW
G36 Arc thread cutting CCW
G0 G33 G0 G0
ON
OFF
Thread cutting:
Feed-forward control request
(FFC:YC94)
Thread cutting:
Feed-forward control ON
(FFCO:XCA4)

[Function]
This signal informs that tap retract is possible. This signal is output when the operation is interrupted during the tap cycle execution.
The tap retract is performed by turning ON the "Tap retract" signal (TRV: YC5C) when this signal (TRVE: XCA5) is ON.
(1) When the parameter "#1234 set06/bit3" is set to "0", all the axes are interlocked while the "Tap retract possible" signal (XCA5) is ON. If the automatic or manual axis movement is commanded, the operation error (M01 0057) occurs. To cancel the interlocked state, turn ON the "Tap retract possible state cancel" signal (YCD6). (Doing so turns this signal (XCA5) OFF.)
[Operation]
This signal turns ON when the tap cycle is interrupted in the cutting feed area due to the following causes.
Emergency stop
Reset stop
Power OFF (only in absolute position detection system)
Refer to the section on the "Tap retract" signal (TRV: YC5C) for the tap retract operation.
The signal turns OFF when:
Tap retract is executed and completed.
The target axis for the tap retract is moved automatically or with manual mode.
However, it is moved only when the following conditions are met.
- The parameter "#1234 set06/bit3" is set to "1".
- The "Tap retract" signal (YC5C) is OFF.
- The target axis for the tap retract is stopped.
The rising edge of the "Tap retract possible state cancel" signal (YCD6) is confirmed.
[Caution]
(1) When the parameter "#1234 set06/bit3" is set to "1", the axis interlock control is not performed on the CNC side even if the tapping is interrupted due to emergency stop, etc. The axis moves according to the movement command even during the tap retract operation. Safety measures are required on the machine side.
(2) Refer to the section on the "Tap retract" signal (YC5C: TRV) for the other cautions of the tap retract.
[Related signals]
(1) Tap retract (TRV: YC5C)
(2) Tap retract possible state cancel (TRVEC: YCD6)
[Function]
This signal is output when the No. of work machining matches or exceeds the maximum No. of work machining.
[Operation]
This signal turns ON when the No. of work machining matches or exceeds the maximum work value (WRK LIMIT) set in the [Process parameter] screen.
(1) This signal turns ON when the No. of work machining matches or exceeds the maximum work value regardless of the count up by the controller or user PLC.
(2) This signal is not output when "0" is set for the maximum work value.
[Related signals]
(1) No. of work machining (current value) (R606, 7)
(2) No. of work machining (maximum value) (R608, 9)
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Tap retract possible TRVE XCA5 XDE5 XF25 X1065 X11A5 X12E5 X1425 X1565
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A No. of work machining over PCNT XCA6 XDE6 XF26 X1066 X11A6 X12E6 X1426 X1566

Note
Note

[Function]
This signal notifies that the movement amount when the power is turned OFF exceeds the tolerable amount in the absolute position detection system.
[Operation]
This signal turns ON when the difference of the machine position at power OFF and at power ON exceeds the tolerable value ([ABS. POSI PARAM] "#2051 check" setting value) when using the absolute position detection system.
(1) The movement amount during power OFF depends on the "PON POS" (power ON position) and "POF POS" (power OFF position) on the [ABS SERVO MONITOR] (absolute position monitor) screen.
[Function]
This signal informs that the axis name is being switched.
[Operation]
This signal turns ON by the axis name switch command (G111).
[Function]
This signal informs that the hob retract operation is running.
[Operation]
This signal turns ON when:
The retract operation is started by the "Hob machining: Retract request" signal (HOBRTR) during the hob machining mode.
The retract operation is started due to a program error or an operation error during the hob machining mode.
This signal turns OFF when:
Retract operation is completed.
The power is turned OFF and ON.
Retract operation is stopped due to reset or emergency stop.
[Related signals]
(1) Hob machining: Retract request (HOBRTR: YCDE)
(2) Hob machining: Retract amount selection (HOBRTV: YB20)
(3) Hob machining: Retract complete (HOBRTF: XCAF)
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Absolute position warning ABSW XCA7 XDE7 XF27 X1067 X11A7 X12E7 X1427 X1567
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A In axis name switch XCA9 XDE9 XF29 X1069 X11A9 X12E9 X1429 X1569
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Hob machining: Retracting HO BRTM XCAE XDEE XF2E X106E X11AE X12EE X142E X156E
Note
Hob machining: retract request
(HOBRTR)
Retract operation
Hob machining: retracting
(HOBRTM)

[Function]
This signal informs that hob retract operation is completed.
[Operation]
This signal turns ON when:
Retract is performed by the "Hob machining: Retract request" signal (HOBRTR) in the hob machining mode, and the retract operations of all axes are completed.
Retract is performed due to a program error or an operation error in the hob machining mode, and the retract operations of all axes are completed.
This signal turns OFF when:
The power is turned OFF and ON.
Reset or emergency stop is input, or automatic operation is restarted.
Retract axis moves.
[Related signals]
(1) Hob machining: Retract reqest (HOBRTR: YCDE)
(2) Hob machining: Retract amount selection (HOBRTV: YB20)
(3) Hob machining: Retracting (HOBRTM: XCAE)
[Function]
This signal informs the PLC that polygon machining (spindle-NC axis) mode is entered.
(1) Refer to the "In spindle-spindle polygon mode" signal for details on the spindle-spindle polygon.
#1501 polyax 0: Polygon machining (spindle-NC axis)
#1501 polyax = 0: Spindle-spindle polygon (spindle-spindle)
[Operation]
This signal turns ON by the polygon machining start command (G51.2/G251). The status ON is retained during the polygon machining mode.
This signal turns OFF when the polygon machining mode is canceled (G50.2/G250, reset, etc.), and remains OFF in modes other than the polygon machining mode. The OFF status is retained except during the polygon machining mode.
[Related signals]
(1) In spindle-spindle polygon mode (XCB2)
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Hob machining: Retract complete HOBRTF XCAF XDEF XF2F X106F X11AF X12EF X142F X156F
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A In spindle-NC axis polygon mode XCB0 XDF0 XF30 X1070 X11B0 X12F0 X1430 X1570
Hob machining: retract reaction
(HOBRTR)
Retract operation
Hob machining: retracting
(HOBRTM)
Hob machining: retract complete
(HOBRTF)

Note

[Function]
This signal informs that the controller is in operation alarm (error) condition.
[Operation]
This signal is turned ON when:
 The parameter "#1238 set10/bit7" is ON and the following operation alarms occur.
This signal turns OFF when:
 The parameter "#1238 set10/bit7" is OFF.
 The parameter "#1238 set10/bit7" is ON and there are no following operation alarm conditions.
For details on the operation alarms, refer to the instruction manual for each model.
<Operation alarms output to the "NC alarm 5">
 External interlock axis exists (M01 0004)
 Override zero (M01 0102)
 External feed speed zero (M01 0103)
 Block start interlock (M01 0109)
 Cutting block start interlock (M01 0110)
 Rapid traverse override zero (M01 0125)
 Interference check disabled (M01 0200)
 Tool interfere. check disabled (M01 0205)
 Spindle-spindle polygon (G51.2/G251) cutting interlock (M01 1033)
[Function]
This signal informs that the spindle-spindle polygon machining mode is being executed.
(1) Refer to the explanation of the "In Spindle-NC axis polygon mode" signal for details on the spindle-NC axis polygon.
#1501 polyax 0: Polygon machining (spindle-NC axis)
#1501 polyax = 0: Spindle-spindle polygon (spindle-spindle)
[Operation]
This signal is turned ON when:
 The G51.2/G251 is commanded, and the spindle-spindle polygon machining is executed.
This signal turns OFF when:
 G50.2/G250 is commanded, and the spindle-spindle polygon machining is canceled.
 The "Spindle synchronization cancel" signal is input, and the spindle-spindle polygon machining is canceled.
 Emergency stop occurs.
 Reset is input.
When this signal turns ON and the spindle-spindle polygon synchronization is completed, the "Spindle-spindle polygon synchronization completion" signal turns ON.
[Related signals]
(1) Spindle-spindle polygon cancel (YCD1)
(2) Spindle-spindle polygon synchronization completion (XCB3)
(3) In Spindle-NC axis polygon mode (XCB0)
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A NC alarm 5 AL5 XCB1 XDF1 XF31 X1071 X11B1 X12F1 X1431 X1571
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A In spindle-spindle polygon mode XCB2 XDF2 XF32 X1072 X11B2 X12F2 X1432 X1572
Note

[Function]
This signal informs that the workpiece spindle and rotary tool spindle are in the synchronized rotation state.
[Operation]
This signal turns ON when:
 The rotary tool spindle rotation speed, in respect to the rotation speed following the rotary tool spindle and workpiece spindle rotation ratio command, reaches the value set for the spindle-spindle polygon synchronization rotation speed attainment level during the spindle-spindle polygon machining mode.
This signal turns OFF when:
 The rotary tool spindle rotation speed, in respect to the rotation speed following the rotary tool spindle and workpiece spindle rotation ratio command, deviates from the value set for the spindle-spindle polygon synchronization rotation speed attainment level during the spindle-spindle polygon machining mode.
 The spindle-spindle polygon synchronization mode is canceled.
[Related signals]
(1) Spindle-spindle polygon cancel (YCD1)
(2) In spindle-spindle polygon mode (XCB2)
[Function]
This signal notifies that the controller is in 3-dimensional coordinate conversion.
[Operation]
This signal turns ON when:
 G68 (M system)/G68.1 (L system) (3-dimensional coordinate conversion) is commanded.
This signal turns OFF when:
 G69 (M system)/G69.1 (L system) (3-dimensional coordinate conversion cancel) is commanded.
 G68/G68.1 (3-dimensional coordinate conversion) modal is cleared by reset.
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Spindle-spindle polygon synchroniza tion completion XCB3 XDF3 XF33 X1073 X11B3 X12F3 X1433 X1573
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A In 3-dimensional coordinate conversion XCB9 XDF9 XF39 X1079 X11B9 X12F9 X1439 X1579

[Function]
This signal notifies that the machining condition parameter group switch request is completed.
[Operation]
This signal turns ON in the following conditions.
 The machining condition parameter group switch is performed by turning ON the "Machining condition selection I:

Machining condition parameter group switch request" signal (YC6D), and completed.
The machining condition parameter group switch is not completed, and ended as an error.
When it is ended as an error, this completion signal (XCBD) turns ON at the same time as when the corresponding bit of the "Machining condition selection I: Machining condition parameter group switch error status" signal (R20583) turns ON.
This signal turns OFF in the following conditions.
The "Machining condition selection I: Machining condition parameter group switch request" signal (YC6D) is turned OFF.
[Caution]
Refer to [Caution] of the "Machining condition selection I: Machining condition parameter group switch request" signal (YC6D).
[Related signals]
(1) Machining condition selection I: Machining condition parameter group switch request (YC6D: MCSLR)
(2) Machining condition selection I: Selection of machining application (R22564: MCSLSA)
(3) Machining condition selection I: Selection of machining condition (R22565: MCSLSC)
(4) Machining condition selection I: Current machining condition (application) (R20580: MCSLPA)
(5) Machining condition selection I: Current machining condition (condition) (R20581: MCSLPC)
(6) Machining condition selection I: Current machining condition status (R20582: MCSLSTS)
(7) Machining condition selection I: Machining condition parameter group switch error status (R20583: MCSLERR)
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A
Machining condition selection I: Ma chining condition parameter group
switch completed
MCSLF XCBD XDFD XF3D X107D X11BD X12FD X143D X157D

[Function]
This signal notifies that the machining condition parameter group switch is canceled and that the switch to the current machining condition parameter group is completed.
[Operation]
This signal turns ON in the following conditions.
The switch to the current machining condition parameter group is performed by turning ON the "Machining condition selection I: Machining condition parameter group switch cancel request" signal (YC6E), and completed.
The switch to the current machining condition parameter group is not completed and ended as an error.
When it is ended as an error, this completion signal (XCBE) turns ON at the same time as when the corresponding bit of the "Machining condition selection I: Machining condition parameter group switch error status" signal (R20583) turns ON.
This signal turns OFF in the following conditions.
The "Machining condition selection I: Machining condition parameter group switch cancel request" signal (YC6E) is turned OFF.
[Caution]
Refer to [Caution] of the "Machining condition selection I: Machining condition parameter group switch cancel request" signal (YC6E).
[Related signals]
(1) Machining condition selection I: Machining condition parameter group switch cancel request (YC6E: MCSLCR)
(2) Machining condition selection I: Current machining condition (application) (R20580: MCSLPA)
(3) Machining condition selection I: Current machining condition (condition) (R20581: MCSLPC)
(4) Machining condition selection I: Current machining condition status (R20582: MCSLSTS)
(5) Machining condition selection I: Machining condition parameter group switch error status (R20583: MCSLERR)
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A
Machining condition selection I: Ma chining condition parameter group
switch cancel completed
MCSLCF XCBE XDFE XF3E X107E X11BE X12FE X143E X157E

[Function]
This signal informs that the synchronized tapping mode is active.
(This signal is output only when the M function synchronized tapping cycle valid parameter (#1272 ext08 bit1) is ON.)
[Operation]
<ON timing>
(1) Spindle position loop and in synchronized tapping selection turn ON only during synchronized tapping.
(2) If synchronized tapping is applied even during tap retract, the "In synchronized tapping selection" signal turns ON.
<OFF timing>
This signal is turned OFF by commanding reset, G80 (hole drilling fixed cycle cancel), 01 group G codes, or other fixed cycle G codes.
(1) The gears are not selected until the S command is issued again.
(2) This signal turns OFF when tap retract is interrupted or completed.
[Related signals]
(1) Gear shift completion (GFIN: Y1885)
(2) Spindle actual speed (R6506)
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A In synchronized tapping selection (M
command) RTAP XCC0 XE00 XF40 X1080 X11C0 X1300 X1440 X1580
S1000 ;
Gears are selected at maximum speed
S1000
Positioning Drilling
G84 ~ ;
The spindle can be rotated at the spindle rotation speed
Program command
G84 operation
Spindle position loop
S function strobe (SF)

Spindle gear shift
(GR1/2)
In synchronized tapping
selection (RTAP)
Gear changeover
operation
Gear shift completion
(GFIN)
Spindle actual speed
(R18)
M function finish (FIN1)
Internal process
Sequence process
Note
G80 ;
Internal process
Program command G84 ~ ;
Spindle position loop
Spindle gear shift (GR1/2)
In synchronized tapping
selection (RTAP)
Note

[Function]
This signal outputs the state of "in drilling operation" of small diameter deep hole cycle.
[Operation]
This signal is output between the positioning to the R point for drilling axis and returning to the R point/initial point after finishing the drilling.
[Related signals]
(1) Small diameter deep hole drilling cycle (YCCA)
[Function]
This signal informs that the barrier area of left side (right side) is valid in the chuck/tailstock barrier function.
[Operation]
This signal is turned ON when all conditions below are satisfied and the barrier area is enabled. (When this signal is OFF, the barrier check is not executed.)
The additional specification of chuck barrier check function is valid.
The setting of the parameter #8310 Barrier ON" on the barrier data screen is "1". (Except when the special display unit is used.)
The setting of the parameter "#8315 Barrier Type (L)" ("#8316 Barrier Type (R)") on the barrier data screen is other than "0".
The barrier valid signal input described above is ON or in G22 modal.
[Related signals]
(1) Barrier valid (left) (YCD8)
(2) Barrier valid (right) (YCD9)
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A In small diameter deep hole cycle XCC1 XE01 XF41 X1081 X11C1 X1301 X1441 X1581
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A In barrier valid (left) XCC8 XE08 XF48 X1088 X11C8 X1308 X1448 X1588
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A In barrier valid (right) XCC9 XE09 XF49 X1089 X11C9 X1309 X1449 X1589
#8310 Barrier ON: 1
#8315 BARRIER TYPE(L): 1
Barrier valid (L)
In barrier valid (L)

[Function]
This signal informs the PLC that the drive power supply for all axes is being shut off or released due to the the "Door open I" signal (DOOR1) or the "Door open II" signal (DOOR2).
[Operation]
This signal turns ON when the drive power supply for all axes is shut off by turning ON the "Door open I" signal (DOOR1) or the "Door open II" signal (DOOR2).
This signal turns OFF when all axes are ready ON and all servo axes are servo ON by turning OFF the "Door open I" signal (DOOR1) or the "Door open II" signal (DOOR2).
Release of the door lock is enabled at the rising edge of the "Door open enable" signal.
The operation is in a READY status at the falling edge of the "Door open enable" signal.
[Caution]
<Handling of the PLC axis>
For the PLC axis, stop it at the PLC and then output the "Door open I" signal (DOOR1) or the "Door open II" signal (DOOR2) to the NC. If the "Door open I" signal (DOOR1) or the "Door open II" signal is input without stopping the PLC axis, the axis stops with a dynamic brake method due to the ready OFF. The remaining distance is held in the R register being used in the PLC axis control.
<Handling of the analog spindle>
When an analog spindle is connected, it is not possible to confirm that the spindle has completely stopped with the NC. Thus, confirm that the spindle has completely stopped using the PLC, before opening the door.
Since the spindle may resume rotation immediately after the door is closed, for safety, turn OFF the forward run and the reverse run signals when the door is opened.
<Opening the door during ATC operation>
To open the door while ATC is operating, apply an interlock with the user PLC.
[Related signals]
(1) Door open I (DOOR1: Y768)
(2) Door open II (DOOR2: YCE1)
[Function] [Operation]

This signal turns ON when the program return is completed by inputting the program return signal. This also turns ON when an error occurs.
This signal turns OFF when the program return signal is turned OFF from the user PLC.
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Door open enable DROPNS XCD8 XE18 XF58 X1098 X11D8 X1318 X1458 X1598
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A External search: Program return com pleted XCEA XE2A XF6A X10AA X11EA X132A X146A X15AA
Program return signal
(YC9A)
Processing program return
(NC internal state)
Program return completed signal
(XCEA)
Program return complete status
(R501)
The timing chart for program return is shown below.

[Function]
This signal informs of the program format switch state.
0: Program format switch not in progress
1: Program format switch in progress
[Operation]
This signal notifies the PLC of the part system where program format switch is enabled.
When the "Program format switch request" (PFCHR: YD00) has turned ON and the format switch is completed, the PFCHS signal turns ON. When automatic operation is started while this signal is ON, the program is executed based on the switched program format (G code system).
L-system operation example
[Caution]
(1) After the "Program format switch request" (PFCHR: YD00) is turned ON, do not start automatic operation until this sig nal turns ON. Otherwise, it cannot be assured that "the control runs a program based on the switched G code system from the top block of the program".
[Related signals]
(1) Program format switch request (PFCHR: YD00)
[Function]
This signal indicates that the torque skip ON occurred while the torque skip (G160) is commanded.
[Operation]
This signal turns ON when:
The torque skip ON occurs while the torque skip (G160) is commanded.
This signal turns OFF when:
The "Reset 1", "Reset 2", or "Reset & rewind" signal is input for the target part system.
An emergency stop occurred.
An axis movement is commanded for the target part system with a machining program in the next or later block for the target part system.
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Program format switch in progress PFCHS XCF0 XE30 XF70 X10B0 X11F0 X1330 X1470 X15B0
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Torque limitation skip:
G160 torque limit ON GLMT XCF9 XE39 XF79 X10B9 X11F9 X1339 X1479 X15B9
Program format switch
request(PFCHR:YD00)
Program format switch in
progress (PFCHS: XCF0)
In automatic operation
"Run" (OP)
Execute program with M system G code system
G160 ; G4 ; G1/G0 ;
G160 Torque limit ON
(XCF9)
In torquw limit
Machining
program

[Function]
This signal indicates the currently selected rapid traverse time constant.
[Operation]
This signal turns ON when:
The rapid traverse time constant has already been switched to the axis specifications parameter "#2598 G0tL_2" or the rapid traverse time constant (primary delay)/second-step time constant for soft acceleration/deceleration has been switched to the axis specifications parameter "#2599 G0t1_2".
This signal turns OFF when:
The rapid traverse time constant has already been switched to the axis specifications parameter "#2004 G0tL" or the rapid traverse time constant (primary delay)/second-step time constant for soft acceleration/deceleration has been switched to the axis specifications parameter "#2005 G0t1".
[Related signals]
(1) Rapid traverse time constant: Switchover request (ACCG: YD0B)
[Function]
This signal indicates that the switching process of acceleration/deceleration time constant is being performed in the real time tuning 2 function.
[Operation]
This signal is ON while switching process of the acceleration/deceleration time constant is being performed.
This signal is OFF while switching process of the acceleration/deceleration time constant is not performed or real-time tuning 2 function is disabled.
[Related signals]
(1) Real-time tuning 2: Acceleration/deceleration time constant in automatic switchover (RT2CHGA: YD0C)

(2) Real-time tuning 2: Acceleration/deceleration time constant in manual switchover (RT2CHGM: YD0D)
(3) Real-time tuning 2: Acceleration/deceleration time constant reset (RT2RST: YD0E)
[Function]
This signal notifies the PLC that the reserved tool wear compensation memory has not been reflected to the tool wear compensation memory yet.
[Operation]
Refer to the page of the "Request for reflecting reserved tool wear compensation" signal (TWIN: YD0F).
[Related signals]
(1) Reservation of tool wear compensation (TWR: Y1CB8)
(2) Request for reflecting reserved tool wear compensation (TWIN: YD0F)
(3) Reflection of reserved tool wear compensation is complete (TWOUT: XD0F)
[Function]
This signal notifies the PLC that the contents of the reserved tool wear compensation memory have been reflected to the tool wear compensation memory.
[Operation]
Refer to the page of the "Request for reflecting reserved tool wear compensation" signal (TWIN: YD0F).
When the "Request for reflecting reserved tool wear compensation" signal (TWIN) turns OFF, this signal also turns OFF.
[Related signals]
(1) Reservation of tool wear compensation (TWR: Y1CB8)
(2) Request for reflecting reserved tool wear compensation (TWIN: YD0F)
(3) Reserved tool wear compensation not reflected (TWNIN: XD0E)
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Rapid traverse time constant: In swi tchover G0AC XD0B XE4B XF8B X10CB X120B X134B X148B X15CB
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Real-time tuning 2: Acceleration/decel eration time constant in switchover RT2CHG XD0C XE4C XF8C X10CC X120C X134C X148C X15CC
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Reserved tool wear compensation not
reflected TWNIN XD0E XE4E XF8E X10CE X120E X134E X148E X15CE
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Reflection of reserved tool wear com pensation is complete TWOUT XD0F XE4F XF8F X10CF X120F X134F X148F X15CF

[Function]
While this signal is ON, the coordinate system for manual operation is selected by the "3D coordinate conversion: Manual feed coordinates switch" signal (YD14).
While this signal is OFF, manual feed is carried out with respect to the machine coordinate system.
[Operation]
This signal turns ON when the following conditions are all satisfied:
G68 (M system)/G68.1 (L system) (3D coordinate conversion) has been commanded at least once.
However, if the command is canceled by G69 (M system)/G69.1 (L system) (3D coordinate conversion cancel), the sig nal will not turn ON until G68/G68.1 is commanded again.
[Related signals]
(1) 3D coordinate conversion: Manual feed coordinates switch (YD14)
[Function]
This signal indicates that the rotation center error compensation is valid.
[Operation]
This signal turns "1" when the additional specification of rotation center error compensation is enabled and the "Rotation center error compensation enabled" signal (RCEE) is "1".
This signal turns "0" when the rotation center error compensation is disabled.
[Related signals]
(1) Rotation center error compensation enabled (RCEE: YD15)
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A 3D coordinate conversion: Manual feed
valid XD14 XE54 XF94 X10D4 X1214 X1354 X1494 X15D4
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Rotation center error compensation in
progress
RCEI XD15 XE55 XF95 X10D5 X1215 X1355 X1495 X15D5

[Function]
This signal indicates that the spatial error compensation is valid and error compensation can be performed.
[Operation]
When the spatial error compensation is invalid, this signal is set to "0".
When the "Spatial error compensation enabled" signal (SECE: YD17) is ON and the option of the spatial error compensation is valid, this signal is set to "1".
The spatial error compensation function can compensate errors only in the first part system.
[Timing chart]
<Without the spatial error compensation option>
<With the spatial error compensation option>
(1) When the spatial error compensation is enabled and the error data is the same as when it was enabled the last time, the calculation processing is not performed.
[Related signals]
(1) Spatial error compensation enabled (SECE: YD17)
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Spatial error compensation in progress SECI XD17 XE57 XF97 X10D7 X1217 X1357 X1497 X15D7
Low
: M01 0260 No spec: Spatial error comp
Spatial error compensation
enabled signal (YD17)
Spatial error compensation in
progress signal (XD17)
: Error data calculation processing
Spatial error compensation
enabled signal (YD17)

Spatial error compensation in
progress signal (XD17)
Input the error data
(Note)
Note

[Function]
This signal indicates the coordinate system in which the 3D manual feed is carried out by the jog or incremental feed.
Jog feed or incremental feed is carried out on the coordinate system for which this signal is ON.
[Operation]
This signal turns ON when:
The signal (YD18 to YD1A) to select the coordinate system for the 3D manual feed (JOG, INC) is turned ON during jog mode or incremental mode.
This signal turns OFF when:
The signal (YD18 to YD1A) to select the coordinate system for the 3D manual feed (JOG, INC) is turned OFF.
The jog feed mode or incremental feed mode is turned OFF.
[Related signals]
(1) In jog mode (JO: XC00)
(2) In incremental mode (SO: XC02)
(3) 3D manual feed (JOG, INC): Tool axis coordinate system selection (MJCT: YD18)
(4) 3D manual feed (JOG, INC): Table coordinate system selection (MJCB: YD19)
(5) 3D manual feed (JOG, INC): Feature coordinate system selection (MJCF: YD1A)
(6) In tool center point rotation (TCPRS: XD27)
[Function]
This signal indicates the coordinate system in which the 3D manual feed is carried out on the 1st handle axis.
The feed on the 1st handle axis is carried out on the coordinate system for which this signal is ON.
[Operation]
This signal turns ON when:
The 1st handle feed is valid, the axis is selected and the signal (YD1B to YD1D) to select the coordinate system for the 3D manual feed (1st handle) is turned ON.
This signal turns OFF when:
The signal (YD1B to YD1D) to select the coordinate system for the 3D manual feed (1st handle) is turned OFF.
The "1st handle valid" signal is turned OFF.
The signal to select the 1st handle axis is turned OFF.
[Related signals]
(1) 1st handle axis selection code (HS11 to HS116: YC40 to 4)
(2) 1st handle valid (HS1S: YC47)
(3) 3D manual feed (1st handle): Tool axis coordinate system selection (MH1CT: YD1B)
(4) 3D manual feed (1st handle): Table coordinate system selection (MH1CB: YD1C)
(5) 3D manual feed (1st handle): Feature coordinate system selection (MH1CF: YD1D)
(6) In tool center point rotation (TCPRS: XD27)
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A 3D manual feed (JOG, INC): Tool axis
coordinate system selected MJST XD18 XE58 XF98 X10D8 X1218 X1358 X1498 X15D8
A 3D manual feed (JOG, INC): Table co ordinate system selected MJSB XD19 XE59 XF99 X10D9 X1219 X1359 X1499 X15D9
A 3D manual feed (JOG, INC): Feature
coordinate system selected MJSF XD1A XE5A XF9A X10DA X121A X135A X149A X15DA
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A 3D manual feed (1st handle): Tool axis
coordinate system selected MH1ST XD1B XE5B XF9B X10DB X121B X135B X149B X15DB
A 3D manual feed (1st handle): Table co ordinate system selected MH1SB XD1C XE5C XF9C X10DC X121C X135C X149C X15DC
A 3D manual feed (1st handle): Feature
coordinate system selected MH1SF XD1D XE5D XF9D X10DD X121D X135D X149D X15DD

[Function]
This signal indicates the coordinate system in which the 3D manual feed is carried out on the 2nd handle axis.
The feed on the 2nd handle axis is carried out on the coordinate system for which this signal is ON.
[Operation]
This signal turns ON when:
The 2nd handle feed is valid, the axis is selected and the signal (YD1E to YD20) to select the coordinate system for the 3D manual feed (2nd handle) is turned ON.
This signal turns OFF when:
The signal (YD1E to YD20) to select the coordinate system for the 3D manual feed (2nd handle) is turned OFF.
The "2nd handle valid" signal is turned OFF.
The signal to select the 2nd handle axis is turned OFF.
[Related signals]
(1) 2nd handle axis selection code (HS21 to HS216: YC48 to C)
(2) 2nd handle valid (HS2S: YC4F)
(3) 3D manual feed (2nd handle): Tool axis coordinate system selection (MH2CT: YD1E)
(4) 3D manual feed (2nd handle): Table coordinate system selection (MH2CB: YD1F)
(5) 3D manual feed (2nd handle): Feature coordinate system selection (MH2CF: YD20)
(6) In tool center point rotation (TCPRS: XD27)
[Function]
This signal indicates the coordinate system in which the 3D manual feed is carried out on the 3rd handle axis.
The feed on the 3rd handle axis is carried out on the coordinate system for which this signal is ON.
[Operation]
This signal turns ON when:
The 3rd handle feed is valid, the axis is selected and the signal (YD21 to YD23) to select the coordinate system for the 3D manual feed (3rd handle) is turned ON.
This signal turns OFF when:
The signal (YD21 to YD23) to select the coordinate system for the 3D manual feed (3rd handle) is turned OFF.
The "3rd handle valid" signal is turned OFF.

The signal to select the 3rd handle axis is turned OFF.
[Related signals]
(1) 3rd handle axis selection code (HS31 to HS316: YC50 to 4)
(2) 3rd handle valid (HS3S: YC57)
(3) 3D manual feed (3rd handle): Tool axis coordinate system selection (MH3CT: YD21)
(4) 3D manual feed (3rd handle): Table coordinate system selection (MH3CB: YD22)
(5) 3D manual feed (3rd handle): Feature coordinate system selection (MH3CF: YD23)
(6) In tool center point rotation (TCPRS: XD27)
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A 3D manual feed (2nd handle): Tool axis
coordinate system selected MH2ST XD1E XE5E XF9E X10DE X121E X135E X149E X15DE
A 3D manual feed (2nd handle): Table co ordinate system selected MH2SB XD1F XE5F XF9F X10DF X121F X135F X149F X15DF
A 3D manual feed (2nd handle): Feature
coordinate system selected MH2SF XD20 XE60 XFA0 X10E0 X1220 X1360 X14A0 X15E0
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A 3D manual feed (3rd handle): Tool axis
coordinate system selected MH3ST XD21 XE61 XFA1 X10E1 X1221 X1361 X14A1 X15E1
A 3D manual feed (3rd handle): Table co ordinate system selected MH3SB XD22 XE62 XFA2 X10E2 X1222 X1362 X14A2 X15E2
A 3D manual feed (3rd handle): Feature
coordinate system selected MH3SF XD23 XE63 XFA3 X10E3 X1223 X1363 X14A3 X15E3

[Function]
This signal informs the operation of the rotation axis of 3D manual feed (JOG/incremental/handle).
[Operation]
When the rotation axis of 3D manual feed (JOG/incremental/handle) is operated, this signal informs that the tool is operating while maintaining the positional relationship of tool center point as seen from the workpiece.
[Related signals]
(1) 3D manual feed (JOG, INC): Tool axis coordinate system selected (MJST: XD18)
(2) 3D manual feed (JOG, INC): Table coordinate system selected (MJSB: XD19)
(3) 3D manual feed (JOG, INC): Fearture coordinate system selected (MJSF: XD1A)
(4) 3D manual feed (1st handle): Tool axis coordinate system selected (MH1ST: XD1B)
(5) 3D manual feed (1st handle): Table coordinate system selected (MH1SB: XD1C)
(6) 3D manual feed (1st handle): Fearture coordinate system selected (MH1SF: XD1D)
(7) 3D manual feed (2nd handle): Tool axis coordinate system selected (MH2ST: XD1E)
(8) 3D manual feed (2nd handle): Table coordinate system selected (MH2SB: XD1F)
(9) 3D manual feed (2nd handle): Fearture coordinate system selected (MH2SF: XD20)
(10)3D manual feed (3rd handle): Tool axis coordinate system selected (MH3ST: XD21)
(11)3D manual feed (3rd handle): Table coordinate system selected (MH3SB: XD22)
(12)3D manual feed (3rd handle): Fearture coordinate system selected (MH3SF: XD23)
[Function]
This signal notifies that a machining surface is being selected by the R-Navi function.
[Operation]
This signal turns ON when:
A machining surface is selected on [S-sel] of the monitor screen.
This signal turns OFF when:
The machining surface is canceled.
The machining surface is canceled with emergency stop.
(1) This signal will not turn ON while a machining surface is being called by a program.
[Related signals]
(1) R-Navi: Machining surface being indexed (RSIND: XD29)
(2) R-Navi: Machining surface indexing completion (RSIDF: XD2A)
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A In tool center point rotation TCPRS XD27 XE67 XFA7 X10E7 X1227 X1367 X14A7 X15E7
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A R-Navi: Machining surface being select ed RSSCT XD28 XE68 XFA8 X10E8 X1228 X1368 X14A8 X15E8
Note

[Function]
This signal notifies that a selected machining surface is being indexed by the R-Navi function.
[Operation]
This signal turns ON when:
"#11037 R-Navi Index Type" is set to "0".
The [Index exec] menu is pressed on [Surface Selection] of the Monitor screen while a machining surface is being selected.
"#11037 R-Navi Index Type" is "1".
The [Index exec] menu is pressed on [Surface Selection] of the Monitor screen and then a tool length offset No. is entered while a machining surface is being selected.
This signal turns OFF when:
Indexing is completed.
The NC is reset.
Emergency stop occurs.
[Related signals]
(1) R-Navi: Machining surface being selected (RSSCT: XD28)
(2) R-Navi: Machining surface indexing completion (RSIDF: XD2A)
[Function]
This signal notifies that indexing of a selected machining surface is completed by the R-Navi function.
[Operation]
This signal turns ON when:
Machining surface indexing is completed, and the "Smoothing zero" is turned ON.
This signal turns OFF when:
The machining surface is canceled.
Another machining surface is selected while the surface is being selected (surfaces are switched).

The machining surface is canceled with emergency stop.
[Related signals]
(1) R-Navi: Machining surface being selected (RSSCT: XD28)
(2) R-Navi: Machining surface being indexed (RSIND: XD29)
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A R-Navi: Machining surface being in dexed RSIND XD29 XE69 XFA9 X10E9 X1229 X1369 X14A9 X15E9
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A R-Navi: Machine surface index com plete RSIDF XD2A XE6A XFAA X10EA X122A X136A X14AA X15EA

[Function]
This signal notifies that the inclined surface machining command and simple inclined surface control command are in modal.
[Operation]
The signal turns ON when:
A block of inclined surface machining command (G68.2/G68.4) is executed.
A block of simple inclined surface control command (G176) is executed.
The parameter "#1247 set19/bit2" (Inclined surface machining mode hold) is set to "1" and the power is turned OFF and ON again during the simple inclined surface control command.
The signal turns OFF when:
A cancel block of inclined surface machining command and simple inclined surface control command (G69.1) are exe cuted.
The parameter "#1247 set19/bit2" (Inclined surface machining mode hold) is set to "0" and the emergency stop is turned ON.
The inclined surface machining command and simple inclined surface control command are canceled by reset.
The inclined surface machining command and simple inclined surface control command are canceled when:
[Function]
This signal notifies that DB operation is being performed to the arbitrary information accumulation table in the database.
[Operation]
This signal notifies that whether the DB operation is being performed to the arbitrary information accumulation table in the database.
0: The DB operation is not performing to the arbitrary information accumulation table in the database.
1: The DB operation is performing to the arbitrary information accumulation table in the database.
When MES interface library function is invalid, this signal is set to "0".
[Related signals]
(1) MES interface library: User arbitrary information send request (YC9B to Y155B)
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Simple inclined surface machining/In clined surface control command ON SLOP XD2F XE6F XFAF X10EF X122F X136F X14AF X15EF
#1151 rstint
(Reset initial)
#1210 RstGmd/bitF
(Modal G code reset) Reset 1 Reset 2 Reset & rewind
0
0 Retains all modals. Cancel Cancel
1 Retains all modals. Retains only the in clined surface.
Retains only the in clined surface.
1
0 Cancel Cancel Cancel
1 Retains only the in clined surface.
Retains only the in clined surface.
Retains only the in clined surface.
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A MES interface library:
Sending user arbitrary information XD30 XE70 XFB0 X10F0 X1230 X1370 X14B0 X15F0

[Function]
This signal notifies that the reverse run is not possible.
[Operation]
This signal notifies that the reverse run is not possible when the reverse run is performed in the block where the reverse run is prohibited during manual arbitrary reverse.
This signal turns ON at the timing when the reverse run is performed in the block where the reverse run is prohibited. After that, as the state of the signal is retained, the signal continues to be output even when the reverse run stops. This signal turns OFF at the time of reset/emergency stop or forward run start.
Also, this signal turns OFF when manual arbitrary reverse run is canceled during reverse run invalid status.
[Related signals]
(1) Manual arbitrary reverse run mode (MORR: Y73C)
(2) Manual arbitrary reverse run mode ON (PCHKO: X715)
(3) Manual arbitrary reverse run speed selection (MORSP: Y73D)
(4) Actual cutting mode (thread, tap) in manual arbitrary reverse run (MRCMD: Y761)
(5) Manual arbitrary reverse run: MSTB reverse run prohibited (MRPSG: YCFC)
(6) Manual arbitrary reverse run speed multiplier (R379)
(7) Manual arbitrary reverse run: Reverse run ON (MOREV: X716)
(8) Manual arbitrary reverse run handle selection (R375)
[Function]
This signal notifies that the vibration cutting mode is being executed.
[Operation]
This signal turns ON during the vibration cutting mode.
This signal turns OFF when the vibration cutting mode is canceled.
[Related signals]
(1) VCC: Mode in execution (VCC: X1810)
(2) VCC: Numbers of vibrations (VCC_VIB: R20556)
(3) VCC: Frequency (VCC_FRQ: R20557)
(4) VCC: Spindle rotation speed (VCC_SPREV: R7024,R7025)
(5) VCC: Vibrating axis (VCC_VIBAX: R20558)

(6) VCC: Temporary cancel of axis vibration (VCC_INVAX: R22532)
(7) VCC: Cause of non-vibration (VCC_FACT: R20559)
[Function]
This signal indicates that the "Edit/Search" window is displayed.
[Operation]
This signal is turned ON when the "Edit/Search" window is displayed on the monitor screen, and turned OFF when the window is closed.
[Related signals]
(1) Edit/Search (Y1878)
[Function]
This signal is output if specified gear No. is illegal.
[Operation]
This signal turns ON when the gear No. specified by the user exceeds the system maximum gear No.
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Manual arbitrary reverse run: Reverse
run invalid status XD31 XE71 XFB1 X10F1 X1231 X1371 X14B1 X15F1
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A VCC: Mode in execution VCC X1810 X1811 X1812 X1813 X1814 X1815 X1816 X1817
Cont. Signal name Abbrev. Common ($)
A Edit/search window displayed X1878
Cont. Signal name Abbrev. 1stSP 2ndSP 3rdSP 4thSP 5thSP 6thSP 7thSP 8thSP
A S command gear No. illegal SIGE X1882 X18E2 X1942 X19A2 X1A02 X1A62 X1AC2 X1B22

[Function]
This signal is output when S command value is clamped to the maximum or minimum value.
[Operation]
The signal turns ON when the S command value is larger than the value of the maximum spindle rotation speed parameter (Smax) or smaller than the value of the minimum spindle rotation speed parameter (Smin) for the currently selected gear.
[Function]
This signal is output when there is no gear to select for the S function (S code) commanded by automatic operation.
[Operation]
This signal turns ON when the S function (S code) is commanded in automatic operation and the S code does not apply to any gear stage set in the parameter (maximum spindle rotation speed).
This signal (SNGE) is output at the same time as the "S function strobe" signal (SF).
[Related signals]
(1) S function strobe (SFn: XC64)
(2) Spindle gear shift (GR1, GR2: X1885, 6)
[Function]
This signal informs which gear stage in the spindle applies to the S command (S code) issued in the automatic operation (memory, MDI or tape) machining program.
For machines that have gear stage shift, the gear will be shifted on the machine side when this signal is received.
[Operation]
When the S command (S code) is issued in automatic operation, the gear stage of the currently commanded S code is output as a 2-bit (GR1, GR2) code according to the preset parameter (maximum spindle rotation speed).
The following table shows the relationship between the maximum spindle rotation speed parameter (Smax1 to Smax4) and the "Spindle gear shift" signal (GR1, GR2) output.
This signal (GR1, GR2) is output simultaneously with the "Spindle function strobe" (SFn).
(1) If the commanded S code does not apply to any of the gear stages, the "S command no gear selected" signal (SNGE) is output separately from this signal.
At this time, the output to this signal depends on the settings of Smax1 to Smax4.
When a spindle speed exceeding Smax4 is commanded while Smax1 up to Smax4 are set: GR2=1, GR1=1
When a spindle speed exceeding Smax3 is commanded while Smax1 up to Smax3 are set: GR2=1, GR1=0
When a spindle speed exceeding Smax2 is commanded while Smax1 and Smax2 are set: GR2=0, GR1=1
When a spindle speed exceeding Smax1 is commanded while only Smax1 is set: GR2=0, GR1=0
[Related signals]
(1) S function strobe (SFn: XC64)
(2) S command no gear selected (SNGE: X1884)
Cont. Signal name Abbrev. 1stSP 2ndSP 3rdSP 4thSP 5thSP 6thSP 7thSP 8thSP
A S command max./min. command val ue over SOVE X1883 X18E3 X1943 X19A3 X1A03 X1A63 X1AC3 X1B23
Cont. Signal name Abbrev. 1stSP 2ndSP 3rdSP 4thSP 5thSP 6thSP 7thSP 8thSP
A S command no gear selected SNGE X1884 X18E4 X1944 X19A4 X1A04 X1A64 X1AC4 X1B24
Cont. Signal name Abbrev. 1stSP 2ndSP 3rdSP 4thSP 5thSP 6thSP 7thSP 8thSP
A Spindle gear shift command 1, 2 GR1, 2 X1885, 6 X18E5, 6 X1945, 6 X19A5, 6 X1A05, 6 X1A65, 6 X1AC5, 6 X1B25, 6
Gear stage Maximum spindle rota tion speed
Spindle gear shift com mand
GR2 GR1
1 Smax1 0 0 Range SO to S (Smax1)
2 Smax2 0 1 Range S (Smax1) + 1 to S (Smax2)
3 Smax3 1 0 Range "S (Smax2) + 1 to S (Smax3)"
4 Smax4 1 1 When range over S (Smax3)+1 is specified.
Note

[Function]
This signal informs that the spindle has been positioned within the specified range in accordance with the spindle orientation command. The information is sent earlier than the "Spindle in-position" signal. Since orientation completion can be predicted using this signal, it is possible to eliminate the sequence delay time, etc. for tool changes and other such operations, thereby achieving a shorter tact time.
[Operation]
Orientation is started by the "Spindle orientation command" (ORC), and this signal turns ON when the difference between the orientation position and the feedback position is within the range of the 2nd in-position width.
The range of in-position can be set by the spindle specification parameter "#3132 ori_inp2".

The in-position signal is turned OFF when the "Spindle orientation command" (ORC) is turned OFF.
(1) When the spindle orientation command is given, orientation starts regardless of the status of the "Spindle forward run start" (SRN) or "Spindle reverse run start" (SRI).
(2) This signal is not available when an analog connection is used.
(3) The spindle is in the servo-locked state during the spindle orientation command. However, if the spindle is rotated by an external force, the in-position signal may turn OFF.
[Related signals]
(1) Spindle in-position (ORAO: X188E)
(2) Spindle orientation command (ORC: Y189E)
Cont. Signal name Abbrev. 1stSP 2ndSP 3rdSP 4thSP 5thSP 6thSP 7thSP 8thSP
A Spindle 2nd in-position ORAO2 X1888 X18E8 X1948 X19A8 X1A08 X1A68 X1AC8 X1B28
Spindle orientation
command (ORC)
Orientation position
Spindle 2nd in-position
Spindle position
2nd in-position width
Spindle in-position
Orientation position
In-position width (SP024)
Orientation 2nd in-position width (ori_inp2)
In the orientation, "Spindle 2nd in-position" turns ON
when the spindle is positioned in the 2nd in-position
width.
"Spindle in-position" turns ON when in the in-position
width.
Note

[Function]
This signal is output from the spindle controller (spindle drive) with high-speed serial coupling specifications, and informs that the load current is about to reach the permissible maximum current. This signal is used to prevent the cutter from biting into the workpiece, for example.
[Operation]
This signal (CDO) turns ON when the motor current is above the threshold (110% output) close to the permissible maximum current (120%).
(1) This signal is valid only for systems that are high-speed serially coupled to the spindle controller.
[Function]
This signal is output from the spindle controller (spindle drive) with high-speed serial coupling specifications and informs that motor speed is dropped below the speed specified by parameter.
[Operation]
This signal (VRO) turns ON when the motor speed (motor rotation speed) falls below the detection level specified by the spindle parameter "#13028 SP028 SDTS" (Speed detection set value).
(1) This signal is valid only for systems that are high-speed serially coupled to the spindle controller.
[Related signals]
(1) Speed detection 2 (SD2: X189D)
[Function]
This signal is output from the spindle controller (spindle drive) with high-speed serial coupling specifications and informs that some kind of alarm has occurred on the spindle controller.
[Operation]
This signal turns ON when an alarm is detected on the spindle controller side.
To cancel the alarm, reset (reset & rewind) the controller, turn OFF the controller, or turn OFF the spindle controller. The reset method depends on the type of alarm.
Typical examples of alarm are listed below. For details of alarm contents and cancel procedure, refer to the "Instruction Manual" of the spindle drive unit used.
Overcurrent
Breaker trip
Motor overheat
(1) This signal is valid only for systems that are high-speed serially coupled to the spindle controller.
Cont. Signal name Abbrev. 1stSP 2ndSP 3rdSP 4thSP 5thSP 6thSP 7thSP 8thSP
A Current detection CDO X1889 X18E9 X1949 X19A9 X1A09 X1A69 X1AC9 X1B29
Cont. Signal name Abbrev. 1stSP 2ndSP 3rdSP 4thSP 5thSP 6thSP 7thSP 8thSP
A Speed detection VRO X188A X18EA X194A X19AA X1A0A X1A6A X1ACA X1B2A
Cont. Signal name Abbrev. 1stSP 2ndSP 3rdSP 4thSP 5thSP 6thSP 7thSP 8thSP
A In spindle alarm FLO X188B X18EB X194B X19AB X1A0B X1A6B X1ACB X1B2B
Note
Spindle motor speed
Speed detection (VR0)
Speed command threshold
(SP020)
Speed command
Note
Note

[Function]
This signal is output from the spindle controller (spindle drive) with high-speed serial coupling specifications and informs that motor speed has dropped below the set speed threshold.
[Operation]
This signal turns ON when:
The actual spindle motor speed drops to the speed specified by the spindle parameter "#13027 SP027 ZSP" (Motor zero speed) or less.
This signal turns OFF when:
The actual spindle motor speed reached the rotation speed which was added 15 (r/min) to the set value of the spindle

parameter "#13027 SP027 ZSP" (Motor zero speed), then approximately 200 (ms) has passed.
(1) The signal is output regardless of the rotation direction commanded by the "Spindle forward run start" signal (SRN) or the "Spindle reverse run start" signal (SRI).
(2) Minimum output pulse width of this signal is approximately 200 (ms).
(3) Speed at which this signal is output can be set within range from 1 (r/min) to 1000 (r/min) with the spindle parameter "#13027 SP027 ZSP" (Motor zero speed).
(4) This signal is valid only for systems that are high-speed serially coupled to the spindle controller.
Cont. Signal name Abbrev. 1stSP 2ndSP 3rdSP 4thSP 5thSP 6thSP 7thSP 8thSP
A Zero speed ZSO X188C X18EC X194C X19AC X1A0C X1A6C X1ACC X1B2C
15 (r/min)
Spindle motor speed
(r/min)
Zero speed (ZS0n)
Approximate 200 (ms)
#13027 SP027 ZSP
(Motor zero speed)
Note

[Function]
This signal is output from the spindle controller (spindle drive) with high-speed serial coupling specifications and informs that the actual rotation speed of the spindle motor has reached the range specified by the parameter "#3105 sut" (standard setting 15%).
This signal is used for the completion condition of S command during automatic operation and for interlocking the control axis.
[Operation]
When a command is issued to change the rotation of the motor from "forward rotation" to "reverse rotation", the spindle motor starts decelerating and the "Spindle up-to-speed" signal (USO) turns OFF.
When the motor speed falls within the specified detection range, the "Spindle up-to-speed" signal turns ON.
(1) The signal cannot be output unless either the "Spindle forward run start" signal (SRN) or the "Spindle reverse run start" signal (SRI) is ON.
(2) This signal is not output in the case of operation by a command that is not a speed command such as a synchronous tap.
(3) This signal is valid only for systems that are high-speed serially coupled to the spindle controller.
Cont. Signal name Abbrev. 1stSP 2ndSP 3rdSP 4thSP 5thSP 6thSP 7thSP 8thSP
A Spindle up-to-speed USO X188D X18ED X194D X19AD X1A0D X1A6D X1ACD X1B2D
Spindle motor speed
Spindle up-to-speed (USO)
Up-to-speed range
Spindle forward run start
(SRN)
Spindle reverse run start
(SRI)
Spindle motor
speed
Spindle up-to-speed
(USO)
Up-to-speed range
Up-to-speed range
Note

[Function]
This signal informs that the spindle has been positioned within the specified range in accordance with the spindle orientation command.
[Operation]
Orientation is started by the "Spindle orientation command" signal (ORC), and this signal turns ON when the positioning of the spindle is completed within the specified range.
The in-position range is set with the spindle parameter "#13024 SP024 INP".
The in-position signal is turned OFF when the "Spindle orientation command" (ORC) is turned OFF.
(1) When the Spindle orientation command" is turned ON, the orientation starts regardless of the status of the "Spindle forward run start" signal (SRN) or the "Spindle reverse run start" signal (SRI).
(2) This signal is not available when an analog connection is used.
(3) The spindle is under servo lock condition during the spindle orientation command. However, when the spindle is rotated by an external force, the in-position signal may turn OFF.
[Related signals]
(1) Spindle 2nd in-position (ORAO2: X1888)
(2) Spindle orientation command (ORC: Y189E)
Cont. Signal name Abbrev. 1stSP 2ndSP 3rdSP 4thSP 5thSP 6thSP 7thSP 8thSP
A Spindle in-position ORAO X188E X18EE X194E X19AE X1A0E X1A6E X1ACE X1B2E
Spindle orientation command (ORC)
Spindle motor speed
Spindle in-position (ORAO)
Note

[Function]
This signal indicates that the low-speed coil is being selected in the spindle coil changeover function.
[Operation]
The high-speed coil and low-speed coil are changed over only with the "L coil selection" (LRSL) in the 2-step coil changeover specification. The high-speed coil, middle-speed coil and low-speed coil are changed over with the combination of the "L coil selection" (LRSL) and "M coil selection" (LRSM) in the 3-step coil changeover specification.

<2-step coil changeover>
<3-step coil changeover>
[Related signals]
(1) L coil selection (LRSL: Y189F)
(2) M coil selection (LRSM: Y18A6)
(3) In M coil selection (MCSA: X189E)
[Function]
This signal is a signal output from the spindle controller (spindle drive) with high-speed serial coupling specifications, and informs that the spindle is ready for operation.
[Operation]
This signal (SMA) turns ON when the spindle controller is ready for operation.
The signal turns OFF (ready off) in the following conditions.
A spindle alarm is detected.
Ready-on signal (internal signal) from the controller is OFF.
(*1) The ready on signal is output from the controller to the spindle controller.
(1) This signal is valid only with the system that is high-speed serially coupled to the spindle controller.
Cont. Signal name Abbrev. 1stSP 2ndSP 3rdSP 4thSP 5thSP 6thSP 7thSP 8thSP
A In L coil selection LCSA X188F X18EF X194F X19AF X1A0F X1A6F X1ACF X1B2F
Selected coil L coil selection
(LRSL)
In L coil selection
(LCSA)
High-speed (H) OFF OFF
Low-speed (L) ON ON
Selected coil L coil selection
(LRSL)
M coil selection
(LRSM)
In L coil selection
(LCSA)
In M coil selection
(MCSA)
High-speed (H) OFF OFF OFF OFF
Middle-speed
(M) OFF ON OFF ON
Low-speed (L)
ON OFF ON OFF
ON ON ON ON
Cont. Signal name Abbrev. 1stSP 2ndSP 3rdSP 4thSP 5thSP 6thSP 7thSP 8thSP
A Spindle ready-ON SMA X1890 X18F0 X1950 X19B0 X1A10 X1A70 X1AD0 X1B30
Controller ready-on
(*1)
Spindle ready-on (SMA)
Spindle alarm
Machine ready-on
(External interface signal) Maximum 1 (s) Maximum 1 (s) Maximum 1 (s)
Note
M800V/M80V Series PLC Interface Manual
4 Explanation of Interface Signals
4.1 PLC Input Signals (Bit Type: X***)
261 IB-1501616-F
[Function]
This signal is a signal output from spindle controller (spindle drive) with high-speed serial coupling specifications, and informs that the spindle is in the position control (synchronous tap control, etc.) state.
[Operation]
The "Spindle servo-ON" signal (SSA) turns ON when the spindle is ready (SMA signal is ON), the servo-ON command has been transferred from the controller to the spindle controller, and the spindle controller is in the servo-on state.
Note that this signal turns ON during rotation by the "Spindle forward run start" (SRN) or the "Spindle reverse run start" (SRI) other than during spindle synchronization, and during spindle orientation.
This signal (SSA) turns OFF when the servo-ON command is canceled.
(*1) The spindle servo-ON command is output from the controller to the spindle controller. It is mainly output during syn chronous tap control.
(1) While the "Spindle servo-ON" signal is ON, the "Spindle forward run start" (SRN), "Spindle reverse run start" (SRI), and "Spindle orientation command" (ORC) signals are ignored.
(2) This signal is valid only for systems that are high-speed serially coupled to the spindle controller.
[Function]
This signal is output from the spindle controller (spindle drive) with high-speed serial coupling specifications and informs that the spindle is rotating in the forward direction.
[Operation]
The "In spindle forward run" signal (SSRN) turns ON when the spindle motor is rotating in the forward direction.
This signal also turns ON if the spindle motor is rotating in the forward direction during orientation or synchronous tap.
(1) The "In spindle forward run" signal (SSRN) turns ON and OFF while the spindle motor is in the stop state with servo rigidity during oriented motion or synchronous tap.
(2) This signal is valid only for systems that are high-speed serially coupled to the spindle controller.
Cont. Signal name Abbrev. 1stSP 2ndSP 3rdSP 4thSP 5thSP 6thSP 7thSP 8thSP
A Spindle servo-ON SSA X1891 X18F1 X1951 X19B1 X1A11 X1A71 X1AD1 X1B31
Cont. Signal name Abbrev. 1stSP 2ndSP 3rdSP 4thSP 5thSP 6thSP 7thSP 8thSP
A In spindle forward run SSRN X1893 X18F3 X1953 X19B3 X1A13 X1A73 X1AD3 X1B33
Spindle servo-on (SSA)
Spindle servo-on command
(*1)
Note
Spindle motor speed
In spindle forward run
(SSRN)
Note
M800V/M80V Series PLC Interface Manual
4 Explanation of Interface Signals
4.1 PLC Input Signals (Bit Type: X***)

[Function]
This signal is output from the spindle controller (spindle drive) with high-speed serial coupling specifications and informs that the spindle is rotating in the reverse direction.
[Operation]
The "In spindle reverse run" signal (SSRI) turns ON when the spindle motor rotates in the reverse direction.
This signal also turns ON when the spindle motor is in reverse rotation even during orientation or synchronous tap operation.
(1) The "In spindle reverse run" signal (SSRI) turns ON and OFF while the spindle motor is in the stop state with servo rigidity during oriented motion or synchronous tap.
(2) This signal is valid only for systems that are high-speed serially coupled to the spindle controller.
[Function]
When the connection with the spindle controller is high-speed serial, this signal informs that the spindle is in the in-position state during synchronous tap control.
[Operation]
This signal turns ON when:
 The droop amount (servo tracking delay error) is within the in-position range during synchronous tap control (servo ON).
 Synchronous tap control is not commanded. ((A) in the figure below)
This signal turns OFF when:
 The droop amount (servo tracking delay error) has exceeded the in-position range during synchronous tap control (servo ON).
Cont. Signal name Abbrev. 1stSP 2ndSP 3rdSP 4thSP 5thSP 6thSP 7thSP 8thSP
A In spindle reverse run SSRI X1894 X18F4 X1954 X19B4 X1A14 X1A74 X1AD4 X1B34
Cont. Signal name Abbrev. 1stSP 2ndSP 3rdSP 4thSP 5thSP 6thSP 7thSP 8thSP
A Position loop in-position SIMP X1896 X18F6 X1956 X19B6 X1A16 X1A76 X1AD6 X1B36
Spindle motor speed
In spindle reverse run
(SSRI)
Note
Servo-on command
Motor speed
Forward run
Reverse run
Position loop
In-position
(A) (A)

[Function]
This signal is output from the spindle controller (spindle drive) with high-speed serial coupling specifications and informs that the spindle is under torque control.
[Operation]
This signal turns ON when:
 The "Spindle torque limit 1" (TL1) or the "Spindle torque limit 2" signal (TL2) is ON.
This signal turns OFF when:
 The "Spindle torque limit 1" (TL1) and the "Spindle torque limit 2" signal (TL2) is OFF.
(1) This signal is valid only for systems that are high-speed serially coupled to the spindle controller.
[Related signals]
(1) Spindle torque limit 1 (TL1: Y189A)
(2) Spindle torque limit 2 (TL2: Y189B)
[Function]
This signal informs that the actual torque has reached the limit on the torque limit target spindle.
[Operation]
This signal turns ON when:
 The actual torque has reached the limit on the torque limit target spindle.
This signal turns OFF when:
 The actual torque of the torque limit target spindle is under its limit.
[Related signals]
(1) In spindle torque limit (STLQ: X1897)
(2) Spindle torque limit 1 (TL1: Y189A)
(3) Spindle torque limit 2 (TL2: Y189B)
[Function]
This signal is output from the spindle controller (spindle drive) with high-speed serial coupling specifications and informs that motor speed is dropped below the speed specified by the parameter.
[Operation]
This signal (SD2) turns ON if the motor speed (motor rotation speed) drops the detection threshold specified by the parameter "#13030 SP030".
(1) This signal is valid only for systems that are high-speed serially coupled to the spindle controller.
[Related signals]
(1) Speed detection (VRO: X188A)
Cont. Signal name Abbrev. 1stSP 2ndSP 3rdSP 4thSP 5thSP 6thSP 7thSP 8thSP
A In spindle torque limit STLQ X1897 X18F7 X1957 X19B7 X1A17 X1A77 X1AD7 X1B37
Cont. Signal name Abbrev. 1stSP 2ndSP 3rdSP 4thSP 5thSP 6thSP 7thSP 8thSP
A Spindle torque limit reached X189A X18FA X195A X19BA X1A1A X1A7A X1ADA X1B3A
Cont. Signal name Abbrev. 1stSP 2ndSP 3rdSP 4thSP 5thSP 6thSP 7thSP 8thSP
A Speed detection 2 SD2 X189D X18FD X195D X19BD X1A1D X1A7D X1ADD X1B3D
Note
(SP030)
(SD2)
Spindle motor speed
Speed detection 2
Speed command threshold
Note

[Function]
This signal indicates that the middle-speed coil is being selected in the 3-step coil changeover specification of the spindle coil changeover function.
[Operation]
The state of the selected coil is output in combination with the "In L coil selection" (LCSA).
[Related signals]
(1) L coil selection (LRSL: Y189F)
(2) M coil selection (LRSM: Y18A6)
(3) In L coil selection (LCSA: X188F)
[Function]
This signal informs that positioning for the spindle forward run and reverse run indexing functions has been completed.
[Operation]
When the "Spindle forward run index" signal (WRN: Y189C) or the "Spindle reverse run index" signal (WRI: Y189D) is turned ON, this signal turns OFF.
For the turret indexing, when the time set by the parameter "#3126 tret_fin_off" (Index positioning complete signal OFF time) has passed after the "Spindle forward run index" signal (WRN: Y189C) or the "Spindle reverse run index" signal (WRI: Y189D) is turned ON, this signal turns ON. Even when the indexing movement is completed, this signal will not turn ON until the time set in the parameter #3126 has elapsed.
To use this signal, program the sequence so that the signal is referenced after the time set in the parameter #3126 has elapsed.
[Related signals]
(1) Spindle orientation command (ORC: Y189E)
(2) Spindle forward run index (WRN: Y189C)
(3) Spindle reverse run index (WRI: Y189D)
(4) Multi-point orientation position data (R7009)
Cont. Signal name Abbrev. 1stSP 2ndSP 3rdSP 4thSP 5thSP 6thSP 7thSP 8thSP
A In M coil selection MCSA X189E X18FE X195E X19BE X1A1E X1A7E X1ADE X1B3E
Selected coil L coil selection
(LRSL)
M coil selection
(LRSM)
In L coil selection
(LCSA)
In M coil selection
(MCSA)
High-speed (H) OFF OFF OFF OFF
Middle-speed (M) OFF ON OFF ON
Low-speed (L)
ON OFF ON OFF
ON ON ON ON
Cont. Signal name Abbrev. 1stSP 2ndSP 3rdSP 4thSP 5thSP 6thSP 7thSP 8thSP
A Index positioning completion X189F X18FF X195F X19BF X1A1F X1A7F X1ADF X1B3F
0
(*1)
Indexing position data during forward/reverse run
(*1) For the turret indexing, this signal turns ON when the time set to the parameter #3126 has passed.
Spindle orientation command
(ORC)
Orientation completion
Multi-point orientation data
(R7009)
Spindle forward run index
(WRN)
Index positioning completion
(X189F)

[Function]
This signal informs whether there are command outputs to the spindle or not.
0: No command output to spindle
1: With command output to spindle
[Related signals]
(1) Spindle selection (SWS: Y18A8)
(2) Spindle command selection (SLSP: R7002)
(3) Spindle stop (SSTP: Y1894)
(4) Encoder selection (R2567)
(5) Spindle forward run start (SRN: Y1898)
(6) Spindle reverse run start (SRI: Y1899)
[Function]
This signal informs that the spindle synchronous control mode has been entered.
[Operation]
The signal turns ON when:
The G114.1 is commanded and spindle synchronous control is entered. (Spindle synchronization control I)
The spindle synchronous control signal (SPSY) turns ON. (Spindle synchronization control II)
The signal turns OFF when:
Spindle synchronous control is canceled with the G113 command. Or, when the "Spindle synchronization cancel" signal (SPSYC) turns ON. (Spindle synchronization control I)
When the "Spindle synchronous control" signal (SPSY) turns OFF. (Spindle synchronization control II)
(1) Refer to the signal of the 1st spindle when the parameter "#1440 multi_sp_syn" (Multiple spindle synchronization valid) is set to "0".
(2) Use the synchronized spindle's signal when the parameter "#1440 multi_sp_syn" (Multiple spindle synchronization valid) is set to "1".
[Related signals]
(1) Spindle rotation speed synchronization completion (FSPRV: X18A9)
(2) Spindle phase synchronization completion (FSPPH: X18AA)

(3) Spindle synchronization (SPSY: Y18B0)
(4) Spindle phase synchronization (SPPHS: Y18B1)
(5) Spindle synchronization cancel (SPSYC: Y18B8)
Cont. Signal name Abbrev. 1stSP 2ndSP 3rdSP 4thSP 5thSP 6thSP 7thSP 8thSP
A Spindle enable ENB X18A0 X1900 X1960 X19C0 X1A20 X1A80 X1AE0 X1B40
Cont. Signal name Abbrev. 1stSP 2ndSP 3rdSP 4thSP 5thSP 6thSP 7thSP 8thSP
A In spindle synchronization SPSYN1 X18A8 X1908 X1968 X19C8 X1A28 X1A88 X1AE8 X1B48
Note

[Function]
This signal informs that the spindle synchronization state mode is entered.
(1) This signal uses the 1st spindle signal regardless of the hob spindle's number.
[Operation]
This signal turns ON when:
The speeds of both the synchronization reference spindle and synchronized spindle reach the commanded synchroni zation rotation speed during the rotation synchronization mode. (Spindle synchronization I)
The workpiece axis rotation speed reaches the value set for the spindle synchronization rotation speed attainment level corresponding to the workpiece axis and rotary tool axis rotation ratio command in spindle synchronization (without R command) mode. (Polygon)
The workpiece axis rotation speed completes phase alignment at the rotation speed corresponding to the rotation ratio command for the workpiece axis and rotary tool axis in spindle synchronization (with R command) mode. (Polygon)
The CNC is reset (any of Reset1, Reset2, or Reset & rewind) with the parameter "#1239 bit3" set to "1". (Polygon)
This signal turns OFF when:
The actual rotation speed of the reference spindle or synchronized spindle, in respect to the spindle synchronous rota tion speed command value, widely exceeds or deviates value set for the spindle synchronization rotation speed attain ment level during the rotation synchronization mode.
The spindle synchronous control mode is canceled.
(1) Refer to the signal of the 1st spindle when the parameter "#1440 multi_sp_syn" (Multiple spindle synchronization valid) is set to "0".
(2) Refer to the signal of the hob axis during hobbing, or refer to the signal of the synchronized spindle during other machining when the parameter "#1440 multi_sp_syn" (Multiple spindle synchronization valid) is set to "1".
[Related signals]
(1) In spindle synchronization (SPSYN1: X18A8)
(2) Spindle phase synchronization completion (FSPPH: X18AA)
(3) Spindle synchronization (SPSY: Y18B0)
(4) Spindle phase synchronization (SPPHS: Y18B1)
Cont. Signal name Abbrev. 1stSP 2ndSP 3rdSP 4thSP 5thSP 6thSP 7thSP 8thSP
A Spindle rotation speed synchroniza tion completion FSPRV X18A9 X1909 X1969 X19C9 X1A29 X1A89 X1AE9 X1B49
Note
Note

[Function]
This signal informs that the spindle synchronization state mode is entered.
[Operation]
This signal turns ON when:
The phase alignment of the reference spindle and synchronized spindle is completed during the phase synchronization mode.
This signal turns OFF when:
The phase difference of the reference spindle and synchronized spindle exceeds the value set for the spindle synchro nization phase attainment level during the phase synchronization mode.
The spindle synchronous control mode is canceled.
(*1) Temporarily turns OFF to change the rotation speed during the phase synchronization.
(1) Refer to the signal of the 1st spindle when the parameter "#1440 multi_sp_syn" (Multiple spindle synchronization valid) is set to "0".
(2) Use the synchronized spindle's signal when the parameter "#1440 multi_sp_syn" (Multiple spindle synchronization valid) is set to "1".
[Related signals]
(1) In spindle synchronization (SPSYN1: X18A8)
(2) Spindle rotation speed synchronization completion (FSPRV: X18A9)
(3) Spindle synchronization (SPSY: Y18B0)
(4) Spindle phase synchronization (SPPHS: Y18B1)
Cont. Signal name Abbrev. 1stSP 2ndSP 3rdSP 4thSP 5thSP 6thSP 7thSP 8thSP
A Spindle phase synchronization com pletion FSPPH X18AA X190A X196A X19CA X1A2A X1A8A X1AEA X1B4A
Spindle synchronous control
(SPSY)
Spindle rotation speed
synchronization completion
(FSPRV)
In spindle synchronous control
(SPSYN1)
Spindle rotation speed synchronization
completion ON
Spindle synchronous control ON Spindle synchronous control OFF
Spindle phase synchronous
control (SPPHS)
Spindle phase synchronization
completion (FSPPH)
Spindle phase synchronous
control ON
Spindle phase synchronization
completion ON
Spindle phase synchronous
control OFF
(*1)
Note

[Function]
This signal informs that the spindle-spindle polygon machining mode is being executed.
[Operation]
This signal turns ON when:
G114.2 is commanded, and the spindle-spindle polygon machining is started.
This signal turns OFF when:
G113/G113.1 is commanded, and the spindle-spindle polygon machining is canceled.
When the spindle synchronization cancel signal (SPSYC) is input, and spindle-spindle polygon machining is canceled.
(1) Refer to the signal of the 1st spindle when the parameter "#1440 multi_sp_syn" (Multiple spindle synchronization valid) is set to "0".
(2) Refer to the synchronized spindle's signal when the parameter "#1440 multi_sp_syn" (Multiple spindle synchroniza tion valid) is set to "1".
[Related signals]
(1) Spindle synchronization cancel (SPSYC: Y18B8)
(2) Spindle rotation speed synchronization completion (FSPRV: X18A9)
Cont. Signal name Abbrev. 1stSP 2ndSP 3rdSP 4thSP 5thSP 6thSP 7thSP 8thSP
A In spindle synchronization 2 SPSYN2 X18AB X190B X196B X19CB X1A2B X1A8B X1AEB X1B4B
Note

[Function]
This signal informs that the "Chuck close" (SPCMPC) is input during the spindle synchronous control.
[Operation]
This signal turns ON when the "Chuck close" (SPCMPC) is ON.
This signal turns OFF when the "Chuck close" (SPCMPC) is OFF.
This signal turns OFF when the spindle synchronous control is canceled.
(1) Refer to the signal of the 1st spindle when the parameter "#1440 multi_sp_syn" (Multiple spindle synchronization valid) is set to "0".
(2) Refer to the synchronized spindle's signal when the parameter "#1440 multi_sp_syn" (Multiple spindle synchroniza tion valid) is set to "1".
(3) Use the "Error temporary cancel" signal only when the synchronization error between two spindles still occurs even after the "Chuck close" signal is turned ON.
[Related signals]
(1) Chuck close (SPCMPC: Y18B9)
(2) In spindle synchronization (SPSYN1: X18A8)
(3) Spindle rotation speed synchronization completion (FSPRV: X18A9)
(4) Spindle synchronization (SPSY: Y18B0)
(5) Error temporary cancel (SPDRPO: Y18B5)
Cont. Signal name Abbrev. 1stSP 2ndSP 3rdSP 4thSP 5thSP 6thSP 7thSP 8thSP
A Chuck close confirmation SPCMP X18AC X190C X196C X19CC X1A2C X1A8C X1AEC X1B4C
Chuck open Chuck close Chuck close
Spindle synchronous
control (SPSY)
Error temporary cancel
(SPDRPO)
In spindle synchronous
control (SPSYN1)
In error cancel
Synchronized spindle chuck
Spindle rotation speed
synchronization completion
(FSPRV)
Chuck close Chuck close Chuck open
Chuck close
confirmation
Chuck open
confirmation
Chuck close (SPCMPC)
Reference spindle chuck
Note

[Function]
This signal informs that the tool spindle synchronization I (polygon) mode has been entered.
[Operation]
This signal is turned ON when:
The G114.2 is commanded, and the tool spindle synchronization I is entered.
This signal turns OFF when:
The tool spindle synchronization I is canceled with the G113/G113.1 command.
The tool spindle synchronization I is canceled with the "Spindle synchronization/superimposition cancel" signal (SPSYC).
(1) Refer to the signal of the 1st spindle when the parameter "#1440 multi_sp_syn" (Multiple spindle synchronization valid) is set to "0".
(2) Refer to the synchronized spindle's signal when the parameter "#1440 multi_sp_syn" (Multiple spindle synchroniza tion valid) is set to "1".
[Related signals]
(1) Spindle rotation speed synchronization completion (FSPRV: X18A9)
(2) Spindle synchronization/superimposition cancel (SPSYC: Y18B8)
[Function]
This signal informs that the tool spindle synchronization II (hob machining) is being executed.
(1) This signal uses the 1st spindle signal regardless of the hob spindle's number.
[Operation]
This signal is turned ON when:

Tool spindle synchronization II (hob machining) is started with a G114.3 command.
This signal turns OFF when:
Spindle synchronous control is canceled with a G113/G113.1 command, or when the "Spindle synchronization cancel" signal (SPSYC) turns ON.
(1) Refer to the signal of the 1st spindle when the parameter "#1440 multi_sp_syn" (Multiple spindle synchronization valid) is set to "0".
(2) Refer to the signal of the hob axis when the parameter "#1440 multi_sp_syn" (Multiple spindle synchronization valid) is set to "1".
(3) For the G code system 6 and 7, substitute G114.3 with G81.4 and G113/G113.1 with G80.4/G113.1.
[Related signals]
(1) Spindle synchronization/superimposition cancel (SPSYC: Y18B8)
Cont. Signal name Abbrev. 1stSP 2ndSP 3rdSP 4thSP 5thSP 6thSP 7thSP 8thSP
A In tool spindle synchronization I (Poly gon) TSS1 X18AD X190D X196D X19CD X1A2D X1A8D X1AED X1B4D
Cont. Signal name Abbrev. 1stSP 2ndSP 3rdSP 4thSP 5thSP 6thSP 7thSP 8thSP
A In tool spindle synchronization II SPSYN3 X18AE X190E X196E X19CE X1A2E X1A8E X1AEE X1B4E
Note
Note
Note

[Function]
This signal indicates that the spindle rotation speed command is invalid in the following situation: the spindle rotation speed is commanded to the reference spindle while a tapping or synchronized tapping cycle is executed for the superimposed spindle in the spindle superimposition control.
[Operation]
This signal turns ON when:
The spindle rotation speed is commanded to the reference spindle while a tapping or synchronized tapping cycle is exe cuted for the superimposed spindle in the spindle superimposition control mode.
This signal turns OFF when:
A tapping or synchronized tapping cycle for the superimposed spindle in the spindle superimposition control is com pleted, and commands to the reference spindle become valid.
The spindle superimposition mode is canceled.
Refer to the signal of the superimposed spindle.
(1) Refer to the signal of the 1st spindle when the parameter "#1440 multi_sp_syn" (Multiple spindle synchronization valid) is set to "0".
(2) Refer to the signal of the superimposed spindle when the parameter "#1440 multi_sp_syn" (Multiple spindle synchro nization valid) is set to "1".
[Related signals]
(1) Spindle synchronization/superimposition cancel (SPSYC: Y18B8)
(2) Spindle superimposition control ON (SPILE: X18B1)
(3) Spindle rotation speed synchronization completion (FSPRV: X18A9)
(4) Spindle superimposition control: Spindle superimposition clamped (SPLCR: X18B2)
[Function]
This signal informs that, after the phase alignment is completed under the absolute position spindle synchronization, the spindle synchronization phase error between the reference and synchronized spindles (R6516) is greater than the spindle synchronization phase error tolerance (R7019).
[Operation]
This signal turns ON when:
When the phase error between the reference and synchronized spindles with respect to the position command has exceeded the spindle synchronization phase error tolerance (R7019) after the phase alignment under the absolute posi tion spindle synchronization.
This signal turns OFF when:
The spindle synchronization control I mode is cancelled.
(1) Refer to the 1st spindle's signal when the parameter "#1440 multi_sp_syn" (Multiple spindle synchronization valid) is set to "0".
(2) Refer to the synchronized spindle's signal when the parameter "#1440 multi_sp_syn" (Multiple spindle synchroniza tion valid) is set to "1".
[Related signals]
(1) Chuck close (SPCMPC: Y18B9)
(2) In spindle synchronization (SPSYN1: X18A8)
(3) Spindle rotation speed synchronization completion (FSPRV: X18A9)
(4) Spindle phase synchronization completion (FSPPH: X18AA)
(5) Spindle synchronization: Phase error/Hob axis delay angle (R6516)
(6) Spindle synchronization: Maximum phase error/Maximum hob axis delay angle (R6517)
(7) Error temporary cancel (SPDRPO: Y18B5)
(8) Spindle synchronization phase error tolerance (R7019)
Cont. Signal name Abbrev. 1stSP 2ndSP 3rdSP 4thSP 5thSP 6thSP 7thSP 8thSP
A Spindle superimposition control:
Speed change disabled SPNCH X18AF X190F X196F X19CF X1A2F X1A8F X1AEF X1B4F
Cont. Signal name Abbrev. 1stSP 2ndSP 3rdSP 4thSP 5thSP 6thSP 7thSP 8thSP
A Spindle synchronization: Phase error
over SPPHOV X18B0 X1910 X1970 X19D0 X1A30 X1A90 X1AF0 X1B50
Note
Note

[Function]
This signal indicates that the spindle superimposition control mode has been entered.
[Operation]
The signal turns ON when:
The G164 is commanded, and the spindle superimposition control mode is entered.
This signal turns OFF when:
The spindle superimposition control is canceled with the G113 command.
The spindle superimposition control is canceled with the "Spindle synchronization/superimposition cancel" signal (SPSYC).
(1) Refer to the signal of the 1st spindle when the parameter "#1440 multi_sp_syn" (Multiple spindle synchronization valid) is set to "0".
(2) Refer to the signal of the superimposed spindle when the parameter "#1440 multi_sp_syn" (Multiple spindle synchro nization valid) is set to "1".
[Related signals]

(1) Spindle superimposition control: Speed change disabled (SPNCH: X18AF)
(2) Spindle synchronization/superimposition cancel (SPSYC: Y18B8)
(3) Spindle rotation speed synchronization completion (FSPRV: X18A9)
(4) Spindle superimposition control: Spindle superimposition clamped (SPLCR: X18B2)
[Function]
This signal indicates that the following matters occurred during the spindle superimposition control:
- The reference spindle was clamped at the maximum rotation speed of the superimposed spindle
- The superimposed spindle was clamped during superimposition
(This means that the sum of the command rotation speeds determined based on the rotation direction of the reference spindle and superimposed spindles has exceeded the maximum rotation speed of the superimposed spindle.)
[Operation]
This signal turns ON when:
The reference spindle was clamped at the maximum rotation speed of the superimposed spindle during the spindle superimposition control.
The superimposed spindle was clamped during superimposition (the sum of the command rotation speeds determined based on the rotation direction of the reference and superimposed spindles has exceeded the maximum rotation speed of the superimposed spindle).
This signal turns OFF when:
The rotation speed of the reference spindle falls below the maximum rotation speed of the superimposed spindle during the spindle superimposition control.
The rotation speed of the superimposed spindle falls below the maximum rotation speed of the superimposed spindle during the spindle superimposition control.
The spindle superimposition control mode is canceled.
(1) Refer to the signal of the 1st spindle when the parameter "#1440 multi_sp_syn" (Multiple spindle synchronization valid) is set to "0".
(2) Refer to the signal of the superimposed spindle when the parameter "#1440 multi_sp_syn" (Multiple spindle synchro nization valid) is set to "1".
[Related signals]
(1) Spindle superimposition control: Speed change disabled (SPNCH: X18AF)
(2) Spindle synchronization/superimposition cancel (SPSYC: Y18B8)
(3) Spindle superimposition control ON (SPILE: X18B1)
(4) Spindle rotation speed synchronization completion (FSPRV: X18A9)
Cont. Signal name Abbrev. 1stSP 2ndSP 3rdSP 4thSP 5thSP 6thSP 7thSP 8thSP
A Spindle superimposition control ON SPILE X18B1 X1911 X1971 X19D1 X1A31 X1A91 X1AF1 X1B51
Cont. Signal name Abbrev. 1stSP 2ndSP 3rdSP 4thSP 5thSP 6thSP 7thSP 8thSP
A Spindle superimposition control: Spin dle superimposition clamped SPLCR X18B2 X1912 X1972 X19D2 X1A32 X1A92 X1AF2 X1B52
Note
Note
M800V/M80V Series PLC Interface Manual
4 Explanation of Interface Signals
4.1 PLC Input Signals (Bit Type: X***)
273 IB-1501616-F
[Function]
This signal informs that after the spindle rotation speed synchronization is completed in the tool spindle synchronization II (Hobbing), the hob axis tracking delay between the actual position and the commanded position has exceeded the allowable delay angle.
(1) This signal uses the 1st spindle signal regardless of the hob spindle's number.
[Operation]
This signal turns ON when:
The spindle rotation speed synchronization has been completed and the maximum delay angle of the hob axis (spindle) exceeded the delay allowable angle set in the parameter "#3133 spherr".
This signal turns OFF when:
The tool spindle synchronization II is canceled.
(1) Refer to the signal of the 1st spindle when the parameter "#1440 multi_sp_syn" (Multiple spindle synchronization valid) is set to "0".
(2) Refer to the signal of the hob axis when the parameter "#1440 multi_sp_syn" (Multiple spindle synchronization valid) is set to "1".
[Timing chart]
[Related signals]
(1) In tool spindle synchronization II (SPSYN3: X18AE)
(2) Spindle rotation speed synchronization completion (FSPRV: X18A9)
(3) Spindle synchronization Maximum phase error/Maximum hob axis delay angle (R6517)
[Function]
The increase holding power of spindle (disturbance observer) state is output to this signal.
[Operation]
This signal turns ON when the "Increase holding power of spindle" signal (EXOBS) turns ON and the spindle drive unit enables the disturbance observer.
Turning OFF the "Increase holding power of spindle" signal (EXOBS) turns this signal OFF.
[Related signals]
(1) Increase holding power of spindle (EXOBS: Y1893)
Cont. Signal name Abbrev. 1stSP 2ndSP 3rdSP 4thSP 5thSP 6thSP 7thSP 8thSP
A Hob axis delay excess PHOVR X18B3 X1913 X1973 X19D3 X1A33 X1A93 X1AF3 X1B53
Cont. Signal name Abbrev. 1stSP 2ndSP 3rdSP 4thSP 5thSP 6thSP 7thSP 8thSP
A Holding power of spindle increased EXOFN X18B5 X1915 X1975 X19D5 X1A35 X1A95 X1AF5 X1B55
Note
Note
In tool spindle synchronization II
NCPLC SPSYN3
Spindle rotation speed
synchronization completion
NCPLC FSPRV
Maximum hob axis delay angle
NCPLC
Hob axis delay excess
NCPLC PHOVR
-spherr
+spherr
Delay allowable angle
#3133 spherr

Monitoring area
ON(G114.3) OFF(G113)

[Function]
The signal communicates that the spindle is being excluded from CNC control.
[Operation]
This signal turns ON when the spindle is excluded from CNC control by the "Exclude spindle" signal (SPOFF).
Any command to the spindle for which this signal is ON is invalid.
[Related signals]
(1) Spindle off request (SPOFF: Y18BF)
Cont. Signal name Abbrev. 1stSP 2ndSP 3rdSP 4thSP 5thSP 6thSP 7thSP 8thSP
A In spindle off SPOFFA X18B6 X1916 X1976 X19D6 X1A36 X1A96 X1AF6 X1B56

[Function]
This signal indicates that the spindle speed fluctuation detection function has detected a fluctuation in the actual spindle speed.
[Operation]
This signal is turned ON when the actual spindle speed exceeds the tolerance for the spindle speed command set with the Spindle speed fluctuation detection command (G162) or the parameter.
This signal is turned OFF when:
The detection is canceled with the Spindle speed fluctuation detection cancel command (G163).
The actual spindle speed returns back within the tolerance range.
There is a change in the spindle command speed (including the spindle override and speed change for each function).
There is a change in the spindle state (forward run, reverse run or stop).
The reset is input.
The emergency stop occurs.
The spindle is in the C axis mode of spindle synchronous tapping, spindle orientation or spindle position control.
Cont. Signal name Abbrev. 1stSP 2ndSP 3rdSP 4thSP 5thSP 6thSP 7thSP 8thSP
A Spindle speed fluctuation detection:
Spindle speed out of setting range SSRD X18B7 X1917 X1977 X19D7 X1A37 X1A97 X1AF7 X1B57
N1 G97 G98
N2 S___
N3 M3
N4 G162 S___

0
N2N3N4
[Program example]
Spindle speed fluctuation
detection: Spindle speed
out of setting range
(SSRD: X18B7)
In spindle speed fluctuation
detection
Spindle forward run start
(SRN: Y1898)
Spindle speed
Commanded speed
Actual speed
Commanded
speed
Actual speed
Time
Commanded speed S command (N2)
Elapse of
delay time
Invalid Waiting for start In fluctuation detection
Allowable spindle speed fluctuation range
(#43072 or #43073)
Speed reach range (#3105)
Delay time for starting spindle speed fluctuation detection
(#43071)
Reaches
up-to-speed
range

[Related signals]
(1) Spindle stop (SSTP: Y1894)
(2) Spindle forward run start (SRN: Y1898)
(3) Spindle reverse run start (SRI: Y1899)
(4) Spindle selection (SWS: Y18A8)
(5) Spindle command final data (rotation speed) (R6502)
(6) Spindle command selection (SLSP: R7002)
[Function]
This signal indicates that the mode is the C axis mode or spindle mode when the program command method ("#3129 cax_spec/bit0" is set to"1") is selected for the spindle in the spindle position control.
[Operation]
This signal is turned ON when a change to C-axis mode is commanded and remains ON until a change to the spindle mode is commanded. This signal indicates that a mode change command has been executed.

(1) The "Spindle position control (Spindle/C axis control): C axis mode ON" signal (SVMD) does not turn ON when the mode was changed with the "Servo OFF" signal (*SVFn) or the "Spindle position control (Spindle/C axis control): C axis selection" signal (CMOD).
Cont. Signal name Abbrev. 1stSP 2ndSP 3rdSP 4thSP 5thSP 6thSP 7thSP 8thSP
A
Spindle position control (Spindle/C
axis control):
C axis mode ON
SVMD X18C1 X1921 X1981 X19E1 X1A41 X1AA1 X1B01 X1B61
Note
SVMD
RDYn
SRN
*SVFn
NCPLC
PLCNC
M03 S1000 G00 X10. G00 C45. G01 C180. F90 G00 X0. M03 S1000
Spindle position control
Spindle/C axis control: In C axis mode
Machining
program
Spindle/C axis
X axis
Servo OFF signal
Servo ready
Forward run command
Position decision at C axis 45.0

[Function]
This signal informs which gear stage the spindle gear is at.
[Operation]
The gear stage of the spindle gear is output with a 2-bit (GO1, GO2) code.
While the "Spindle gear selection code" signal (GI1, GI2) and the "Spindle gear selection output" signal (GO1, GO2) are different during gear shift, it indicates that the gear shift operation is in progress.
When gear shift is completed, the gear stage of the "Spindle gear selection output" signal (GO1, GO2) changes, and it becomes the same as the "Spindle gear selection code" signal (GI1, GI2).
The following table shows the relationship between the gear stage and the "Spindle gear selection output" signal (GO1, GO2).
[Function]
This signal informs that the spindle oscillation is in operation.
[Operation]
This signal turns ON when the spindle oscillation is started.
This signal turns OFF when the spindle oscillation is stopped.
[Related signals]
(1) Spindle oscillation command (Y18C8)
Cont. Signal name Abbrev. 1stSP 2ndSP 3rdSP 4thSP 5thSP 6thSP 7thSP 8thSP
A Spindle gear selection output 1, 2 GO1, 2 X18C2, 3 X1922, 3 X1982, 3 X19E2, 3 X1A42, 3 X1AA2, 3 X1B02, 3 X1B62, 3
Gear stage Spindle gear selection output
GO1 GO2
10 0
21 0
30 1
41 1
Cont. Signal name Abbrev. 1stSP 2ndSP 3rdSP 4thSP 5thSP 6thSP 7thSP 8thSP
A Spindle oscillation in progress X18C8 X1928 X1988 X19E8 X1A48 X1AA8 X1B08 X1B68
(a) Spindle gear selection code 1,2 Gear stage 1(1:1) Gear stage 2(2:1)
In gear switch
Gear switch
completed
(b) Spindle rotation speed
Speed [r/min]
Speed [r/min]
(d)
(c)
Spindle gear selection output
signal
Motor rotation speed
(GI1,GI2)(SGRA:SGRB)
1000
500
0
1000
500
0
(GO1,GO2)(SGRA:SGRB)
(S command)
Gear stage 1(1:1) Gear stage 2(2:1)

[Function]
This signal notifies that the acceleration/deceleration time constant of the spindle motor has changed for protection because of detecting overheat of the spindle motor.
[Operation]

This signal turns ON when the spindle starts rotating from speed zero with the motor already being overheated. The overheated state refers to the range of the spindle temperature from which is at or above the spindle protection start temperature (#43084) until which drops below the spindle protection cancel temperature (#43085). If the motor temperature reaches the spindle protection start temperature (#43084) during rotation of the spindle, this signal will not turn ON.
This signal turns OFF when the spindle rotation speed is "0".
<Status of the "Spindle protection: Mode in progress" signal when the spindle starts to rotate in an overheated state>
When the spindle temperature is at or above the spindle protection start temperature (#43084) at the start of rotation
Cont. Signal name Abbrev. 1stSP 2ndSP 3rdSP 4thSP 5thSP 6thSP 7thSP 8thSP
A Spindle protection: Mode in progress SPRTCT X18C9 X1929 X1989 X19E9 X1A49 X1AA9 X1B09 X1B69
Motor temperature
Spindle rotation speed
Turns ON when the spindle is
overheated and the spindle
rotation starts.
[NC -> PLC]
Spindle protection: Mode in progress
(SPRTCT)
Turns OFF when the spindle
rotation speed is "0".
Acceleration/Deceleration time constant during
spindle protection is applied
Overheated state
Acceleration/Deceleration time
constant during spindle protection
(#43086 to #43089)
Spindle protection start
temperature (#43084)
Spindle protection cancel
temperature (#43085)
Spindle motor
temperature
Time
Time
M800V/M80V Series PLC Interface Manual
4 Explanation of Interface Signals
4.1 PLC Input Signals (Bit Type: X***)
279 IB-1501616-F
When the spindle rotation is started after its temperature has reached the spindle protection start temperature (#43084) but before it drops below the spindle protection cancel temperature (#43085), the acceleration/deceleration time constant during spindle protection is applied and this signal is turned ON.
<Status of the "Spindle protection: Mode in progress" signal when the spindle starts to rotate in an overheated state>
When the spindle temperature is lower than the spindle protection start temperature (#43084) at the start of rotation
Acceleration/Deceleration time
constant during spindle protection
(#43086 to #43089)
Spindle protection start
temperature (#43084)
Spindle protection cancel
temperature (#43085)
Turns OFF when the spindle
rotation speed is "0".
Turns ON when the spindle is
overheated and the spindle
rotation starts.
Time
Spindle rotation speed
[NC -> PLC]
Spindle protection: Mode in progress
(SPRTCT)
Motor temperature
Overheated state
Acceleration/Deceleration time constant during
spindle protection is applied
Time
M800V/M80V Series PLC Interface Manual
4 Explanation of Interface Signals
4.1 PLC Input Signals (Bit Type: X***)
IB-1501616-F 280
[Function]
This signal indicates that speed control gain switching is currently stopped in the real-time tuning 1 function.
[Operation]
This signal indicates that speed control gain switching is stopped and the value of speed control gain is retained.
This signal is output when the "Speed control gain changeover hold-down command" is ON or when the cutting command modal is effective, regardless of whether this function is enabled or disabled.
This signal is not output when speed control gain switching is performed. Also, the signal is not output when the additional specification of real-time tuning 1 is set to OFF.
[Related signals]
(1) Real-time tuning 1: Speed control gain changeover hold-down command (VGHLDC: Y18CA)
Cont. Signal name Abbrev. 1stSP 2ndSP 3rdSP 4thSP 5thSP 6thSP 7thSP 8thSP
A
Real-time tuning 1:
Speed control gain changeover hold down ON
VGHLD X18CA X192A X198A X19EA X1A4A X1AAA X1B0A X1B6A
G0 G1 G0
In cutting command

Speed control gain
changeover prevented
command
In speed control gain
changeover prevented
Inertia value
Speed control gain
Value
maintained
Switch restart
Switch restart
Value
maintained

[Function]
This signal indicates that the height control is in progress.
[Operation]
This signal turns ON when:
- The "Laser: Height control" signal (Y1CD8) is turned ON, and approach control is started.
This signal turns OFF when the height control is canceled in any of the following cases:
- The "Laser: Height control" signal (Y1CD8) is turned OFF.
- A reset or emergency stop, etc. is performed.
[Caution]
(1) When a retract control is to be made, turn this signal OFF after the retract is completed.
(2) When NC is reset during hight control, the "Laser: Height control in progress" signal (X1CA0) is turned OFF after
retract control.
(3) When the emergency stop occurs during hight control, the operation decelerates to stop and the "Laser: Height con trol in progress" signal (X1CA0) is turned OFF.
[Related signals]
(1) Laser: Height control (Y1CD8)
[Function]
When the target axis of the height control reaches the in-position width for the target height, this signal turns ON.
When the approach is completed, trace control is performed.
[Operation]
This signal turns ON when:
The target axis of the height control reaches the target height after the "Laser: Height control" signal (Y1CD8) is turned
ON and approach control is started.
This signal turns OFF in any of the following cases:
The "Laser: Height control" signal (Y1CD8) is turned OFF.
The "Laser: Enable height retention in height control" signal (Y1CD9) is turned OFF.
The nozzle height or the sensor offset is changed.
[Related signals]
(1) Laser: Height control (Y1CD8)
(2) Laser: Height control in progress (X1CA0)
[Function]
This signal indicates that the height retention control is in progress.
[Operation]
This signal turns ON when:
The "Laser: Enable height retention in height control" signal (Y1CD9) is turned ON while the "Laser: Approach in height
control completed" signal (X1CA1) is ON.
This signal turns OFF when:
The "Laser: Enable height retention in height control" signal (Y1CD9) is turned OFF.
The "Laser: Height control" signal (Y1CD8) is turned OFF and the height control is canceled.
A reset or emergency stop, etc. is performed and the height control is canceled.
[Related signals]
(1) Laser: Height control (Y1CD8)
(2) Laser: Enable height retention in height control (Y1CD9)
(3) Laser: Approach in height control completed (X1CA1)
Cont. Signal name Abbrev. Common ($)
A Laser: Height control in progress X1CA0
Cont. Signal name Abbrev. Common ($)
A Laser: Approach in height control completed X1CA1
Cont. Signal name Abbrev. Common ($)
A Laser: Height being retained in height control X1CA2

[Function]
This signal notifies that the height control high-speed retraction is in progress.
[Operation]
This signal turns ON when:
The "Laser: Height control" signal (Y1CD8) is turned ON, the "Laser: Approach in height control completed" signal
(X1CA1) is turned ON, and then M code set in the parameter "#90105 lsr_M_HEvac_on" (Height control_Fast retraction
control ON M code) is commanded.
This signal turns OFF when the height control is canceled in any of the following cases:
M code set in the parameter "#90106 lsr_M_HEvac_off" (Height control_Fast retraction control OFF M code) is com manded.
The "Laser: Height control" signal (Y1CD8) is turned OFF.
A reset or emergency stop, etc. is performed.
[Related signals]
(1) Laser: Height control (Y1CD8)
(2) Laser: Approach in height control completed (X1CA1)
[Function] [Operation]
When the current machining condition is changed on the "Laser Processing Condition" screen or the "Set Laser Process
Cond." screen, this signal turns ON.
When the "Laser: Laser beam irradiation ON" signal (Y1CA7) is turned ON, the operation error (M95 9508) occurs, and

laser is not irradiated. When the "Laser: Laser condition change complete" signal (Y1CA6) is turned ON, this error is canceled, and laser can be irradiated.

[Related signals]

(1) Laser: Laser condition change complete (Y1CA6)

[Function] [Operation]

This signal indicates that laser is being irradiated from a laser oscillator.

When the "Laser: Laser beam irradiation ON" signal (Y1CA7) is turned ON while the "Laser: Laser beam irradiation ready" signal (Y1CE0) is ON, or when M code set in the parameter "#90023 lsr_M_beam_on" is commanded, this signal turns ON.

[Related signals]

(1) Laser: Laser beam irradiation ready (Y1CE0)

(2) Laser: Laser beam irradiation ON (Y1CA7)

[Function] [Operation]

This signal indicates the status of handy terminal key 1 to 45.

[Related signals]

(1) Handle pulse encoder communication connector priority (Y70D)

(2) Handle/Incremental feed magnification code m (MP1, MP2, MP4: YC80, YC81, YC82)

(3) Handle/incremental feed magnification method selection (MPS: YC87)

(4) Handy terminal Data area top address (R297)

(5) Handy terminal Data valid number of registers (R298)

(6) Handy terminal Cause of communication error (R299)

(7) 1st handle/incremental feed magnification (R2508, 9)

Cont. Signal name Abbrev. Common ($)

A Laser: Height control high-speed retraction in progress X1CA3

Cont. Signal name Abbrev. Common ($)

A Laser: Laser condition change strobe X1CA6

Cont. Signal name Abbrev. Common ($)

A Laser: Laser beam irradiating X1CA7

Cont. Signal name Abbrev. Common ($)

A Handy terminal key 1 to 45 X1CD0 to FC

[Function]

This signal notifies that the machine position is within the area set by the parameters.

[Operation]

This signal turns ON when the machine position of the control axis reaches the range set by the parameters, and turns OFF when it goes out of the range. The axis name and range are set in parameters #7501 to #7734.

Whether this signal is valid or invalid depends on absolute position detection and incremental detection as follows.

<For absolute position detection system>

This signal is valid when the power is turned ON after zero point initialization is completed.

<For incremental position detection system>

This signal is not enabled until the first reference position return is completed after the power is turned ON. (All PSW1 to PSW24 remain OFF until this signal is enabled.)

Example of signal output

The setting range of the position switch uses the basic machine coordinate system as a reference.

Regardless of the size of the setting values of dog1 and dog2, the position switch signal is turned ON when the axis moves between dog1 and dog2. When dog1 and dog2 are set to the same value, the signal turns ON at the position.

Note that the change in the output signal is slightly delayed from the actual machine position. This maximum delay time (tmax), which depends on the area check method parameters #7504 to #7734, is as follows. Also, consider the delay due to the scan time as it depends on the scan time of the ladder.

Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8

A Position switch 1 to 24 PSW1 to

24

X1D00 to

17

X1D20 to

37

X1D40 to

57

X1D60 to

77

X1D80 to

97

X1DA0

to B7

X1DC0

to D7

X1DE0

to F7

PSW1: ON

PSW2: OFF

PSW3: OFF

PSW4: OFF

PSW5: ON

Machine position

dog1 dog2

dog1 dog2

dog1 dog2

dog2 dog1

dog2 dog1

tmax = 0.004 - TP [s]

TP :

PGN :

tmax = 0.004 [s]

When parameter is set to "0"

(commanded machine position)

When parameter is set to "1"
(encoder FB position)
1
PGN Position loop time constant ([s])
Position loop gain

4.2 PLC Input Signals (Data Type: R***)
[Function]
When an analog voltage is input to the designated connector on the remote I/O unit or built-in AI/AO, which has the analog input function, the corresponding data can be read into the specified file register.
[Operation]
The following shows the interfaces.
<How input voltages are read into the file registers>
[Function]
Operator's key operation can be monitored on the user PLC side.
[Operation]
While operator is using the keyboard, the data corresponding to the key is set to Key in 1.
[Related signals]
(1) Key out 1 (R212)
Cont. Signal name Abbrev. Common ($)
A Analog input m AIn R0 to 7
Channel File register Data update cycle
AI0 R0 <Remote I/O unit with the analog input function>
One channel is input per PC high-speed cycle.
If one station has four channels, the four channels are input in four PC high-speed cy cle times.

<Built-in AI/AO>
All channels are input per PC high-speed cycle.
All analog input of four channels are input in one PC high-speed cycle time.
AI1 R1
AI2 R2
AI3 R3
AI4 R4
AI5 R5
AI6 R6
AI7 R7
Resolution: 20V/4095 = 4.88mv
Precision: Within +/-25mV
Maximum input rating: 15V
(1) Value in the file register
(2) Analog input voltage
(Example 1)
An input of +5V enters the value "1024" (400 in hexa decimal) into the file register.
(Example 2)
An input of -6V enters the value "-1229" (FB33 in hexadecimal) into the file register.
Cont. Signal name Abbrev. Common ($)
A Key in 1 R8
(2)
0
2047
-2048
-10V +10V
(1)

[Function]
The year, month, date, hour, minute, second and millisecond data is informed by the controller to the PLC as the current clock information.
[Operation]
The date and time data is output as shown below. The data is output as binary data.
(Example) For October 26, 2002, 14:56:36.
(1) The time is displayed with the 24-hour system.
(2) The data and time are set with the [TIME] screen on the setting and display unit.
[Function]
This indicates the CNC software version.
[Operation]
The version displayed at "MP" on the [Software Directory] screen is indicated.
The file registers R16 to R19 are set to the following data.
(*1) If the version is a 2-digit number, bits F to 8 of R16 are set to "20H".
Cont. Signal name Abbrev. Common ($)
A Clock data Year/Month R11
A Clock data Date/Hour R12
A Clock data Minute/Second R13
Cont. Signal name Abbrev. Common ($)
A CNC software version code R16 to 9
Item File register Type Example
(1) Model function No. R19 Binary 0803H = 2051 (decimal)
(2) Serial No. R18 Binary 0000H = 000
(3) Version bits F to 8 of R17 ASCII code 41H ("A")
bits 7 to 0 of R17 ASCII code 30H ("0")
bits F to 8 of R16 ASCII code(*1) 42H ("B")
- - bits 7 to 0 of R16 Always 20H (Blank)

R11 Month Year
R12 Hour Date
R13 Second Minute
R11 ... 0 0 0 0 1 0 1 0 0 0 0 0 0 0 1 0 = 0A 02H
October 2002
R12 ... 0 0 0 0 1 1 1 0 0 0 0 1 1 0 1 0 = 0E1AH
14 hundred hours 26th day
R13 ... 0 0 1 0 0 1 0 0 0 0 1 1 1 0 0 0 = 2438H
36 seconds 56 minutes
Note
(Example)
(1) (2) (3)

[Function]
This signal provides information about under voltage.
[Operation]
The voltage in the battery voltage that is supplied to the control equipment (NC controller or graphic control unit) for saving data is monitored, and the status battery is indicated for each control unit.
When the voltage is above the battery warning detection threshold, this signal is "0".
<Note>
When the detection of battery alarm or battery warning is disabled ("#6449/bit4" is "1", this signal is always "0".
When the voltage is above the battery alarm detection threshold and below the battery warning detection threshold, this signal is "1".
For the encoder errors, this signal is "2".
When the voltage is below the battery alarm detection threshold, this signal is "3".
[Related signals]
(1) Battery warning (BATWR: X70E)
(2) Battery alarm (BATAL: X70F)
Cont. Signal name Abbrev. Common ($)
A Battery drop cause R56
F 7 43 0 8
R56 Not used Graphic
control unit NC control unit

[Function]
If the internal temperature of the control unit exceeds a certain level, the overheat will be detected, and the following states will occur.
The "Temperature rise" (SM16) is turned ON.
The "Temperature warning cause" (R57/bit0) is turned ON.
The alarm message (Z53) is displayed on the screen.
If the machine is in automatic operation, the operation will be continued, but restarting will not be possible after resetting or stopping with M02/M30. (Starting will be possible after block stop or feed hold.)
[Operation]
<Conditions for turning ON the "Temperature warning cause">
The internal temperature of the control unit rise above the temperature at which the alarm occurs (Alarm temperature).
(This temperature depends on the model.)
(*1) The values in a table are for the software version A9 or later. The values differs if the software versions below are used.
[M800VW: Main card WN125B or later/WN115B or later]
Software version A7: 98.0 C
Software version A8: 85.0 C
[M80VW: Main card WN116B or later]
Software version A7: 102.0 C
Software version A8: 85.0 C
<Conditions for turning OFF the "Temperature warning cause">
The internal temperature of the control unit has dropped by 2.0 C or more from the above-described temperature at which the alarm occurs.
(Example) For the M80V, this signal turns ON when the temperature of the control unit exceeds 84.5 C and turns OFF when the temperature drops to 82.5 C or lower.
The "Temperature warning cause" is a bit unit signal.
<Operation example>
Cont. Signal name Abbrev. Common ($)
A Temperature warning cause R57/bit0
Model Alarm temperature
M80V 84.5 C
M800VS: Main card 84.5 C
M800VW: Main card WN125A/WN115A 98.0 C
M800VW: Main card WN125B or later/WN115B or later 87.0 C (*1)
M80VW: Main card WN116A 102.0 C
M80VW: Main card WN116B or later 87.0 C (*1)
File FEDCBA9876543210 register
(R57)
Bit
Control unit temperature
SM16
R57/bit0
Alarm temperature 2.0
The overheat will be detected.
Control unit
internal temperature

[Related signals]
(1) Temperature rise (SM16)
(2) Control unit temperature (R60)
[Function]
This signal indicates the temperature in the control unit.
[Operation]
This signal indicates the temperature in the control unit. The unit is "C".
[Related signals]
(1) Temperature rise (SM16)
(2) Temperature warning cause (R57/bit1)
[Function]
Time taken for scanning in user PLC can be monitored.
[Operation]
Scanning time for user PLC main processing is continuously updated and set.
<File register contents and time calculation>
Time calculation
(Example)
(1) For this data, mean scanning time is approximately 0.9 sec.
(2) I/O processing time for PLC control software (PLC BASIC) is included in this data processing time.
Cont. Signal name Abbrev. Common ($)
A Control unit temperature R60
Cont. Signal name Abbrev. Common ($)
A PLC main scan time R68
FEDCBA9 8 7 6 5 4 3 2 1 0
0000000011010000
File register F E D C B A 9 8 7 6 5 4 3 2 1 0
3. 5 (ms)
Data
256
3. 5 (ms)
Data=208
256
Note

[Function]
The causes of emergency stop are shown with bit correspondence.
[Operation]
The cause of the emergency stop state is shown as follows with bit correspondence.
If there are multiple causes, the multiple bits corresponding to each cause are output.
The bit of this signal that is set to "0" is the emergency stop cause.
Cont. Signal name Abbrev. Common ($)
A Emergency stop cause R69
File register
(R) FEDCBA9 8 Servo drive unit emergency stop output Spindle drive unit emergency stop output Door interlock, dog/OT arbitrary allocation device illegal PLC high-speed processing error User PLC Illegal codes exist. LINE Contactor shutoff test
76543210 Bit Built-in PLC Software emergency stop output device YC2C is "1". Power supply external emergency stop state Control unit EMG connector Emergency stop state External PLC Communication error External PLC Not ready External PLC Communication error Built-in PLC Stop state
SRV
SPIN
PARA
PC-H
LAD
MCT
PLC
CVIN
EXIN
LINK
WAIT
XTEN
STOP
EMG Emergency stop

[Function]
The remote I/O unit connected to the controller can be found with the user PLC.
The user PLC finds the connection state of the remote I/O unit with this data.
[Operation]
When remote I/O unit is connected, "1" is set, and when it is not connected, "0" is set. Note that, for the remote I/O units DX230, DX231 and DX654, two stations are occupied for one unit, and for DX651, three stations are occupied for one unit. Therefore, when one unit is connected, the corresponding two or three bits are set to "1".
<Note>
Only information from the 1st to 8th stations is output to R70. (Information about 9th and following stations is not out put.)
Number of occupied stations of remote I/O unit (DX***)
The position of the bit that turns ON depends on the rotary switch on the remote I/O unit.
[Function] [Operation]
Thermal expansion compensation amount for the current machine position is set by NC.
Refer to the section on "Ball screw thermal displacement compensation offset amount" (R400) for details.
[Related signals]
(1) Ball screw thermal displacement compensation offset amount n-th axis (R400)
(2) Ball screw thermal displacement compensation Max. compensation amount n-th axis (R401)

(3) Ball screw thermal displacement compensation part-system, axis No. n-th axis (R402)
Cont. Signal name Abbrev. Common ($)
A DIO card information R70
Unit Number of occupied stations
DX220, DX202, DX213 1
DX230, DX231, DX654 2
DX651 3
Cont. Signal name Abbrev. Common ($)
A Ball screw thermal displacement compensation: Compen sation amount n-th axis R72 to 5
Device No. Signal name
R72 Ball screw thermal displacement compensation: Compen sation amount 1st axis
R73 Ball screw thermal displacement compensation: Compen sation amount 2nd axis
R74 Ball screw thermal displacement compensation: Compen sation amount 3rd axis
R75 Ball screw thermal displacement compensation: Compen sation amount 4th axis
File register
(R) F E D C B A 9 8 7 6 5 4 3 2 1 0
Bit
1st station
2nd station
:
:
:
8th station

[Function]
This signal executes speed monitor function for the control axis for which a valid door No. is selected with parameter "#2118 SscDrSel" and the spindle for which a valid door No. is selected with parameter "#3071 SscDrSelSP". Then the signal notifies that the selected door can be opened.
The door No. corresponds to the following bits.
[Operation]
When both NC and drive unit start the speed monitor function with the speed monitor mode turned ON and speed monitor parameter check completed, the speed monitor door open signal will turn ON.
When the speed monitor mode is OFF, the speed monitor door open possible signal is OFF as well. After the "Speed monitor door open possible" signal is turned OFF, cancel the speed limit.
[Caution]
To use the speed monitor function, create user PLC that enables door open when the speed monitor door open possible signal is ON.
[Related signals]
(1) Speed monitor mode (SOMD: R296)
Cont. Signal name Abbrev. Common ($)
A Speed monitor door open possible SMDOEN R96
Door 1
Door 2
F E D C B A 9 8 7 6 5 4 3 2 1 0 Bit
Speed monitor mode (SOMD)
Speed monitor door open possible (SMDOEN)
Mechanical door lock
Parameter check In check
Door lock
Door status Door close Door open Door close
Door lock canceled Door lock

[Function]
The number of selected observation speed steps is output to this signal.
The following table shows the R register status and the selected number of observation speed steps.
[Operation]
Observation speed change is performed with the "observation speed change" signals. When the observation speed actually switches, the number of selected observation speed steps is output to the "Multi-step speed monitor selected speed output" (R98).
Even if the "Speed monitor mode" signal is OFF, the number is output corresponding to the "observation speed change" signals.
(a) After confirming that the observation speed change signal and the "Multi-step speed monitor selected speed output" (R98) match on user PLC side, turn ON the "Speed monitor mode" signal (R296). After confirming that the observa tion speed change signal and the "Multi-step speed monitor selected speed output" (R98) match on user PLC side and the axis speed is the same as or slower than the observation speed, turn ON the speed monitor mode signal.
(b) To increase the observation speed, after the observation speed change signal and the "Multi-step speed monitor se lected speed output" (R98) match on the user PLC side, increase the axis speed.
Cont. Signal name Abbrev. Common ($)
A Multi-step speed monitor selected speed output SOPFN R98
Bit2 Bit1 Bit0 Observation speed
0 0 0 Observation speed 1 (#2181, #3141)
0 0 1 Observation speed 2 (#2182, #3142)
0 1 0 Observation speed 3 (#2183, #3143)
0 1 1 Observation speed 4 (#2184, #3144)
1 0 0 Observation speed 5 (#2185, #3149)
1 0 1 Observation speed 6 (#2186, #3150)
1 1 0 Observation speed 7 (#2191, #3151)
1 1 1 Observation speed 8 (#2192, #3152)
(a)
(b)
Door open switch
Speed monitor mode signal
(SOMD:R296)
Observation speed change

signal 1
Parameter check
Observation speed
Speed monitor door open possible
signal(SMDOEN:R96)
Multi-step speed monitor selected
speed output(SOPFN:R98/bit0)
Observation
speed 2
Normal mode
(without speed monitor) In speed monitor mode
Check
Axis speed
Observation mode
Observation
speed 2
Observation
speed 1
Observation
speed 2
Observation
speed 1

If the axis speed is equal to or higher than the changed observation speed when the observation speed change signal is changed in observation speed change during speed monitor, the alarm (Y21 0001) is output and the observation speed is not switched until the axis speed becomes smaller than the changed observation speed.
[Function]
This signal notifies of the cause of the alarm with the value of bitC to bitF when the operation alarm (M01 1050) occurs.
This signal notifies which interfering object has setting error with bit0 to bit5 when the value of bitC to bitF is between 5 and 8.
[Operation]
When the operation alarm (M01 1050) occurs, the value of bitC to bitF is as follows depending on the cause:
When a value of bitC to bitF is between 5 and 8, the bit which corresponds to the interfering object with setting error is turned ON.
[Related signals]
(1) Interference check between part systems: Alarm information (R102)
(2) Interference check between part systems: Interference check enabled (CCHK: Y73F)
Cont. Signal name Abbrev. Common ($)
A Interference check between part systems: Setting error
alarm information R101
Value of bitC to bitF (repre sented in binary) Cause of the operation alarm (M01 1050)
1 (0001) An attempt was made to start the interference check between part systems in a system con figured with a single part system.
2 (0010) Interference check between part systems: Data address (R468) is an odd number.
3 (0011) The value set in "number of defined interference objects" is out of the setting range.
4 (0100) Same axis has been set multiple times in one part system of "reference axis corresponding axes for each part system".
5 (0101) The value set in "interfering object, moving object/fixed object selection" is out of the setting range, or of a nonexistent part system.
6 (0110) Three or more fixed objects have been set in "interfering object, moving object/fixed object selection".
7 (0111) Two or more moving objects have been set in "interfering object, moving object/fixed object selection" of one part system.
8 (1000) "0" has been set in length I, J or K.
Observation speed change
signal 1
Observation speed
Multi-step speed monitor
selected speed output
(SOPFN:R98/bit0)
Observation speed 2 Observation speed 1
Observation speed 2
Observation speed 1
Axis speed
Alarm (Y21 0001)

E DF C B A 9 6 8 7 5 4 321 0
Cause of alarm 6th interfering object 1st interfering object

[Function]
This signal notifies which interfering object is in the interference state when the operation alarm (M01 1051 or M01 1052) occurs.
[Operation]
The bit which corresponds to the interfering object in the interference state is turned ON.
[Related signals]
(1) Interference check between part systems: Setting error alarm information (R101)
(2) Interference check between part systems: Interference check enabled (CCHK: Y73F)
Cont. Signal name Abbrev. Common ($)
A Interference check between part systems: Alarm informa tion R102

FE BA 8 D C 9 6 7 54321 0
6th interfering object 1st interfering object

[Function]
Cumulative pulses of the 1st to 3rd handles are output in this signal.
[Operation]
The number of pulses increases or decreases depending on the direction in which the 1st to 3rd handles are turned.
(Range of increase/decrease: -32768 to 32767)
The following examples show how the number of pulses changes as the handle is turned.
(Example 1) Change of pulses when the handle is turned continuously in plus direction
(Example 2) Change of pulses when the handle is turned continuously in minus direction
(Example 3) Change of pulses when the handle is turned in plus and minus directions alternately
When the power supply is turned ON, the number of pulses is "0".
This value can be changed arbitrarily using the ladder, etc.
After the change, the number of pulses increases or decreases from the changed value.
(Example 4) Change of pulses when the value is changed during plus-direction operation.
The number of pulses increases or decreases as the handle is turned regardless of the operation mode.
For both 5V handle and 12V handle, the number of pulses increases or decreases in increments of 1 pulse per notch.
Regardless of the setting of the handle feed magnification, the number of pulses increases or decreases in increments of 1 pulse per notch.
The handle rotation direction can be determined by calculating the amount of change per scan in the ladder.
Cont. Signal name Abbrev. Common ($)
A Handle feed: 1st handle pulse counter HS1PCNT R116
A Handle feed: 2nd handle pulse counter HS2PCNT R117
A Handle feed: 3rd handle pulse counter HS3PCNT R118
32767
0
-32768
32767
0
-32768
32767
0
-32768
Plus derection Minus direction Plus derection
32767
0
-32768
Set 0 Set an arbitrary value

[Function]
This signal notifies the present consumption of entire drive system.
[Operation]
The present consumption of entire drive system is set.
The present consumption of entire drive system is the sum of present power consumption of servo axis in drive system (fluctuating part), present power consumption of spindle in drive system (fluctuating part), drive system's fixed power consumption (parameter "#1372 DrvBasePwr"), and drive system's fixed consumption correction (R306, 7).
Setting size is 2 words, Setting unit is 1 (W), Setting range is -2147483648 to 2147483647 (W)
[Caution]
(1) The positive value represents power consumption and the negative value represents power regeneration.
[Related signals]
(1) Power consumption computation: Drive system's fixed consumption correction (DFPCC: R306, 7)
[Function]
This signal notifies the accumulated consumption of entire drive system.
[Operation]
The accumulated consumption of entire drive unit is set.
The accumulated consumption of entire drive system is the accumulation of present power consumption of servo axis in drive system (fluctuating part), present power consumption of spindle in drive system (fluctuating part), drive system's fixed power consumption (parameter "#1372 DrvBasePwr"), and drive system's fixed consumption correction (R306, 7).
Setting size is 2 words, Setting unit is 1 (Wh), Setting range is -2147483648 to 2147483647 (Wh)
[Caution]
(1) When the power is turned ON again, the state prior to the power ON is held.
(2) The positive value represents power consumption and the negative value represents power regeneration.
(3) When the accumulated value exceeds the maximum or minimum value of the setting range, each value is clamped to the maximum/minimum value.
[Related signals]
(1) Power consumption computation: Clear consumption accumulation 1 to 4 (IPCC1 to 4: Y700 to 3)
(2) Power consumption computation: Enable consumption accumulation 1 to 4 (IPCE1 to 4: Y724 to 7)
(3) Power consumption computation: Drive system's fixed consumption correction (DFPCC: R306, 7)
[Function]
This signal notifies the accumulated value of total power consumption of devices other than drive system.
[Operation]
The accumulated consumption of devices other than drive system is set.
The accumulated consumption of devices other than drive system is the accumulation of power consumption of devices other than drive system (R304, 5).
Setting size is 2 words, Setting unit is 1 (Wh), Setting range is -2147483648 to 2147483647 (Wh)
[Caution]
(1) When the power is turned ON again, the state prior to the power ON is held.
(2) The positive value represents power consumption and the negative value represents power regeneration.
(3) When the accumulated value exceeds the maximum or minimum value of the setting range, each value is clamped to the maximum/minimum value.
[Related signals]
(1) Power consumption computation: Clear consumption accumulation 1 to 4 (IPCC1 to 4: Y700 to 3)
(2) Power consumption computation: Enable consumption accumulation 1 to 4 (IPCE1 to 4: Y724 to 7)
(3) Power consumption computation: Consumption of devices other than drive system (NDPC: R304, 5)

Cont. Signal name Abbrev. Common ($)
A Power consumption computation: Present consumption of
entire drive system DTPPC R120, 1
Cont. Signal name Abbrev. Common ($)
A Power consumption computation: Accumulated consump tion of entire drive system 1 to 4 DTIPC1 to 4 R122 to 9
Cont. Signal name Abbrev. Common ($)
A Power consumption computation: Accumulated consump tion of devices other than drive system 1 to 4 NDIPC1 to 4 R130 to 7

[Function] [Operation]
This signal notifies the interfering object No. of the interfering object selection in which the operation alarm (M03 0003) has occurred.
bit0: 1st interfering object entry in the interference warning area
:
bitF: 16th interfering object entry in the interference warning area
If more than one interfering object enters the interference warning area, all bits corresponding to the interfering objects which have entered the interference warning area are turned ON.
[Function] [Operation]
This signal notifies the interfering object No. of the interfering object selection in which the operation alarm (M03 0001) has occurred.
bit0: 1st interfering object interference detection
:
bitF: 16th interfering object interference detection
If the entry of more than one interfering object to the interference alarm area has been detected, all bits corresponding to the interfering objects in which the entry to the interference alarm area is detected are turned ON.
[Function] [Operation]
This signal notifies the interfering object No. of the interfering object selection in which the operation alarm (M03 0002) has occurred.
bit0: 1st interfering object entry in the interference alarm area
:
bitF: 16th interfering object entry in the interference alarm area
If more than one interfering object enters the interference alarm area, all bits corresponding to the interfering objects which have entered the interference alarm area are turned ON.
[Function] [Operation]
This signal notifies that the error of the data (operation alarm (M03 300*)) set in the interfering object selection has occurred when the "Interference check III: Enable interfering object selection data" (Y769) is ON.
bit0: 1st interfering object selection setting error
:
bitF: 16th interfering object selection setting error
Cont. Signal name Abbrev. Common ($)
A Interference check III: Entry in interference warning area in terfering object information
ITF3CHWG OBJ R138
Cont. Signal name Abbrev. Common ($)
A Interference check III: Interference detection interfering ob ject information
ITF3CHAL OBJ R139
Cont. Signal name Abbrev. Common ($)
A Interference check III: Entry in interference alarm area inter fering object information
ITF3TRAL OBJ R140
Cont. Signal name Abbrev. Common ($)
A Interference check III: Data setting error information 1 ITF3DTER1 R141

[Function] [Operation]
This signal notifies that the error of the data (operation alarm (M03 200*)) set in the interfering object definition has occurred when the "Interference check III: Enable interfering object selection data" (Y769) is ON.
<R142>
bit0: 1st interfering object definition setting error
:
bitF: 16th interfering object definition setting error
<R149>
bit0: 113th interfering object definition setting error
:
bitF: 128th interfering object definition setting error
[Function]
This signal indicates the alarm No./warning No. of the servo drive unit for PLC axis. (hexadecimal 2 digits)
This signal sets the 4-digit alarm No. which is displayed on the NC screen.
[Operation]
This signal is set up when the alarm/waring occurs in the servo drive unit for PLC axis.
This signal will be cleared when the alarm/warning is canceled.
This signal does not set if the servo warning "S52 00E6" (Control axis detachment warning) or "S52 00E7" (In NC emergency stop state) occurs.
If more than one alarm/warning occurs, the value displayed in the [LED display] of [Drv mon]-[Servo unit] screen is set.
[Related signals]
(1) NC warning (servo warning) (XC9C)
Cont. Signal name Abbrev. Common ($)
A Interference check III: Data setting error information 2 ITF3DTER2 R142 to
R149
Cont. Signal name Abbrev. Common ($)
A PLC axis alarm/warning No. n-th axis R168 to 175

[Function] [Operation]

The status at the end of the external search is output.
The correspondence of the external search status values and details output from the NC based on the external search is shown below.
[Related signals]
(1) External search finished (XC1D)
[Function] [Operation]
This signal outputs the status of when the program return completed signal is ON.
The correspondence of the program return complete status values and details output from the NC based on the result of returning to the machining program before the external search is shown below.
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A External search status R500 R700 R900 R1100 R1300 R1500 R1700 R1900
Status value Details Remedy
0 Normally finished. -
1 Operation search is being carried out. Wait for other function's operation search to finish before searching.
2 Search was attempted while external search was inval id.
Stop the program before searching.
Cancel the emergency stop or reset before searching.
3 Any non-existent or inoperative device has been desig nated.
Confirm the presence of the device, and that the device is within the specifications.
4 The program file is not designated. Designate the program No. or sequence No.
5 The block with the designated program No., sequence No. or block No. was not found. Check the machining program.
6 - -
7 The designated device does not support the batch pro gram search across all part systems.
Designate a device which supports the batch program search across all part systems.
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A External search:
Program return complete status R501 R701 R901 R1101 R1301 R1501 R1701 R1901
Status value Details Remedy
0 Normally finished -
1 Function is invalid Check the parameter setting
2 Program return was attempted during the op eration, reset, or emergency stop.
Input the signal after stopping the program operation.
Confirm the cancellation of the emergency stop or reset, and then input the signal.
3
Program return is disabled because the exter nal search has not been performed or due to any restriction.
Execute the external search first, and then input the sig nal.
Do not execute a function that is restricted after the exter nal search.
Program return signal
(YC9A)
Processing program return
(NC internal state)
Program return completed signal
(XCEA)
Program return complete status
(R501)
The timing chart for program return is shown below.

[Function]
When an auxiliary function is commanded, the number following the auxiliary function address "M" is notified. The M code data output from the controller can be selected from 8-digit BCD data, unsigned 32-bit binary data, or signed 32-bit binary data by the parameter "#12006 Mbin".
[Operation]
M code data "n" is updated when:
"M**" is issued in automatic operation (memory, MDI or tape).
"M**" in fixed cycle causes motion during execution of the fixed cycle.
"M**" is executed by manual numerical command input.
M code data is also updated when an "M code independent output" command is issued even during M function lock. Data remain unchanged even when the "M function finish" signal (FIN1 or FIN2) is sent back. Reset or "Emergency stop" does not clear the data.
[Caution]
(1) Multiple sets of the miscellaneous functions (M functions) can be specified in a block. When multiple M functions are in one block, the signals are output in the order at programming.
When the number of sets of the M commands in a block are more than the settings of the parameter "#12005 Mfig", the latter commands are valid.
Program example
(2) M98 (read of subprogram), M99 (return to main program), etc. are processed inside the CNC and are not output as M code data.
[Related signals]
(1) M function strobe n (MFn: XC60)
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A M code data 1 R504, 5 R704, 5 R904, 5 R1104, 5 R1304, 5 R1504, 5 R1704, 5 R1904, 5
A M code data 2 R506, 7 R706, 7 R906, 7 R1106, 7 R1306, 7 R1506, 7 R1706, 7 R1906, 7
A M code data 3 R508, 9 R708, 9 R908, 9 R1108, 9 R1308, 9 R1508, 9 R1708, 9 R1908, 9
A M code data 4 R510, 1 R710, 1 R910, 1 R1110, 1 R1310, 1 R1510, 1 R1710, 1 R1910, 1
M03 M08 M80 M82;
Output to M code data 1
Output to M code data 2
Output to M code data 3
Output to M code data 4

[Function]
When S function is commanded, the value following address "S" of the S function is notified. The S code data output from the controller can be selected from 8-digit BCD data, unsigned 32-bit binary data, or signed 32-bit binary data, by the parameter "#12008 Sbin".
[Operation]
S code data (1 to 8) are updated when:
"S** is specified in automatic operation (tape, memory or MDI).
"S** is executed by manual numerical command input.
Data remain unchanged even when the "M function finish 1" signal (FIN1) or the "M function finish 2" signal (FIN2) is sent back. Reset or "Emergency stop" does not clear the data.
The S code data is assigned as follows.
[Caution]
(1) If two or more S codes for one spindle are issued in a block, the S code defined last will be valid.
[Related signals]
(1) S function strobe (SFn: XC64)
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A S code data 1 to 8 R512 to
27
R712 to
27
R912 to
27
R1112 to
27
R1312 to
27
R1512 to
27
R1712 to
27
R1912 to
27
Signal name Register
$1 $2 $3 $4 $5 $6 $7 $8
S code data 1 R512, 3 R712, 3 R912, 3 R1112, 3 R1312, 3 R1512, 3 R1712, 3 R1912, 3
S code data 2 R514, 5 R714, 5 R914, 5 R1114, 5 R1314, 5 R1514, 5 R1714, 5 R1914, 5
S code data 3 R516, 7 R716, 7 R916, 7 R1116, 7 R1316, 7 R1516, 7 R1716, 7 R1916, 7
S code data 4 R518, 9 R718, 9 R918, 9 R1118, 9 R1318, 9 R1518, 9 R1718, 9 R1918, 9
S code data 5 R520, 1 R720, 1 R920, 1 R1120, 1 R1320, 1 R1520, 1 R1720, 1 R1920, 1
S code data 6 R522, 3 R722, 3 R922, 3 R1122, 3 R1322, 3 R1522, 3 R1722, 3 R1922, 3
S code data 7 R524, 5 R724, 5 R924, 5 R1124, 5 R1324, 5 R1524, 5 R1724, 5 R1924, 5
S code data 8 R526, 7 R726, 7 R926, 7 R1126, 7 R1326, 7 R1526, 7 R1726, 7 R1926, 7

[Function]
When T function is commanded, the value following address "T" of the T function is notified. The T code data output from the controller can be selected from 8-digit BCD data, unsigned 32-bit binary data, or signed 32-bit binary data, by the parameter "#12010 Tbin".
[Operation]
T code data (1 to 4) are updated when:
"T**" is specified in automatic operation (memory, MDI or tape).
T** is executed by manual numerical command input.
Data remain unchanged even when the "M function finish 1" signal (FIN1) or the "M function finish 2" signal (FIN2) is sent back. Reset or "Emergency stop" does not clear the data.
T code data is assigned as follows.
[Caution]
(1) Up to four T codes can be commanded in one block. When five or more commands are issued in one block, the later commands will be valid.
[M system]
[L system]
[Related signals]
(1) Tool function strobe 1 (TF1: XC68)
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A T code data 1 to 4 R536 to
43
R736 to
43
R936 to
43
R1136 to
43
R1336 to
43
R1536 to
43
R1736 to
43
R1936 to
43
Signal name Register
$1 $2 $3 $4
T code data 1 R536, 7 R736, 7 R936, 7 R1136, 7

T code data 2 R538, 9 R738, 9 R938, 9 R1138, 9
T code data 3 R540, 1 R740, 1 R940, 1 R1140, 1
T code data 4 R542, 3 R742, 3 R942, 3 R1142, 3
T05 T15;
Output to T code data 1
This T code data is invalid.
T0505 T1515;
Output to T code data 1
This T code data is invalid.

[Function]
When 2nd M function is commanded, the value following address "B" of the 2nd M function is notified.
The 2nd M function data output from the controller can be selected from 8-digit BCD data, unsigned 32-bit binary data, or signed 32-bit binary data, by the parameter "#12012 Bbin".
Signed binary data can also be output by setting "#1045 nskno".
(1) Select an address for the 2nd M function address from the machine parameters basic specification parameter "#1170 M2name" A, B or C address that is not being used for "#1013 axname" or "#1014 incax".
[Operation]
2nd M function data (1 to 4) are updated when:
B** (or A** or C**) is specified in automatic operation (memory, MDI or tape).
B** (or A** or C**) is executed by manual numerical command input.
Data remain unchanged even when the "M function finish 1" signal (FIN1) or the "M function finish 2" signal (FIN2) is sent back. Reset or "Emergency stop" does not clear the data.
2nd M function data is assigned as follows.
[Caution]
(1) Up to four 2nd M functions can be commanded in one block. When five or more commands are issued in one block, the later commands will be valid.
[Related signals]
(1) 2nd M function strobe 1 (BF1: XC6C)
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A 2nd M function data 1 to 4 R544 to
51
R744 to
51
R944 to
51
R1144 to
51
R1344 to
51
R1544 to
51
R1744 to
51
R1944 to
51
Signal name Register
$1 $2 $3 $4
2nd M function data 1 R544, 5 R744, 5 R944, 5 R1144, 5
2nd M function data 2 R546, 7 R746, 7 R946, 7 R1146, 7
2nd M function data 3 R548, 9 R748, 9 R948, 9 R1148, 9
2nd M function data 4 R550, 1 R750, 1 R950, 1 R1150, 1
Note
B05 B15 ;
Output to 2nd M function data 2
Output to 2nd M function data 1

[Function]
This signal notifies the user PLC of the alarm details when an alarm occurs during chopping operation.
[Operation]
Chopping error No. and details are shown below.
[Related signals]
(1) Chopping (CHPS: YC30)
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Chopping error No. R554 R754 R954 R1154 R1354 R1554 R1754 R1954
Error No. Details Classification
0 No error -
1 The number of chopping cycles is zero. (Operates when the number of cycles is 1.) A
2 The speed exceeds the cutting feed clamp speed.
(The feedrate is clamped at the cutting feed clamp speed.)
A
3 The acceleration determined based on the parameter exceeds the value of parameter "#2002 clamp" or "#2141 chtL".
(The number of cycles decreases because the acceleration is clamped at "#2002 clamp" or "#2141 chtL")
A
4 The number of cycles exceeds 1056/min.
(The number of cycles for chopping is clamped at 1056/min.)
A
5 Chopping axis zero point return is not completed. B
6 Chopping override is zero. B
7 Commanded axis is the chopping axis. B

8 The bottom dead center point position is zero. B
9 The chopping axis is a manual feed axis. B
10 Interlock B
11 Stored stroke limit or stroke end B
12 The function that cannot be used concurrently is valid. B
13 An interference is detected in the interference check III, or an entry in the interference alarm area
occurs.
B
20 There is no specification for chopping.
Or the chopping function cannot be used.
-
21 Chopping control data area exceeds the R register area designated for the chopping control data.
Chopping control data area and compensation amount record area are overlapped.
Compensation amount record area exceeds R register's backup area (R8300 to R9799). ("Rm +
14 N sets + 4" exceeds "9799".)
C
22 Multiple chopping axes are specified by the PLC interface. C
23 Chopping axis is not specified by either PLC interface or parameter. C
24 Compensation method is set to other than "0" or "1". C
25 The mode for the compensation value fixed method is set to other than "0" (playback mode) or "1"
(record mode).
C
26 Data No. of the chopping control data is a negative value. C
27 Chopping axis's "#2081 chclsp" (Maximum chopping speed) and "#2002 clamp" (Cutting feedrate
for clamp function) are both set to "0".
C
28 Chopping axis was changed during chopping operation.
(Chopping axis cannot be changed during chopping.)
C
29 Rotary axis was specified as chopping axis. C
30 Rapid traverse override valid/invalid is set to other than "0" (invalid) or "1" (valid). A
31 The setting unit of the chopping override is set to other than "0" (1%) or "1" (0.01%). A
Classification A: The error is retained during chopping operation.
The error is cleared at the rising edge of the "Chopping parameter valid" signal (YC34) after the chopping con trol data is corrected, or when the NC is reset.
Classification B: The error is cleared after the alarm factor is removed, or when the NC is reset.
Classification C: The error is cleared at the falling edge of the "Chopping parameter valid" signal (YC34), or when the NC is reset.
The chopping control data is not enabled when this alarm occurs.

[Function]
This signal indicates measurement status during measurement corresponding to bit.
[Operation]
Measurement status during manual measurement is indicated corresponding to bit.
This register value is displayed on the screen during manual measurement shown as below.
[Related signals]
(1) Tool length measurement 1 (TLM: YC20)
[Function] [Operation]
This signal outputs group No. currently in life management with the tool life management II.
[Function]
This signal outputs the operating status of the NC in bit units when it seems that the machine is not operating in automatic
operation without an alarm. The alarm messages can be displayed using this signal in the user PLC.
[Operation]
The corresponding bit below turns ON.
bit0: Complete standby status of M, S, T, B
bit1: In rapid traverse deceleration check
bit2: In cutting feed deceleration check
bit3 : Waiting for spindle orientation complete
bit4: Waiting for spindle position loop
bit7: Door opened
bit8: In executing dwell
bitB: Waiting for unclamp signal
The following figure shows the bit correspondence.
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Manual measurement status R555 R755 R955 R1155 R1355 R1555 R1755 R1955
R555 Display Meaning
bit0 On mea0 Status other than "On mea1" to "On mea6".
bit1 On mea1 Status when a skip signal is input during manual measurement.
It will shift to "On mea2" state after deceleration stop is confirmed.
bit2 On mea2 Status during the first retract operation.
It will shift to "On mea3" state after completing retraction by the retract amount.
bit3 On mea3
Status in which retract has completed by the retract amount.
If the skip signal is ON after confirming deceleration stop, a warning will appear, and status display will remain
the same.
It will shift to "On mea0" state by resetting.
bit4 On mea4
Status during the second measurement.
If the skip signal is not input, even if moving to the designated position, a warning will appear, and status display
will remain the same.
It will shift to "On mea0" state by resetting.
bit5 On mea5 Status when a skip signal is input during the second measurement.
It will shift to "On mea6" state after deceleration stop is confirmed.
bit6 On mea6 Status during the second retract operation.
It will shift to "On mea0" state after completing retraction by the retract amount.
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Group in tool life management R567 R767 R967 R1167 R1367 R1567 R1767 R1967

Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A CNC completion standby status R572 R772 R972 R1172 R1372 R1572 R1772 R1972
F E D C B A 9 8 7 6 5 4 3 2 1 0
R572
(B) (7) (4) (3) (2)(1)(0) (8)

[Function]
This signal is output when zero point initialization is being carried out in the absolute position detection system.
[Operation]
The axis for which "1" is set in #0 on the [ABS. POSITION SET] screen is set to "1" and is held until the power is turned OFF.
While this signal is set to "1", the stored stroke limit and stroke end signals are invalid, and the current limit during initialization is valid.
This signal is also set to "1" when the "Zero point initialization mode" signal (AZS1 to 8) is ON.
[Function]
This signal is output when the absolute position is not established in the absolute position detection system.
[Operation]
This signal indicates an axis for which an initial set of the zero point has never been established or has lost its absolute position.
The stored stroke limit of the axis for which this signal is set to "1" in the absolute position detection system is invalid.
[Function] [Operation]
When NC receives the "Reference position adjustment completion" signal's ON from PLC and the axis is controlled for the dog-type reference position return in the synchronization at zero point initialization (#1493 ref_syn = 1), NC sets the reference position adjustment value to "#2036 slv_adjust" and then turns ON the bit corresponding to the master axis in the part system.
Turn OFF the "Reference position adjustment value completion" signal after this signal is ON.
NC turns this signal OFF when the "Reference position adjustment completion" signal is changed from ON to OFF.
[Caution]
(1) Parameter screen is also available to change the reference position adjustment value (#2036 slv_adjust), which does not turn this signal ON.
[Related signals]
(1) Reference position adjustment completion (R2592)
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A In initialization R574 R774 R974 R1174 R1374 R1574 R1774 R1974
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Initialization incompletion R575 R775 R975 R1175 R1375 R1575 R1775 R1975
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Reference position adjustment value
parameter setting completed R576 R776 R976 R1176 R1376 R1576 R1776 R1976
File register
(R) FEDCBA9 8 7 6 5 4 3 2 1 0 Bit
In initialization: 1st axis
:
:
In initialization: 8th axis
File register
(R) FEDCB A 9 8 7 6 5 4 3 2 1 0 Bit
IInitialization incompletion: 1st axis
:
:
IInitialization incompletion: 8th axis
Reference position adjustment
completion
Reference position adjustment value
parameter setting completed

[Function] [Operation]
Execution result is stored when NC data is read or written using the system variables (#100050 to #100054).
[Caution]
(1) The values are updated when NC data is read or written.
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A User macro section and sub-section
designated execution result APIER R577 R777 R977 R1177 R1377 R1577 R1777 R1977
Execution con tents Results Data to be stored in R register
Read Successful completion 0x0000
Section No. error 0x0191
Sub-section No. error 0x0192
Part system designation error 0x0190
Axis designation error 0x01A0
Write-only data 0x019F
Write Successful completion 0x0000
Section No. error 0x0291
Sub-section No. error 0x0292
Part system designation error 0x0290
Axis designation error 0x02A0
Read-only data 0x029B
Unable to write data 0x029E

[Function]

This signal indicates that the control axis is near the reference position in the absolute position detection system.
This signal is output for the 1st reference position to the 4th reference position.
In the signal near the 1st reference position, the time required to output the signal is shorter than that of the "Near reference position n-th axis" signal (NRFn) (the accuracy of ON/OFF timing during axis movement is improved).
[Operation]
Using the n-th reference position as a reference, when the control axis is in the range set with the parameters, this sig nal turns ON, and turns OFF when the axis is not within the range.
The near reference position signal is output with four bits for each axis.
<R register and corresponding axes>
R580
R581
<Output value and near n-th reference position>
(1) The near reference position signal devices include X devices (NRF1 and following) which output signal only for the 1st reference position, and the R registers (R580/R581) which outputs a signal for each reference position (1st reference position to 4th reference position).
(2) The near reference position signal output width is set with the absolute position parameters "#2057 nrefp" and "#2058 nrefn". The near reference position signal output width is the same width for the 1st reference position to the 4th refer ence position.
(3) Near the 1st reference position, the signals are output to the conventional X device (NRF1 and following) and the R registers (R580/R581) which output signals to each reference position.
[Related signals]
(1) Near reference position n-th axis (NRF1 to 8: X880 to 7)
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Near reference position (per reference position) R580, 1 R780, 1 R980, 1 R1180, 1 R1380, 1 R1580, 1 R1780, 1 R1980, 1
High-order bit <----------> Low-order bit Near n-th reference position
0 0 0 1 Near 1st reference position
0 0 1 0 Near 2nd reference position
0 1 0 0 Near 3rd reference position
1 0 0 0 Near 4th reference position
F E D C B A 9 8 7 6 5 4 3 2 1 0
1st axis output value
2nd axis output value
3rd axis output value
4th axis output value
F E D C B A 9 8 7 6 5 4 3 2 1 0

5th axis output value
6th axis output value
7th axis output value
8th axis output value
Note

[Function]
The axis movement direction at the moment when the skip signal is entered is output in the tool presetter.
[Operation]
The movement direction of the axis at the moment when the tool touches the sensor (skip signal is ON) in the tool measurement mode (TLMS is ON) is set to the corresponding bit.
This signal is turned OFF when the sensor is OFF.
This signal turns OFF when the tool measurement mode signal is turned OFF.
This signal is not output when the tool measurement mode is not entered.
This signal is "0xFFFF" when an axis with no movement contacts the sensor.
1: Sensor ON
0: Sensor OFF or tool measurement mode OFF
[Related signals]
(1) Tool length measurement 2 (TLMS: YC21)
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Presetter contact R582 R782 R982 R1182 R1382 R1582 R1782 R1982
F E D C B A 9 8 7 6 5 4 3 2 1 0

Presetter contact +1 axis
Presetter contact +2 axis
Presetter contact +3 axis
Presetter contact +4 axis
Presetter contact +5 axis
Presetter contact +6 axis
Presetter contact +7 axis
Presetter contact +8 axis
Presetter contact -1 axis
Presetter contact -2 axis
Presetter contact -3 axis
Presetter contact -4 axis
Presetter contact -5 axis
Presetter contact -6 axis
Presetter contact -7 axis
Presetter contact -8 axis

[Function]
The interlock direction in the CNC is output after the sensor is entered in the tool presetter.
[Operation]
The interlock direction to the entrance direction in the CNC is output after the sensor is entered during the tool measurement mode (TLMS ON).
This signal is turned OFF when the escape operation completion conditions are satisfied.
This signal turns OFF when the tool measurement mode signal is turned OFF.

This signal is not output when the tool measurement mode is not entered.
1: In interlock
0: Interlock cancel or tool measurement mode OFF
[Related signals]
(1) Tool length measurement 2 (TLMS: YC21)
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Presetter interlock R583 R783 R983 R1183 R1383 R1583 R1783 R1983
F E D C B A 9 8 7 6 5 4 3 2 1 0

In presetter interlock +1 axis
In presetter interlock +2 axis
In presetter interlock +3 axis
In presetter interlock +4 axis
In presetter interlock +5 axis
In presetter interlock +6 axis
In presetter interlock +7 axis
In presetter interlock +8 axis
In presetter interlock -1 axis
In presetter interlock -2 axis
In presetter interlock -3 axis
In presetter interlock -4 axis
In presetter interlock -5 axis
In presetter interlock -6 axis
In presetter interlock -7 axis
In presetter interlock -8 axis

[Function]
The No. of work machining current value and maximum value are notified by the controller to the PLC.
[Operation]
If data is set in the No. of work machining (WRK COUNT M) and work machining maximum value (WRK LIMIT) of the [Process parameters], the current value or maximum value of the No. of work machining is output.
<For 1st part system>
(1) If data is not set in "WRK COUNT M" and "WRK LIMIT" on the [Process Parameter] screen, data is not output to the file register.
(2) If the No. of work machining matches or exceeds maximum value, the "No. of work machining over" signal (XCA6) turns ON.
<Counting of No. of work machining using user PLC>
Set "0" in "WRK COUNT M" on the [Process Parameter] screen. With this setting, the controller side does not count up.
Add "1" to R606, 7 with the user PLC
The controller displays R606, 7 as the No. of work machining on the [COORDINATE] screen. Even in this case, if the No. of work machining matches or exceeds the work maximum value, the "No. of work machining over" signal (XCA6) turns ON.
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A No. of work machining (current value) R606, 7 R806, 7 R1006, 7 R1206, 7 R1406, 7 R1606, 7 R1806, 7 R2006, 7
A No. of work machining (maximum val ue) R608, 9 R808, 9 R1008, 9 R1208, 9 R1408, 9 R1608, 9 R1808, 9 R2008, 9
R606 No. of work machining Low -order side
R607 Current value High -order side
R608 No. of work machining Low -order side
R609 Maximum value High -order side
Note

[Function]
This signal indicates the identification numbers of sub part systems.
Refer to this signal if it is necessary to identify the G144 command that is controlling the sub part system.
[Operation]
A sub part system under the sub part system control II outputs the sub part system identification number while the "Sub part system control: Sub part system processing" signal (SBS) is ON.
The value is "0" when sub part system processing is not performed.
[Related signals]
(1) Sub part system control: Sub part system processing (SBS: XC4E)
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A
Sub part system control:
Sub part system control II identification
No.
SBSID R616 R816 R1016 R1216 R1416 R1616 R1816 R2016
PLC input signal Part system that outputs
signals Output signal value
Sub part system control: Sub part system processing (SBS:
XC4E) Sub part system 1: ON / 0: OFF
Sub part system control: Sub part system control II identifi cation No. (SBSID: R616) Sub part system Sub part system identification No.
0000
0064 00C8 00C8
0000 0000 0000
(7)
(7)
(4)
(4)
(3)
(3)
(2)
(2)

(1)
(1)
(6)
(6)
(5)
(5)
OFF OFF OFF OFF
ON ON ON
G144 A300 D0 B200 ;
:
:
:
:
:
:
:
:
:
:
:
:
:
:
:
:
G144 A100 D0 B100 ;
G144 A200 D1 B200 ;
M99 ;
M99 ;
M99 ;
SBSID
SBS
Main part system 1
Sub part system
Sub part system
The value is R register value
hexadecimal
* 0064 hexadecimal = 100 decimal
00C8 hexadecimal = 200 decimal
Waiting for
completion
Waiting for
completion
method
Parallel
processing
method
Main part system 2
Sub part system
Waiting for sub part
system vacant
Waiting for
completion
method

[Function]
This signal indicates the system bit data of a part system which is started as a sub part system.
To divide the PLC processing of the calling part system based on the sub part system, use this signal to find out which number of the sub part system is started.
[Operation]
The system bit of the sub part system is ON at the calling part system while the "Sub part system control: Sub part system processing" signal (SBS) is ON.
The value is "0" when sub part system processing is not performed.
[Related signals]
(1) Sub part system control: Sub part system processing (SBS: XC4E)
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Sub part system control:
Calling sub part system SBSCL R617 R817 R1017 R1217 R1417 R1617 R1817 R2017
bitF bitE bitD bitC bitB bitA bit9 bit8 bit7 bit6 bit5 bit4 bit3 bit2 bit1 bit0
Not used. $8 $7 $6 $5 $4 $3 $2 $1
PLC input signal Part system that outputs
signals Output signal value
Sub part system control: Sub part system processing (SBS:
XC4E) Sub part system 1: ON / 0: OFF
Sub part system control: Calling sub part system (SBSCL:
R617) Caller of part system System bit of sub part system
0000
0000
0004 0004
0004
0000 0000
0000
(7)
(7)
(7)

(4)
(4)
(4)
(3)
(3)
(3)
(2)
(2)
(2)
(1)
(1)
(1)
(6)
(6)
(6)
(5)
(5)
(5)
OFF OFF OFF OFF
ON ON ON
($1)
M99;
G122 A300 D0 B2 ;
G144 A300 D0 B2 ;
:
:
:
:
:
:
:
:
:
:
:
:
:
:
:
:
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:
:
:
:
($2)
($2)
($3)
($3)
($1)
G122 A100 D0 B2;
G144 A100 D0 B2 ;
G144 A200 D1 B2 ;
G122 A200 D1 B2 ;
M99 ;
M99 ;
M99 ;
M99 ;
M99 ;
SBSCL
SBSCL
SBS
When the 1st part system and the 2nd part system are Main part systems and the 3rd part system is Sub part system.
Command format of sub part system control I
Main part system 1
Waiting for
completion
Waiting for sub part
system vacant
Waiting for
completion
method
Parallel
processing
method
Command format of sub part system control II
Main part system 1

Main part system 2
Main part system 2
Waiting for sub part
system vacant
Sub part system
Waiting for
completion
method
Parallel
processing
method
Sub part system
Waiting for
completion
method
Waiting for
completion
method
Main part system 1
Main part system 2
Sub part system
The value is R register value
hexadecimal
Waiting for
completion
M800V/M80V Series PLC Interface Manual
4 Explanation of Interface Signals
4.2 PLC Input Signals (Data Type: R***)
IB-1501616-F 314
[Function]
This signal indicates which part system's completion the calling part system is waiting for.
To divide the PLC processing of the calling part system based on the starting method of the sub part system, use this
signal to distinguish between the completion waiting method performed with this signal and the parallel processing
method.
[Operation]
If a sub part system is started with the completion waiting method, the system bit of the sub part system whose completion
is waited remains ON at the calling part system while the "Sub part system control: Sub part system processing" signal
(SBS) is ON.
The value is "0" when sub part system processing is not performed.
[Related signals]
(1) Sub part system control: Sub part system processing (SBS: XC4E)
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Sub part system control:
Waiting for sub part system completion SBSWT R618 R818 R1018 R1218 R1418 R1618 R1818 R2018
bitF bitE bitD bitC bitB bitA bit9 bit8 bit7 bit6 bit5 bit4 bit3 bit2 bit1 bit0
Not used. $8 $7 $6 $5 $4 $3 $2 $1
PLC input signal Part system that outputs
signals Output signal value
Sub part system control: Sub part system processing (SBS:
XC4E) Sub part system 1: ON / 0: OFF
Sub part system control: Waiting for sub part system com pletion (SBSWT: R618) Caller of part system System bit of sub part system
0000
0000
0004
0004
0000
0000
(7)
(7)
(7)
(4)
(4)
(4)
(3)
(3)
(3)
(2)
(2)
(2)
(1)
(1)
(1)
(6)
(6)
(6)
(5)
(5)
(5)
OFF OFF OFF OFF
ON ON ON
($1)
M99 ;
G122 A300 D0 B2 ;
G144 A300 D0 B2 ;
:
:
:
:

:
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:
:
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:
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:
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($2)
($2)
($3)
($3)
($1)
G122 A100 D0 B2;
G144 A100 D0 B2 ;
G144 A200 D1 B2 ;
G122 A200 D1 B2 ;
M99 ;
M99 ;
M99 ;
M99 ;
M99 ;
SBSWT
SBSWT
SBS
When the 1st part system and the 2nd part system are Main part systems and the 3rd part system is Sub part system.
Command format of sub part system control I
Main part system 1
Waiting for
completion
Waiting for sub part
system vacant
Waiting for
completion
method
Parallel
processing
method
Command format of sub part system control II
Main part system 1
Main part system 2
Main part system 2
Waiting for sub part
system vacant
Sub part system
Waiting for
completion
method
Parallel
processing
method
Sub part system
Waiting for
completion
method
Waiting for
completion
method
Main part system 1
Main part system 2
Sub part system
The value is R register value
hexadecimal
Waiting for
completion

[Function]

This signal indicates the part system that called the sub part system.

To divide the PLC processing of the sub part system based on the calling part system, use this signal to find out which part system (number) called the sub part system.

[Operation]

The system bit of the calling part system remains ON at the sub part system while the "Sub part system control: Sub part system processing" signal (SBS) is ON.

The value is "0" when sub part system processing is not performed.

[Related signals]

(1) Sub part system control: Sub part system processing (SBS: XC4E)

Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8

A Sub part system control:

Caller of sub part system SBSSY R619 R819 R1019 R1219 R1419 R1619 R1819 R2019

bitF bitE bitD bitC bitB bitA bit9 bit8 bit7 bit6 bit5 bit4 bit3 bit2 bit1 bit0

Not used. $8 $7 $6 $5 $4 $3 $2 $1

PLC input signal Part system that outputs

signals Output signal value

Sub part system control: Sub part system processing (SBS:

XC4E) Sub part system 1: ON / 0: OFF

Sub part system control: Caller of sub part system (SBSSY:

R619) Sub part system System bit of calling part system

0000

0001 0001 0002

0000 0000 0000

(7)

(7)

(7)

(4)

(4)

(4)

(3)

(3)

(3)

(2)

(2)

(2)

(1)

(1)

(1)

(6)

(6)

(6)

(5)

(5)

(5)

OFF OFF OFF OFF

ON ON ON

($1)

M99 ;

G122 A300 D0 B2 ;

G144 A300 D0 B2 ;

:

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($2)

($2)

($3)

($3)

($1)
G122 A100 D0 B2;
G144 A100 D0 B2 ;
G144 A200 D1 B2 ;
G122 A200 D1 B2 ;
M99 ;
M99 ;
M99 ;
M99 ;
M99 ;
SBSSY
SBS
When the 1st part system and the 2nd part system are Main part systems and the 3rd part system is Sub part system.
Command format of sub part system control I
Main part system 1
Waiting for
completion
Waiting for sub part
system vacant
Waiting for
completion
method
Parallel
processing
method
Command format of sub part system control II
Main part system 1
Main part system 2
Main part system 2
Waiting for sub part
system vacant
Sub part system
Waiting for
completion
method
Parallel
processing
method
Sub part system
Waiting for
completion
method
Waiting for
completion
method
Sub part system
The value is R register value
hexadecimal
Waiting for
completion
Sub part system
M800V/M80V Series PLC Interface Manual
4 Explanation of Interface Signals
4.2 PLC Input Signals (Data Type: R***)
IB-1501616-F 316
[Function]
With bit data, this signal indicates which axis is under constant torque control or proportional torque stopper control.
(1) The axis bit configuration for part systems are the same as the basic axis configuration.
[Operation]
<High-order 8 bits: Axis in proportional torque stopper control>
The axis bit corresponding to the axis to which proportional torque stopper control is commanded with the "Proportional torque stopper control request axis" signal (R2620/high-order 8 bits) turns ON.
The axis bit corresponding to the axis for which proportional torque stopper control is canceled with the "Proportional torque stopper control request axis" signal turns OFF.
<Low-order 8 bits: Axis in torque constant control>
The axis bit corresponding the axis to which constant torque control is commanded with the "Constant torque control request axis" signal (R2620/low-order 8 bits) turns ON.
The axis bit corresponding the axis for which constant torque control is canceled with the "Constant torque control request axis" signal turns OFF.
[Related signals]
(1) Constant torque control: Constant torque/proportional torque stopper control request axis (R2620)
[Function]
With bit data, this signal indicates the axis for which constant torque droop cancellation is being executed or the axis for which constant torque droop cancellation is completed.
(1) The axis bit configuration for part systems are the same as the basic axis configuration.
[Operation]
<High-order 8 bits: Axis for which constant torque droop cancellation is completed>
The axis bit corresponding to the axis for which droop cancellation commanded with the "Constant torque droop cancel request axis" signal (R2621/high-order 8 bits) is completed turns ON.
When the axis bit of the "Constant torque droop cancel request axis" signal turns OFF, the corresponding axis bit of this signal turns OFF.
<Low-order 8 bits: Axis for which constant torque droop cancellation is being executed>
The axis bit corresponding to the axis for which droop cancellation commanded with the "Constant torque droop cancel request axis" signal (R2621/low-order 8 bits) is being executed turns ON.
When the axis bit of the "Constant torque droop cancel request axis" signal turns OFF, the corresponding axis bit of this signal turns OFF.
[Related signals]
(1) Constant torque control: Constant torque droop cancel request axis (R2621)

Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A
Constant torque control: Axis under
constant torque/proportional torque
stopper control
R624 R824 R1024 R1224 R1424 R1624 R1824 R2024
BIT F E D C B A 9 8 7 6 5 4 3 2 1 0
Axis 8 7 6 5 4 3 2 1 8 7 6 5 4 3 2 1
Axis in proportional torque stopper control Axis in constant torque control
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Constant torque control: Constant
torque droop cancel axis status R625 R825 R1025 R1225 R1425 R1625 R1825 R2025
BIT F E D C B A 9 8 7 6 5 4 3 2 1 0
Axis 8 7 6 5 4 3 2 1 8 7 6 5 4 3 2 1
Axis for which constant torque droop cancellation is completed Axis for which constant torque droop cancellation is being exe cuted
Note
Note

[Function] [Operation]
This signal outputs usage data of tools currently being used with the tool life management II. (For tools that use multiple
compensation Nos, the total usage data for each compensation No. is output.)
[Function] [Operation]
This signal indicates the number of tools currently in life management.
[Function]
The current positions of H' and V' axes on the hypothetical coordinate are set when the circular feed in manual mode is
valid.
[Operation]
The current positions of H' and V' axes on the hypothetical coordinate are set while the "Circular feed in manual mode
valid" signal is ON.
In the "circular-linear" mode, the current position of H' on the hypothetical coordinate is set by an angle (0.000 to
360.000) from the basic point defined as 0 degree.
The hypothetical coordinate value in the following state is input.
[Caution]
(1) This data is valid only when the "Circular feed in manual mode being valid" signal is ON. If the signal is OFF, the cur rent position data is uncertain. (The value is not ensured.)
(2) The current positions are output with "0.5PLC setting unit".
(3) When the parameter "#1040 M_inch" is set to "1", this data is output in inches.
[Related signals]
(1) In circular feed in manual mode (XC4F)
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Tool life usage data R628, 9 R828, 9 R1028, 9 R1228, 9 R1428, 9 R1628, 9 R1828, 9 R2028, 9
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Number of registered tool life control
tools R630 R830 R1030 R1230 R1430 R1630 R1830 R2030
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Circular feed in manual mode Current
position H R636,7 R836,7 R1036,7 R1236,7 R1436,7 R1636,7 R1836,7 R2036,7
A Circular feed in manual mode Current
position V R640,1 R840,1 R1040,1 R1240,1 R1440,1 R1640,1 R1840,1 R2040,1
Linear-linear hypothetical coor dinate V axis: mirror image is not valid
Circular-linear hypothetical coor dinate
H' axis: "+" indicates the inverse (CW) direction
V' axis: mirror image is not valid

[Function]
This signal indicates the status of operation commanded with the "Thread recutting command" signal.
When the thread recutting operation from the ladder ("#1258 set30/bit4" is set to "1") is selected, the CNC outputs the
status of thread recutting operation to this signal.
The status is not output when the thread recutting operation on the CNC screen ("#1258 set30/bit4" is set to "0") is
selected.
[Operation]
<Description of each bit>
<ON/OFF of this signal>
The bits of this signal turn ON only when bit7 (Command execution) of the "Thread recutting command" signal (R2626)
is ON.
All bits of this signal turn OFF at the falling edge of bit7 (Command execution) of the "Thread recutting command" signal
(R2626). Other signals such as a resetting signal cannot be used to turn this signal OFF.
[Related signals]
(1) Thread recutting command (R2626)
(2) Thread recutting spindle No. (R650)
(3) Thread recutting lead axis No. (R651)
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Thread recutting status R648 R848 R1048 R1248 R1448 R1648 R1848 R2048
Bit of R648 Meaning Factors that the bit turns ON
0 Memory completed The "Memory" (bit0) operation commanded with the "Thread recutting command" sig nal (R2626) was completed normally.
1 Erase completed The "Erase" (bit1) operation commanded with the "Thread recutting command" signal
(R2626) was completed normally.
2 to 6
7 Error completed The "Memory" (bit0) or "Erase" (bit1) operation commanded with the "Thread recutting
command" signal (R2626) was not completed normally.
8 Command illegal error Operation was executed with both "Memory" (bit0) and "Erase" (bit1) of the "Thread re cutting command" signal (R2626) turned OFF or both turned ON.
9 Command unavailable er ror
Conditions are not met to execute the "Memory" (bit0) or "Erase" (bit1) operation com manded with the "Thread recutting command" signal (R2626).

A Lead axis illegal error The lead axis coordinates are not established when the "Memory" (bit0) operation is commanded with the "Thread recutting command" signal (R2626).
B
Spindle illegal error The spindle has rotated less than one revolution after the power is turned ON when the "Memory" (bit0) operation is commanded with the "Thread recutting command" signal (R2626).
C
Axis number illegal error The lead axis number or spindle number is "0" or larger than the number of connected axes when the "Memory" (bit0) operation is commanded with the "Thread recutting command"signal (R2626).
D Option illegal error The thread recutting option is disabled when the "Memory" (bit0) or "Erase" (bit1) op eration is commanded with the "Thread recutting command" signal (R2626).
0123456789ABCDEF BIT
Memorization completed
Erase completed
Lead axis illegal error
Command illegal error
Command not available error
Error completed
Spindle illegal error
Axis number illegal error
Option illegal error

[Function]
This signal indicates whether thread recutting can be executed or not.
When the thread recutting operation from the ladder ("#1258 set30/bit4" is set to "1") is selected, the CNC outputs the status of thread recutting operation to this signal.
The status is not output when the thread recutting operation on the CNC screen ("#1258 set30/bit4" is set to "0") is selected.
[Operation]
[Related signals]
(1) Thread recutting execution operation (R2627)
[Function] [Operation]
With binary data, this signal outputs the spindle number for which the position within one spindle revolution is memorized.
0: Not memorized
1: 1st spindle/1st axis
2: 2nd spindle/2nd axis
3: 3rd spindle/3rd axis
:
(Displays up to the number of connected axes.)
When the thread recutting operation from the ladder ("#1258 set30/bit4" is set to "1") is selected, the CNC outputs the status of thread recutting operation to this signal.
The status is not output when the thread recutting operation on the CNC screen ("#1258 set30/bit4" is set to "0") is selected.
[Related signals]
(1) Encoder selection (R2567)
(2) Thread recutting command (R2626)
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Thread recutting execution status R649 R849 R1049 R1249 R1449 R1649 R1849 R2049
Bit of R649 Meaning Details
F
Thread recutting function enabled
Thread recutting is performed if thread cutting is performed while this bit is ON.
This bit turns ON when bitF of the "Thread recutting execution operation" signal (R2627) has been turned ON and the data required to execute thread recutting is stored in the memory.
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Thread recutting spindle No. R650 R850 R1050 R1250 R1450 R1650 R1850 R2050
0123456789ABCDEF BIT
Thread recutting function enabled

[Function] [Operation]
With binary data, this signal outputs the lead axis number for which the lead axis coordinates is memorized.
0: Not memorized
1: 1st spindle/1st axis
2: 2nd spindle/2nd axis
3: 3rd spindle/3rd axis
:
(Displays up to the number of connected axes.)
When the thread recutting operation from the ladder ("#1258 set30/bit4" is set to "1") is selected, the CNC outputs the status of thread recutting operation to this signal.
The status is not output when the thread recutting operation on the CNC screen ("#1258 set30/bit4" is set to "0") is selected.
[Related signals]
(1) Encoder selection (R2567)
(2) Thread recutting command (R2626)
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Thread recutting lead axis No. R651 R851 R1051 R1251 R1451 R1651 R1851 R2051

[Function]
This signal notifies configuration No. and switching status for the rotary axis configuration parameter that is being applied.
[Operation]
<Low-order 8 bits: Configuration No. of rotary axis configuration parameter>
This notifies the configuration No. of the rotary axis configuration parameter that is being applied.
"0" is notified when there are no applicable rotary axis configuration parameters.
<High-order 8 bits: Switching status of rotary axis configuration parameter>
This notifies the switching status of rotary axis configuration parameter.
After the rotary axis configuration parameter switching request is made, the "Rotary axis configuration parameter switch completion signal" (bit8) is turned ON when the "Rotary axis configuration parameter switch request signal" is completed.
When the "Rotary axis configuration parameter switch request signal" is turned OFF, the "Rotary axis configuration parameter switch completion signal" is also turned OFF.
(1) Regardless of the setting of the parameter "#1450 5axis_Spec/bit2" (Application of rotary axis configuration parame ters), the "Configuration No. of rotary axis configuration parameter" (R656/low-order 8 bits) is output. However, the "Rotary axis configuration parameter switch completion signal" (R656/bit8) is turned ON only when "#1450 5ax is_Spec/bit2" is set to "1" (PLC signal method).
[Timing chart]
[Related signals]
(1) Rotary axis configuration parameter switch (RPARCHG: R2615)
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Rotary axis configuration parameter
output
RPAROU
T R656 R856 R1056 R1256 R1456 R1656 R1856 R2056
F EDCB A 9 8
(R)
File register
< High-order 8 bits > < Low-order 8 bits >
Not in use
Configuration No. of rotary axis configuration parameter
Rotary axis configuration parameter switch completion signal
(0: Not complete; 1: Completed)
bit
Note
2
2
Machining program N01 G28 X0. Z0.; N02 M**; N03 G0 Z100.;
Configuration No. of rotary axis
configuration parameter (R2615/low-order 8 bits)
Rotary axis configuration parameter
switch request signal (R2615/bit8)
Rotary axis configuration parameter
switch completion signal (R656/bit8)
M function finish 1 (FIN1n)
Applying rotary axis configuration parameter

[Function]
These signals notify the workpiece No. of the machining surface being selected by the R-Navi function.
[Operation]
These signals are set when:
A machining surface is selected on [S-sel] of the monitor screen.
These signals are cleared when:
The machining surface is canceled.
The machining surface is canceled due to an emergency stop.
(1) These signals will not be set while a machining surface is being called by a program.
[Related signals]
(1) R-Navi: Machining surface being selected (RSSCT: XD28)
[Function]
These signals notify the surface No. of the machining surface being selected by the R-Navi function.
[Operation]
These signals are set when:
A machining surface is selected on [S-sel] of the monitor screen.
These signals are cleared when:
The machining surface is canceled.
The machining surface is canceled due to an emergency stop.
(1) These signals will not be set while a machining surface is being called by a program.
[Related signals]
(1) R-Navi: Machining surface being selected (RSSCT: XD28)
[Function] [Operation]
This signal notifies the solid which has entered the interference warning area at the occurrence of the operation alarm (M03 0003).
This signal notifies the interfering object definition information (the interfering object No. (high-order 8 bits) and configured solid No. (low-order 8 bits) of the interfering objects) for the pair of interfering objects in which interference has occurred.
If more than one solid enters the interference warning area, this signal notifies the interfering object No. and configured solid No. of the interfering object which has first entered the interference warning area.
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A R-Navi: Selected workpiece No. RSWRK R660 R860 R1060 R1260 R1460 R1660 R1860 R2060
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A R-Navi: selecting machine surface
number RSSRF R661 R861 R1061 R1261 R1461 R1661 R1861 R2061
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A
Interference check III:
Entry in interference warn area solid in formation
ITF3CH
WGSLD R670,1 R870,1 R1070,1 R1270,1 R1470,1 R1670,1 R1870,1 R2070,1
Note

Note
(1) (3) (1)
(2)
(3) (4) (5)
(6)
(2) Solid information
(interfering object definition information)
R670: 01 06 (1st interfering object 6th solid)
R671: 07 03 (7th interfering object 3rd solid)
1st interfering object 7th interfering object
1st interfering object 6th solid 7th interfering object 3rd solid

[Function] [Operation]
This signal notifies the solid for which the entry to the interference alarm area has been detected at the occurrence of the operation alarm (M03 0001).
This signal notifies the interfering object definition information (the interfering object No. (high-order 8 bits) and configured solid No. (low-order 8 bits) of the interfering objects) for the pair of interfering objects in which interference has occurred.
If the entry of more than one solid to the interfering alarm area has been detected, this signal notifies the interfering object No. and configured solid No. of the interfering object which has first entered the interfering alarm area.
[Function] [Operation]
This signal notifies the solid which has entered the interference alarm area at the occurrence of the operation alarm (M03 0002).
This signal notifies the interfering object definition information (the interfering object No. (high-order 8 bits) and configured solid No. (low-order 8 bits) of the interfering objects) for the pair of interfering objects in which interference has occurred.
If more than one solid enters the interference alarm area, this signal notifies the interfering object No. and configured solid No. of the interfering object which has first entered the interference alarm area.
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Interference check III:
Interference detection solid information
ITF3CHA
LSLD R672,3 R872,3 R1072,3 R1272,3 R1472,3 R1672,3 R1872,3 R2072,3
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A
Interference check III:
Entry in interference alarm area solid in formation
ITF3-
TRALSL
D
R674, 5 R874, 5 R1074, 5 R1274, 5 R1474, 5 R1674, 5 R1874, 5 R2074, 5
(1)
(2)
(3) (4) (5)
(1)
(2)
(3)
Solid information
(interfering object definition information)
R672: 01 05 (1st interfering object 5th solid)
R673: 07 03 (7th interfering object 3rd solid)
1st interfering object 7th interfering object
1st interfering object 5th solid 7th interfering object 3rd solid
(1)
(2)
(3) (4) (5)
(1)
(2)
(3)
Solid information
(interfering object definition information)
R674: 01 05 (1st interfering object 5th solid)
R675: 07 03 (7th interfering object 3rd solid)
1st interfering object 7th interfering object
1st interfering object 5th solid 7th interfering object 3rd solid

[Function]
This signal outputs the No. of shape group which has been selected as the target of 3D machine interference check or real-time 3D machine interference check on the shape selection screen.
[Operation]
This signal is updated when the target shape group is changed on the shape selection screen.
Change of the Requested shape group No. does not affect the interference check.
To reflect the Requested shape group No. in the interference check, update the "3D Machine Interference Check: Enabled shape group No." signal.
(1) Shapes defined in Group 1 are within the scope of the interference check. Interference check is not executed for the shape defined in Groups 2 to 4.
[Related signals]
(1) 3D Machine Interference Check: Enabled shape group No. (R4400)
[Function]
This signal outputs the position (n-th axis) on the machine coordinate system by the PLC setting unit.
[Function]
This signal outputs motor feedback position (n-th axis) on the machine coordinate system by the PLC setting unit.
[Function]
The deflection amount of the servo n-th axis is output always in the command unit.

[Operation]
Servo 1st part system 1st axis: R4756 (low) R4757 (high)
:
Servo 1st part system 8th axis: R4770 (low) R4771 (high)
Servo 2nd part system 1st axis: R4772 (low) R4773 (high)
:
Servo 2nd part system 8th axis: R4786 (low) R4787 (high)
Cont. Signal name Abbrev. Common ($)
A 3D machine interference check: Requested shape group
No. 1 to 4 R2400 to 3
Cont. Signal name Abbrev. $1 $2 $3 $4
A Machine position n-th axis R4500,1 to
R4528,9
R4532,3 to
R4560,1
R4564,5 to
R4592,3
R4596,7 to
R4624,5
Cont. Signal name Abbrev. $1 $2 $3 $4
A Feedback machine position n-th axis R4628,9 to
R4656,7
R4660,1 to
R4688,9
R4692,3 to
R4720,1
R4724,5 to
R4552,3
Cont. Signal name Abbrev. $1 $2 $3 $4
A Servo deflection amount n-th axis R4756 to 71 R4772 to 87 R4788 to
803 R4804 to 19
Note

[Function]
This signal outputs motor rotation speed (n-th axis) with r/min.
[Operation]
The motor rotation speed is assigned as below.
[Function]
This signal outputs motor load current (n-th axis) with continuous current (%) during stalling.
[Operation]
The motor load current is assigned as below.
[Function]
This signal outputs skip coordinate position Y (n-th axis) with PLC setting unit.
Cont. Signal name Abbrev. $1 $2 $3 $4
A Motor rotation speed n-th axis R4820,1 to
R4834,5
R4836,7 to
R4850,1
R4852,3 to
R4866,7
R4868,9 to
R4882,3
Signal name File register
$1 $2 $3 $4
Motor rotation speed 1st axis R4820, 1 R4836, 7 R4852, 3 R4868, 9
Motor rotation speed 2nd axis R4822, 3 R4838, 9 R4854, 5 R4870, 1
Motor rotation speed 3rd axis R4824, 5 R4840, 1 R4856, 7 R4872, 3
Motor rotation speed 4th axis R4826, 7 R4842, 3 R4858, 9 R4874, 5
Motor rotation speed 5th axis R4828, 9 R4844, 5 R4860, 1 R4876, 7
Motor rotation speed 6th axis R4830, 1 R4846, 7 R4862, 3 R4878, 9
Motor rotation speed 7th axis R4832, 3 R4848, 9 R4864, 5 R4880, 1
Motor rotation speed 8th axis R4834, 5 R4850, 1 R4866, 7 R4882, 3
Cont. Signal name Abbrev. $1 $2 $3 $4
A Motor load current n-th axis R4884,5 to
R4898,9
R4900,1 to
R4914,5
R4916,7 to
R4930,1
R4932,3 to
R4946,7
Signal name File register
$1 $2 $3 $4
Motor load current 1st axis R4884, 5 R4900, 1 R4916, 7 R4932, 3
Motor load current 2nd axis R4886, 7 R4902, 3 R4918, 9 R4934, 5
Motor load current 3rd axis R4888, 9 R4904, 5 R4920, 1 R4936, 7
Motor load current 4th axis R4890, 1 R4906, 7 R4922, 3 R4938, 9
Motor load current 5th axis R4892, 3 R4908, 9 R4924, 5 R4940, 1
Motor load current 6th axis R4894, 5 R4910, 1 R4926, 7 R4942, 3
Motor load current 7th axis R4896, 7 R4912, 3 R4928, 9 R4944, 5
Motor load current 8th axis R4898, 9 R4914, 5 R4930, 1 R4946, 7
Cont. Signal name Abbrev. $1 $2 $3 $4
A Skip coordinate position n-th axis R4948,9 to
R4976,7
R4980,1 to

R5008,9
R5012,3 to
R5040,1
R5044,5 to
R5072,3

[Function]
The synchronization error amount during the synchronous control is output. (Unit: command unit)
[Operation]
The synchronization error amount between the reference axis and synchronized axis during the synchronous control is output to the synchronized axis.
(The axis Nos. are not for each part system, but for the entire system.)
[Related signals]
(1) Synchronous control request (SYNC1 to 8: YA80 to 7)
(2) Superimposition control request (PILE1 to 8: YAA0 to 7)
[Function]
This signal indicates the alarm No./warning No. of servo drive unit. (hexadecimal 2 digits)
This signal sets the 4-digit alarm No. which is displayed on the NC screen.
[Operation]
This signal is set up when the alarm/waring occurs in the servo drive unit.
This signal will be cleared when the alarm/warning is canceled.
This signal is not set if the servo warning "S52 00E6" (Control axis detachment warning) or "S52 00E7" (In NC emergency stop state) occurs.
If more than one alarm/warning occurs, the value displayed in the [LED display] of [Drv mon]-[Servo unit] screen is set.
[Related signals]
(1) NC warning (servo warning) (XC9C)
[Function]
This signal outputs skip coordinate position (n-th axis) by the PLC setting unit.
Cont. Signal name Abbrev. $1 $2 $3 $4
A Synchronous error amount n-th axis R5076,7 to
R5090,1
R5092,3 to
R5106,7
R5108,9 to
R5122,3
R5124,5 to
R5138,9
Synchronization error
amount R register Synchronization error
amount R register
1st axis R5076(L)/R5077(H) 17th axis R5108(L)/R5109(H)
2nd axis R5078(L)/R5079(H) 18th axis R5110(L)/R5111(H)
3rd axis R5080(L)/R5081(H) 19th axis R5112(L)/R5113(H)
4th axis R5082(L)/R5083(H) 20th axis R5114(L)/R5115(H)
5th axis R5084(L)/R5085(H) 21th axis R5116(L)/R5117(H)
6th axis R5086(L)/R5087(H) 22th axis R5118(L)/R5119(H)
7th axis R5088(L)/R5089(H) 23th axis R5120(L)/R5121(H)
8th axis R5090(L)/R5091(H) 24th axis R5122(L)/R5123(H)
9th axis R5092(L)/R5093(H) 25th axis R5124(L)/R5125(H)
10th axis R5094(L)/R5095(H) 26th axis R5126(L)/R5127(H)
11th axis R5096(L)/R5097(H) 27th axis R5128(L)/R5129(H)
12th axis R5098(L)/R5099(H) 28th axis R5130(L)/R5131(H)
13th axis R5100(L)/R5101(H) 29th axis R5132(L)/R5133(H)
14th axis R5102(L)/R5103(H) 30th axis R5134(L)/R5135(H)
15th axis R5104(L)/R5105(H) 31th axis R5136(L)/R5137(H)
16th axis R5106(L)/R5107(H) 32th axis R5138(L)/R5139(H)
Cont. Signal name Abbrev. $1 $2 $3 $4
A Servo alarm/warning No. R5332 to
R5339
R5340 to
R5347
R5348 to
R5355
R5356 to
R5363
Cont. Signal name Abbrev. $1 $2 $3 $4
A Skip coordinate position n-th axis feature coordinate R5364,5 to
R5392,3
R5396,7 to
R5424,5
R5428,9 to
R5456,7
R5460,1 to
R5488,9

[Function]
The cutting torque (estimated disturbance torque) of the servo axis is output to this signal.
The content to be output is specified with the parameter "#1232 set04/bit0".
When "#1232/bit0" is set to "1", the estimated disturbance torque is output.
For the drive axes (vertical axes), the unbalance torque offset (setting value of the parameter "#2232 SV032") is contained.
[Operation]

The cutting torque (estimated disturbance torque) is output to this signal.
Output unit: Stall current %
A value "0x64" is output when the cutting torque (estimated disturbance torque) reaches 100%.
A value "0xFFFF" is output when the cutting torque (estimated disturbance torque) reaches -1%.
[Related signals]
(1) Load monitoring I: Axis selection (R2580)
(2) Load monitoring I: Effective torque output n-th axis (R5620)
(3) Load monitoring I: Estimated spindle disturbance torque output (R6541)
(4) Load monitoring I: Effective spindle torque output (R6542)
[Function]
The effective torque of the servo axis is output to these devices.
[Operation]
The effective torque of the servo axis is output to this signal.
[Related signals]
(1) Load monitoring I: Axis selection (R2580)
(2) Load monitoring I: Cutting torque output n-th axis (R5492)
(3) Load monitoring I: Estimated spindle disturbance torque output (R6541)
(4) Load monitoring I: Effective spindle torque output (R6542)
Cont. Signal name Abbrev. $1 $2 $3 $4
A Load monitoring I: Cutting torque output n-th axis R5492 to
R5499
R5500 to
R5507
R5508 to
R5515
R5516 to
R5523
R5492 Cutting torque (estimated disturbance torque) output 1st axis
R5493 Cutting torque (estimated disturbance torque) output 2nd axis
R5494 Cutting torque (estimated disturbance torque) output 3rd axis
R5495 Cutting torque (estimated disturbance torque) output 4th axis
R5496 Cutting torque (estimated disturbance torque) output 5th axis
R5497 Cutting torque (estimated disturbance torque) output 6th axis
R5498 Cutting torque (estimated disturbance torque) output 7th axis
R5499 Cutting torque (estimated disturbance torque) output 8th axis
Cont. Signal name Abbrev. $1 $2 $3 $4
A Load monitoring I: Effective torque output n-th axis R5620 to
R5627
R5628 to
R5635
R5636 to
R5643
R5644 to
R5651
R5620 Effective torque output 1st axis
R5621 Effective torque output 2nd axis
R5622 Effective torque output 3rd axis
R5623 Effective torque output 4th axis
R5624 Effective torque output 5th axis
R5625 Effective torque output 6th axis
R5626 Effective torque output 7th axis
R5627 Effective torque output 8th axis

[Function]
This is interface function used to coordinate user PLC to user macro.
[Operation]
When a value is set in the system variables #1100 to #1131 or #1132 with the user macro program, the value is output to the corresponding file registers Rn and Rn + 1 of the user PLC, and the value can be referenced by the user PLC.
The relationship between system variable and file register is as follows:
This correspondence table uses the file registers R6372 and R6373 as an example.
File registers R6372 and R6373 correspond to system variables #1100 to #1131, and #1132 (32-bit data).
To use the R register of the 2nd and subsequent part system, set "1" to "#1230 set02/bit7".
[Related signals]
(1) User macro output #1133, #1134, #1135 (R6374/6375, R6376/6377, R6378/6379)
(2) User macro input #1032, #1033, #1034, #1035 (R6436/6437, R6438/6439, R6440/6441, R6442/66443)
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A User macro output #1132 (NC -> PLC) R6372, 3 R6380, 1 R6388, 9 R6396, 7 R6404, 5 R6412, 3 R6420, 1 R6428, 9
System variable Points Interface output signal System variable Points Interface output signal
#1100 1 Register R6372/bit0 #1116 1 Register R6373/bit0
#1101 1 Register R6372/bit1 #1117 1 Register R6373/bit1
#1102 1 Register R6372/bit2 #1118 1 Register R6373/bit2
#1103 1 Register R6372/bit3 #1119 1 Register R6373/bit3
#1104 1 Register R6372/bit4 #1120 1 Register R6373/bit4
#1105 1 Register R6372/bit5 #1121 1 Register R6373/bit5
#1106 1 Register R6372/bit6 #1122 1 Register R6373/bit6
#1107 1 Register R6372/bit7 #1123 1 Register R6373/bit7
#1108 1 Register R6372/bit8 #1124 1 Register R6373/bit8
#1109 1 Register R6372/bit9 #1125 1 Register R6373/bit9
#1110 1 Register R6372/bit10 #1126 1 Register R6373/bit10
#1111 1 Register R6372/bit11 #1127 1 Register R6373/bit11
#1112 1 Register R6372/bit12 #1128 1 Register R6373/bit12
#1113 1 Register R6372/bit13 #1129 1 Register R6373/bit13
#1114 1 Register R6372/bit14 #1130 1 Register R6373/bit14
#1115 1 Register R6372/bit15 #1131 1 Register R6373/bit15
System variable Points Interface output signal

#1132 32 Register R6372, R6373
#1133 32 Register R6374, R6375
#1134 32 Register R6376, R6377
#1135 32 Register R6378, R6379

[Function]
This is interface function used to coordinate user PLC to user macro.
[Operation]
When a value is set in the system variable #1133 with the user macro, it is output to the corresponding file registers Rn and Rn+1 of the user PLC, and the value can be referenced by the user PLC.
(Example)
[Related signals]
(1) User macro output #1132, #1134, #1135 (R6372/6373, R6376/6377, R6378/6379)
(2) User macro input #1032, #1033, #1034, #1035 (R6436/6437, R6438/6439, R6440/6441, R6442/66443)
[Function] [Operation]
The function, operation, etc. are the same as those of "User macro output #1133".
[Function] [Operation]
The function, operation, etc. are the same as those of "User macro output #1133".
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A User macro output #1133 (NC -> PLC) R6374, 5 R6382, 3 R6390, 1 R6398, 9 R6406, 7 R6414, 5 R6422, 3 R6430, 1
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A User macro output #1134 (NC -> PLC) R6376, 7 R6384, 5 R6392, 3 R6400, 1 R6408, 9 R6416, 7 R6424, 5 R6432, 3
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A User macro output #1135 (NC -> PLC) R6378, 9 R6386, 7 R6394, 5 R6402, 3 R6410, 1 R6418, 9 R6426, 7 R6434, 5
ACT
DMOV
User macro program Sequence program
R6374 D100 #1133 = 1000
1000 is input in D100 and 101 when the ACT signal turns ON.

[Function]
This signal informs the value of the spindle function (S) data specified by automatic operation (memory, MDI or tape) or manual numerical command. Spindle command rotation input speed output from the controller is binary data. Under the S command mode, the data can be monitored in the "S display" on the command value screen.
Spindle command rotation speed input directly denotes spindle speed (r/min) specified as S function command.
[Operation]
The "Spindle command rotation speed input" is renewed when:
"S**" is specified in automatic operation (memory, MDI or tape) and the "M function finish 1" (FIN1), the "M function fin ish 2" signal (FIN2) or the "Gear shift completion" signal (GFIN) is sent back to the controller.
"S**" is specified by manual numerical command input and the "M function finish 1" (FIN1), the "M function finish 2" sig nal (FIN2) or the "Gear shift completion" signal (GFIN) is sent back to the controller. (Reset or "Emergency stop" does not clear the data.)
[Related signals]
(1) Spindle command rotation speed output (R7000, R7001)
(2) Spindle command final data (R6502, R6503)
[Function]
The command value to the spindle controller is indicated.
[Operation]
The "Spindle command rotation speed input" indicates the value of the spindle function (S) data commanded by automatic operation or manual numerical command, whereas this data further indicates the value that take into account the conditions of the "Spindle override", "Spindle gear selection code" (GI1, GI2), "Spindle stop" (SSTP), "Spindle gear shift" (SSFT) and "Spindle orientation" (SORC).
[Related signals]
(1) Spindle command rotation speed input (R6500, 1)
(2) Spindle command rotation speed output (R7000, 1)
[Function]
When the system has spindle equipped with encoder, actual spindle speed can be monitored.
[Operation]
True spindle speed is always set by feedback signal from spindle encoder.
Data are multiplied by 1000 and stored.
Cont. Signal name Abbrev. 1stSP 2ndSP 3rdSP 4thSP 5thSP 6thSP 7thSP 8thSP
A Spindle command rotation speed in put R6500,1 R6550,1 R6600,1 R6650,1 R6700,1 R6750,1 R6800,1 R6850,1
Cont. Signal name Abbrev. 1stSP 2ndSP 3rdSP 4thSP 5thSP 6thSP 7thSP 8thSP
A Spindle command final data (rotation speed) R6502, 3 R6552, 3 R6602, 3 R6652, 3 R6702, 3 R6752, 3 R6802, 3 R6852, 3
Cont. Signal name Abbrev. 1stSP 2ndSP 3rdSP 4thSP 5thSP 6thSP 7thSP 8thSP
A Spindle actual speed R6506, 7 R6556, 7 R6606, 7 R6656, 7 R6706, 7 R6756, 7 R6806, 7 R6856, 7
When the system is under constant surface speed control, constant surface speed data is set for "Spindle command rotation speed input".
Always ransfers
Spindle command
rotation speed input
Spindle command
rotation speed output
S function
command
S code data 1 +
S function strobe 1 (SF1) turns ON
and the following signals rise:
M function finish 1, 2 (FIN1, FIN2)
Gear shift completion (GFIN)
Reset & rewind (RRW)
or during synchronous tapping
Transfer timing

+ Spindle controller
Spindle command
final data
Spindle gear selection code
1,2 (GI1, GI2)
Spindle stop (SSTP)
Spindle gear shift (SSFT)
Spindle orientation (SORC)
Spindle speed override (SP)
S function strobe 1
<Data flow>

[Function]
The synchronized spindle delay to the reference spindle is output in the spindle synchronized function.
The delay of the workpiece axis to the hob axis is output in the tool spindle synchronization II (Hobbing).
(1) This signal uses the 1st spindle signal regardless of the hob spindle's number.
[Operation]
The synchronized spindle delay to the reference spindle is output.
The delay of the workpiece axis to the hob axis is output in the tool spindle synchronization II (Hobbing).
Unit: 360/4096
(1) Refer to the signal of the 1st spindle when the parameter "#1440 multi_sp_syn" (Multiple spindle synchronization valid) is set to "0".
(2) Refer to the signal of the hob axis during hobbing, or refer to the signal of the synchronized spindle during other machining when the parameter "#1440 multi_sp_syn" (Multiple spindle synchronization valid) is set to "1".
(3) If the phase cannot be calculated because, for instance, the reference spindle or synchronized spindle (hob axis or workpiece axis) has not passed the Z-phase, "-1" is output.
(4) This data is output only during the phase shift calculation or the spindle phase synchronization.
[Related signals]
(1) Phase shift calculation request (SSPHM: Y18B3)
(2) Phase offset request (SSPHF: Y18B4)
(3) Spindle synchronization: Phase offset data (R6518)
(4) Spindle synchronization: Maximum phase error/Maximum hob axis delay angle (R6517)
[Function]
In spindle synchronization, the maximum value of the phase error between the reference spindle and the synchronized spindle is output.
In tool spindle synchronization II (Hobbing), when the hob axis and work axis rotate in synchronization, the maximum delay (advance) of the hob axis from the commanded position is output by angle.
(1) This signal uses the 1st spindle signal regardless of the hob spindle's number.
[Operation]
In spindle synchronization, the maximum value of the "Spindle synchronization: Phase error" (R6516) is output.
In the tool spindle synchronization II (Hobbing), when the hob axis and work axis rotate in synchronization, the maximum delay (advance) of the hob axis from the commanded position is output by angle.
The maximum value output is retained until the next spindle synchronization/tool spindle synchronization II turns ON or until the power turns OFF.
(1) Refer to the signal of the 1st spindle when the parameter "#1440 multi_sp_syn" (Multiple spindle synchronization valid) is set to "0".
(2) Refer to the signal of the hob axis during hobbing, or refer to the signal of the synchronized spindle during other machining when the parameter "#1440 multi_sp_syn" (Multiple spindle synchronization valid) is set to "1".
[Related signals]
(1) Hob axis delay excess (PHOVR: X18B3)
(2) Spindle synchronization: Phase error/Hob axis delay angle (R6516)
Cont. Signal name Abbrev. 1stSP 2ndSP 3rdSP 4thSP 5thSP 6thSP 7thSP 8thSP
A Spindle synchronization: Phase error/
Hob axis delay angle R6516 R6566 R6616 R6666 R6716 R6766 R6816 R6866
Cont. Signal name Abbrev. 1stSP 2ndSP 3rdSP 4thSP 5thSP 6thSP 7thSP 8thSP
A
Spindle synchronization: Maximum
phase error/Maximum hob axis delay
angle
R6517 R6567 R6617 R6667 R6717 R6767 R6817 R6867
Note
Note
Note
Note

[Function]
With the spindle phase shift amount calculation function, the phase error of the reference spindle and synchronized spindle is obtained and memorized by turning the PLC signal ON at executing the spindle synchronization. The synchronized spindle can be rotated with the handle during the spindle phase shift calculation, so the phase relation between two spindles can be adjusted by seeing.
If the "Spindle phase synchronous control" signal (SPPHS) is input while the "Phase offset request" signal (SSPHF) is ON, the phase error will be aligned based on the position shifted by the memorized phase shift amount.
Such operation makes the phase alignment easy when clamping a profile material over.
[Operation]
The phase error memorized by the phase shift calculation is output.
Unit: 360/4096
(1) Refer to the signal of the 1st spindle when the parameter "#1440 multi_sp_syn" (Multiple spindle synchronization valid) is set to "0".
(2) Refer to the synchronized spindle's signal when the parameter "#1440 multi_sp_syn" (Multiple spindle synchroniza tion valid) is set to "1".
(3) This data is output only during the spindle synchronous control.
[Related signals]
(1) Spindle phase synchronization (SPPHS: Y18B1)

(2) Phase shift calculation request (SSPHM: Y18B3)
(3) Phase offset request (SSPHF: Y18B4)
(4) Spindle synchronization: Phase error/Hob axis delay angle (R6516)
[Function]
The phase error during the spindle phase synchronous state can be monitored.
[Operation]
The phase error during the spindle phase synchronous control is output by the pulse unit.
(1) Refer to the signal of the 1st spindle when the parameter "#1440 multi_sp_syn" (Multiple spindle synchronization valid) is set to "0".
(2) Refer to the synchronized spindle's signal when the parameter "#1440 multi_sp_syn" (Multiple spindle synchroniza tion valid) is set to "1".
[Related signals]
(1) Spindle synchronization: Phase error monitor (lower limit) (R6520)
(2) Spindle synchronization: Phase error monitor (upper limit) (R6521)
Cont. Signal name Abbrev. 1stSP 2ndSP 3rdSP 4thSP 5thSP 6thSP 7thSP 8thSP
A Spindle synchronization: Phase offset
data R6518 R6568 R6618 R6668 R6718 R6768 R6818 R6868
Cont. Signal name Abbrev. 1stSP 2ndSP 3rdSP 4thSP 5thSP 6thSP 7thSP 8thSP
A Spindle synchronization: Phase error
monitor R6519 R6569 R6619 R6669 R6719 R6769 R6819 R6869
Note
Note

[Function]
The phase error during the spindle phase synchronous state can be monitored.
[Operation]
The lower limit value of the phase error during the spindle phase synchronous control is output by the pulse unit.
(1) Refer to the signal of the 1st spindle when the parameter "#1440 multi_sp_syn" (Multiple spindle synchronization valid) is set to "0".
(2) Refer to the synchronized spindle's signal when the parameter "#1440 multi_sp_syn" (Multiple spindle synchroniza tion valid) is set to "1".
[Related signals]
(1) Spindle synchronization: Phase error monitor (R6519)
(2) Spindle synchronization: Phase error monitor (upper limit) (R6521)
[Function]
The phase error during the spindle phase synchronous state can be monitored.
[Operation]
The upper limit value of the phase error during the spindle phase synchronous control is output by the pulse unit.
(1) Refer to the signal of the 1st spindle when the parameter "#1440 multi_sp_syn" (Multiple spindle synchronization valid) is set to "0".
(2) Refer to the synchronized spindle's signal when the parameter "#1440 multi_sp_syn" (Multiple spindle synchroniza tion valid) is set to "1".
[Related signals]
(1) Spindle synchronization: Phase error monitor (R6519)
(2) Spindle synchronization: Phase error monitor (lower limit) (R6520)
Cont. Signal name Abbrev. 1stSP 2ndSP 3rdSP 4thSP 5thSP 6thSP 7thSP 8thSP
A Spindle synchronization: Phase error
monitor (lower limit) R6520 R6570 R6620 R6670 R6720 R6770 R6820 R6870
Cont. Signal name Abbrev. 1stSP 2ndSP 3rdSP 4thSP 5thSP 6thSP 7thSP 8thSP
A Spindle synchronization: Phase error
monitor (upper limit) R6521 R6571 R6621 R6671 R6721 R6771 R6821 R6871
Note
Note

[Function]
<During spindle synchronous function (G114.1)>
This signal informs the phase error (value including the phase error memorized with the spindle synchronization phase shift calculation function) when the phase synchronization (with R command) or the "Phase shift calculation request" signal (SSPHM) is ON. The phase error is output by 1 increment.
<During phase synchronization of polygon machining between spindles (G114.2)>
This signal informs the phase error corresponding to the commanded phase shift amounts by 1 increment.
The data has no meaning in cases other than above.
[Operation]
<During spindle synchronous function (G114.1)>
When the phase synchronization (with R command) or the "Phase shift calculation request" signal (SSPHM) is ON, and when the speeds of the reference spindle and the synchronized spindle are constant, the phase error between the reference spindle and the synchronized spindle is output.
<During phase synchronization of polygon machining between spindles (G114.2)>
This signal informs the phase error corresponding to the commanded phase shift amounts by 1 increment.
(1) Refer to the signal of the 1st spindle when the parameter "#1440 multi_sp_syn" (Multiple spindle synchronization valid) is set to "0".
(2) Refer to the synchronized spindle's signal when the parameter "#1440 multi_sp_syn" (Multiple spindle synchroniza tion valid) is set to "1".
[Related signals]
(1) Phase shift calculation request (SSPHM: Y18B3)
[Function]
<During spindle synchronous function (G114.1)>
This signal informs the phase error (value excluding the phase error memorized with the spindle synchronization phase shift calculation function) when the phase synchronization (with R command) or the "Phase shift calculation request" signal (SSPHM) is ON. The phase error is output by 1 increment.
<During phase synchronization of polygon machining between spindles (G114.2)>
This signal informs the phase error corresponding to the commanded phase shift amounts by 1 increment. (Same as R6522.)
The data has no meaning in cases other than above.
[Operation]
<During spindle synchronous function (G114.1)>

When the phase synchronization (with R command) or the "Phase shift calculation request" signal (SSPHM) is ON, and when the speeds of the reference spindle and the synchronized spindle are constant, the phase error between the reference spindle and the synchronized spindle is output.
<During phase synchronization of polygon machining between spindles (G114.2)>
This signal informs the phase error corresponding to the commanded phase shift amounts by 1 increment. (Same as R6522.)
(1) Refer to the signal of the 1st spindle when the parameter "#1440 multi_sp_syn" (Multiple spindle synchronization valid) is set to "0".
(2) Refer to the synchronized spindle's signal when the parameter "#1440 multi_sp_syn" (Multiple spindle synchroniza tion valid) is set to "1".
[Related signals]
(1) Phase shift calculation request (SSPHM: Y18B3)
Cont. Signal name Abbrev. 1stSP 2ndSP 3rdSP 4thSP 5thSP 6thSP 7thSP 8thSP
A Spindle synchronization: Phase error
1 R6522 R6572 R6622 R6672 R6722 R6772 R6822 R6872
Cont. Signal name Abbrev. 1stSP 2ndSP 3rdSP 4thSP 5thSP 6thSP 7thSP 8thSP
A Spindle synchronization: Phase error
2 R6523 R6573 R6623 R6673 R6723 R6773 R6823 R6873
Note
Note

[Function]
The spindle load is output with 0.01% increment.
[Operation]
When the parameter "#1256 set28/bit2" is set to "1", the spindle load is output with 0.01% increment.
When the parameter "#1256 set28/bit2" is set to "0", "0" is output.
[Function] [Operation]
The spindle motor temperature is output to this register. The temperature is expressed in degrees Celsius (C). The temperature is output as a signed integer between 0x0000 and 0xFFFF (-32768 (C) to 32767 (C)).
[Function]
This signal indicates the alarm No./warning No. of spindle drive unit. (hexadecimal 2 digits)
This signal sets the 4-digit alarm No. which is displayed on the NC screen.
[Operation]
This signal is set up when the alarm/waring occurs in the spindle drive unit.
This signal will be cleared when the alarm/warning is canceled.
This signal is not set if the servo warning "S52 00E6" (Control axis detachment warning) or "S52 00E7" (In NC emergency stop state) occurs.
If more than one alarm/warning occurs, the value displayed in the [LED display] of [Drv mon]-[Spindle unit] screen is set.
[Related signals]
(1) NC warning (servo warning) (XC9C)
[Function] [Operation]
The current value of the synchronous tapping error width (motor tracking delay from each position commands on the spindle and the tapping axis) is output during the synchronous tapping.
A positive output value means that the tapping axis lags behind the spindle, while a negative output value means that the spindle lags behind the tapping axis. The output range is -99999.999 to 99999.999 mm.
[Caution]
(1) The synchronous tapping error is not output during the spindle orientation or the R point positioning.
(2) The current value is kept retrieved during the synchronous tapping.
(3) If the synchronous tapping error is over the output range, the maximum value of the range is output.
(4) Execute the synchronous tap R-point in-position check before using this signal.
Unless the synchronous tap R-point in-position check is executed, an illegal value of the synchronous tapping error may be detected.
[Related signals]
(1) Synchronous tapping Maximum error width (R6534, 6535)
(2) Synchronous tapping Current error angle (R6536, 6537)
(3) Synchronous tapping Maximum error angle (R6538, 6539)
Cont. Signal name Abbrev. 1stSP 2ndSP 3rdSP 4thSP 5thSP 6thSP 7thSP 8thSP
A Spindle motor load ratio R6525 R6575 R6625 R6675 R6725 R6775 R6825 R6875
Cont. Signal name Abbrev. 1stSP 2ndSP 3rdSP 4thSP 5thSP 6thSP 7thSP 8thSP
A Spindle temperature output SPTEMP R6526 R6576 R6626 R6676 R6726 R6776 R6826 R6876
Cont. Signal name Abbrev. 1stSP 2ndSP 3rdSP 4thSP 5thSP 6thSP 7thSP 8thSP
A Spindle alarm/warning No. R6529 R6579 R6629 R6679 R6729 R6779 R6829 R6879
Cont. Signal name Abbrev. 1stSP 2ndSP 3rdSP 4thSP 5thSP 6thSP 7thSP 8thSP
A Synchronous tapping Current error
width R6532, 3 R6582, 3 R6632, 3 R6682, 3 R6732, 3 R6782, 3 R6832 R6882

[Function] [Operation]
The largest absolute value of the synchronous tapping error width (-99999.999 to 99999.999 mm) is output during the synchronous tapping.
The value is initialized to "0" when the synchronous tapping starts or the power turns ON again.
[Caution]
(1) The synchronous tapping error is not output during the spindle orientation or the R point positioning.
(2) This output value is the largest one throughout the synchronous tapping mode.
(3) If the synchronous tapping error is over the output range, the maximum value of the range is output.
(4) Execute the synchronous tap R-point in-position check before using this signal.
Unless the synchronous tap R-point in-position check is executed, an illegal value of the synchronous tapping error may be detected.
[Related signals]
(1) Synchronous tapping Current error width (R6532, 6533)
(2) Synchronous tapping Current error angle (R6536, 6537)
(3) Synchronous tapping Maximum error angle (R6538, 6539)
[Function] [Operation]
The synchronous tapping error (motor tracking delay from each position commands on the spindle and the tapping axis) is

output with angle during the synchronous tapping.
A positive output value means that the tapping axis lags behind the spindle, while a negative output value means that the spindle lags behind the tapping axis. The output range is -99999.999 to 99,999.999.
[Caution]
(1) The synchronous tapping error is not output during the spindle orientation or the R point positioning.
(2) The current value is kept retrieved during the synchronous tapping.
(3) If the synchronous tapping error is over the output range, the maximum value of the range is output.
(4) Execute the synchronous tap R-point in-position check before using this signal. Unless the synchronous tap R-point in-position check is executed, an illegal value of the synchronous tapping error may be detected.
[Related signals]
(1) Synchronous tapping Current error width (R6532, 6533)
(2) Synchronous tapping Maximum error width (R6534, 6535)
(3) Synchronous tapping Maximum error angle (R6538, 6539)
[Function] [Operation]
The largest absolute value of the synchronous tapping error angle (-99999.999 to 99,999.999) is output during the synchronous tapping.
The value is initialized to "0" when the synchronous tapping starts or the power turns ON again. The value is kept retrieved and displayed during the synchronous tapping.
[Caution]
(1) The synchronous tapping error is not output during the spindle orientation or the R point positioning.
(2) This output value is the largest one throughout the synchronous tapping mode.
(3) If the synchronous tapping error is over the output range, the maximum value of the range is output.
(4) Execute the synchronous tap R-point in-position check before using this signal.
Unless the synchronous tap R-point in-position check is executed, an illegal value of the synchronous tapping error may be detected.
[Related signals]
(1) Synchronous tapping Current error width (R6532, 6533)
(2) Synchronous tapping Maximum error width (R6534, 6535)
(3) Synchronous tapping Current error angle (R6536, 6537)
Cont. Signal name Abbrev. 1stSP 2ndSP 3rdSP 4thSP 5thSP 6thSP 7thSP 8thSP
A Synchronous tapping Maximum error
width R6534, 5 R6584, 5 R6634, 5 R6684, 5 R6734, 5 R6784, 5 R6834, 5 R6884, 5
Cont. Signal name Abbrev. 1stSP 2ndSP 3rdSP 4thSP 5thSP 6thSP 7thSP 8thSP
A Synchronous tapping Current error
angle R6536, 7 R6586, 7 R6636, 7 R6686, 7 R6736, 7 R6786, 7 R6836, 7 R6886, 7
Cont. Signal name Abbrev. 1stSP 2ndSP 3rdSP 4thSP 5thSP 6thSP 7thSP 8thSP
A Synchronous tapping Maximum error
angle R6538, 9 R6588, 9 R6638, 9 R6688, 9 R6738, 9 R6788, 9 R6838, 9 R6888, 9

[Function]
The estimated disturbance torque of the spindle is output to this signal.
[Operation]
The estimated disturbance torque of the spindle is output to this signal.
Output unit: Stall current 0.01%
A value "0x2710" is output when the estimated disturbance torque reaches 100%.
A value "0xFF9C" is output when the estimated disturbance torque reaches -1%.
[Caution]
(1) Use this signal when the spindle rotation speed is within the constant output range of the spindle motor (IM).
(2) This signal is assumed to be used for an induction motor (IM motor) or a tool spindle motor. When an IPM motor is used, the correct value is not output.
[Related signals]
(1) Load monitoring I: Axis selection (R2580)
(2) Load monitoring I: Cutting torque output n-th axis (R5492)
(3) Load monitoring I: Effective torque output n-th axis (R5620)
(4) Load monitoring I: Effective spindle torque output (R6542)
[Function]
The effective torque of the spindle is output to these devices.
[Operation]
The effective torque of the spindle is output to these devices.
Output unit: Stall current % (#2634 SrvFunc01/bit0 = 0)
A value "0x64" is output when the effective torque reaches 100%.
A value "0xFFFF" is output when the effective torque reaches -1%.
[Caution]
(1) Use this signal when the spindle rotation speed is within the constant output range of the spindle motor (IM).
(2) This signal is assumed to be used for an induction motor (IM motor) or a tool spindle motor. When an IPM motor is used, the correct value is not output.
[Related signals]
(1) Load monitoring I: Axis selection (R2580)
(2) Load monitoring I: Cutting torque output n-th axis (R5492)
(3) Load monitoring I: Effective torque output n-th axis (R5620)
(4) Load monitoring I: Estimated spindle disturbance torque output (R6541)
Cont. Signal name Abbrev. 1stSP 2ndSP 3rdSP 4thSP 5thSP 6thSP 7thSP 8thSP
A
Load monitoring I:
Estimated spindle disturbance torque
output
R6541 R6591 R6641 R6691 R6741 R6791 R6841 R6891
Cont. Signal name Abbrev. 1stSP 2ndSP 3rdSP 4thSP 5thSP 6thSP 7thSP 8thSP
A Load monitoring I:
Effective spindle torque output R6542 R6592 R6642 R6692 R6742 R6792 R6842 R6892

[Function]

This signal notifies the PLC of the spindle switch state.
[Operation]
<Low-order 8 bits: In-use spindle switch setting number>
This indicates the switch setting number used in the spindle switch. The value is set at the timing when the spindle switch is completed.
<High-order 8 bits: Spindle switch state>
The "Spindle switch in progress" signal (R6547/bit8) is ON while the spindle switch is performed, and turns OFF when the switch is completed.
The "Spindle switch completion" signal (R6547/bit9) is ON during the period from when the switch is completed until the "Spindle switch request" signal (R7026/bit8) is turned OFF.
Refer to the timing chart of the "Tool head hot swapping: Spindle switch" signal (R7026: SPCHGCMD).
[Related signals]
(1) Tool head hot swapping: Spindle switch (R7026: SPCHGCMD)
(2) Exclude spindle (Y18BF: SPOFF)
(3) In spindle off (X18B6: SPOFFA)
[Function]
This signal notifies PLC of the spindle rotation speed in the vibration cutting mode.
[Operation]
The rotation speed of the spindle selected in the part system in the vibration cutting mode is stored.
"0" is output for the spindle that is not used for vibration cutting control.
[Related signals]
(1) VCC: Mode in execution (VCC: X1810)
(2) VCC: Numbers of vibrations (VCC_VIB: R20556)
(3) VCC: Frequency (VCC_FRQ: R20557)
(4) VCC: Spindle rotation speed (VCC_SPREV: R7024,R7025)
(5) VCC: Vibrating axis (VCC_VIBAX: R20558)
(6) VCC: Temporary cancel of axis vibration (VCC_INVAX: R22532)
(7) VCC: Cause of non-vibration (VCC_FACT: R20559)
[Function] [Operation]
This signal turns ON when the axis is within the setting range of the respective position switches.
Cont. Signal name Abbrev. 1stSP 2ndSP 3rdSP 4thSP 5thSP 6thSP 7thSP 8thSP
A Tool head hot swapping:
Spindle switch status
SP CHGSTS R6547 R6597 R6647 R6697 R6747 R6797 R6847 R6897
Cont. Signal name Abbrev. 1stSP 2ndSP 3rdSP 4thSP 5thSP 6thSP 7thSP 8thSP
A VCC: Spindle rotation speed VC C_SPREV R7024, 5 R7074, 5 R7124, 5 R7174, 5 R7224, 5 R7274, 5 R7324, 5 R7374, 5
Signal name Abbrev. 1stSP 2ndSP 3rdSP 4thSP 5thSP 6thSP 7thSP 8thSP
PLC axis indexing control status 4 AUXST4 R8000 R8006 R8012 R8018 R8024 R8030 R8036 R8042
Cont. Signal name Abbrev. bit
A Position switch 1 to 15 PSW1 to
PSW15
AUXST4/bit0 to 7
AUXST3/bit9 to F
R6547 F EDCB A 9 8
Spindle switch completion Spindle switch in progress
<High-order 8 bits>
Not in use In-use spindle switch setting number
<Low-order 8 bits>

[Function] [Operation]
This signal turns ON when:
The "Operation start" signal is turned ON for an axis other than the PLC indexing axis.
[Function] [Operation]
This signal shows a 9-digit binary No. of the present station.
This signal outputs the station position when the "Set position reached" (JST) is ON, and outputs "0" when the "Set position reached" is OFF.
[Function] [Operation]
This signal indicates that the automatic operation mode has been selected.
[Function] [Operation]
This signal indicates that the manual operation mode has been selected.
[Function] [Operation]
This signal indicates that the JOG operation mode has been selected.
[Function] [Operation]
This signal indicates that the machine is in the reference position return.
[Function] [Operation]
This signal indicates that reference position return mode is selected.
[Function] [Operation]
This signal indicates that the basic point initialization setting mode has been selected.
[Function] [Operation]
This signal indicates that incremental mode is selected.
[Function] [Operation]
This signal indicates that an alarm has occurred requiring the power to be turned ON again after the cause is removed.
Cont. Signal name Abbrev. bit
A Start not possible NST AUXST4/bitB
Signal name Abbrev. 1stSP 2ndSP 3rdSP 4thSP 5thSP 6thSP 7thSP 8thSP
PLC axis indexing control status 3 AUXST3 R8001 R8007 R8013 R8019 R8025 R8031 R8037 R8043
Cont. Signal name Abbrev. bit
A Station position 1 to 256 STO1 to
STO256 AUXST3/bit0 to 8
Signal name Abbrev. 1stSP 2ndSP 3rdSP 4thSP 5thSP 6thSP 7thSP 8thSP
PLC axis indexing control status 2 AUXST2 R8002 R8008 R8014 R8020 R8026 R8032 R8038 R8044
Cont. Signal name Abbrev. bit
A In automatic operation mode AUTO AUXST2/bit0
Cont. Signal name Abbrev. bit
A In manual operation mode MANO AUXST2/bit1

Cont. Signal name Abbrev. bit
A In JOG operation mode JO AUXST2/bit2
Cont. Signal name Abbrev. bit
A In reference position return ARNN AUXST2/bit3
Cont. Signal name Abbrev. bit
A In reference position return mode ZRNO AUXST2/bit4
Cont. Signal name Abbrev. bit
A In basic point initialization setting mode AZSO AUXST2/bit6
Cont. Signal name Abbrev. bit
A In incremental mode SO AUXST2/bit7
Cont. Signal name Abbrev. bit
A Alarm 1 AL1 AUXST2/bit8

[Function] [Operation]
This signal indicates that an alarm has occurred which can be released by the "Master reset" signal (MRST) after the cause is removed.
[Function] [Operation]
This signal indicates that an operation alarm or absolute position alarm has occurred.
[Function] [Operation]
This signal indicates that the axis moved beyond the tolerable amount while the control power was OFF in the absolute position system.
[Function] [Operation]
This signal indicates that the absolute position data has been lost in the absolute position system.
[Function] [Operation]
This signal indicates that in the absolute position system the basic point initialization setting has completed normally, and that the absolute position coordinates have been established.
[Function] [Operation]
This signal indicates that the basic point initialization setting has not finished normally in the absolute position system.
[Function]
This signal indicates that the servo system is in an operable status.
[Operation]
The signal turns ON when:
The servo system diagnosis is normally completed after the power is turned ON.
The servo alarm, which had occurred, has been released by the "Master reset" (MRST).
The emergency stop has been released.
The "Ready OFF" (RDF) or the "Servo OFF" (*SVF) has been released.
The signal turns OFF when:
Servo ready completion (SA) is turned OFF.
The "Servo OFF" signal is input and the drive unit is in a servo OFF state.
[Related signals]
(1) Master reset (MRST: AUXCM1/bit3)
(2) Ready OFF (RDF: AUXCM1/bit6)
(3) Servo OFF (SVF: AUXCM1/bit0)
(4) Servo ready completion (SA: AUXST1/bitC)
Cont. Signal name Abbrev. bit
A Alarm 2 AL2 AUXST2/bit9
Cont. Signal name Abbrev. bit
A Alarm 4 AL4 AUXST2/bitA
Cont. Signal name Abbrev. bit
A Absolute position power shutoff movement over ABS AUXST2/bitC
Cont. Signal name Abbrev. bit
A Absolute position data loss ZSN AUXST2/bitD
Cont. Signal name Abbrev. bit
A Initialization setting completed ZSF AUXST2/bitE
Cont. Signal name Abbrev. bit
A Initialization setting error completed ZSE AUXST2/bitF
Signal name Abbrev. 1stSP 2ndSP 3rdSP 4thSP 5thSP 6thSP 7thSP 8thSP
PLC axis indexing control status 1 AUXST1 R8003 R8009 R8015 R8021 R8027 R8033 R8039 R8045
Cont. Signal name Abbrev. bit
A Servo ready RDY AUXST1/bit0

[Function]
This signal notifies that the control axis is in-position.
[Operation]
The signal turns ON when:
The "Smoothing zero" (SMZ) is turned ON and the droop is within the range set by the parameters.
The signal turns OFF when:
The "Smoothing zero" (SMZ) is turned OFF. (When there is a movement command.)
The droop exceeds the range set in the parameters.
[Caution]
(1) The "In-position" (INP) may turn ON, even during movement, when the axis is moving at extremely low speeds.
(2) The in-position detection range is set in the parameter "#2224 SV024 In-position detection width".
(3) In the servo ready OFF state, the "Smoothing zero" (SMZ) turns OFF when the travel amount of servomotor is detected. Therefore, the "In-position" (INP) also turns OFF. The "In axis plus motion" (MVP) or the "In axis minus motion" (MVN) turns ON depending on the detected movement direction. Note that the "Smoothing zero" (SMZ), the "In axis plus motion" (MVP) and the "In axis minus motion" (MVN) will not change in the servo OFF state without error correction, because detected servomotor travel amount becomes a droop amount.
[Related signals]
(1) Smoothing zero (SMZ: AUXST1/bit2)
[Function] [Operation]
This signal indicates that the acceleration/deceleration process in the built-in controller is finished, and that no command to the control section remains.

Cont. Signal name Abbrev. bit
A In-position INP AUXST1/bit1
Cont. Signal name Abbrev. bit
A Smoothing zero SMZ AUXST1/bit2
Acceleration/
deceleration
delay process Position loop process
Acceleration/deceleration delay Servo droop

[Function]
This signal indicates that the control axis has received the movement command.
[Operation]
This signal turns ON in the following cases, and turns OFF after the "Smoothing zero" (SMZ) is detected.
<In automatic operation mode>
This signal turns ON while the "Operation start" (ST) is ON and the axis is moving.
<In manual operation mode>
This signal turns ON while the "Operation start" (ST) is ON and the axis is moving.
<In JOG operation mode>
This signal turns ON while the "Operation start" (ST) is ON and the axis is moving.
<In reference position return mode>
This signal turns ON while the "Operation start" (ST) is ON and the axis is moving.
When an interlock is applied, this signal remains ON even when the servo is OFF. This signal turns OFF at the emergency stop.
[Related signals]
(1) Operation start (ST: AUXCM2/bit0)
[Function]
This signal indicates that the axis is moving in the "+" direction.
[Operation]
This signal turns ON when the axis starts moving in the "+" direction, and turns OFF after the "Smoothing zero" (SMZ) is detected or the axis starts moving in the "-" direction.
[Related signals]
(1) Smoothing zero (SMZ: AUXST1/bit2)
[Function]
This signal indicates that the axis is moving in the "-" direction.
[Operation]
This signal turns ON when the axis starts moving in the "-" direction, and turns OFF after the "Smoothing zero" (SMZ) is detected or the axis starts moving in the "+" direction.
[Related signals]
(1) Smoothing zero (SMZ: AUXST1/bit2)
[Function] [Operation]
This signal indicates that the control axis has reached the current limit value. This signal turns ON when the motor output torque (motor current) is limited at the torque limit value of the selected operation parameter group.
Cont. Signal name Abbrev. bit
A Axis selection output AX1 AUXST1/bit3
Cont. Signal name Abbrev. bit
A In axis plus motion MVP AUXST1/bit4
Cont. Signal name Abbrev. bit
A In axis minus motion MVM AUXST1/bit5
Cont. Signal name Abbrev. bit
A In torque limit TLQ AUXST1/bit6
Axis selection output (AX1)
Axis movement
Operation start (ST)

[Function]
This signal indicates that the control axis is on the reference position.
[Operation]
The signal turns ON when:
The control axis reaches the reference position in the reference position return mode.
The signal does not turn ON even if the control axis is at the reference position in other operation modes or by other commands.
The signal turns OFF when:
The axis is moved from the reference point by a travel command, etc.
An emergency stop has been activated due to an emergency stop input or the occurrence of a servo alarm, etc.
The axis has moved in the servo OFF state.
[Related signals]
(1) Reference position return mode (ZRN: AUXCM1/bitB)
[Function]
This signal indicates that the built-in controller is being reset.
[Operation]
The signal turns ON when:
The "Master reset" signal (MRST) is turned ON.
The "Master reset" signal (MRST) is turned ON and the built-in controller is being reset.
In an emergency stop status.
[Related signals]
(1) Master reset (MRST: AUXCM1/bit3)
[Function] [Operation]
This signal indicates that handle feed operation mode is selected.
[Function]
This signal indicates that the controller is ready for normal operation.
[Operation]
The signal turns ON when:

Normal operation has begun after the power ON.
The signal turns OFF when:
The power is turned OFF.
An error in the control device itself such as a CPU error and memory error is detected.
A servo alarm which cannot be reset without turning OFF the power of the controller has occurred.
Cont. Signal name Abbrev. bit
A Reference position reached ZP AUXST1/bit8
Cont. Signal name Abbrev. bit
A In "reset" RST AUXST1/bit9
Cont. Signal name Abbrev. bit
A In handle feed operation mode HO AUXST1/bitA
Cont. Signal name Abbrev. bit
A Controller ready completion MA AUXST1/bitB

[Function]
This signal indicates that the servo system is ready for normal operation. In other words, the servo system (position control) is not working when this signal is OFF.
[Operation]
The signal turns ON when:
The servo system diagnosis is normally completed after the power is turned ON.
The servo alarm, which had occurred, has been released by the "Master reset" (MRST).
The emergency stop has been released.
The "Ready OFF" (RDF) is turned OFF.
The signal turns OFF when:
The "Controller ready completion" (MA) is turned OFF.
A servo alarm has occurred.
Emergency stop is issued.
The "Ready OFF" (RDF) is turned ON.
[Caution]
(1) With the "Servo OFF" (*SVF), the "Servo ready completion" (SA) will not turn OFF unless there is another condition to turn OFF the SA.
(2) In an emergency stop status, all I/O output points turn OFF.
[Related signals]
(1) Master reset (MRST: AUXCM1/bit3)
(2) Ready OFF (RDF: AUXCM1/bit6)
(3) Controller ready completion (MA: AUXST1/bitB)
[Function]
In the automatic operation, this signal notifies that the positioning to the commanded station No. is completed. The tolerable width which this signal is regarded as ON is as same as that of the "Set position reached" (JST).
[Operation]
The signal turns ON when:
The positioning to the designated station No. is completed in the automatic operation mode.
The signal actually turns ON when the tool enters the tolerable width before the positioning is completed.
The signal turns OFF when:
The "Operation start" signal is input in any of the operation modes.
The tool deviates outside the tolerable width.
[Caution]
(1) This signal does not turn ON when positioning is performed to the nearest station by turning OFF the "Operation start" signal during automatic operation.
(2) Even if the indexing of the same station No. is started when this signal is ON, this signal does not turn OFF.
(3) When the indexing of the same station number is started with the positioning to the station completed in the manual mode, this signal turns ON. However, there is no movement.
(4) Once this signal is turned OFF, it does not turn ON even if the axis returns to the tolerable width.
(5) During the emergency stop or the servo OFF, when a tool once deviated outside the width of "Set position reached", then returns within the area, this signal turns ON again if "#12802 aux_Cont1/bit4" is set to "OFF", and does not turn ON if "#12802 aux_Cont1/bit4" is set to "ON".
Cont. Signal name Abbrev. bit
A Servo ready completion SA AUXST1/bitC
Cont. Signal name Abbrev. bit
A Automatic set position reached JSTA AUXST1/bitD

[Function]
This signal notifies that the positioning to the station position has been completed. This signal turns ON when the machine position is at any of the station positions. The tolerable width which this signal is regarded as ON is set with a parameter.
[Operation]
The signal turns ON when:
The positioning to the station is completed in automatic or manual operation.
The signal actually turns ON when the axis enters the tolerable width before the positioning is completed.
The stop position after JOG operation is the station position or within the tolerable width.
The reference position return position corresponds to those of the stop position in (2).
Other than the above conditions, this signal normally monitors the machine position, and carries out comparisons between stations. Therefore, this signal is output even when the machine moves to a station position other than each operation.
The signal turns OFF when:
The "Operation start" signal is input in any of the operation modes.
When the operation is started by the "Operation start" signal, this signal will not turn ON even when a station position is passed during the operation.
The axis deviates outside the tolerable width.
[Function]
This signal notifies that the machine position is near the station.
[Operation]
The operation is the same as the "Set position reached" (JST). However, the tolerable width is set with a different parameter. Generally, a value larger than the tolerable width of the "Set position reached" is set, and this signal is used,

for example, to start the mechanical clamp operation immediately before the completion of positioning.
[Function]
The status for each additional specification (enabled/disabled) is exported to the R register (R8260 to R8289).
By confirming the R register to which the information is exported, ladders and macro programs can be shared between the machines with different additional specification status. In addition, the custom screens dedicated to the respective additional specification can be displayed or non-displayed.
For the PLC bit location and the corresponding additional specification for each bit, refer to "7 Appx.3: List of Option Status Exported to PLC".
[Operation]
The status of additional specification is automatically registered to the R register when the CNC is started.
Cont. Signal name Abbrev. bit
A Set position reached JST AUXST1/bitE
Cont. Signal name Abbrev. bit
A Near set position NEAR AUXST1/bitF
Cont. Signal name Abbrev. Common ($)
A Option status export to PLC R8260 to
R8289

[Function]
In communication between the control unit and the remote I/O unit (channel), the number of errors is counted and output.
[Operation]
The number of CRC error occurrences (maximum value) is output to the high-order 8 bits of the R registers, and the number of connection error occurrences (maximum value) is output to the low-order 8 bits.
R register allocations are as shown below.
[Caution]
(1) Control unit cannot identify the remote I/O unit to which the power cable or communication cable is not connected, or the remote I/O unit to which power is not supplied. Therefore, no remote I/O error will occur even if a malfunction exists in those remote I/O units.
(2) To confirm that the physically existing remote I/O unit is operating normally, use the output of "Connection status of each channel" (R10064, R10065), "No. of error occurrences" (R10000 to R10031), and "CRC warning channel" (R10068, R10069).
(3) Once the number of error occurrences exceeds 255, the output of "No. of error occurrences" is clamped to 255 and a remote I/O error occurs.
(4) Output data of the number of error occurrences is retained even if the power is turned OFF and ON.
However, the data of the channel where the specified value is exceeded and a remote I/O error occurs is set to "0".
(5) RIO4 can be used for M800VW/M80VW Series only.
[Related signals]
(1) Connection status of each channel RIO1, RIO2 (R10064)
(2) CRC warning channel RIO1, RIO2 (R10068)
Cont. Signal name Abbrev. Common ($)
A No. of error occurrences n-th ch R10000 to
31
Remote I/O unit connection
system 1st ch 2nd ch 3rd ch 4th ch 5th ch 6th ch 7th ch 8th ch
RIO1 R10000 R10001 R10002 R10003 R10004 R10005 R10006 R10007
RIO2 R10008 R10009 R10010 R10011 R10012 R10013 R10014 R10015
RIO3 R10016 R10017 R10018 R10019 R10020 R10021 R10022 R10023
RIO4 R10024 R10025 R10026 R10027 R10028 R10029 R10030 R10031

[Function]
Connection status of each channel of remote I/O unit 1, 2, 3 and 4 is constantly output to these R registers.
[Operation]
When remote I/O unit is connected, "1" is set, and when it is not connected, "0" is set. The connection status of each channel of RIO1 is output to the high-order 8 bits of R10064, and that of RIO2 is output to the low-order 8 bits of R10064. Similarly, the status of RIO3 is output to the high-order 8 bits of R10065, and that of RIO4 is output to the low-order 8 bits of R10065.
[Caution]
(1) Control unit cannot identify the remote I/O unit to which the power cable or communication cable is not connected, or the remote I/O unit to which power is not supplied. Therefore, the output of "Connection status" for those remote I/O units is "0".
(2) To confirm that the physically existing remote I/O unit is operating normally, use the output of "Connection status of each channel" (R10064, R10065), "No. of error occurrences" (R10000 to R10031), and "CRC warning channel" (R10068, R10069).
(3) RIO4 can be used for M800VW/M80VW Series only.
[Related signals]
(1) No. of error occurrences (R10000 to 31)
(2) CRC warning channel RIO1, RIO2 (R10068)
Cont. Signal name Abbrev. Common ($)
A Connection status of each channel RIO1, RIO2 R10064
A Connection status of each channel RIO3, RIO4 R10065
R10064 FEDCBA9 8 76 5 0 1234
1st channel of RI01
2nd channel of RI01
:
:
8th channel of RI01
1st channel of RI02
2nd channel of RI02
:
:
8th channel of RI02
Bit

<High-order 8 bits> <Low-order 8 bits>
R10065 FEDCBA9 8 76 5 0 1234
1st channel of RI03
2nd channel of RI03
:
:
8th channel of RI03
1st channel of RI04
2nd channel of RI04
:
:
8th channel of RI04
Bit
<High-order 8 bits> <Low-order 8 bits>

[Function]
These are the registers to output the CRC warning channel of remote I/O unit 1, 2, 3 and 4.
[Operation]
"1" is set to channels where the CRC warning is generated, and "0" is set to channels where the CRC warning is not generated. The warning channels of RIO1 are output to the high-order 8 bits of R10068, and those of RIO2 are output to the low-order 8 bits of R10068. Similarly, the warning channels of RIO3 are output to the high-order 8 bits of R10069, and those of RIO4 are output to the low-order 8 bits of R10069.
[Caution]
(1) Control unit cannot identify the remote I/O unit to which the power cable or communication cable is not connected, or the remote I/O unit to which power is not supplied. Therefore, the CRC warning channel for those remote I/O units is "0". (No warning is generated in any channel.)
(2) To confirm that the physically existing remote I/O unit is operating normally, use the output of "Connection status of each channel" (R10064, R10065), "No. of error occurrences" (R10000 to R10031), and "CRC warning channel" (R10068, R10069).
(3) RIO4 can be used for M800VW/M80VW Series only.
[Related signals]
(1) Connection status of each channel RIO1, RIO2 (R10064)
(2) No. of error occurrences (R10000 to 31)
Cont. Signal name Abbrev. Common ($)
A CRC warning channel RIO1, RIO2 R10068
A CRC warning channel RIO3, RIO4 R10069
R10068 FEDCBA9 8 76 5 0 1234
1st channel of RI01
2nd channel of RI01
:
:
8th channel of RI01
1st channel of RI02
2nd channel of RI02
:
:
8th channel of RI02
Bit
<High-order 8 bits> <Low-order 8 bits>
R10069 FEDCBA9 8 76 5 0 1234
1st channel of RI03
2nd channel of RI03
:
:
8th channel of RI03
1st channel of RI04
2nd channel of RI04
:
:
8th channel of RI04
Bit
<High-order 8 bits> <Low-order 8 bits>

[Function] [Operation]
This signal indicates the base PLC mounting status. (High priority from the top)
[Function]
This signal stores the consumed power value of EcoMonitorLight which is collected at fixed periods.
The consumed power value is stored across two words of register. Values from the 1st to 1000th digits are stored in R14000, and values 10000 and above are stored in R14001.
[Operation]
Updated every 1.5 seconds.
[Function]
This signal stores the regenerated power value of EcoMonitorLight which is collected at fixed periods.
The regenerated power value is stored across two words of register. Values from the 1st digit to 1000th digit are stored in R14002, and values 10000 and above are stored in R14003.
[Operation]
Updated every 1.5 seconds.
Cont. Signal name Abbrev. Common ($)
A Base PLC mounting check R10188,9
Value Status
0xFFFFFFFF Not mounted (no option)
("#11003 APLCvalid" is set to "0", invalid configuration, etc.)

0xFFFFFFFE Not mounted (failed to register the initialize function)
0x00000000 Mounted
Cont. Signal name Abbrev. Common ($)
A EcoMonitorLight connection: Station #1 to #16 consumed
power
R14000,1 to
R14150,1
Station No. Device No. Station No. Device No.
Station #1 R14000,1 Station #9 R14080,1
Station #2 R14010,1 Station #10 R14090,1
Station #3 R14020,1 Station #11 R14100,1
Station #4 R14030,1 Station #12 R14110,1
Station #5 R14040,1 Station #13 R14120,1
Station #6 R14050,1 Station #14 R14130,1
Station #7 R14060,1 Station #15 R14140,1
Station #8 R14070,1 Station #16 R14150,1
Cont. Signal name Abbrev. Common ($)
A EcoMonitorLight connection: Station #1 to #16 regenerated
power
R14002,3 to
R14152,3
Station No. Device No. Station No. Device No.
Station #1 R14002,3 Station #9 R14082,3
Station #2 R14012,3 Station #10 R14092,3
Station #3 R14022,3 Station #11 R14102,3
Station #4 R14032,3 Station #12 R14112,3
Station #5 R14042,3 Station #13 R14122,3
Station #6 R14052,3 Station #14 R14132,3
Station #7 R14062,3 Station #15 R14142,3
Station #8 R14072,3 Station #16 R14152,3

[Function]
This signal stores the number of reception errors, maximum number of successive reception errors, the number of transmission errors, and maximum number of successive transmission errors of EcoMonitorLight.
[Operation]
The number of reception errors and the number of transmission errors are updated when an error occurs on the communication with EcoMonitorLight.
The increment stops when the reception or transmission completes without an error.
The maximum number of successive reception errors is updated when the number of successive communication error is larger than the value of R14201 (for the case of station #1).
The maximum number of successive transmission error is updated when the number of successive communication error is larger than the value of R14203 (for the case of station #1).
[Function]
This bit indicates the completion of the power value collecting function.
[Operation]
Bit0 is set to "1" upon completion of collection.
The bit is cleared to zero in the next cycle.
Cont. Signal name Abbrev. Common ($)
A EcoMonitorLight connection: Station #1 to #16 number of recep tion errors
R14200 to
R14350
A EcoMonitorLight connection: Station #1 to #16 maximum number
of successive reception errors
R14201 to
R14351
A EcoMonitorLight connection: Station #1 to #16 number of trans mission errors
R14202 to
R14352
A EcoMonitorLight connection: Station #1 to #16 maximum number
of successive transmission errors
R14203 to
R14353
Device No.
Station No. No. of reception er rors
Max. No. of successive
reception errors
No. of transmission
errors
Max. No. of successive
transmission errors
Station #1 R14200 R14201 R14202 R14203
Station #2 R14210 R14211 R14212 R14213
Station #3 R14220 R14221 R14222 R14223
Station #4 R14230 R14231 R14232 R14233
Station #5 R14240 R14241 R14242 R14243
Station #6 R14250 R14251 R14252 R14253
Station #7 R14260 R14261 R14262 R14263
Station #8 R14270 R14271 R14272 R14273
Station #9 R14280 R14281 R14282 R14283
Station #10 R14290 R14291 R14292 R14293
Station #11 R14300 R14301 R14302 R14303
Station #12 R14310 R14311 R14312 R14313
Station #13 R14320 R14321 R14322 R14323
Station #14 R14330 R14331 R14332 R14333
Station #15 R14340 R14341 R14342 R14343

Station #16 R14350 R14351 R14352 R14353
Cont. Signal name Abbrev. Common ($)
A EcoMonitorLight connection: Completion bit R14400

[Function]
This signal stores the completion status information of the power value collecting function.
[Operation]
0 indicates the completion.
Non-zero indicates the error.
[Function]
This signal stores the acquired data of the power value collecting function.
[Operation]
The data which corresponds to the register address (R20290) of station specified by the "EcoMonitorLight connection: Station No." (R20289) is stored.
The data size is the size specified by "EcoMonitorLight connection: Size of data to read" (R20291).
[Function]
The serial number of the workpiece is stored here.
[Operation]
The ASCII code (hexadecimal number) corresponding to the desirable character is set.
[Function]
The operator ID is stored here.
[Operation]
The ASCII code (hexadecimal number) corresponding to the desirable character is set.
[Function]
The CNC unit number which sends the information to the database is stored here.
[Operation]
This data is automatically set at NC startup.
If the unit has a product number, the ASCII code (hexadecimal number) corresponding to the product number is set.
If the unit does not have a product number, this is set to "0".
When MES interface library function is invalid, this signal is set to "0".
Cont. Signal name Abbrev. Common ($)
A EcoMonitorLight connection: Completion status R14401
Error code Error description
1 Address setting illegal
2 Reception timeout error
3 Reception frame error (CRC error)
4 Function setting illegal
5 Station No. setting illegal
6 Size setting illegal
7 Transmission timeout error
Cont. Signal name Abbrev. Common ($)
A EcoMonitorLight connection: Acquired data R14402 to
R14405
Cont. Signal name Abbrev. Common ($)
A MES interface library: Serial number R14500 to
R14531
Cont. Signal name Abbrev. Common ($)
A MES interface library: Operator ID R14532 to
R14563
Cont. Signal name Abbrev. Common ($)
A MES interface library: NC unit number R14564 to
R14571

[Function]
The line number is stored here.
[Operation]
The ASCII code (hexadecimal number) corresponding to the desirable character is set.
[Function]
The machine type (machining center or lathe) of the machine is stored here.
[Operation]
This data is automatically set at NC startup.
The ASCII code (hexadecimal number) corresponding to "M" (0x4D) is set for the machining center system and "L" (0x4C) is set for the lathe system.
When MES interface library function is invalid, this signal is set to "0".
[Function]
The connection status between the NC and database, or the cause of DB operation failure is stored here.
[Operation]
The result of the operation request from NC to the database is set.
bit0: 0 (Not connected), 1 (Connected)
bit1: "1" is set when DB operation request condition is disabled.
bit2: "1" is set when no DB operation is selected.
bit3: "1" is set when the record corresponding to retrieval conditions does not exist during updating, deleting or extraction operation.
Bit1 to 3 are cleared when the next operation is requested. (These bits will be "0".)
When MES interface library function is invalid, this signal is set to "0".
[Function]
The content of an operation which NC requested to the database is stored here.
[Operation]
bit0: "1" is set when requesting the database operation for the machining result table.
bit1: "1" is set when requesting the database operation for the alarm history table.
bit2: "1" is set when requesting the database operation for the arbitrary information accumulation table.
"0" is set when "1" is set in the corresponding bit of the "MES interface library: Database operation reception register"

(R14591).
[Related signals]
(1) MES interface library: Database operation reception register (R14591)
(2) MES interface library: Database operation result register (R14592 to R14597)
Cont. Signal name Abbrev. Common ($)
A MES interface library: Line number R14572 to
R14587
Cont. Signal name Abbrev. Common ($)
A MES interface library: Machine type R14588
Cont. Signal name Abbrev. Common ($)
A MES interface library: Database connection status R14589
Cont. Signal name Abbrev. Common ($)
A MES interface library: Database operation request register R14590

[Function]
The reception status of the database for the database operation from the NC is stored here.
[Operation]
bit0: "1" is set while accepting database operations for the machining result table.
bit1: "1" is set while accepting database operations for the alarm history table.
bit2: "1" is set while accepting database operations for the arbitrary information accumulation table.
"0" is set when the database operation is completed.
[Related signals]
(1) MES interface library: Database operation request register (R14590)
(2) MES interface library: Database operation result register (R14592 to R14597)
[Function]
The result of the database operation is stored here.
[Operation]
0: Normal end
Other than 0: Occurrence of an error
Which registers to be used varies for each data table of the target database operations.
R14592 R14593: Notifies the result of the database operation for the machining result table.
R14594 R14595: Notifies the result of the database operation for the alarm history table.
R14596 R14597: Notifies the result of the database operation for the arbitrary information accumulation table.
[Related signals]
(1) MES interface library: Database operation request register (R14590)
(2) MES interface library: Database operation reception register (R14591)
The timing chart for the request register, the reception register and the result register is as follows.
Cont. Signal name Abbrev. Common ($)
A MES interface library: Database operation reception regis ter R14591
Cont. Signal name Abbrev. Common ($)
A MES interface library: Database operation result register R14592 to
R14597
(R14591)
(R14592 to R14597)
(R14590)
Example: Registration operation
(2) Reception register
turns ON after detecting
the request
(3) Request register is turned
OFF automatically after
detecting the request receipt.
(4) When the registration
process is completed and the
requestor confirms the
reception, the process result is
set and reception register
automtically turns OFF.
Data registration processing
Processing result
Registration operation in process
(1) Issue the
registration request
Registration data
Request register
Reception register
Result register

[Function]
This signal is used to select the database operation at the machining end, alarm occurrence, user's option, and rising edge of operation trigger.
[Operation]
Specify "1" to each bit below to set the database operation at the time of machining end.
bit0: Selecting the registration operation at the time of machining end
bit1: Selecting the updating operation at the time of machining end
bit2: Selecting the deleting operation at the time of machining end
bit3: Selecting the extraction operation at the time of machining end
bit4: Selecting the registration operation at the time of alarm occurrence
bit5: Selecting the updating operation at the time of alarm occurrence
bit6: Selecting the deleting operation at the time of alarm occurrence
bit7: Selecting the extraction operation at the time of alarm occurrence
bit8: Selecting the registration operation at the time of user's option

bit9: Selecting the updating operation at the time of user's option
bitA: Selecting the deleting operation at the time of user's option
bitB: Selecting the extraction operation at the time of user's option
(bitC: No DB operation)
bitD: Selecting the updating operation at the rising edge of operation trigger
bitE: Selecting the deleting operation at the rising edge of operation trigger
bitF: Selecting the extraction operation at the rising edge of operation trigger
"0" is set when the power is turned ON again.
When the bit0 to bit3 are all set to "0", select the registration operation at the time of machining end while "0" is specified in R14600/bit0 and the DB operation does not perform at the time of machining end while "1" is specified in R14600/bit0.
When the bit4 to bit7 are all set to "0", select the registration operation at the time of alarm occurrence while "0" is spec ified in R14601/bit0 and the DB operation does not perform at the time of alarm occurrence while "1" is specified in R14601/bit0.
When the bit8 to bitB are all set to "0", select the registration operation at the time of user's option while "0" is specified in R14602/bit0 and the DB operation does not perform at the time of user's option while "1" is specified in R14602/bit0.
When the bitD to bitF are all set to "0", the DB operation does not perform at the rising edge of operation trigger.
When MES interface library function is invalid, this signal is set to "0".
Cont. Signal name Abbrev. Common ($)
A MES interface library: DB operation selection R14598
M800V/M80V Series PLC Interface Manual
4 Explanation of Interface Signals
4.2 PLC Input Signals (Data Type: R***)
355 IB-1501616-F
The tables below indicate the combination of each bit of "DB operation selection" (R14598) and following database operations.
- "Selecting the DB operation when "0" is specified for function selection" at machining end (R14600/bit0)
- "Selecting the DB operation when "0" is specified for function selection" at alarm (R14601/bit1)
- "Selecting the DB operation when "0" is specified for function selection" at user's option (R14602/bit0)
[Related signals]
(1) MES interface library: Operation trigger (Y1C80)
(2) MES interface library: Function selection at machining end (R14600)
(3) MES interface library: Function selection at alarm (R14601)
(4) MES interface library: Function selection at user's option (R14602)
[Function]
This signal is used to select the data table to be the operation target at the rising edge of operation trigger.
[Operation]
Specify the data table to be the operation target at the rising edge of operation trigger as follows.
1: Machining result table
2: Alarm history table
3: Arbitrary information accumulated table
When "0" is set, none of the operations perform even if each bit of the operation trigger is turned ON.
When MES interface library function is invalid, this signal is set to "0".
[Related signals]
(1) MES interface library: Operation trigger (Y1C80)
R14598 R14600
Operation at machining end bit0 bit1 bit2 bit3 bit0
1 0/1 0/1 0/1 0/1 register
0 1 0/1 0/1 0/1 update
0 0 1 0/1 0/1 delete
0 0 0 1 0/1 extract
0 0 0 0 1 no operation
0 0 0 0 0 register
R14598 R14601
Operation at alarm bit4 bit5 bit6 bit7 bit0
1 0/1 0/1 0/1 0/1 register
0 1 0/1 0/1 0/1 update
0 0 1 0/1 0/1 delete
0 0 0 1 0/1 extract
0 0 0 0 1 no operation
0 0 0 0 0 register
R14598 R14602
Operation at user's option bit8 bit9 bitA bitB bit0
1 0/1 0/1 0/1 0/1 register
0 1 0/1 0/1 0/1 update
0 0 1 0/1 0/1 delete
0 0 0 1 0/1 extract
0 0 0 0 1 no operation
0 0 0 0 0 register
R14598 Operation at rising edge of operation
bitC bitD bitE bitF trigger
0/1 1 0/1 0/1 update
0/1 0 1 0/1 delete
0/1 0 0 1 extract
0/1 0 0 0 no operation
Cont. Signal name Abbrev. Common ($)
A MES interface library: Operation table selection R14599
M800V/M80V Series PLC Interface Manual
4 Explanation of Interface Signals
4.2 PLC Input Signals (Data Type: R***)
IB-1501616-F 356
[Function]
This signal is used to select the database operation-related functions at the time of machining completion.
[Operation]
<bit0: Selecting the DB operation when "0" is specified>
0: When "0" is specified to R14598/bit0 to 3, registration operation is selected.
1: When "0" is specified to R14598/bit0 to 3, DB operation does not perform.
<bit1: Selecting the setting for data I/O register for MES interface library at the time of update>
0: When the machining is completed while update operation is selected, common data or machining-related data is not set

to the data I/O register for MES interface library.
1: When the machining is completed while update operation is selected, common data and machining-related data are set to the data I/O register for MES interface library.
When MES interface library function is invalid, this signal is set to "0".
[Related signals]
(1) MES interface library: DB operation selection (R14598)
[Function]
This signal is used to select the database operation-related functions when an alarm occurs.
[Operation]
<bit0: Selecting the DB operation when "0" is specified>
0: When "0" is specified to R14598/bit4 to 7, registration operation is selected.
1: When "0" is specified to R14598/bit4 to 7, DB operation does not perform.
<bit1: Selecting the setting for data I/O register for MES interface library at the time of update>
0: When an alarm occurs while update operation is selected, common data or alarm-related data is not set to the data I/O register for MES interface library.
1: When an alarm occurs while update operation is selected, common data and alarm-related data are set to the data I/O register for MES interface library.
When MES interface library function is invalid, this signal is set to "0".
[Related signals]
(1) MES interface library: DB operation selection (R14598)
[Function]
This signal is used to select the function related to DB operation at the time of user's option.
[Operation]
<bit0: Selecting the DB operation when "0" is specified>
0: When "0" is specified to R14598/bit8 to B, registration operation is selected.
1: When "0" is specified to R14598/bit8 to B, DB operation does not perform.
When MES interface library function is invalid, this signal is set to "0".
[Related signals]
(1) MES interface library: DB operation selection (R14598)
Cont. Signal name Abbrev. Common ($)
A MES interface library: Function selection at machining end R14600
Cont. Signal name Abbrev. Common ($)
A MES interface library: Function selection at alarm R14601
Cont. Signal name Abbrev. Common ($)
A MES interface library: Function selection at user's option R14602

[Function]
This signal is used to set the group of information "G code modal" registered in the database at the time of alarm occurrence.
[Operation]
The G code modal group to be registered to the database is specified in bit units.
Set "1" to the bits corresponding to the group number to be registered.
Group numbers 1 to 19 can be specified.
A total of 12 group numbers can be registered.
When more than 12 group numbers are specified, the 12 groups are registered in ascending order.
When less than 12 group numbers are specified, a total of 12 group numbers, the unspecified group numbers in ascending order in addition to the specified group numbers, are registered.
The following indicates the operation when "1" is set to the bit of each register.
R14604 bit0: (not used)
R14604 bit1 to F: registers the G code modal in the group 1 to 15
R14605 bit0 to 3: registers the G code modal in the group 16 to 19
R14605 bit4 to F: (not used)
Cont. Signal name Abbrev. Common ($)
A MES interface library: G code modal registration selection R14604, 5
F E D C B A 9 8 7 6 5 4 3 2 1 0
R14604
R14605
:
:
F E D C B A 9 8 7 6 5 4 3 2 1 0
Group 1
Group 15
Group 16
Group 19

(Example 1) When setting the group numbers from 1 to 15 (R14604 = 0xFFFE, R14605 = 0x0000)
Register the G code modal belonging in the group numbers 1 to 12.
(G code modals belonging in the group number 13 to 15 are not registered.)
(Example 2) When setting the group numbers from 8 to 15 (R14604 = 0xFF00, R14605 = 0x0000)
Register the G code modal belonging in the group numbers 1 to 4 and 8 to 15.
(G code modals belonging in the group number 1 to 4 are also registered even if R14604 is not specified.)
[Related signals]
(1) MES interface library: G code modal status (R14902 to R14933)
F E D C B A 9 8 7 6 5 4 3 2 1 0
R14604
R14605
:
:
F E D C B A 9 8 7 6 5 4 3 2 1 0
* ******** **** **
*
Group numbers belonging to the

G code modal to be registered
Group numbers belonging to the
specified G code modal
Group 1
Group 15
Group 16
Group 19
Not registered
F E D C B A 9 8 7 6 5 4 3 2 1 0
R14604
R14605
:
:
F E D C B A 9 8 7 6 5 4 3 2 1 0
* *******
*
Group numbers belonging to the
G code modal to be registered
Group numbers belonging to the
specified G code modal
Group 1
Group 15
Group 16
Group 19
Registered additionally

[Function]
This signal notifies that the PLC axis connected to the drive unit is under insulation resistance measurement.
[Operation]
This signal outputs that the PLC axis connected to the drive unit is under insulation degradation detection to each axis and spindle of each part system.
When the insulation resistance measurement is started, the bit of the corresponding axis turns ON.
When the insulation resistance measurement is completed, the bit of the corresponding axis turns OFF.
[Related signals]
(1) Diagnosis data output: Motor insulation degradation detection request (IDDD: R20481)
[Function] [Operation] [Related signals]
Refer to the section on "Diagnosis data output: Servomotor insulation degradation detection in progress (PLC axis) (SVIDDD: R20043)".
[Function]
The laser output feedback value from the laser I/F unit is stored here.
[Operation]
Two words of R register are used. The low-order 16 bits are stored to R20062, and the high-order 16 bits are stored to R20063.
To match the display of the laser output feedback value to that of the laser output command value, the adjustment value can be set by the parameter "#90008 lsr_fb_gain" or "#90009 lsr_fb_ofs".
[Related signals]
(1) Laser: Laser beam irradiation ON (Y1CA7)
[Function]
This is a register to indicate the status common to the motion control release functions.
[Operation]
This register is set only once when the power is turned ON.
The following table shows the value of this register and the corresponding status.
[Caution]
Whether the motion control release function is normally operated can be checked with the status of each function (R20113).
[Related signals]
(1) Motion control release: Implementation check by function (R20113)
Cont. Signal name Abbrev. Common ($)
A Diagnosis data output: Servomotor insulation degradation
detection in progress (PLC axis) SVIDDD R20043
Cont. Signal name Abbrev. Common ($)
A Diagnosis data output: Spindle motor insulation degradation de tection in progress SPIDDD R20048
Cont. Signal name Abbrev. Common ($)
A Laser: Laser output feedback value (W) R20062, 3
Cont. Signal name Abbrev. Common ($)
A Motion control release: Valid/Invalid status R20112
Value Status of motion control release
0xFFFF Invalid (The motion control release specification is enabled, and the parameter "#11481 MCR valid" is set to "0" (Dis able), etc.)
0x0000 Valid (When the parameter "#11481 MCR valid" is set to "1" (Enable), etc.)
F E D C B A 9 8 7 6 5 4 3 2 1 0
:
Degradation detection in progress 1st axis
Degradation detection in progress 2nd axis
Degradation detection in progress 16th axis

[Function]
This is a register to indicate each function status of the motion control release functions.
The status of the coordinate transformation function of the motion control release function is output to bit0 to bit3 of R20113.
[Operation]
This register is set only once when the power is turned ON.
The following table shows the value of this register and the corresponding status.

When the value of this register is any of "0xC", "0xB" and "0xA", the system error (Z57) occurs at the same time.
When the system error (Z57) occurs, take an action according to the value of this register.
[Related signals]
(1) Motion control release: Valid/Invalid status (R20112)
[Function]
This signal indicates the current compensation value for each axis.
[Operation]
When the compensation values for each axis are set, these R registers are updated.
The spatial error compensation function can compensate errors only in the first part system.
[Related signals]
(1) Spatial error compensation in progress (SECI: XD17)
[Function] [Operation] [Related signals]
Refer to the section on "Diagnosis data output: Servomotor insulation degradation detection in progress (PLC axis) (SVIDDD: R20043)".
Cont. Signal name Abbrev. Common ($)
A Motion control release: Implementation check by function R20113
Value Details
0xF (1111) The parameter to enable the corresponding function is set to "0" (Disable).
0xE (1110) The contents of the definition file are invalid.
0xD (1101) The add-on module is not loaded on the CNC.
0xC (1100) The function table failed to be registered.
0xB (1011) The essential function is not registered in the function table.
0xA (1010) The add-on module cannot be decoded.
0x0 (0000) The corresponding function is implemented and available.
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Current spatial error compensation value
(orthogonal coordinate horizontal axis)
R20500,
1
R20700,
1
R20900,
1
R21100,
1
R21300,
1
R21500,
1
R21700,
1
R21900,
1
A Current spatial error compensation value
(orthogonal coordinate vertical axis)
R20502,
3
R20702,
3
R20902,
3
R21102,
3
R21302,
3
R21502,
3
R21702,
3
R21902,
3
A Current spatial error compensation value
(orthogonal coordinate height axis)
R20504,
5
R20704,
5
R20904,
5
R21104,
5
R21304,
5
R21504,
5
R21704,
5
R21904,
5
A Current spatial error compensation value
(1st rotary axis)
R20506,
7
R20706,
7
R20906,
7
R21106,

7
R21306,
7
R21506,
7
R21706,
7
R21906,
7
A Current spatial error compensation value
(2nd rotary axis)
R20508,
9
R20708,
9
R20908,
9
R21108,
9
R21308,
9
R21508,
9
R21708,
9
R21908,
9
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A
Diagnosis data output: Servomotor in sulation degradation detection in prog ress
SVIDDD R20522 R20722 R20922 R21122 R21322 R21522 R21722 R21922
R20113 FEDCBA9 8 76 5 0 1234
Status of coordinate transformation function

[Function]
When "#11038 T disp typ" is set to "1" in the lathe system (L system) and a tool function is commanded by automatic operation (memory, MDI), the numerical value following the tool function address T is notified. T code data 1 to 4 notify the tool number only, but this signal notifies the tool command number that is commanded by machining program.
T code data that is output by controller can be selected from 8-digit BCD data, a unsigned 32-bit binary data, or signed 32-bit binary data, by the parameter "#12010 Tbin".
[Operation]
<Program example>
O100
N010 G28XYZ
N020 T0102
<In case of executing N020 T0102 command when "#11038 T disp typ" is set to "1">
T code data for L system (R20536) = 0x66
T code data (R536) = 0x01
<In case of executing N020 T0102 command when "#11038 T disp typ" is set to "0">
T code data for L system (R20536) = 0
T code data (R536) = 0x01
Data remain unchanged even when the "M function finish" signal (FIN1 or FIN2) is sent back. Reset or "Emergency stop" does not clear the data.
[Caution]
(1) Commanding "Txx" by manual numerical input will not update this signal. T code data 1 is updated.
(2) When "#11038 T disp typ" is set to "0", this signal is cleared.
(3) In the M (machining center) system, this signal is cleared.
[Related signals]
(1) T function strobe 1 (TF1:XC68)
(2) T code data 1 (R536-R537)
[Function]
This signal notifies PLC of the number of vibrations in vibration cutting mode.
[Operation]
The value obtained by multiplying the number of vibrations per spindle rotation in the vibration cutting mode by "100" is stored in this register.
This signal is retained even after the vibration cutting mode is canceled. When the commanded spindle speed is "0", the previous information is retained.
[Caution]
The number of vibration in vibration cutting mode is a value rounded off to the second decimal place of the actual numbers of vibrations.
[Related signals]
(1) VCC: Mode in execution (VCC: X1810)
(2) VCC: Numbers of vibrations (VCC_VIB: R20556)
(3) VCC: Frequency (VCC_FRQ: R20557)
(4) VCC: Spindle rotation speed (VCC_SPREV: R7024,R7025)
(5) VCC: Vibrating axis (VCC_VIBAX: R20558)
(6) VCC: Temporary cancel of axis vibration (VCC_INVAX: R22532)
(7) VCC: Cause of non-vibration (VCC_FACT: R20559)
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A T code data for L system R20536,
7
R20736,
7
R20936,
7

R21136,
7
R21336,
7
R21536,
7
R21736,
7
R21936,
7
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A VCC: Number of vibrations VCC_VIB R20556 R20756 R20956 R21156 R21356 R21556 R21756 R21956

[Function]
This signal notifies PLC of the frequency in the vibration cutting mode.
[Operation]
The value obtained by multiplying the frequency in the vibration cutting mode by "100" is stored.
This signal is retained even after the vibration cutting mode is canceled. When the commanded spindle speed is "0", the previous information is retained.
[Caution]
The number of vibrations in the vibration cutting mode is a value rounded off to the second decimal place of the actual number of vibrations.
[Related signals]
Refer to the section of the "VCC: Number of vibrations" signal (VCC_VIB: R20556).
[Function]
This signal notifies PLC of the vibrating axes with bit data.
(1) Switching an axis does not change a bit position.
[Operation]
When the control axis starts to vibrate in the vibration cutting mode, the bit corresponding to the control axis turns ON.
When vibration of the control axis converges, the corresponding bit turns OFF.
[Caution]
Only one axis in the programmed part system vibrates. Even for a cutting command with two or more axes such as taper, only the specified one axis vibrates.
[Related signals]
Refer to the section of the "VCC: Number of vibrations" signal (VCC_VIB: R20556).
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A VCC: Frequency VCC_-
FRQ R20557 R20757 R20957 R21157 R21357 R21557 R21757 R21957
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A VCC: Vibrating axis VC C_VIBAX R20558 R20758 R20958 R21158 R21358 R21558 R21758 R21958
0123456789ABCDEF
1st axis
bit
File register
(R)
2nd axis
12th axis

Note

[Function]
This signal notifies PLC of the cause of cutting without axis vibration in the cutting blocks or performing unintended vibration even during the vibration cutting mode.
[Operation]
When there is non-vibrating axis in the cutting blocks during the vibration cutting mode, the bit which is corresponding to the cause turns ON.
Each bit for devices and the corresponding cause of non-vibration for each vibration cutting mode are shown below.
[Related signals]
Refer to the section of the "VCC: Number of vibrations" signal (R20556: VCC_VIB).
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A VCC: Cause of non-vibration VCC_-
FACT R20559 R20759 R20959 R21159 R21359 R21559 R21759 R21959
Bit Cause
0 OMR-FF is disabled.
("#2313 SV113/bit0" is not set to "1".)
Vibration cutting is performed with the OMR-FF disabled.
1 Not used.
2 The vibration target axis is the vibration cutting disabled axis.
The "vibration cutting disabled axis" here refers to an axis whose corresponding bit of the "VCC: Temporarily dis abled axis" signal (R22532 to R23932) is ON.
3 Vibration condition cannot be obtained.
(Example 1) The G94 (feed per minute) is executed and spindle rotation speed is commanded to "0".
(Example 2) "G08.5" with different type of vibration condition was commanded to the spindle for which the vibra tion cutting is being executed in other part system.
4 There is a superimposed axis during an control axis superimposition or arbitrary axis superimposition among the feed axes.
5 to 6 Not used.
7 The vibration target axis is not specified.
(Example) When a cutting command for two or more axes is issued without specifying the vibration axis in the address "" in the command "G08.5 P2"
Program example Operation explanation
N01 M03 S3500; The first spindle rotates at 3500 (r/min).
N02 G95; The mode is set to feed per revolution (synchronous feed) mode.
N03 G08.5 P2; The vibration cutting mode starts.

N04 G01 Z-1.0 F0.04; Cutting is performed while vibrating the feed axis (Z axis).
N05 G01 X1.0; Cutting is performed while vibrating the feed axis (X axis).
N06 G01 Z-2.0 X2.0; Since the address "" was omitted in the vibration cutting mode
start command of the N03 block, the vibration cutting control of
the N06 block is temporarily disabled.
At this time, bit7 of the "VCC: Cause of non-vibration" is turned
ON.
N07 G08.5 P0; The vibration cutting mode is canceled.
8 The movement command includes the inclined axis for which the inclined axis control is performed.
9 to E Not used.
F The vibration cutting control is temporarily disabled by the ",V0" command.
0123456789ABCDEF bit File register
(R)

[Function]
The maximum value of the cutting load is output to this register.
[Operation]
The maximum value of the spindle load is output in binary. (Range: 0 to 327%)
The value is output in 1% unit regardless of the setting of the parameter "#1256 set28/bit2" (Change current FB (load) output unit).
While the "Spindle up-to-speed" signal (USO) is ON, the value is updated when the load value of the spindle set to "CLC: Spindle selection" (R22540) becomes maximum.
The spindle load when the spindle is stopped or accelerated is not updated as the maximum load.
The value becomes "0" at the rising edge of the "In automatic operation "run"" signal (OP).
(*1) When the "Spindle up-to-speed" signal is OFF, the value of "Maximum load" is not updated.
[Related signals]
(1) Spindle up-to-speed (USO: X188D)
(2) In automatic operation "run" (OP: XC12)
(3) CLC: Spindle selection (R22540)
[Function]
The minimum value of the cutting load is output to this register.
[Operation]
The minimum value of the spindle load is output in binary. (Range: 0 to 327%)
The value is output in 1% unit regardless of the setting of the parameter "#1256 set28/bit2" (Change current FB (load) output unit).
While the "Spindle up-to-speed" signal (USO) is ON, the value is updated when the load value of the spindle set to "CLC: Spindle selection" (R22540) becomes minimum.
The spindle load when the spindle is stopped or accelerated is not updated as the minimum load.
The value becomes "0" at the rising edge of the "In automatic operation "run"" signal (OP).
(*1) When the "Spindle up-to-speed" signal is OFF, the value of "Minimum load" is not updated.
[Related signals]
Refer to the section of "CLC: Maximum load" signal (R20564).
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A CLC: Maximum load R20564 R20764 R20964 R21164 R21364 R21564 R21764 R21964
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A CLC: Minimum load R20565 R20765 R20965 R21165 R21365 R21565 R21765 R21965
Spindle load
Maximum load (R20564)
In automatic operation
"run" (OPn)
Spindle up-to-speed
(USOn)
(*1)
Spindle load
Minimum load (R20565)
In automatic operation
"run" (OPn)
Spindle up-to-speed
(USOn)
(*1)

[Function]
This signal notifies the machining application and machining condition that are currently enabled in the machining condition selection I function.
Current machining condition (application): This notifies the machining application.
Current machining condition (condition): This notifies the machining condition.
[Operation]
The numbers of machining application and machining condition in use which are displayed in "Machin. Cond" on the machining condition selection screen are stored. When the machining condition parameter group is switched by any of the operation on the machining condition selection screen, G code command (G120.1, G121), and PLC signal ("Machining condition parameter group switch request" (YC6D) and "Machining condition parameter group switch cancel request" (YC6E)), the numbers after the switch are stored.
When the machining condition parameter group is switched by turning ON the "Machining condition selection I: Machining condition parameter group switch request" signal (YC6D), refer to these signals (R20580, R20581) to check whether the machining application and machining condition are the desired ones after the "Machining condition selection I: Machining condition parameter group switch completed" signal (XCBD) is turned ON.
0: Reference parameter
1 to 3: Machining application 1 to 3, machining condition 1 to 3
[Related signals]
(1) Machining condition selection I: Machining condition parameter group switch request (YC6D: MCSLR)
(2) Machining condition selection I: Machining condition parameter group switch completed (XCBD: MCSLF)
(3) Machining condition selection I: Selection of machining application (R22564: MCSLSA)

(4) Machining condition selection I: Selection of machining condition (R22565: MCSLSC)
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Machining condition selection I: Current
machining condition (application) MCSLPA R20580 R20780 R20980 R21180 R21380 R21580 R21780 R21980
A Machining condition selection I: Current
machining condition (condition) MCSLPC R20581 R20781 R20981 R21181 R21381 R21581 R21781 R21981

[Function]
This signal notifies that the parameter group as the current condition is set by which function; by operation on the machining condition selection screen, by G code command (G120.1, G121) or by PLC signal ("Machining condition parameter group switch request" (YC6D) and "Machining condition parameter group switch cancel request" (YC6E)). This allows you to check the each function command state with the PLC program. This can be used as a check or investigation to prevent illegal operations from occurring when switch requests are performed at the same time, etc.
[Operation]
When the machining condition parameter group switch is completed, the bit for the function to select the parameter group as the current condition is turned ON.
When the power is turned ON, bit0 (Switching not performed) is ON until the machining condition parameter group switch is executed.
[Related signals]
(1) Machining condition selection I: Machining condition parameter group switch request (YC6D: MCSLR)
(2) Machining condition selection I: Machining condition parameter group switch cancel request (YC6E: MCSLCR)
(3) Machining condition selection I: Selection of machining application (R22564: MCSLSA)
(4) Machining condition selection I: Selection of machining condition (R22565: MCSLSC)
(5) Machining condition selection I: Current machining condition (application) (R20580: MCSLPA)
(6) Machining condition selection I: Current machining condition (condition) (R20581: MCSLPC)
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Machining condition selection I: Current
machining condition status
MCSLST
S R20582 R20782 R20982 R21182 R21382 R21582 R21782 R21982
F EDCB A 9 8 7 6 5 4 3 2 1 0 bit
Switching not performed (Reference parameter is valid)
Specified on machining condition selection screen
Specified by G code (G120.1)
Specified by G code (G121)
Specified by PLC signal
("Machining condition parameter group switch request" (YC6D))
Specified by PLC signal
("Machining condition parameter group switch cancel request"
(YC6E))
Specified by emergency stop, reset, or program end

[Function]
This signal notifies the error cause when the machining condition parameter group is switched by PLC signal (YC6D or YC6E).
[Operation]
When the machining condition parameter group cannot be switched by the "Machining condition selection I: Machining condition parameter group switch request" signal (YC6D) or the "Machining condition selection I: Machining condition parameter group switch cancel request" signal (YC6E), the bit corresponding to the error cause is turned ON. When these request signals (YC6D/YC6E) are turned OFF, this status signal (R20583) is cleared.
[Operation sequence]
The following shows the sequences when a value out of the range is specified in "Selection of machining condition".
(In the figure, "Machining condition selection I:" in the signal name is omitted.)
[Caution]
(1) After the "Machining condition parameter group switch completed" signal (XCBD) or the "Machining condition param eter group switch cancel completed" signal (XCBE) is turned ON, refer to this status signal (R20583).
(2) For machining condition parameter group switch cancel request, only the error of bit0 (Machining condition parameter group not initialized) occurs.
[Related signals]
(1) Machining condition selection I: Machining condition parameter group switch request (YC6D: MCSLR)
(2) Machining condition selection I: Machining condition parameter group switch completed (XCBD: MCSLF)
(3) Machining condition selection I: Selection of machining application (R22564: MCSLSA)
(4) Machining condition selection I: Selection of machining condition (R22565: MCSLSC)
(5) Machining condition selection I: Current machining condition (application) (R20580: MCSLPA)
(6) Machining condition selection I: Current machining condition (condition) (R20581: MCSLPC)
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A
Machining condition selection I: Machin ing condition parameter group switch er ror status
MCSLER
R R20583 R20783 R20983 R21183 R21383 R21583 R21783 R21983
F EDCB A 9 8 7 6 5 4 3 2 1 0 bit
Machining condition parameter group not initialized
Out of range (machining application)
Out of range (machining condition)
1
1
2
0x00 0x00
Selection of machining application
(R22564)
Selection of machining condition
(R22565)
Machining condition parameter group switch

request (YC6D)
Machining condition parameter group switch
completed (XCBD)
Machining condition parameter group switch
error status (R20583)
5 (Setting value is out of the range)
0x04 (bit2 is "1")

[Function] [Operation]
The R register stores the accumulated value of movement amounts that were output to the drive unit.
Values to be stored depend on the settings of the parameter "#1005 plcunit" (PLC unit).
The value is initialized to "0" when the power is turned ON.
[Caution]
(1) The movement amounts are not added to the total when the traveling direction reverses, for example, at quadrant transitions for circular contours or at joints of the blocks where direction reverses.
(2) Values to be stored in the R register may decrease by the fractions which are caused by converting units to the one set in the parameter "#1005 plcunit".
[Related signals]
(1) Cutting feed movement amount n-th axis (R5172)
[Function]
This signal notifies the PLC of the NC axis switch state.
[Operation]
<Low-order 8 bits: In-use NC axis switch setting number>
This indicates the switch setting number used in the NC axis switch. The value is set at the timing when the NC axis switch is completed.
<High-order 8 bits: NC axis switch state>
The "NC axis switch in progress" signal (R25012/bit8) is ON while the NC axis switch is performed, and turns OFF when the switch is completed.
The "NC axis switch completion" signal (R25012/bit9) is ON during the period from when the switch is completed until the "NC axis switch request" signal (R25684/bit8) turns OFF.
Refer to the timing chart of the "Tool head hot swapping: NC axis switch n-th axis" signal (R25684: AXCHGCMDn).
[Related signals]
(1) Control axis detachment n-th axis (Y780: DTCHn)
(2) Tool head hot swapping: NC axis switch n-th axis (R25684: AXCHGCMDn)
Cont. Signal name Abbrev. $1 $2 $3 $4
A Total distance traveled by n-th axis during automatic opera tion
R24884,5 to
R24914,5
R24916,7 to
R24946,7
R24948,9 to
R24978,9
R24980,1 to
R25010,1
Cont. Signal name Abbrev. $1 $2 $3 $4
A Tool head hot swapping: NC axis switch status
n-th axis
AX CHGSTS1 to
8
R25012 to
19
R25020 to
27
R25028 to
35
R25036 to
43
R25012 F EDCB A 9 8
NC axis switch completion NC axis switch in progress
Not in use In-use NC axis switch setting number
<High-order 8 bits> <Low-order 8 bits>

[Function]
This signal clears a variety of accumulated power consumption.
[Operation]
The following accumulated power consumption is cleared at the rising edge of this signal.
Accumulated consumption of entire drive system 1 to 4 (R122 to 9)
Accumulated consumption of devices other than drive system 1 to 4 (R130 to 7)
Total accumulated consumption 1 to 4
Drive system's fixed consumption correction 1 to 4
Accumulated consumption of servo axis in drive system (fluctuating part) 1 to 4
Accumulated regeneration of servo axis in drive system (fluctuating part) 1 to 4
Accumulated consumption of spindle in drive system (fluctuating part) 1 to 4
Accumulated regeneration of spindle in drive system (fluctuating part) 1 to 4
[Related signals]
(1) Power consumption computation: Clearing consumption accumulation 1 to 4 complete (IPCCC1 to 4: X708 to B)
(2) Power consumption computation: Accumulated consumption of entire drive system 1 to 4 (DTIPC1 to 4: R122 to 9)
(3) Power consumption computation: Accumulated consumption of devices other than drive system 1 to 4 (NDIPC1 to 4: R130 to 7)
[Function]
The total integration time of the signal specified by the user PLC can be counted and displayed. There are two types of

integration time input, integration time input 1 and 2.
[Operation]
The total integration time while this signal (RHD1) is ON is displayed in hours, minutes, and seconds.
The counted (integrated) time is held even when the power is turned OFF. The integration time can be reset and settings such as presets can be changed.
[Function] [Operation]
Both functions and operations are the same as those of the "Integration time input 1" (RHD1).
[Function]
General tool data and coordinate system presets by origin set can be protected with this signal.
[Operation]
When this signal is turned OFF (0), the tool data setting operation is prohibited.
[Caution]
(1) When an attempt has been made to change the setting while this signal is OFF (0), a message "Data protect" appears in the message section of the screen.
(2) Even when this signal is OFF (0), the setting of the tool wear compensation amount can be changed by the setting of the parameter "#1760 cfgPR10/bit6" (Wear compensation amount edit in Data protection ON).
(3) This signal is set to ON (1) when the power is turned ON. This means that data protection has been canceled. Therefore, when the sequence program has no line to use data protection key, the signal is always turned ON (1).
[Related signals]
(1) Data protection key 2 (*KEY2: Y709)
(2) Data protection key 3 (*KEY3: Y70A)
(3) Data protection key (memory card) (*KEY_MemC: Y1C81)
(4) Data protection key (DS) (*KEY_DS: Y1C82)
Cont. Signal name Abbrev. Common ($)
A Power consumption computation: Clear consumption accu mulation 1 to 4 IPCC1 to 4 Y700 to 3
Cont. Signal name Abbrev. Common ($)
A Integration time input 1 RHD1 Y704
Cont. Signal name Abbrev. Common ($)
A Integration time input 2 RHD2 Y705
Cont. Signal name Abbrev. Common ($)
B Data protection key 1 *KEY1 Y708

[Function]
Various data such as user parameters, common variables, Email notification to operator, range setting screen, machining condition selection, laser processing condition, etc. can be protected.
[Operation]
When this signal is turned OFF (0), the following data settings and operations are prohibited.
- User parameters
- Common variables
- Email notification to operator
- Data on range setting screen
- Switching selection parameter (machining condition selection)
- Setting application name and condition name (machining condition selection)
- Performing initialization (machining condition selection)

[Caution]
(1) When an attempt has been made to change the setting while this signal is OFF (0), a message "Data protect" appears in the message section of the screen.
(2) This signal is set to ON (1) when the power is turned ON. This means that data protection has been canceled. Therefore, when the sequence program has no line to use data protection key, the signal is always turned ON (1).
[Related signals]
(1) Data protection key 1 (*KEY1: Y708)
(2) Data protection key 3 (*KEY3: Y70A)
(3) Data protection key (memory card) (*KEY_MemC: Y1C81)
(4) Data protection key (DS) (*KEY_DS: Y1C82)
[Function]
Data of the machining program of NC memory and NC memory 2 can be protected.
[Operation]
When this signal is turned OFF (0), the editing of the machining program of NC memory and NC memory 2 is prohibited. The target device is "memory".
[Caution]
(1) When an attempt has been made to edit while this signal is OFF, a message "Data protect" appears in the message section of the screen.
(2) This signal is set to ON (1) when the power is turned ON. This means that data protection has been canceled. Therefore, when the sequence program has no line to use data protection key, the signal is always turned ON (1).
[Related signals]
(1) Data protection key 1 (*KEY1: Y708)
(2) Data protection key 2 (*KEY2: Y709)
(3) Data protection key (memory card) (*KEY_MemC: Y1C81)
(4) Data protection key (DS) (*KEY_DS: Y1C82)
[Function] [Operation]
The priority of the handle input pulse is determined when the parameter "#1239 set11/bit1" is OFF.
0: Remote I/O connecting handle priority
1: Handle pulse encoder communication connector connecting handle priority
[Related signals]
(1) Handy terminal key 1 to 45 (X1CD0 to X1CFC)
(2) Handle/Incremental feed magnification code m (MP1, MP2, MP4: YC80, YC81, YC82)
(3) Handle/incremental feed magnification method selection (MPS: YC87)
(4) Handy terminal Data area top address (R297)
(5) Handy terminal Data valid number of registers (R298)
(6) Handy terminal Cause of communication error (R299)
(7) 1st handle/incremental feed magnification (R2508, 9)
Cont. Signal name Abbrev. Common ($)
B Data protection key 2 *KEY2 Y709
Cont. Signal name Abbrev. Common ($)
B Data protection key 3 *KEY3 Y70A

Cont. Signal name Abbrev. Common ($)
A Handle pulse encoder communication connector priority Y70D

[Function]
The near point dog signal of the PLC axis reference position return is input.
[Operation]
Set the near point dog signal of the PLC axis reference position return for the following devices in the PLC.
(1) Setting the dog signal in the medium-speed processing of the PLC is less responsive than setting the dog signal in the high-speed processing of the PLC.
[Function]
This signal is designated when handle feeds using 1st to 3rd handles are to be carried out with the PLC axis.
[Operation]
Designate with the following devices to carry out handle feed with the PLC axis.
(1) When this signal is ON, each handle is dedicated to the PLC axis and is not valid for the NC control axis. The "n-th handle axis selection code" (HSn1 to HSn16) and the "n-th handle valid" (HSnS) are used to select each handle axis.
(2) The handle feed magnification is common with that for the NC control axis.
Cont. Signal name Abbrev. Common ($)
B PLC axis near point detection n-th axis *PCD1 to 8 Y718 to F
Device No. Signal name
Y718 PCD1 PLC axis near point detection 1st axis
Y719 PCD2 PLC axis near point detection 2nd axis
Y71A PCD3 PLC axis near point detection 3rd axis
Y71B PCD4 PLC axis near point detection 4th axis
Y71C PCD5 PLC axis near point detection 5th axis
Y71D PCD6 PLC axis near point detection 6th axis
Y71E PCD7 PLC axis near point detection 7th axis
Y71F PCD8 PLC axis near point detection 8th axis
Cont. Signal name Abbrev. Common ($)
A PLC axis 1st to 3rd handle valid PCH1 to 3 Y720 to 2
Device No. Signal name
Y720 PCH1 PLC axis 1st handle valid
Y721 PCH2 PLC axis 2nd handle valid
Y722 PCH3 PLC axis 3rd handle valid
Note
Note

[Function] [Operation]
In buffering mode, the PLC axis command (control information data) can be commanded to multiple blocks. This enables a smooth changeover of commands.
<Control information data>
The control data for the buffering mode is set in three blocks.
The contents of each control information data have the same configuration as the normal control information data.
At the time of execution, the axis moves in the order in which each control information data is started. After the movement is completed, the movement of the next block is started.
(If the start signals are turned ON simultaneously, it will be performed in the order of A, B, and C.)
Cont. Signal name Abbrev. Common ($)
A PLC axis control buffering mode valid PABMI Y723
Rn+0
(*1)
Rn+14
Rn+28
(*1) It is an address set to R448.
(*2) Axis designation is valid only in the buffering mode.
Control
information
data A
Control
information
data C
Control
information
data B
Not used
Status
Alarm contents
Control signal
Axis designation (*2)
Operation mode
Feedrate
Travel amount
Machine position
Remaining distance

[Timing chart]
G1 -> G1 -> G0 -> G1 (Same axis)
(1) Change and start the data after the busy signal turns OFF. Starting while the busy signal is ON is ignored.
PLC axis
control valid
Start

busy
den
move
wait
A
Speed
Start
busy
den
move
wait
C
Start
busy
den
move
wait
B
Note

G0 -> G1 -> G1 -> G0 (Two axes)
[Caution]
Only one set of buffering mode can be commanded. When two or more sets are commanded simultaneously, the sets commanded later cause an alarm.
[Related signals]
(1) PLC axis control buffering mode information address (R448)
PLC axis
control valid
1st axis
speed
Start
busy
den
move
wait
Axis No.
A
Start
busy
den
move
wait
Axis No.
B
Start
busy
den
move
wait
Axis No.
C
0 1
0
1
2nd axis
speed

[Function]
This signal enables "Consumption accumulation 1 to 4".
[Operation]
The following kinds of consumption accumulation are performed while this signal is ON.
Accumulated consumption of entire drive system 1 to 4 (R122 to 9)
Accumulated consumption of devices other than drive system 1 to 4 (R130 to 7)
Total accumulated consumption 1 to 4
Drive system's fixed consumption correction 1 to 4
Accumulated consumption of servo axis in drive system (fluctuating part) 1 to 4
Accumulated regeneration of servo axis in drive system (fluctuating part) 1 to 4
Accumulated consumption of spindle in drive system (fluctuating part) 1 to 4
Accumulated regeneration of spindle in drive system (fluctuating part) 1 to 4
[Related signals]
(1) Power consumption computation: Consumption accumulation ON 1 to 4 (IPCEI1 to 4: X700 to 3)
(2) Power consumption computation: Accumulated consumption of entire drive system 1 to 4 (DTIPC1 to 4: R122 to 9)
(3) Power consumption computation: Accumulated consumption of devices other than drive system 1 to 4 (NDIPC1 to 4: R130 to 7)
(4) Power consumption computation: Consumption of devices other than drive system (NDPC: R304, 5)
(5) Power consumption computation: Drive system's fixed consumption correction (DFPCC: R306, 7)
[Function]
When one setting display device is used as the display device of multiple control devices, this signal is used to inform the controller that it has been switched as its own display device.
[Operation]
When this signal is turned ON, the currently selected screen is displayed at the rising edge. For the setting and display unit screen, the display screen of the control device before switching remains. Therefore, input this signal to switch to the own

screen display.
[Timing chart]
Cont. Signal name Abbrev. Common ($)
A Power consumption computation: Enable consumption ac cumulation 1 to 4 IPCE1 to 4 Y724 to 7
Cont. Signal name Abbrev. Common ($)
A CRT changeover completion CRTFN Y728
CRT changeover
CRT changeover completion
(CRTFN)
Screen display
Other controller Local
At least 100 ms
Or more required
Screen display on other controller Local screen display

[Function]
The screen backlight, which was turned OFF with the screen saver function, can be turned ON again.
[Operation]
The backlight is turned ON again at the rising edge of this signal. Counting of the time until the the backlight turns OFF starts at the falling edge of this signal.
When this signal is output to the CNC while the screen is displayed, the time until the screen is cleared is counted again.
(1) While the "Screen display request" signal is ON, the backlight is not turned OFF with the parameter "#8078 Screen Saver Timer". However, the backlight can be turned OFF using the [SHIFT] and [C.B/CAN] keys.
(2) After switching the "Screen display request" signal (Y729), wait at least one scan before switching again.
[Function]
Data collection will be stopped by turning this signal ON while collecting history data using operation history function.
Data collection will be started (resumed) by turning the signal OFF in data stop mode.
[Operation]
Collecting diagnosis data stop signal stops data collection during rising edge movement following the signal turned ON from OFF.
This signal starts data collection during falling edge movement following the signal turned OFF from ON.
Data collection will be stopped when this signal is turned ON while diagnosis data collection is in progress (when the "Collecting diagnosis data" signal is turned ON).
At that time, data collection will be stopped in approximately 500 ms after this signal is turned ON. The "Collecting diag nosis data" signal is turned OFF when data collection is stopped.
Data collection is started when this signal is turned OFF while diagnosis data collection is stopped (when the "Collecting diagnosis data" signal is turned OFF).
Data collection is started in approximately 500 ms after this signal is turned OFF. The "Collecting diagnosis data" signal is turned ON when data collection is started.
(1) This signal is ignored this signal is operated from the first scan after the power is turned ON.
[Related signals]
(1) Collecting diagnosis data (X723)
Cont. Signal name Abbrev. Common ($)
A Screen display request SCRON Y729
Cont. Signal name Abbrev. Common ($)
A Collecting diagnosis data stop Y72B
Screen ON Counting of time to
turn the backlight
OFF starts.
1 scan or more
"Screen display request"
signal (SCRON)
Note
Collecting diagnosis data stopped
Collecting history data
Collecting diagnosis data
Collecting In stop
Stop
Start
Approx. 500ms
Collecting
Note

[Function]
This signal is used when NC data sampling is started or stopped on the PLC device.
[Operation]
When "2" (PLC device) is selected for "Start condition":
This signal is turned ON while "1" (Start sampling) is set in "Start sampling", data sampling is started.
When "2" (PLC device) is selected for "Termination condition":
The sampling is terminated when this signal is turned OFF during sampling.
This signal is ignored in the following cases:
- When neither "Start condition" nor "Termination condition" is set to "2"
- When "Start sampling" is set to "0" (Stop sampling)
[Function] [Operation]
To transfer external workpiece coordinate offset (EXT) in the pallet 4 page registration, turn this signal ON. NC starts transfer processing at the rising edge of this signal.
When the external workpiece coordinate transfer completion signal is turned ON, turn this signal OFF.
It takes approximately 8 ms from the start to the end of transfer processing. If the transfer completion signal is not turned ON even after 8 ms has passed since the transfer ready signal was turned ON, reconsider the value of R register 4100 and 4102.
NC turns the external workpiece coordinate transfer completion signal OFF at the falling edge of this signal.
To turn ON the transfer ready signal from the machining program, the "Recalculation request" and the "M function finish"

(FIN1 or FIN2) must be turned ON after the external workpiece coordinate transfer completion signal is turned ON.
When recalculation is not requested, operation of the pre-read machining program will be carried out using the external workpiece coordinate offset prior to the change.
When M function has been completed before transfer is completed, the external workpiece coordinate offset data to be used in the machining program will not be changed from the one prior to the change until the transfer completion signal is turned ON.
This signal must be turned ON while the external workpiece coordinate transfer completion signal is OFF.
[Timing chart]
[Related signals]
(1) Pallet program registration Ext. workpiece coordinate transfer completion (X758)
Cont. Signal name Abbrev. Common ($)
A Sampling start/stop SMPTRG Y72C
Cont. Signal name Abbrev. Common ($)
A Pallet program registration Ext. workpiece coordinate trans fer ready Y72F
Ext. workpiece coordinate transfer
ready (Y72F)
Ext. workpiece coordinate
transfer completion (X758)
Transfer processing Extension workpiece
External workpiece

[Function]
The displayed part system of the multiple part systems can be changed.
[Operation]
The screen display for the multiple part systems is a screen for displaying one of the part systems. Thus, which part system to be displayed is determined by these signals.
If both of these signals are started up simultaneously, they is invalid.
If "#11035 Sys. change limit" is set to "2", this signal is invalid.
The displayed part system is changed when the "Display changeover $1 to $8" signal (Y730) is changed.
An example of the displayed part system change is as follows.
(Example) When there are three effective part systems
(*1) If all signals are "0" when the power is turned ON, part system 1 is displayed.
(*2) If a signal of any inactive part system is changed, the displayed part system is unchanged.
(*3) If a signal of two or more part systems are changed at a time, the displayed part system is unchanged.
[Function]
This signal enables the "Single block between part systems" operation.
This is a function for performing single-block operation while maintaining the synchronization relationship between each system in the operation of two or more part systems in a multi-part system.
[Operation]
In a multi-part system in which single-block operation is performed while the "Single block between part systems" signal is ON, if single-block stop occurs in a part system, automatic operation pause occurs in other part systems.
This signal is enabled if any of the part systems is in single-block operation. If all part systems are in continuous operation, this signal is disabled.
[Related signals]
(1) Single block (SBK: YC12)
(2) Synchronization between part systems OFF (MSYNC: YCF8)
Cont. Signal name Abbrev. Common ($)
A Display changeover $1 to $8 DISP1 to 8 Y730 to 7
State A State B State C State D State E State F
Y730 ($1) 000000
Y731 ($2) 001101
Y732 ($3) 011001
Y733 ($4) 010000
Y734 ($5) 000000
Y735 ($6) 000000
Y736 ($7) 000000
Y737 ($8) 000000
The state of
display
Part system 1 is
displayed
(*1)
Change to Part
system 3.
(*2)
Part system 3 re mains displayed.
Change to Part
system 2.
Part system 2 re mains displayed.
Part system 2 re mains displayed.
(*3)
Cont. Signal name Abbrev. Common ($)
A Single block between part systems MSBK Y73A
Single block between
part systems (MSBK)
Function enable/disable
Enable Disable Disable Enable
$1 Single block (SBK)
$2 Single block (SBK)
$3 Single block (SBK)

[Function]

This signal enables manual arbitrary reverse run function.
The manual arbitrary reverse run is performed by controlling the feedrate during automatic operation in the memory or MDI mode. The feedrate is controlled in proportion to the manual (jog) feed speed or manual rotation speed (handle).
[Operation]
The manual arbitrary reverse run is enabled while in memory or MDI mode and when this signal is ON. During the manual arbitrary reverse run, the manual mode (handle or jog) must be turned ON at the same time as this signal turns ON, as the axis is moved in the manual mode (handle or jog).
Speed control during manual arbitrary reverse run is also enabled if the "Manual arbitrary reverse run speed selection" (MORSP) and the "Manual arbitrary reverse run speed multiplier" (R379) are commanded.
However, when the parameter "#1260 set32/bit0" (Switching to actual cutting mode during automatic operation) is set to "1", switching ON/OFF of this signal in a specific operation block during thread cutting, thread cutting cycle and tapping cycle does not switch ON/OFF of the "Manual arbitrary reverse run mode ON" (X715). For the specific movement block, refer to the section of the "Actual cutting mode (thread, tap) in manual arbitrary reverse run" (Y761).
[Operation sequence]
[Related signals]
(1) Manual arbitrary reverse run mode ON (PCHKO: X715)
(2) Manual arbitrary reverse run: Reverse run ON (MOREV: X716)
(3) Thread, tap block stopping in manual arbitrary reverse run (MBSTP: X74D)
(4) Thread, tap reverse run prohibition alarm in manual arbitrary reverse run (MRVNG: X74E)
(5) Manual arbitrary reverse run speed selection (MORSP: Y73D)
(6) Actual cutting mode (thread, tap) in manual arbitrary reverse run (MRCMD: Y761)
(7) Manual arbitrary reverse run: MSTB reverse run prohibited (MRPSG: YCFC)
(8) Manual arbitrary reverse run: Reverse run block stop designated part system (RBSSY: YD01)
(9) Manual arbitrary reverse run handle selection (R375)
(10)Manual arbitrary reverse run speed multiplier (R379)
Cont. Signal name Abbrev. Common ($)
A Manual arbitrary reverse run mode MORR Y73C
Memory or MDI mode
(Part system 1 +
active part system(s))
Command speed Command speed
Manual arbitrary
reverse run speed
Manual arbitrary
reverse run enabled
Manual arbitrary
reverse run disabled
Handle or jog mode
($1)
Manual arbitrary reverse run
speed selection
(MORSP Y73D)
Manual arbitrary reverse run
mode
(MORR Y73C)
ON
OFF
ON
OFF
ON
OFF
ON
OFF

[Function]
In speed control during manual arbitrary reverse run, this signal enables the program check speed constant.
[Operation]
When this signal is ON, the program check speed constant is used for speed control. When this signal is OFF, the command speed in the normal machining program is used.
The feedrate for manual arbitrary reverse run is controlled by the "Manual arbitrary reverse run speed multiplier" (R379) when operation is in jog mode. In handle mode, the feedrate is controlled by the ratio of the handle pulses per unit time and "#19007 program check constant".
When this signal is OFF, the command speed in the normal machining program is used.
<The speed used when the "Manual arbitrary reverse run speed selection" (MORSP) is ON>
When jog mode is selected:
Manual arbitrary reverse run speed is calculated from the following formula.
When handle mode is selected:
The manual arbitrary reverse run speed can be calculated from the following formula.
Rapid traverse override or cutting override can be exerted on the command speed in the machining program.
Reverse motion is performed if the value of the manual arbitrary reverse run speed calculated with the above formula is a negative value.
As the same rate of change of the manual arbitrary reverse run speed is applied to all part systems, synchronization of the part systems can be maintained.
However, synchronization is not guaranteed when synchronization relationship is broken due to rapid traverse override or cutting override.
If the value of the "Manual arbitrary reverse run speed multiplier" (R379) or the amount of change of handle pulses exceeds "#19007 Prg check constant", the value is clamped at "#19007 Prg check constant".
The manual arbitrary reverse run speed never exceeds the command speed.
[Related signals]
(1) Manual arbitrary reverse run mode ON (PCHKO: X715)
(2) Manual arbitrary reverse run: Reverse run ON (MOREV: X716)
(3) Thread, tap block stopping in manual arbitrary reverse run (MBSTP: X74D)
(4) Thread, tap reverse run prohibition alarm in manual arbitrary reverse run (MRVNG: X74E)
(5) Manual arbitrary reverse run mode (MORR: Y73C)
(6) Actual cutting mode (thread, tap) in manual arbitrary reverse run (MRCMD: Y761)

(7) Manual arbitrary reverse run: MSTB reverse run prohibited (MRPSG: YCFC)
(8) Manual arbitrary reverse run: Reverse run block stop designated part system (RBSSY: YD01)
(9) Manual arbitrary reverse run handle selection (R375)
(10)Manual arbitrary reverse run speed multiplier (R379)
Cont. Signal name Abbrev. Common ($)
A Manual arbitrary reverse run speed selection MORSP Y73D
Manual arbitrary reverse run speed multiplier
Program check speed constant
Command speed in the
machining program
Change amount of handle pulse per unit time
Manual arbitrary reverse run speed multiplier
Program check speed constant
Command speed in the
machining program

[Function]
This signal enables the high-speed simple program check function.
[Operation]
When this signal is enabled, the machining program is executed while all axes are in machine lock.
In this operation, the feedrate of the machining program changes according to the value of the "High-speed simple program check: Time reduction coefficient" (R378).
[Related signals]
(1) High-speed simple program check mode ON (SMLKO: X712)
(2) High-speed simple program check: Time reduction coefficient (R378)
(3) High-speed simple program check: Time measurement output (R372,3)
[Function]
This signal enables interference check between part systems.
[Operation]
When this signal is turned ON, the interference check between part systems is started.
When this signal is turned OFF, the interference check between part systems is completed.
[Related signals]
(1) Interference check between part systems: Mode is active (X773)
(2) Interference check between part systems: Setting error alarm information (R101)
(3) Interference check between part systems: Alarm information (R102)
[Function]
This signal carries out a contactor shutoff test.
[Operation]
Send a "ready OFF" command to the drive unit at the rising edge of the "Contactor shutoff test" signal and shut the drive unit side contactor OFF. Then, turn MC_ct1 of I/O unit connector (contactor shutoff output 1) output OFF and shut the NC side contactor OFF.
Confirm that the contactor's status is OFF by monitoring contactor's auxiliary B contact signal, then send a "ready ON" command to the drive unit to turn the drive unit side contactor ON. Turn ON the safety monitor connector output, then the NC side contactor. After that, turn the "24 hours continuous operation" signal OFF.
If the contactor shutoff could not be confirmed within 5 seconds, the alarm (Y20 0008) is output and the status turns to the emergency stop.
If the motor power cannot be shut off by STO within 5 seconds when STO function is enabled, the alarm (Y20 0013) is output and the status turns to the emergency stop.
[Timing chart]
[Caution]
(1) Contactor shutoff test must be carried out when the drive power can be shut off without causing any problem.
(2) Vertical axis requires brake circuit, etc. for a fall prevention.
[Related signals]
(1) 24 hours continuous operation (X752)
(2) Emergency stop cause (R69)
Cont. Signal name Abbrev. Common ($)
A High-speed simple program check mode SMLK Y73E
Cont. Signal name Abbrev. Common ($)
A Interference check between part systems: Interference
check enabled CCHK Y73F
Cont. Signal name Abbrev. Common ($)
A Contactor shutoff test MCT Y742
24 hours continuous operation (CNOP)
Contactor shutoff test (MCT)
Servo ready state
Contactor's auxiliary b contact signal

[Function]
This is the skip input signal from the PLC.
Skip operation can be performed under conditions set by built-in PLC.
PLC skip operates by logical sum of the high speed skip (a fixed signal on the hardware).
[Operation]
This can be used for the skip related functions. (G31 skip, tool length measurement, etc.)
[Caution]
(1) The PLC skip signal is output to the skip input.
(2) When PLC skip is used, the coasting amount from the skip signal input will be slightly longer than the high speed skip.
Cont. Signal name Abbrev. Common ($)
A PLC skip 1 to 8 Y748 to F

[Function]
Automatic power OFF function notifies that the control unit's power can be turned OFF after shutting the display unit down (do not turn OFF the power) by inputting the "Automatic power OFF request" signal from user PLC to NC.
For M800VW/M80VW Series, an Windows-equipped display unit can be shut down automatically.
[Operation]
When the user PLC turns ON the "Automatic power OFF request" signal (Y75D), NC requests the display unit to be shut down after turning ON the "Power OFF processing" signal (X707).
<M800VW/M80VW Series>
The device specified by the "Power OFF indication Y device No." signal (R215) is turned ON after NC has received the shutdown completion notification from the display unit or the timeout time has passed.
When the control unit and display unit use different power supplies, confirm that the Y device which notifies the power failure (Y device specified by R215) is turned ON, and then turn OFF the power of the control unit.
<M800VS/M80V Series>
One second after the "Power OFF processing" signal (X707) is turned ON, turn ON the device specified by the "Power OFF indication Y device No." (R215) signal. Turn OFF the control unit's power after confirming the Y device (Y device designated with R215) which notifies that the power is turned OFF has turned ON.
Cont. Signal name Abbrev. Common ($)
A Automatic power OFF request Y75D
NC
R215
Y75D
X707
Yxx
User PLC
Display unit
M800VW/M80VW Series
M800VS/M80V Series
Power OFF indication Y device No.
Shutdown
request
Shutdown
(Do not turn OFF the
power)
Shutdown completion notice
(Only for M800VW/M80VW)
Receiving the shutdown
completion notice or
time-out period has passed
Power OFF indication
(Y device designated with R215)
Power OFF
Automatic power
OFF request
Power OFF
processing
Control unit
power
M800V/M80V Series PLC Interface Manual
4 Explanation of Interface Signals
4.3 PLC Output Signals (Bit Type: Y***)
IB-1501616-F 384
[Timing chart]
<M800VW/M80VW Series>
<M800VS/M80V Series>
[Caution]
(1) Time including the time required for HMI application termination and Windows shutdown has to be set in the machine parameter "#11007 PC Timeout".
(2) Normal power OFF processing is executed when the control unit's power is turned OFF during automatic power OFF processing.
(3) When an illegal IP address is set to the machine parameter "#11005 PC IP address", the personal computer on the network may be turned OFF.
(4) Do not execute the automatic power OFF function during editing or file I/O operation, etc.
(5) The automatic power OFF function is carried out to the display unit set to the machine parameter "#11005 PC IP address".
(6) During spindle rotation or control axis movement, execute automatic power OFF after these actions stopped.
[Related signals]
(1) Power OFF processing (X707)
(2) Power OFF indication Y device No. (R215)
Automatic power
OFF request (Y75D)
Power OFF
processing (X707)
Y device to indicate the power
OFF
(designated with R215)
Display unit
(time-out period)
Shutdown request
Shutdown
completion notice
Display unit
shutdown
Power OFF processing ON
Automatic power OFF request
(Y75D)
Power OFF processing
(X707)
(Fixed to 1 second.)

Y device to indicate the power
OFF
(designated with R215)

[Function]
This signal determines operation concerning the thread cutting and tapping blocks during manual arbitrary reverse run.
[Operation]
When this signal is ON, thread cutting and tapping during manual arbitrary reverse run operate in the actual cutting mode (the command speed of the machining program).
When this signal is turned OFF, the thread cutting and tapping during manual arbitrary reverse run operate in dry run operation mode (program check speed).
However, even if this signal is switched ON/OFF in the specific operation block during reverse run, thread cutting, thread cutting cycle and tapping cycle, ON/OFF of the "Manual arbitrary reverse run: Actual cutting mode ON" signal (X714) is not switched.
Specific operation block
In the figure above, when this signal is turned ON/OFF while the block with dotted line is moving, ON/OFF of the "Manual arbitrary reverse run: Actual cutting mode ON" signal (X714) is switched at the following timing:
Thread cutting: At the end point of (3) block
Thread cutting cycle: At the end point of (4) block
Tapping cycle: At the end point of (5) block
The following shows the operation sequence when this signal turns ON while (2) block of thread cutting is executed in the figure above.
The "Manual arbitrary reverse run: Actual cutting mode ON" signal (PNCMDO: X714) does not turn ON at the timing when the "Actual cutting mode (thread, tap) in manual arbitrary reverse run" signal (MRCMD: Y761) turns ON. ((a) in the operation sequence)
At the end point of "(3) Block", the "Manual arbitrary reverse run: Actual cutting mode ON" signal (PNCMDO: X714) turns ON. ((b) in the operation sequence)
Cont. Signal name Abbrev. Common ($)
A Actual cutting mode (thread, tap) in manual arbitrary reverse
run MRCMD Y761
X
Z
X
Z
X
Z
(1)
(2)
(3)
(4)
(5)
(6)
(1)
(2)
(3)
(4) (1)
(2)
(4) (3)
Thread cutting Thread cutting cycle Tapping cycle
Specific operation block
In one cycle
ON
OFF
ON
OFF
ON
OFF
ON
OFF
(a) (b)
Movement block (1) Block (2) Block (3) Block (4) Block
Manual arbitrary reverse
run mode
(MORR:Y73C)
Manual arbitrary reverse
run mode ON
(PCHKO:X715)
Actual cutting mode
(thread, tap) in manual
arbitrary reverse run
MRCMD:Y761
Manual arbitrary reverse run:
Actual cutting mode ON
(PNCMDO:X714)

[Related signals]
(1) Manual arbitrary reverse run: Actual cutting mode ON (PNCMDO: X714)
(2) Manual arbitrary reverse run mode ON (PCHKO: X715)
(3) Manual arbitrary reverse run: Reverse run ON (MOREV: X716)
(4) Thread, tap block stopping in manual arbitrary reverse run (MBSTP: X74D)
(5) Thread, tap reverse run prohibition alarm in manual arbitrary reverse run (MRVNG: X74E)
(6) Manual arbitrary reverse run mode (MORR: Y73C)

(7) Manual arbitrary reverse run speed selection (MORSP: Y73D)
(8) Manual arbitrary reverse run: MSTB reverse run prohibited (MRPSG: YCFC)
(9) Manual arbitrary reverse run: Reverse run block stop designated part system (RBSSY: YD01)
(10)Manual arbitrary reverse run handle selection (R375)
(11)Manual arbitrary reverse run speed multiplier (R379)
[Function]
These signals select encoder arbitrary pulse.
[Operation]
[Timing chart]
[Caution]
Switching each encoder's arbitrary pulse selection (Y764 and 765) must be carried out during the spindle stop.
[Related signals]
(1) Encoder 1 arbitrary pulse valid (Y766)
(2) Encoder 2 arbitrary pulse valid (Y767)
(3) Encoder 1 arbitrary pulse 1 (R456)
(4) Encoder 1 arbitrary pulse 2 (R457)
(5) Encoder 2 arbitrary pulse 1 (R458)
(6) Encoder 2 arbitrary pulse 2 (R459)
Cont. Signal name Abbrev. Common ($)
A Encoder 1 arbitrary pulse selection Y764
A Encoder 2 arbitrary pulse selection Y765
Device No. Signal name Details
Y764 Encoder 1 arbitrary pulse selection
Select arbitrary pulse input 1 and 2 set in R register when entering arbi trary pulse with encoder input 1.
0: Encoder 1 arbitrary pulse 1
1: Encoder 1 arbitrary pulse 2
Y765 Encoder 2 arbitrary pulse selection
Select arbitrary pulse input 1 and 2 set in R register when entering arbi trary pulse with encoder input 2.
0: Encoder 2 arbitrary pulse 1
1: Encoder 2 arbitrary pulse 2
Encoder 1 arbitrary pulse valid
(Y766)
Encoder 1 arbitrary pulse selection
(Y764)
Spindle rotation
Encoder 1 arbitrary
pulse 2 is valid
Encoder 1 arbitrary
pulse 1 is valid
Select encoder 1 arbitrary pulse 2 Select encoder 1 arbitrary pulse 1

[Function]
These signals select valid/invalid for encoder arbitrary pulse.
[Operation]
Turn OFF the arbitrary pulse valid signal when using the conventional 1024 pulse encoder.
[Caution]
Turning ON/OFF the encoder arbitrary pulse valid (Y766 and Y767) of the each encoder must be carried out during the spindle stop.
[Related signals]
(1) Encoder 1 arbitrary pulse selection (Y764)
(2) Encoder 2 arbitrary pulse selection (Y765)
(3) Encoder 1 arbitrary pulse 1 (R456)
(4) Encoder 1 arbitrary pulse 2 (R457)
(5) Encoder 2 arbitrary pulse 1 (R458)
(6) Encoder 2 arbitrary pulse 2 (R459)
[Function]
This signal stops all axes, and shuts OFF the contactor.
[Operation]
The NC carries out the following operations when the "Door open I" signal turns ON.
A deceleration stop is carried out for all axes (servo axes and spindles).
A ready OFF state occurs after all axes stop, and each drive unit shuts OFF the contactor.
The "Door open enable" signal turns ON.
The NC carries out the following operations when the "Door open I" signal turns OFF.
A ready ON and servo ON state occurs for all axes.
The "Door open enable" signal turns OFF.
[Caution]
(1) Handling of the PLC axis
For the PLC axis, stop it at the PLC and then output the "Door open I" signal to the NC. If the "Door open I" signal is input without stopping the PLC axis, the axis stops with a dynamic brake method due to the ready OFF state.
(2) Handling of the analog spindle
When an analog spindle is connected, it is not possible to confirm that the spindle has completely stopped with the NC. Thus, confirm that the spindle has completely stopped using the PLC, before opening the door.
Since the spindle may resume rotation immediately after the door is closed, for safety, turn the forward run and reverse run signals OFF when the door is opened.
(3) Opening the door during ATC operation
To open the door while ATC is operating, apply an interlock with the user PLC.
[Related signals]
(1) Door open enable (DROPNS: XCD8)
Cont. Signal name Abbrev. Common ($)
A Encoder 1 arbitrary pulse valid Y766
A Encoder 2 arbitrary pulse valid Y767
Device No. Signal name Details
Y766 Encoder 1 arbitrary pulse valid
Select valid/invalid for arbitrary pulse with the encoder input 1.
0: Invalid (conventional 1024 pulse fixed input)

1: Valid (arbitrary pulse input)
Y767 Encoder 2 arbitrary pulse valid
Select valid/invalid for arbitrary pulse with the encoder input 2.
0: Invalid (conventional 1024 pulse fixed input)
1: Valid (arbitrary pulse input)
Cont. Signal name Abbrev. Common ($)
A Door open I DOOR1 Y768

[Function] [Operation]
This signal enables the interfering object selection set in the system variables (#40000 to #40097) or the "Interference check III: Interfering object selection" (R20304 to R20449).
The "Interference check III: Interfering object selection" is incorporated into NC as the interference check III execution data at the rising edge of this signal.
[Related signals]
(1) Interference check III: Interfering object selection data setting completed (ITF3DTF: X771)
[Function]
The interference check III is executed.
[Operation]
While this signal is ON, interference check between interfering objects is performed using the interfering object data set.
If the interfering object selection is changed while this signal is ON, the interference check is performed using the changed data at the completion of the interfering object selection.
[Related signals]
(1) Interference check III: In interference check III mode (ITF3MD:X772)
Cont. Signal name Abbrev. Common ($)
A Interference check III: Enable interfering object selection
data ITF3VLDT Y769
Cont. Signal name Abbrev. Common ($)
A Interference check III: Interference check III mode ITF3CMD Y76A
Interference check III :
interfering object selection
(R20304 to R20449)
After confirming the Interference check III: Interfering object selection
data setting completed (X771), turn OFF the Interference check III:
Enable interfering object selection data (Y769).
At the timing when the Interference check III: Enable interfering object selection data (Y769)
is turned OFF, the Interference check III: Interfering object selection data setting completed
(X771) also turns OFF.
Interfering object data is incorporated as the interference check execution data(NC)At the
completion, the Interference check III: Interfering object selection data setting completed
(X771) turns ON.
Interference check III: Interfering object
selection data setting completed (X771)
Interference check III: Enable interfering
object selection data (Y769)
Interfering object data is incorporated as the interference check execution data (NC).
Interfering object data setting
Interference check III:
Enable interfering object
selection data (Y769)
Interfering data pattern [1] is set. Interfering data pattern [2] is set.
"Interference check III: Interfering object selection data setting completed" (X771)
will be turned OFF at the same timing that "Interference check III: Enable
interfering object selection data" (Y769) is turned OFF.
Interference check III:
Interfering object selection
data setting completed (X771)
Interference check III:
Interference check III mode
(Y76A)
Interference check III:
In interference check III mode
(X772)
State of interference
check III Check is performed
with data pattern [2]
The interference check is performed with the interference
execution data which is already set. During execution,
"Interference check III: In interference check III mode"
(X772) will be turned ON.
When "Interference check III: Interference check III mode" (Y76A)
is turned OFF, the execution of the interference check will end.
"Interference check III: In interference check III mode" (X772) will
also be turned OFF.
Check is performed
with data pattern [1]
Check not
performed
Check not
performed

[Function]
This signal enables the following check when NC reset is input during high-speed simple program check: difference check

for the workpiece coordinate position and command machine coordinate position at the beginning of the machining program and at NC reset input.
[Operation]
If the following conditions are met, the workpiece coordinate position and command machine coordinate position at the beginning of the machining program are compared with these positions at NC reset input: this signal is turned ON during high-speed simple program check and NC reset is input while the "High-speed simple program check: Coordinate position check ON" signal (X713) is ON.
If any difference is detected, an operation error occurs.
This check is performed only for the following axes: the axes for which workpiece coordinate position/command machine coordinate position checks are enabled with parameters "#8226 work position check" and "#8227 machine position check".
[Timing chart]
[Related signals]
(1) High-speed simple program check mode (SMLK: Y73E)
(2) High-speed simple program check mode ON (SMLKO: X712)
(3) High-speed simple program check: Coordinate position check ON (SPSCO: X713)
Cont. Signal name Abbrev. Common ($)
A High-speed simple program check: Enable coordinate posi tion check SPSC Y76B
G0X100.
G0Z50.
M02
M02
The difference between the workpiece coordinate position and machine
coordinate position at machining program start and NC reset input is checked.
High-speed simple program
check mode
(Y73E)
In high-speed simple program
check mode
(X712)
High-speed simple program check
coordinate position enable (Y76B)
NC reset : $1
(NRST1, NRST2, RRW)
NC reset : $2
(NRST1, NRST2, RRW)
High-speed simple program check
coordinate position enabled (X713)
Automatic operation start (ST)
$1/$2
Machining program : $1
Machining program : $2
M800V/M80V Series PLC Interface Manual
4 Explanation of Interface Signals
4.3 PLC Output Signals (Bit Type: Y***)
IB-1501616-F 390
[Function]
PLC axis control process is executed with the control information data while the PLC axis control valid signal is ON.
[Operation]
To turn ON the PLC axis control valid signal, specify it with the following device.
(1) When the PLC axis control valid signal is turned OFF, the reset state is activated.
[Related signals]
(1) PLC axis control buffering mode valid (PABMI: Y723)
(2) PLC axis control information address (R440 to R447)
[Function]
This signal enables the guide bushing (G/B) spindle synchronization function.
[Operation]
The spindle synchronization state is entered by turning ON this signal.
[Related signals]
(1) G/B spindle synchronizing mode (GBMOD: X778)
(2) G/B spindle synchronization: Position control synchronizing (GBSYN: X779)
(3) G/B spindle synchronization: Phase shift amount (R466)
[Function]
This signal aligns the phase (relative position) of the rotating reference spindle and the guide bushing (G/B) spindle.
[Operation]
When this signal is ON, and when the reference spindle and the guide bushing spindle are in the synchronous state (the "G/B spindle synchronization valid" signal (GBON) is ON) and also when they are in the steady rotation state, a phase alignment of the reference spindle and the G/B spindle is carried out targeting the phase gap (relative position) between the reference spindle and the G/B spindle that have been saved by the "G/B spindle synchronization phase memory" (GBPHM).
[Related signals]
(1) G/B spindle synchronization valid (GBON: Y778)
(2) G/B spindle synchronization: Phase memory (GBPHM: Y77B)
(3) G/B synchronization: Phase alignment complete (GBPHF: X77A)
(4) Spindle up-to-speed (USO: X188D)
Cont. Signal name Abbrev. Common ($)
A PLC axis control valid n-th axis PLCAEn Y770 to 7
Device No. Signal name
Y770 PLC axis control valid 1st axis
Y771 PLC axis control valid 2nd axis
Y772 PLC axis control valid 3rd axis
Y773 PLC axis control valid 4th axis
Y774 PLC axis control valid 5th axis
Y775 PLC axis control valid 6th axis
Y776 PLC axis control valid 7th axis
Y777 PLC axis control valid 8th axis
Cont. Signal name Abbrev. Common ($)
A G/B spindle synchronization valid GBON Y778

Cont. Signal name Abbrev. Common ($)
A G/B spindle synchronization: Phase alignment GBPHS Y77A
Note

[Function]
This signal saves the phase gap (relative position) between the reference spindle and the guide bushing (G/B) spindle in the NC.
[Operation]
The reference spindle and the guide bushing spindle are rotated by one revolution or more (until the Z phase is passed) in synchronous state (the "G/B spindle synchronization valid" (GBON) is ON), and then stopped. After both of them stop, the NC saves the phase gap (relative position) at the rising edge of this signal.
[Related signals]
(1) G/B spindle synchronization valid (GBON: Y778)
(2) Z phase passed (SZPH: X1895)
(3) Zero speed (ZSO: X188C)
(4) G/B spindle synchronization: Phase shift amount (R466)
[Function]
This signal carries out compensation by finding the position error compensation amount based on the position error of the reference spindle and the guide bushing (G/B) spindle caused by a square bar's torsion.
[Operation]
When this signal is turned ON, the position error compensation amount of the reference spindle and the guide bushing spindle is found, and the guide bushing spindle synchronization position error compensation starts.
[Related signals]
(1) G/B spindle synchronization valid (GBON: Y778)
(2) G/B spindle synchronization: Keep position error compensation amount (GBCMKP: Y77E)
(3) G/B spindle synchronization: Position error compensation scale and the number of times of compensations (R390)
(4) G/B spindle synchronization: Position error compensating (GBPCM: X77B)
(5) G/B spindle synchronization: Position error compensation amount (R465)
[Function]
The reference spindle and the guide bushing (G/B) spindle can be controlled independently by temporarily canceling the guide bushing spindle synchronization using this signal.
[Operation]
ON: Guide bushing spindle synchronization temporarily canceled
OFF: Guide bushing spindle synchronization can be enabled
The following signals are disabled when this signal is ON, and they are enabled when this signal is OFF.
Y778 (G/B spindle synchronization valid)
Y77A (G/B spindle synchronization: Phase alignment)
Y77B (G/B spindle synchronization: Phase memory)
Y77C (G/B spindle synchronization: Position error compensation)
Y77E (G/B spindle synchronization: Keep position error compensation amount)
The operation error (M01 1137) occurs if this signal is turned ON/OFF when the reference spindle or the guide bushing spindle is in any of the following modes.
During rotation (when not stopped)
During tap cycle synchronization mode
During spindle synchronization mode/tool-spindle synchronization I (polygon machining) mode/tool-spindle synchroni zation II (hobbing) mode
During C axis mode of spindle/C axis control
During orientation/indexing
Cont. Signal name Abbrev. Common ($)
A G/B spindle synchronization: Phase memory GBPHM Y77B
Cont. Signal name Abbrev. Common ($)
A G/B spindle synchronization: Position error compensation GBCMON Y77C
Cont. Signal name Abbrev. Common ($)
A G/B spindle synchronization: Temporary cancel GBOFF Y77D

[Function]
Select whether to cancel or hold the guide bushing (G/B) spindle synchronization position error compensation execution state when the "G/B spindle synchronization: position error compensation" signal (GBCMON) is OFF.
[Operation]
OFF: Position error compensation execution state is canceled
(The guide bushing spindle returns to the position before compensation. The guide bushing spindle synchronization position error compensation execution state is canceled.)
ON: Position error compensation execution state is held
(The guide bushing spindle does not return to the position before compensation. The guide bushing spindle synchronization position error compensation execution state is held.)
[Related signals]
(1) G/B spindle synchronization valid (Y778)
(2) G/B spindle synchronization: Position error compensation (GBCMON: Y77C)
(3) G/B spindle synchronization: Position error compensation scale and the number of times of compensations (R390)
(4) G/B spindle synchronization: Position error compensating (GBPCM: X77B)
(5) G/B spindle synchronization: Position error compensation amount (R465)
[Function]
Desired control axis can be excluded from the control target.
This is a signal for each control axis, and the number at the end of the signal name indicates the control axis No.
[Operation]
When the "Control axis detachment" signal (DTCHn) turns ON, the corresponding axis is excluded from control.
Specified axis is not under any positioning control (oriented spindle stop, index, etc.)
Alarms related to specified axis, such as servo alarms, stroke end alarms are ignored.
The interlock signal of the corresponding axis is deemed to be ON.
Specified axis is displayed in the position counter on the screen.
(1) The same function can be used by setting parameter on the screen. (See below)
The control axis detachment is valid when the following settings are enabled.
Cont. Signal name Abbrev. Common ($)

A G/B spindle synchronization: Keep position error compen sation amount signal GBCMKP Y77E
Cont. Signal name Abbrev. $1 $2 $3 $4
A Control axis detachment n-th axis DTCH1 to 8 Y780 to 7 Y788 to F Y790 to 7 Y798 to F
DTCHn
1 ..... 1st axis is detached
:
:
8 ..... 8th axis is detached
Note
Basic specification parameter
"#1070 axoff" (axis detach), and
control axis detach n-th axis(DTCHn)
or
Basic specification parameter
"#1070 axoff" (axis detach), and
axis parameter of machining parameter
"#8201 AX. RELEASE"

[Function]
The control axis can be in the servo OFF state (the state in which the servo motor loses driving force).
In servo OFF condition, positioning control is impossible but the position detection function itself remains enabled.
Therefore, the position is not lost.
This is a signal for each control axis, and the number at the end of the signal abbreviation (n = 1,2,3 ...) indicates the control axis No.
[Operation]
When the "Servo OFF" signal (*SVFn) turns OFF, the corresponding control axis is set to servo OFF condition.
If the axis has moved for some reason while the servo is OFF, whether to compensate the movement amount at the next servo ON can be determined by the parameter settings. ("#1064 svof" (Error correction))
<When displacement is corrected (follow-up)>
An amount of motion equal to the displacement is commanded so that positioning error becomes zero.
In this case, even if the "Servo OFF" signal is restored, machine position remains deviated from in-position. However, the current position of the position counter has been updated by the amount of deviation, and the machine position is corrected with the next absolute command. (The "Manual absolute" signal (ABSn) is turned ON when manual operation is selected.)
<When displacement is not corrected>
In this case, when the "Servo OFF" signal is restored, machine is moved to its original position by the amount of move ment.
<Servo-OFF during motion>
(*1) While the axis is moving, the servo turns OFF after decelerated and stopped.
(*2) Controller internal interlock by servo OFF (axis motion not possible)
[Caution]
These signals are all handled as B contacts.
Cont. Signal name Abbrev. $1 $2 $3 $4
B Servo OFF n-th axis *SVF1 to 8 Y7A0 to 7 Y7A8 to F Y7B0 to 7 Y7B8 to F
Servo OFF (*SVFn)
Axis motion
Servo ready
n-th axis
(*2)
(*1)
(*3)
Approx.
0.7 s

[Function]
This signal is used to machine a symmetrical shape by reversing the sign of the movement amount for each block.
This is a signal for each control axis, and the number at the end of the signal name indicates the control axis No.
[Operation]
Symmetrical cutting is enabled by reversing the sign of the value commanded for memory or MDI operation.
Regardless of whether the coordinate is commanded with an incremental command or absolute command, the mirror image is applied on the incremental amount to be executed for all axes that can be controlled.
[Caution]
(1) The mirror image is changed after block stop.
(2) Even when this signal (Y7C0 and later) is turned ON for the axis used in the loader-dedicated part system, the mirror image is not applied.
(Even when the axis parameter "#8211 MIRR. IMAGE" is set to "1" (enable) for the axes used in the loader-dedicated part system, the parameter setting is ignored.)
[Related signals]
(1) In mirror image n-th axis (MIRn: X9C7)
Cont. Signal name Abbrev. $1 $2 $3 $4
A Mirror image n-th axis MI1 to 8 Y7C0 to 7 Y7C8 to F Y7D0 to 7 Y7D8 to F
MIn
1: Mirror image is applied on 1st axis.
:
8: Mirror image is applied on 8th axis.

[Function]
While this signal (*+EDTn) is OFF, the feedrate when the control axis moves in the "+" direction can be set to the constant speed set by the parameters.
This signal is a signal for each control axis, and the number at the end of the signal name indicates the control axis No.

[Operation]
When the "External deceleration" signal (*+EDTn) turns OFF, each axis decelerates independently in manual operation.
However, in automatic operation, when even one axis matches the external deceleration conditions, all axes will be decelerated. The deceleration occurs when the direction of the moving axis and the direction of the "External deceleration" signal of the corresponding axis match.
The external deceleration speed can be set arbitrarily by setting the parameters. (#1216 extdcc)
When the speed is slower than the external deceleration speed, it will not be affected even if this signal turns OFF.
The deceleration speed during automatic operation will be the combined deceleration speed, if the deceleration condi tions match and the external deceleration speed is exceeded.
To return in the reverse direction, the speed immediately returns to the correct command speed.
For G28, G29 and G30 commands, even in automatic operation, the speed becomes the external deceleration speed only for the axis for which this signal is OFF.
The speed becomes the external deceleration speed even in rapid traverse during synchronous tapping.
[Caution]
(1) The "External deceleration" signal is handled as a B contact (*) signal; however, it changes to "1" (ON) when the power is turned ON. When this signal is not used, there is no need to program for external deceleration.
[Function] [Operation]
The functions and operations of this signal are the same as those of the "External deceleration+ n-th axis" signal (*+EDTn). The deceleration occurs when the movement is in the minus direction and the "External deceleration- n-th axis" signal (*-EDTn) is turned OFF.
Cont. Signal name Abbrev. $1 $2 $3 $4
B External deceleration+ n-th axis *+EDT1 to 8 Y7E0 to 7 Y7E8 to F Y7F0 to 7 Y7F8 to F
Cont. Signal name Abbrev. $1 $2 $3 $4
B External deceleration- n-th axis *-EDT1 to 8 Y800 to 7 Y808 to F Y810 to 7 Y818 to F
* + E D T n
1 ... The 1st axis is decelerated.
:
:
8 ... The 8th axis is decelerated.
Axis movement + direction movement
External deceleration speed
External deceleration+ (*+EDTn)
External deceleration- (*-EDTn) *-EDTn is invalid during + direction movement

[Function]
All axis motions of machine can be decelerated and stopped immediately during automatic operation when motion of a specific axis (n-th axis) in plus direction activates the interlock function.
This signal is a signal for each control axis, and the number at the end of the signal name indicates the control axis No.
[Operation]
When this signal turns OFF for a specific axis in motion in the plus direction under automatic operation mode (memory, MDI or tape), motion of all axis decelerates and stops with the NC alarm (operation error (M01 0004)).
When this signal is OFF before the axis movement, the system completes calculation for axis motion but makes it remain stopped with the same operation error code displayed. In either case, setting the signal ON (1) resumes or starts axis motion.
[Caution]
(1) All automatic interlock signals are for B contact.
(2) When the power is turned ON, the "Automatic interlock" signal is set to "1". Therefore, there is no need to create an interlock cancel state in the sequence program for unused axes.
[Related signals]
(1) Automatic interlock- n-th axis (*-AITn: Y840)
(2) Manual interlock+/- n-th axis (*+/-MITn: Y860/Y880)
[Function] [Operation]
The details are the same as the "Automatic interlock+ n-th axis" signal, except that the direction is opposite.
The "Automatic interlock+ n-th axis" signal is valid for the axis moving in the plus direction, and this signal is valid for the axis moving in the minus direction.
This signal is a signal for each control axis, and the number at the end of the signal name indicates the control axis No.
[Related signals]
(1) Automatic interlock+ n-th axis (*+AITn: Y820)
(2) Manual interlock+/- n-th axis (*+/-MITn: Y860/Y880)
Cont. Signal name Abbrev. $1 $2 $3 $4
B Automatic interlock+ n-th axis *+AIT1 to 8 Y820 to 7 Y828 to F Y830 to 7 Y838 to F
Cont. Signal name Abbrev. $1 $2 $3 $4
B Automatic interlock- n-th axis *-AIT1 to 8 Y840 to 7 Y848 to F Y850 to 7 Y858 to F
*+AITn
1 ..... Automatic interlock+ 1st axis
:
:
8 ..... Automatic interlock+ 8th axis
*-AITn
1 ..... Automatic interlock- 1st axis
:
:
8 ..... Automatic interlock- 8th axis

[Function]
When the corresponding axis is moving in the plus direction with manual operation (jog, manual, incremental, reference position return), only the corresponding axis can be decelerated and stopped by turning OFF this signal that corresponds to that axis.
This signal is the signal for each control axis, and the number at the end of the signal name indicates the control axis No.
[Operation]
When this signal turns OFF (0) for a specific axis in motion in the plus direction under manual operation mode (jog, handle, incremental, reference position return), motion of the axis decelerates and stops with the NC alarm (operation error (M01 0004)).

When this signal is OFF before the axis movement, the axis does not start moving and the same operation error code is displayed. In either case, setting the signal ON resumes or starts axis motion.

[Caution]

(1) All interlock signals are for B contact.

(2) When the power is turned ON, the "Manual interlock" signal is set to "1". Therefore, there is no need to create an inter lock cancel state in the sequence program for unused axis.

[Related signals]

(1) Manual interlock- n-th axis (*-MITn: Y880)

(2) Automatic interlock+/- n-th axis (*+/-AITn: Y820/Y840)

[Function] [Operation]

The details are the same as the "Manual interlock+ n-th axis" signal, except that the direction is opposite.

The "Manual interlock+ n-th axis" signal is valid for the axis moving in the plus direction, and this signal is valid for the axis moving in the minus direction.

This signal is a signal for each control axis, and the number at the end of the signal name indicates the control axis No.

[Related signals]

(1) Manual interlock+ n-th axis (*+MITn: Y860)

(2) Automatic interlock+/- n-th axis (*+/-AITn: Y820/Y840)

Cont. Signal name Abbrev. $1 $2 $3 $4

B Manual interlock+ n-th axis *+MIT1 to 8 Y860 to 7 Y868 to F Y870 to 7 Y878 to F

Cont. Signal name Abbrev. $1 $2 $3 $4

B Manual interlock- n-th axis *-MIT1 to 8 Y880 to 7 Y888 to F Y890 to 7 Y898 to F

*+MITn

1 ..... Manual interlock+ 1st axis

:

:

8 ..... Manual interlock+ 8th axis

*-MITn

1 ..... Manual interlock- 1st axis

:

:

8 ..... Manual interlock- 8th axis

[Function]

During automatic operation, the current position (counter) can be updated and the program can be checked without moving the desired axis.

This signal is a signal for each control axis, and the number at the end of the signal name indicates the control axis No.

[Operation]

In the automatic operation (memory, MDI or tape), when this signal is ON, the current position (counter) is updated without moving the corresponding axis (for which the signal is ON) of the machine. However, if this signal turns ON in the middle of a block (during movement), block termination occurs after the completion of that block, and then the machine lock is enabled from the next block.

[Caution]

(1) If the "Automatic machine lock" signal changes during automatic operation, block stop occurs after completion of the block in execution.

(2) To move only the table without drilling to confirm the drilling position of the drilling operation, turn ON the signal of the 3rd axis of this signal (AMLK3) if the drilling axis is the 3rd axis. (Equivalent to Z axis cancel)

[Related signals]

(1) Manual machine lock n-th axis (MMLKn: Y8C0)

[Function]

When manual operation is performed, only the current position (counter) can be updated without moving the desired axis.

[Operation]

When this signal is ON during manual operation, only the current position is updated without moving the corresponding axis (signal ON axis) of the machine. However, even if this signal turns ON or OFF while moving the axis, the operation is processed in the state at the start of movement. It is required to stop motion of all axes to enable the machine lock.

This signal is a signal for each control axis, and the number at the end of the signal name indicates the control axis No.

[Related signals]

(1) Automatic machine lock n-th axis (AMLKn: Y8A0)

Cont. Signal name Abbrev. $1 $2 $3 $4

A Automatic machine lock n-th axis AMLK1 to 8 Y8A0 to 7 Y8A8 to F Y8B0 to 7 Y8B8 to F

Cont. Signal name Abbrev. $1 $2 $3 $4

A Manual machine lock n-th axis MMLK1 to 8 Y8C0 to 7 Y8C8 to F Y8D0 to 7 Y8D8 to F

AMLKn

1 ..... Automatic machine lock 1st axis

:

:

8 ..... Automatic machine lock 8th axis

MMLKn

1 ..... Manual machine lock 1st axis

:

:

8 ..... Manual machine lock 8th axis

[Function]

This signal is used to start movement (jog feed, incremental feed or reference position return mode) in plus direction during manual operation.

This signal is a signal for each control axis, and the number at the end of the signal name indicates the control axis No.

[Operation]

When the feed axis selection signal (+Jn) is turned ON, the controller operates as follows.

When jog feed, incremental feed or reference position return is possible, motion in plus direction occurs on the selected axis.

In jog feed, motion continues while the signal is ON.

In incremental feed, the amount of movement set in the "Handle/Incremental feed magnification code m" is fed in the plus direction. Even when this signal (+Jn) turns OFF during movement, the feed does not stop. To start the movement

again, turn this signal OFF, confirm the movement is completed, then turn this signal ON.
After reference position return mode is decelerated to approach speed by the near point detection dog, the motion con tinues, even after the feed axis selection signal is turned OFF, until motion reaches the reference position.
(1) If the "+" direction selection and the "-" direction selection of the feed axis selection signal are turned ON at the same time, neither is selected and it is equivalent to the case where the feed axis selection signal is OFF.
(2) If the feed axis selection signal turns ON before jog, incremental or reference position return mode is selected, the feed axis selection signal is ignored. In this case, the feed axis selection signal need to be turned OFF and then turn it ON again.
(3) If reset is exerted while the feed axis selection signal is ON, or the feed axis selection signal turns ON during the reset, the feed axis selection signal is invalid even when the reset is canceled. In this case, the feed axis selection sig nal need to be turned OFF and then turn it ON again.
(4) When the relevant axis is decelerating (when the command output is not completed), the feed axis selection signal is invalid even if it is turned ON. This signal must be turned from OFF to ON again after the deceleration is completely finished (command output is completed). Be especially careful when the feed axis direction changes.
(5) In the case of two part systems, even if the feed axis selection of the 1st part system and the 2nd part system is turned ON in the same cycle (scan) of the sequence, they may not start at exactly the same time.
[Related signals]
(1) Feed axis selection- n-th axis (-Jn: Y900)
Cont. Signal name Abbrev. $1 $2 $3 $4
A Feed axis selection+ n-th axis +J1 to 8 Y8E0 to 7 Y8E8 to F Y8F0 to 7 Y8F8 to F
+Jn
1 ... 1st axis is selected for feed motion
:
:
8 ... 8th axis is selected for feed motion
+... Feed motion in + direction
- ... Feed motion in - direction
Jog mode(J)
Feed axis selection (+J1)
1st axis motion [+]
Incremental feed mode (S)
Feed axis selection (+J1)
1st axis motion [+]
Note

[Function]
This signal is used to feed the axis in the minus (-) direction during jog feed, incremental feed or reference position return mode in manual operation.
This signal is a signal for each control axis, and the number at the end of the signal name indicates the control axis No.
(Refer to the "Feed axis selection+ n-th axis" for details.)
[Operation]
The operation is the same as the feed axis selection+.
Use this signal to move the axis in the minus (-) direction.
[Related signals]
(1) Feed axis selection+ n-th axis (+Jn: Y8E0)
Cont. Signal name Abbrev. $1 $2 $3 $4
A Feed axis selection- n-th axis -J1 to 8 Y900 to 7 Y908 to F Y910 to 7 Y918 to F

[Function]
The automatic mode (tape, MDI, memory) and manual mode (handle, step, jog, manual reference position return) can be simultaneously selected, and manual operation can be performed during automatic operation. (Arbitrary feed with the PLC is also possible.)
[Operation]
The manual/automatic simultaneous mode is entered when the automatic mode and manual mode are selected simultaneously. The manual operation axis operated during the manual/automatic simultaneous mode are selected by this signal. The axis selected with this signal can be operated in the manual mode during automatic operation.
(1) If an axis command is issued to an axis selected by this signal from the automatic mode, the "M01 OPERATION ERROR 0005" occurs. The automatic operation is interlocked until the operation error is canceled.
(2) During the automatic mode (when manual is not selected and manual/automatic simultaneous mode is not entered), this signal will be invalid and the interlock will not be applied.
(3) If this signal turns ON in respect to an axis commanded with automatic during the manual/automatic simultaneous mode, an interlock is applied on the axis, and the axis immediately decelerates and stops. (The "M01 OPERATION ERROR 0005" will occur.)
After the axis decelerates and stops, operation with the manual mode is possible. Note that the interlock is also be applied during the tap modal.
(4) In the manual/automatic simultaneous mode and the automatic mode, the manual axis command with this signal is OFF completely invalid. Note that interruption with the manual handle is possible.
(5) The feedrates of the automatic command axis and the manual command axis are independent. The acceleration/ deceleration modes (rapid traverse, cutting feed) are also independent.
(6) The rapid traverse override, cutting feed override and 2nd cutting feedrate override are valid for both the automatic command axis and manual command axis. (Note that the cutting and 2nd cutting overrides to the manual command axis are valid when the manual cutting override is valid.) Override cancel is valid for the automatic command axis.
(7) The manual interlock is valid for the manual command axis, and the automatic interlock is valid for the automatic com mand axis.
(8) The signals during cutting feed and rapid traverse follow the movement mode of the automatic command axis.
(9) The axis movement with manual movement axis does not stop with a single block stop or feed hold.
(10)If the G92 and G53 commands are issued in the automatic mode to an axis for which this signal is ON, the G92 and G53 commands are executed after the manual axis movement is stopped (An axis command by G53 will cause an operation error after the manual axis movement is stopped.)
(11)If a soft limit or OT is applied on the manual command axis during the manual/automatic simultaneous mode, the automatic command axis also decelerates to a stop, and enters the feed hold state.
(12)When the high-accuracy control or high-speed high-accuracy control mode is valid, if this signal has been changed during execution of movement blocks for the pre-interpolation acceleration/deceleration, the change to this signal is not enabled immediately even if the axis is not moving. The change is enabled when all the axes of the part system decelerate to stop.

<Relation with manual handle interrupt>
The operation of the automatic handle interruption during the manual/auto mode is as follows.
Cont. Signal name Abbrev. $1 $2 $3 $4
A Manual/Automatic simultaneous valid n-th axis MAE1 to 8 Y920 to 7 Y928 to F Y930 to 7 Y938 to F
Axis for which manual/automatic valid signal
is ON
Axis for which manual/automatic valid signal
is OFF
Handle mode
selection
Automatic handle
interrupt
The specifications of the manual/automatic
simultaneous mode will be followed.
The automatic axis command will cause an
operation error, and only the manual axis
command will be valid.
The specifications of the automatic handle in terruption will be followed.
Interruption with the handle can be applied in
respect to the automatic axis movement.
Manual mode other than handle Same as above Same as above
Note

[Function]
This signal enables manual feed using the manual feedrate B.
[Operation]
If this signal is enabled when manual feed is carried out in the jog mode, the axis moves at the speed commanded by manual feedrate B which is commanded separately from the manual feedrate.
This signal is independent for the axes.
<Using the manual feedrate B (Example for 1st part system)>
To set the feedrate common for all axes as the manual feedrate B
(i) Select the "JOG mode" signal (J).
(ii) Turn ON the "Manual feedrate B valid n-th axis" signal (this signal) of the axis to be moved at the manual feedrate B.
(iii) Set the feedrate set as manual feedrate B in the "Manual feedrate B" register.
(iv) Turn ON the "Feed axis selection+" signal or "Feed axis selection-" signal for the axis to be moved at the manual feedrate B.
To set the feedrate independent for each axis as the manual feedrate B
(i) Select the "JOG mode" signal (J).
(ii) Turn ON the "Manual feedrate B valid n-th axis" signal (this signal) of the axis to be moved at the manual feedrate B. Also, turn ON the "Each axis manual feedrate B valid" signal.
(iii) Set the feedrate set as each axis manual feedrate B in the "Each axis manual feedrate B n-th axis" register.
(iv) Turn ON the "Feed axis selection+" signal or "Feed axis selection-" signal for the axis to be moved at the each axis manual feedrate B.
(1) Manual feedrate B is valid only for JOG feed, and is invalid in all other manual modes.
(2) The rapid traverse mode is invalid for the manual feedrate B valid axis.
(3) Manual override is invalid for the manual feedrate B valid axis.
(4) The axis moving at the manual feedrate B decelerates and stops when NC reset is input. To move the axis at the manual feedrate B again, cancel the NC reset, and then turn the axis selection signal OFF and ON.
(5) Even if the feed axis selection signal is turned ON when the command speed is "0", an error occurs and the manual feedrate B valid axis does not move.
(6) The manual/automatic simultaneous signal must be valid to move an arbitrary axis at the manual feedrate B during automatic operation.
(7) When the manual operation mode other than the JOG mode is enabled, the "Jog mode" signal must be enabled simultaneously to move an arbitrary axis at the manual feedrate B.
(8) During synchronous control, the "Manual feedrate B valid n-th axis" signal for the slave axis is invalid, and the manual feed rate B is also valid for the slave axis with the signal for the master axis.
[Related signals]
(1) Jog mode (J: YC00)
(2) Manual feedrate B (R2506, R2507)
(3) Each axis manual feedrate B valid (YC7C)
(4) Each axis manual feedrate B n-th axis (R5764 to R5779)
Cont. Signal name Abbrev. $1 $2 $3 $4
A Manual feedrate B valid n-th axis FBEn Y940 to 7 Y948 to F Y950 to 7 Y958 to F
Note

[Function]
This selects the zero point initialization set with the marked point alignment method in the absolute position detection system.
[Operation]
The zero point initialization set is selected with this signal.
Refer to the section on "Zero point initialization set completed" signal (ZSFn) for details on the operations.
(1) This signal is a function signal for zero point initialization set, and is not a signal that selects the operation mode. Select the jog mode or handle mode to move the axis to a required position.
(2) This signal is valid for the following specifications.
When servo detection specification (motor encoder, servo system) is the absolute position detection system.
When "TYPE" on the [ABS. POSI PARAM] screen is set to "2".
[Related signals]
(1) Zero point initialization set completed (ZSFn: X8C0 to 7)
(2) Zero point initialization set error completed (ZSEn: X8E0 to 7)
(3) In initialization (R574)
(4) Initialization incompletion (R575)

(5) Zero point initialization set start (ZSTn: Y980 to 7)
[Function]
This signal is used to set a desired position as the zero point during the zero point initialization set by the reference point alignment method of the absolute position detection system.
[Operation]
This signal turns ON when a corresponding axis is moved in the zero point initialization set mode, and the position desired as the zero point is reached.
Refer to the section on "Zero point initialization set completed" signal (ZSFn) for details on the operations.
(1) This signal is a function signal for zero point initialization set, and is not a signal that selects the operation mode.
Select the jog mode or handle mode to move the axis to a desired position.
(2) This signal is valid for the following specifications.
When servo detection specification (motor encoder, servo system) is the absolute position detection system.
When "type" on the [ABS. POSI PARAM] screen is set to "2".
(3) This signal is disabled in the following cases:
During emergency stop
In "reset"
When the "Zero point initialization set start" signal (ZSTn) is turned ON before the "Zero point initialization set mode" signal (AZSn).
In this case, turn this signal OFF once, and then turn it ON again.
When the grid (Z-phase signal provided per motor rotation) has never passed after the power is turned ON.
[Related signals]
(1) Zero point initialization set completed (ZSFn: X8C0 to 7)
(2) Zero point initialization set error completed (ZSEn: X8E0 to 7)
(3) In initialization (R574)
(4) Initialization incompletion (R575)
(5) Zero point initialization set mode (AZSn: Y960 to 7)
Cont. Signal name Abbrev. $1 $2 $3 $4
A Zero point initialization set mode n-th axis AZS1 to 8 Y960 to 7 Y968 to F Y970 to 7 Y978 to F
Cont. Signal name Abbrev. $1 $2 $3 $4
A Zero point initialization set start n-th axis ZST1 to 8 Y980 to 7 Y988 to F Y990 to 7 Y998 to F
Note
Note

[Function]
This signal switches current limit value.
[Operation]
This signal turns ON when the current limit is enabled.
The current limit parameter is switched from SV013 to SV014. When the position droop exceeds a certain level, the "Current limit reached" signal (ILA) turns ON.
When the current limit is canceled (from ON to OFF), the parameter is switched from SV014 to SV013. After confirming smoothing zero, cancel the accumulated position droop and adjust the command position to the machine position.
To cancel the droop while the current limit is enabled, turn ON the "Droop cancel request" signal (DOR) instead of turning OFF the "Current limit changeover" signal (ILC) in the timing chart below.
To cancel the current limit without canceling the droop, set the parameter "#1236/bit2" to "1" or turn ON the bit of the target axis of the "Current limit changeover" signal (ILC).
The "In current limit" signal (ILI) turns ON when current limit is enabled. When the current limit is canceled, the signal turns OFF after waiting for the droop to be canceled and the current limit value to be switched.
The user can select whether to interlock when the current limit is reached by the "Current limit mode 1" signal (ILM1) and the "Current limit mode 2" signal (ILM2).
[Related signals]
(1) In current limit n-th axis (ILI1 to 8: X900 to 7)
(2) Current limit reached n-th axis (ILA1 to 8: X920 to 7)
(3) Droop cancel request n-th axis (DOR1 to 8: Y9C0 to 7)
(4) Current limit mode 1 and 2 (ILM1,2: YCC0,1)
(5) Current limit changeover (R2593)
[Function] [Operation]
During the current limit control, the droop generated by the current limit can be released.
[Related signals]
(1) In current limit n-th axis (ILI1 to 8: X900 to 7)
(2) Current limit reached n-th axis (ILA1 to 8: X920 to 7)
(3) Current limit changeover n-th axis (ILC1 to 8: Y9A0 to 7)
(4) Current limit mode 1 and 2 (ILM1,2: YCC0,1)
(5) Current limit changeover (R2593)
Cont. Signal name Abbrev. $1 $2 $3 $4
A Current limit changeover n-th axis ILC1 to 8 Y9A0 to 7 Y9A8 to F Y9B0 to 7 Y9B8 to F
Cont. Signal name Abbrev. $1 $2 $3 $4
A Droop cancel request n-th axis DOR1 to 8 Y9C0 to 7 Y9C8 to F Y9D0 to 7 Y9D8 to F
SV013 SV014 SV013
CNC command position
(Outputs even after pushing.)
CNC command speed
(Outputs even after pushing.)
The command position
is adjusted to the
machine position by
canceling the droop.
It is internally interlocked
so that the axis does not
move while the droop is
released.
Feedback speed
(Stops by pushing.)
Machine position
(Stops by pushing.)
Machine position when

there is no pushing
Current limit
value
Current limit
changeover (ILC)
In current limit
(ILI)
Internal
interlock
Smoothing
zero
Droop cancel
processing
Position
Speed

[Function] (L system)
The Z axis external workpiece coordinate offset data can be set by cutting the workpiece face with manual operations and inputting workpiece coordinate measurement 2nd axis.
[Operation]
<Mode selection>
Set the mode selection switch to the manual mode ([Handle], [Jog] or [Rapid Traverse]).
<Tool measurement mode signal input>
Set the tool measurement mode signal to "1".
<Main/sub selection>
Using the tool presetter sub-side valid signal, select whether to measure the workpiece coordinates on the main spindle side or sub-spindle side.
Tool presetter sub-side valid signal
OFF: The compensation No. is retrieved from the main spindle side R registers.
ON: The compensation No. is retrieved from the sub-spindle side R registers.
(1) Hold the state of this signal until the measurement with the selected tool is completed.
<Tool selection>
Issue the T command with MDI operation, etc., and select the tool.
(1) Set the selected tool compensation No. in the R register. The set R register differs according to the parameter setting and the state of the tool presetter sub-side valid signal.
(2) Set the "tool length/wear data" for the tool being used beforehand.
Compensation No. R registers
When the compensation No. is 0, the compensation amount is calculated as "0".
If the compensation No. exceeds the number of specified offset sets, the "Compensation No. illegal" error occurs.
Whether to use the main side or sub-side is selected with the tool presetter sub-side valid signal. (OFF: Main side, ON: Sub-side)
<Cutting the workpiece face>
If the workpiece face has not been cut, cut the workpiece face slightly to even it.
(1) Do not move the tool in the detection of Z axis after cutting the workpiece face.
(2) If the workpiece does not need to be cut, carry out positioning to the measurement position.
Cont. Signal name Abbrev. $1 $2 $3 $4
A Workpiece coordinate Measurement 2nd axis Y9E1 Y9E9 Y9F1 Y9F9
#1098 Tlno. #1130 set_t #1218 aux02/
bit4
Tool length compensation No. Tool nose wear compensation No.
Main side Sub-side Main side Sub-side
0
0 0/1
R2600, R2601 R2604, R2605 R2600, R2601 R2604, R2605 1 0/1
1
0
0 R536, R537 R2600, R2601 R2604, R2605
1 R2602, R2603 R2606, R2607 R2600, R2601 R2604, R2605
1 0/1 R2602, R2603 R2606, R2607 R2600, R2601 R2604, R2605
Note
Note
Note

<Setting the Z axis external workpiece coordinate offset data with the workpiece coordinate measurement 2nd axis signal input>
Input the "Workpiece coordinate Measurement 2nd axis" signal (this signal). The Z axis external workpiece coordinate offset data is automatically calculated from the tool compensation data of the used tool and the machine value at the point this signal is input. The results are set as the data.
Details of automatic calculation formula
The external workpiece coordinate offset data is automatically calculated with the following formula.
The tool compensation data used for the measurement is selected with the base specification parameter "#1226 aux10/bit0".
<Turning the tool measurement mode signal OFF>
Measurement of the external workpiece coordinate offset is completed.
[Related signals]
(1) Tool compensation No. (Main side: R2600 to R2603, Sub side: R2604 to R2607)
(2) Tool length measurement 2 (TLMS: YC21)
[Function]
Desired control axis can be specified to be exempted from control function.
This is a signal for each control axis, and the number at the end of the signal name indicates the control axis No.
[Operation]
When the "Control axis detachment 2" signal (DTCH2n) turns ON, the corresponding axis is excluded from the control

targets.
Position control cannot be carried out, but the position is not lost because the position detection is valid.
The interlock signal of the corresponding axis is deemed to be ON.
The specified axis is also displayed in the position display on the CRT.
[Related signals]
(1) Control axis detachment n-th axis (DTCHn: Y780)
External workpiece coordinate offset = Machine coordinate value - tool compensation
data
aux10/bit0 Tool compensation data
0 Tool length data + nose wear data
1 Tool length data
Cont. Signal name Abbrev. $1 $2 $3 $4
A Control axis detachment 2 n-th axis DTCH21 to 28 YA00 to 7 YA08 to F YA10 to 7 YA18 to F
External workpiece coordinate offset
Machine value
Tool rest
Workpiece coordinate
zero point
Basic machine
coordinate zero point Tool compensation
amount
DTCH2n
1: The 1st axis is set as axis detach 2.
:
:
8: The 8th axis is set as axis detach 2.

[Function]
This signal indicates that unclamping has been completed in respect to the unclamp command from the CNC.
[Operation]
"Type A" or "Type B" is selected by the parameter "#1282 ext18/bit3" (Index table clamp type).
<Type A ("#1282 ext18/bit3" is set to "0")>
When the "Unclamp command" turns ON, the clamp on the corresponding axis is released by the PLC, and then this signal turns ON.
When the "Unclamp command" turns OFF, the corresponding axis is clamped by the PLC, and then this signal turns OFF.
<Type B ("#1282 ext18/bit3" is set to "1")>
When the "Unclamp command" signal turns ON, the clamp on the corresponding axis is released by the PLC, and the "Unclamp completion" signal turns ON.
This signal is turned OFF by the PLC after the "Unclamp command" signal turns OFF.
<This signal turns ON in the following case>
When the "Unclamp command" turns ON, the clamp on the corresponding axis is released by the PLC, and then this signal turns ON.
<This signal turns ON in the following case>
The "Unclamp command" signal is turned OFF by the CNC.
(1) Refer to the "Programming Manual" for operation details of each type A and type B.
[Related signals]
(1) Unclamp command (UCLPn: X960 to X967)
(2) Clamp command (CLPn: XB00 to XB07)
(3) Clamp completion (CLPFn: YB00 to YB07)
[Function]
The mixed control (cross axis control) is turned ON and OFF with the PLC signal. Which axis is to be in the mixed control (cross axis control) state for each PLC signal is set by the parameter.
[Operation]
<Mixed control (cross axis control) control command using PLC signals>
There are mixed control (cross axis control) request signals (CRS1 to CRS8) for eight axes in each part system. (There are signals for eight axes regardless of the actual number of axes.)
Cross machining is carried out by exchanging the axis for which the PLC signal is input and the axis designated with parameter at the rising edge (0 to 1) of this signal. If an axis is not mounted at the section where the PLC signal is input, the axis designated with the parameter will be moved from another part system.
The axis cross machining state is canceled at the falling edge (1 to 0) of this signal, and normal control is applied.
<Commanding in the machining program>
Turn ON/OFF the mixed control (cross axis control) signal using M or T command, etc. to carry out the mixed control (cross axis control).
Carry out timing synchronization operation before the M command and T command, etc., for mixed control (cross axis control) so that the timing for the mixed control (cross axis control) matches.
[Related signals]
(1) In mixed control (cross axis control) (X980 to X987)
Cont. Signal name Abbrev. $1 $2 $3 $4
A Unclamp completion n-th axis UCLPFn YA20 to 7 YA28 to F YA30 to 7 YA38 to F
Cont. Signal name Abbrev. $1 $2 $3 $4
A Mixed control (cross axis control) request n-th axis CRS1 to 8 YA60 to 7 YA68 to F YA70 to 7 YA78 to F
Note

[Function]
Whether to start or cancel synchronous control is selected with a signal corresponding to the synchronized axis.
1 -> 0 (falling edge) Synchronous control cancel
0 -> 1 (rising edge) Synchronous control start
[Operation]
Synchronous control is started and canceled with the rising edge (OFF to ON) or falling edge (ON to OFF) of the PLC signal (SYNC1 to 8) corresponding to the synchronized axis.
Thus, if synchronous control is canceled by a cause other than the PLC signal turning OFF, such as by emergency stop, and synchronous control is to be started again, turn the PLC signal OFF and then ON again.

The synchronization reference axis corresponding to each synchronized axis is set with the parameter "#2088 bsax_sy".
The movement direction of the synchronized axis in respect to the movement of the synchronized reference axis is determined by the value of the parameter "#2087 syncnt".
0: moves in the same direction as the reference axis
1: moves in the opposite direction of the reference axis
[Caution]
(1) The two axes related to control (synchronous/superimposition control) are both controlled in the smoothing zero state. Control is started after the axis movement has ended and smoothing zero is established.
(2) Control (synchronous/superimposition control) are affected by the state of the two target part systems. Thus, attention must be paid to the timing between part systems. Always command synchronization before commanding the control PLC signal.
(3) Control (synchronous/superimposition control) cannot be commanded to an axis in inclined axis control. An operation error occurs if this type of command is issued.
(4) Before control (synchronous/superimposition control) is started, the target axis must have completed reference posi tion return after the power is turned ON, or the absolute position must be established. An operation error occurs if the above state is not established.
(5) A movement command cannot be issued to a synchronized axis during synchronous control. An operation error occurs if movement is commanded.
(6) An axis in synchronous control cannot be commanded as the superimposition control axis. An operation error occurs if this type of command is issued.
(7) A synchronized axis in synchronous control cannot be commanded as the synchronized axis for other synchronous control. An operation error occurs if this type of command is issued. However, a synchronized reference axis for mul tiple synchronized controls can be specified on a single axis.
[Related signals]
(1) In synchronous/superimposition control (X9A0 to X9A7)
(2) Synchronous error amount (R5076 to R5139)
Cont. Signal name Abbrev. $1 $2 $3 $4
A Synchronous control request n-th axis SYNC1 to 8 YA80 to 7 YA88 to F YA90 to 7 YA98 to F

[Function]
Whether to start or cancel superimposition control is selected with a signal corresponding to the superimposed axis.
1 -> 0 (falling edge) Superimposition control cancel
0 -> 1 (rising edge) Superimposition control start
[Operation]
Superimposition control is started and canceled at the rising edge (OFF to ON) or at the falling edge (ON to OFF) of the PLC signal (PILE1 to 8) corresponding to the superimposed axis.
Thus, to perform the superimposition control again when the superimposition control is canceled due to a factor other than turning OFF the PLC signal such as an emergency stop, turn OFF the PLC signal and then turn it ON again.
The reference axis corresponding to each superimposed axis set with the parameter "#2089 bsax_pl".
The movement direction of the superimposed axis in respect to the movement of the reference axis is determined by the value set for parameter "#2143 polar".
0: moves in the same direction as the reference axis
1: moves in the opposite direction of the reference axis
[Caution]
(1) This signal is ignored if "0" is set to the parameter "#1280 ext16/bit7".
(2) Make sure to command a timing synchronization for the superimposed axis and the reference axis in the blocks before and after the command of this signal.
[Related signals]
(1) In synchronous/superimposition control (X9A0 to X9A7)
Cont. Signal name Abbrev. $1 $2 $3 $4
A Superimposition control request n-th axis PILE1 to 8 YAA0 to 7 YAA8 to F YAB0 to 7 YAB8 to F

[Function]
This signal is used to select the control method of the NC axes which can be controlled by PLC.
0: PLC control
1: NC control
[Operation]
When this signal is ON, the axis is controlled with a machining program. (The axis is handled as an NC axis.)
When this signal is OFF, the axis is controlled with the PLC axis indexing interfaces. (The axis is handled as a PLC axis.)
The correspondence between the axis Nos. and the device Nos. is as follows.
[Timing chart]
[Caution]
(1) This signal is valid only for the NC axis that can be controlled by PLC. The NC axis that can be controlled by PLC is the NC axis for which the axis No. for PLC axis indexing is set by the parameter "#12800 chgauxno".
(2) Confirm that the axis is not moving before turning this signal ON/OFF.
When this signal is turned ON/OFF during the axis movement, an operation error occurs, and then the axis deceler ates and stops.
(Usage example) When the parameters are set as follows
A-axis and C-axis are axes that can be controlled by PLC. To control the A-axis with NC, turn ON the signal YAC3. The signals YAC0 to YAC2 and YAC5 to YAC7 are disabled.
[Related signals]
(1) In NC axis control n-th axis (XA20 to XA27)
Cont. Signal name Abbrev. $1 $2 $3 $4
A NC axis control selection n-th axis - YAC0 to 7 YAC8 to F YAD0 to 7 YAD8 to F
Device No. Signal name Device No. Signal name
YAC0 NC axis control selection 1st
axis YAC4 NC axis control selection 5th
axis
YAC1 NC axis control selection 2nd
axis YAC5 NC axis control selection 6th
axis
YAC2 NC axis control selection 3rd
axis YAC6 NC axis control selection 7th
axis
YAC3 NC axis control selection 4th

axis YAC7 NC axis control selection 8th
axis
Axis No. 1 2 3 4 5
#1013 axname X Y Z A C
#12800 chgauxno 0 0 0 1 2
In axis plus motion
In axis minus motion
In NC axis control
NC axis control selection
(OFF)

[Function]
This signal suppresses the vertical axis pull-up function and prevents the vertical axis to be pulled up.
[Operation]
By turning on this signal, NC performs the following operations.
Command the drive unit to prevent vertical axis pull-up.
Turns ON the "Vertical axis pull-up prevented" signal.
By turning off this signal, NC performs the following operations.
Command the drive unit to cancel the prevention of vertical axis pull-up.
Turns OFF the "Vertical axis pull-up prevented" signal.
[Related signals]
(1) Vertical axis pull-up prevented (XA60 to 7)
[Function]
This signal indicates that clamping has been completed in respect to the clamp command from the CNC.
[Operation]
"Type A" or "Type B" is selected by the parameter "#1282 ext18/bit3" (Index table clamp type).
<Type A ("#1282 ext18/bit3" is set to "0")>
This signal is not used.
<Type B ("#1282 ext18/bit3" is set to "1")>
When the "Clamp command" signal is turned ON, the index table indexing axis is clamped by the PLC, and the clamp completion signal is turned ON. After the "Clamp command" signal turns OFF, this signal is turned OFF by the PLC.
<This signal turns ON in the following case>
After the corresponding axis is clamped by the PLC when the "Clamp command" is turned ON.
<This signal turns ON in the following case>
The "Clamp command" signal is turned OFF by the CNC.
(1) Refer to the "Programming Manual" for operation details of each type A and type B.
[Related signals]
(1) Unclamp command (UCLPn: X960 to X967)
(2) Clamp command (CLPn: XB00 to XB07)
(3) Unclamp completion (UCLPFn: YA20 to YA27)
[Function]
This signal is used to select the parameter for setting the travel distance in hob retract.
[Operation]
When this signal is OFF:
The setting value of "#8219 Hob retract amount 1" is used as the hob retract amount.
When this signal is ON:
The setting value of "#8220 Hob retract amount 2" is used as the hob retract amount.
[Related signals]
(1) Hob machining: Retract request (HOBRTR: YCDE)
(2) Hob machining: Retracting (HOBRTM: XCAE)
(3) Hob machining: Retract complete (HOBRTF: XCAF)
Cont. Signal name Abbrev. $1 $2 $3 $4
A Vertical axis pull-up prevention request n-th axis YAE0 to 7 YAE8 to F YAF0 to 7 YAF8 to F
Cont. Signal name Abbrev. $1 $2 $3 $4
A Clamp completion n-th axis CLPFn YB00 to 7 YB08 to F YB10 to 7 YB18 to F
Cont. Signal name Abbrev. $1 $2 $3 $4
A Hob machining: Retract amount selection n-th axis HOBRTVn YB20 to 7 YB28 to F YB30 to 7 YB38 to F
Note

[Function]
This signal turns ON when an axis, for which rotary axis spindle control is enabled with the parameter, is controlled as a spindle (spindle control mode).
This signal turns OFF when the axis is controlled as a rotary axis (servo axis control mode).
This signal is a signal for each control axis, and the number at the end of the signal name indicates the control axis No.
[Operation]
(1) The axis for which rotary axis spindle control is enabled enters the spindle control mode when the following operation is performed: turning the "Spindle-mode rotary axis control command" (ROTSPCn) ON while the "Reference position establishment" (1st axis (X9E0) to 8th axis (X9E7) of part system 1, and following) is ON and the "All axes smoothing zero" (TSMZ) is ON.
(2) When the spindle control mode is set, the "Spindle-mode rotary axis control mode" (ROTSPMn) turns ON. The axis can be controlled as a spindle by executing S commands after checking that this signal is ON.
(3) The control mode changes from the spindle control mode to servo axis control mode when the "Spindle-mode rotary axis control command" (ROTSPCn) turns OFF. When the servo axis control mode is set, the "Spindle-mode rotary axis control mode" (ROTSPMn) turns OFF.
[Related signals]
(1) Spindle-mode rotary axis control mode n-th axis (ROTSPMn: XB40 and follows)
[Function]
This signal is used to update the range of the stored stroke limit I to the value set in R registers.
[Operation]
At the rising edge (OFF to ON) of this signal, the value set in the R register specified by the parameter "#2190 OT_Rreg" is set as the range of the stored stroke limit I. Note that the stored stroke limit I is updated at the rising edge of this signal only when the parameter "#1278 ext14/bit2" is ON and the R register number of the user area is set in the parameter

"#2190 OT_Rreg" of the corresponding axis.
Cont. Signal name Abbrev. $1 $2 $3 $4
A Spindle-mode rotary axis control command n-th axis ROTSPC1 to
8 YB40 to 7 YB48 to F YB50 to 7 YB58 to F
Cont. Signal name Abbrev. $1 $2 $3 $4
A Stored stroke limit I: Change request n-th axis SLMCn YB60 to
YB67
YB68 to
YB6F
YB70 to
YB77
YB78 to
YB7F
User area
R8300 to R9799 1500 points of backup area
R9800 to R9899 100 points of non-backup area
R18300 to R19799 1500 points of backup area
R19800 to R19899 100 points of non-backup area
R28300 to R29799 1500 points of backup area
R29800 to R29899 100 points of non-backup area
ROTSPCn
1: Turn the spindle control mode ON in 1st axis.
:
:
8: Turn the spindle control mode ON in 8th axis.
"#2013 OT-": -10.0
"#2014 OT+": +1500.0
"#2013 OT-": -100.0
"#2014 OT+": +800.0
The values are the setting of the parameter
"#2013 OT-" and "#2014 OT+".
"#2013 OT-": -10.0
"#2014 OT+": +1500.0
"#2013 OT-": -100.0
"#2014 OT+": +800.0
Stored stroke limit I:
change request
Stored stroke limit I:
range
R register
R9800: 0x7960 R9802: 0xE1C0
R9801: 0xFFFE R9803: 0x00E4
R9800: 0x4240 R9802: 0x1200
R9803: 0x007A

[Function]
This signal is used to stop speed control gain switching of the real-time tuning 1 function. Speed control gain switching is stopped if this signal turns ON while this function is enabled.
[Operation]
ON: Speed control gain switching is stopped.
OFF: Speed control gain switching is not stopped.
[Related signals]
(1) Real-time tuning 1: Speed control gain changeover hold-down ON (VGHLD1: XB80)
Cont. Signal name Abbrev. $1 $2 $3 $4
A Real-time tuning 1: Speed control gain changeover hold down command
VGHLDC1 to
8 YB80 to 7 YB88 to F YB90 to 7 YB98 to F
G0 G1 G0
In cutting command
Speed control gain
changeover prevented
command
In speed control gain
changeover prevented
Inertia value
Speed control gain
Value
maintained
Switch restart
Switch restart
Value
maintained

[Function]
This function switches the control mode for the NC axis/PLC axis switching axis (whether to use the axis as an NC axis or a PLC axis).
This signal is available for each control axis.
[Operation]
Turn ON this signal to control the NC axis/PLC axis switchover axis as a PLC axis, or turn OFF the signal to control the axis as an NC axis. Confirm that the "NC axis/PLC axis switchover invalid status" signal is OFF before switching ON/OFF of this signal.
When the NC axis and the PLC axis is switched while the "NC axis/PLC axis switchover invalid status" signal is ON, the

operation error (M01 1250) occurs. After that, when the "NC axis/PLC axis switchover invalid status" signal turns OFF, the control is switched and the alarm is canceled. If this signal is switched while the axis is moving, the control is switched at the time when the movement command is completed and the "NC axis/PLC axis switchover invalid status" signal is turned OFF.

[Operation sequence]

(1) The "NC axis/PLC axis switchover request" signal is switched from OFF to ON, and the "NC axis/PLC axis switchover invalid status" signal is turned OFF (switching is permitted). Therefore, the control is switched to PLC axis and the "NC axis/PLC axis switchover in process" signal is turned ON.

(2) The "NC axis/PLC axis switchover request" signal is turned OFF, but the "NC axis/PLC axis switchover invalid status" signal is ON (switching is prohibited). Therefore, the control does not move to NC axis and the operation error (M01 1250) occurs.

(3) The axis movement is completed and the "NC axis/PLC axis switchover invalid status" signal is turned OFF. Then the control is switched to NC axis, and the "NC axis/PLC axis switchover in process" signal is turned OFF.

[Related signals]

(1) NC axis/PLC axis switchover invalid status (NPCHGIS1 to 8: XBA0 to 7)

(2) NC axis/PLC axis switchover in process (NPCHGMOD1 to 8: XBC0 to 7)

Cont. Signal name Abbrev. $1 $2 $3 $4

A NC axis/PLC axis switchover request NPCH GREQ1 to 8 YBC0 to 7 YBC8 to F YBD0 to 7 YBD8 to F

(1) (2) (3)

Feedrate

0

NC axis/PLC axis switchover request

(NPCHGREQn)

NC axis/PLC axis switchover invalid status

(NPCHGISn)

(NPCHGMODn)

NC axis/PLC axis switchover in process

In NC axis control

In PLC

axis control

In NC

axis control

[Function]

In each machine group, the control axis belonging in the group is interlocked.

[Operation]

When this signal (YBE0) is turned ON, the control axis belonging in the group is interlocked. The "Machine group-based alarm stop: Machine group-based PLC interlock ON" signal (XBE0: GQEMGO) of the group turns ON.

The signal assignments for each group are as follows:

[Function]

JOG operation mode for manual operation is selected.

[Operation]

When the "JOG mode" signal (J) is turned ON, JOG operation mode is selected.

Axis motion is started by turning ON the feed axis selection+ signal (+J1 to +J8) or the feed axis selection- signal (-J1 to -J8) after turning ON the jog mode and setting the manual feedrate code (*JV1 to *JV16).

The axis movement speed is set by "#2642 jogfeed" (Jog feed rate) or by PLC signal selected by the "Manual feedrate method selection" signal (YC77).

Rapid traverse operation is performed by superimposing the "Rapid traverse" signal (RT) described later on this signal (J) and turning it ON.

When the operation mode conflicts with any other mode or when no mode is selected, the NC alarm (operation error (M01 0101)) occurs.

[Related signals]

(1) Feed axis selection (+J1 to 8: Y8E0, -J1 to 8: Y900)

(2) Manual feedrate method selection (JVS: YC77)

(3) Manual feedrate code m (*JV1 to *JV16: YC70 to 4)

(4) Manual feedrate (method selection) (R2504,5)

(5) Rapid traverse (RT: YC26)

Cont. Signal name Abbrev. Device

A Machine group-based alarm stop:

Machine group-based PLC interlock GQEMGn YBE0 to 7 YBE8 to F YBF0 to 7 YBF8 to F

Group 1 Group 2 Group 3 Group 4 Group 5 Group 6 Group 7 Group 8

YBE0 YBE1 YBE2 YBE3 YBE4 YBE5 YBE6 YBE7

Group 9 Group 10 Group 11 Group 12 Group 13 Group 14 Group 15 Group 16

YBE8 YBE9 YBEA YBEB YBEC YBED YBEE YBEF

Group 17 Group 18 Group 19 Group 20 Group 21 Group 22 Group 23 Group 24

YBF0 YBF1 YBF2 YBF3 YBF4 YBF5 YBF6 YBF7

Group 25 Group 26 Group 27 Group 28 Group 29 Group 30 Group 31 Group 32

YBF8 YBF9 YBFA YBFB YBFC YBFD YBFE YBFF

Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8

A Jog mode J YC00 YD40 YE80 YFC0 Y1100 Y1240 Y1380 Y14C0

[Function]

Handle feed operation mode (manual operation) is selected.

[Operation]

When the "Handle mode" signal (H) is turned ON, handle feed mode is selected.

Axis motion starts when the manual pulse generator hand wheel is rotated after axis is selected by the "n-th handle axis selection code" (HSn1 to HSn16) and the "n-th handle valid" (HSnS), and this signal is turned ON. Speed of the axis motion depends on setting of feedrate magnification (MP1 to 4).

When the operation mode conflicts with any other mode or when no mode is selected, the NC alarm (operation error (M01 0101) occurs.

Automatic operation handle interruption function is valid when the "Handle mode" signal is turned ON while the automatic operation mode is selected.

[Related signals]
(1) 1st handle axis selection code (HS11 to 116: YC40), 1st handle valid (HS1S: YC47)
(2) 2nd handle axis selection code (HS21 to HS216: YC48), 2nd handle valid (HS2S: YC4F):
Valid only for handle 2-axis specification.
(3) 3rd handle axis selection code (HS31 to 316: YC50), 3rd handle valid (HS3S: YC57)
Valid only for handle 3-axis specification.
(4) Handle/Incremental feed magnification code m (MP1 to 4: YC80 to YC82)
[Function]
Incremental feed mode for manual operation is selected.
[Operation]
When the "Incremental mode" signal (S) is turned ON, incremental feed mode is selected.
Every time the "Incremental mode" (S) is turned ON and the feed axis selection signal (+J1 to 8, -J1 to 8) of the desired axis is turned ON, axis movement is performed. Axis movement depends on setting of the "Handle/Incremental feed magnification code m" (MP1 to 4) at that time.
The movement speed at that time is the rapid traverse speed when the "Rapid traverse" signal (RT) is ON, and the manual feedrate (*JV1 to *JV16) when the signal (RT) is OFF.
When the operation mode conflicts with any other mode or when no mode is selected, the NC alarm (operation error (M01 0101)) occurs.
(1) The incremental mode is also called as step mode.
[Related signals]
(1) Handle/Incremental feed magnification code m (MP1 to 4: YC80 to YC82)
(2) Feed axis selection (+J1 to 8: Y8E0, -J1 to 8: Y900)
(3) Manual feedrate code m (*JV1 to *JV16: YC70)
(4) Rapid traverse (RT: YC26)
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Handle mode H YC01 YD41 YE81 YFC1 Y1101 Y1241 Y1381 Y14C1
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Incremental mode S YC02 YD42 YE82 YFC2 Y1102 Y1242 Y1382 Y14C2
Note

[Function]
Manual arbitrary feed mode in manual operation is selected.
[Operation]
Manual arbitrary feed mode is selected when the "Manual arbitrary feed mode" signal (PTP) is turned ON (1).
[Caution]
To turn ON (1) the "Manual arbitrary feed mode", turn OFF (0) other modes and automatic mode.
If the other manual mode and automatic mode are ON (1), the manual arbitrary feed mode will not be set. Note that these modes can be selected simultaneously when manual and automatic modes are enabled at the same time.
[Related signals]
(1) Signals from PLC to controller
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Manual arbitrary feed mode PTP YC03 YD43 YE83 YFC3 Y1103 Y1243 Y1383 Y14C3
Device No.
$1 $2 $3 $4 Abbrev. Signal name
YCA0 YDE0 YF20 Y1060 CX11 Manual arbitrary feed 1st axis selection code 1
YCA1 YDE1 YF21 Y1061 CX12 Manual arbitrary feed 1st axis selection code 2
YCA2 YDE2 YF22 Y1062 CX14 Manual arbitrary feed 1st axis selection code 4
YCA3 YDE3 YF23 Y1063 CX18 Manual arbitrary feed 1st axis selection code 8
YCA4 YDE4 YF24 Y1064 CX116 Manual arbitrary feed 1st axis selection code 16
YCA5 YDE5 YF25 Y1065
YCA6 YDE6 YF26 Y1066
YCA7 YDE7 YF27 Y1067 CX1S Manual arbitrary feed 1st axis valid
Device No.
$1 $2 $3 $4 Abbrev. Signal name
YCA8 YDE8 YF28 Y1068 CX21 Manual arbitrary feed 2nd axis selection code 1
YCA9 YDE9 YF29 Y1069 CX22 Manual arbitrary feed 2nd axis selection code 2
YCAA YDEA YF2A Y106A CX24 Manual arbitrary feed 2nd axis selection code 4
YCAB YDEB YF2B Y106B CX28 Manual arbitrary feed 2nd axis selection code 8
YCAC YDEC YF2C Y106C CX216 Manual arbitrary feed 2nd axis selection code 16
YCAD YDED YF2D Y106D
YCAE YDEE YF2E Y106E
YCAF YDEF YF2F Y106F CX2S Manual arbitrary feed 2nd axis valid
Device No.
$1 $2 $3 $4 Abbrev. Signal name
YCB0 YDF0 YF30 Y1070 CX31 Manual arbitrary feed 3rd axis selection code 1
YCB1 YDF1 YF31 Y1071 CX32 Manual arbitrary feed 3rd axis selection code 2
YCB2 YDF2 YF32 Y1072 CX34 Manual arbitrary feed 3rd axis selection code 4
YCB3 YDF3 YF33 Y1073 CX38 Manual arbitrary feed 3rd axis selection code 8
YCB4 YDF4 YF34 Y1074 CX316 Manual arbitrary feed 3rd axis selection code 16
YCB5 YDF5 YF35 Y1075
YCB6 YDF6 YF36 Y1076
YCB7 YDF7 YF37 Y1077 CX3S Manual arbitrary feed 3rd axis valid

(2) Signals from controller to PLC
In manual arbitrary feed mode (PTPO: XC03)
In manual arbitrary feed (CXN: XC16)
Manual arbitrary feed completion (CXFIN: XC1C)
(3) Others
Feedrate least increment code 1, 2 (PCF1: YC78, PCF2: YC79)
Manual/Automatic simultaneous valid n-th axis (MAE1 to 8)
Device No.
$1 $2 $3 $4 Abbrev. Signal name

YCB8 YDF8 YF38 Y1078 CXS1 Manual arbitrary feed Smoothing off
YCB9 YDF9 YF39 Y1079 CXS2 Manual arbitrary feed Axis independent
YCBA YDFA YF3A Y107A CXS3 Manual arbitrary feed EX.F/MODAL.F
YCBB YDFB YF3B Y107B CXS4 Manual arbitrary feed G0/G1
YCBC YDFC YF3C Y107C CXS5 Manual arbitrary feed MC/WK
YCBD YDFD YF3D Y107D CXS6 Manual arbitrary feed ABS/INC
YCBE YDFE YF3E Y107E *CXS7 Manual arbitrary feed Stop
YCBF YDFF YF3F Y107F CXS8 Manual arbitrary feed Strobe
Device No.
$1 $2 $3 $4 Abbrev. Signal name
R2508 R2708 R2908 R3108 1st handle/incremental feed magnification
R2509 R2709 R2909 R3109
R2510 R2710 R2910 R3110 2nd handle feed magnification
R2511 R2711 R2911 R3111
R2512 R2712 R2912 R3112 3rd handle feed magnification
R2513 R2713 R2913 R3113
R2544 R2744 R2944 R3144 Manual arbitrary feed 1st axis travel amount
R2545 R2745 R2945 R3145
R2546 R2746 R2946 R3146
R2547 R2747 R2947 R3147
R2548 R2748 R2948 R3148 Manual arbitrary feed 2nd axis travel amount
R2549 R2749 R2949 R3149
R2550 R2750 R2950 R3150
R2551 R2751 R2951 R3151
R2552 R2752 R2952 R3152 Manual arbitrary feed 3rd axis travel amount
R2553 R2753 R2953 R3153
R2554 R2754 R2954 R3154
R2555 R2755 R2955 R3155

[Function]
Reference position return mode is selected.
Reference position return is the return of the axis movement components (tools, tables, etc.) to a previously determined position for an individual machine.
[Operation]
The reference position return mode is selected when the "Reference position return mode" signal (ZRN) is turned ON.
Select the reference position return mode and turn ON the feed axis selection signal (+J1 to 8, -J1 to 8) of the specified axis to return to the reference position.
When the operation mode conflicts with any other mode or when no mode is selected, the NC alarm (operation error (M01 0101) occurs.
The first reference position return after the controller power is turned ON is the dog-type return (excluding when the basic machine coordinate system is established for the absolute position detection specifications). After the second manual reference position return (when basic machine coordinate system is established), the dog-type return or high-speed return is selected with the machine parameter/basic specification parameter "#1063 mandog".
<Dog-type reference position return pattern>
The return pattern is determined by the final entry method of the machine parameter reference position return.
After the near-point dog is detected and the approach speed is applied, the axis will move to the reference position even if the "Feed axis selection" signal is turned OFF. Thus, after the approach speed is applied, another axis can be switched to and reference position return executed.
The entry direction (final entry direction) after the near-point dog is tripped is set with parameters.
The feedrate before the approach speed is the reference position return reapid traverse feedrate if the "Rapid traverse" signal (RT) is ON, and the manual feedrate (*JV1 to *JV16) if the signal is OFF.
The approach speed is set with the parameters.
When the reference position is reached, the movement stops even if the feed axis selection signal is ON, and the "1st reference position reached" signal (ZP1n) turns ON.
<High-speed return and reference position return>
The axis moves toward the reference position. The movement speed is rapid traverse if the "Rapid traverse" signal is ON, and manual feedrate if it is OFF.
When the axis reaches the reference position, it stops moving even if the feed axis selection signal is ON, and the "1st reference position reached" signal (ZP1n) turns ON.
The feed axis selection signal for high-speed return is valid only in the reference position direction. If a signal in the opposite direction is specified, the NC alarm (operation error (M01 0003)) occurs.
[Related signals]
(1) Feed axis selection (+J1 to 8: Y8E0, -J1 to 8: Y900)
(2) Manual feedrate code m (*JV1 to 16: YC70)
(3) Rapid traverse (RT: YC26)
(4) 1st reference position reached (ZP11 to 18: X800 to 7)
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Reference position return mode ZRN YC04 YD44 YE84 YFC4 Y1104 Y1244 Y1384 Y14C4
(a) Operation when axis is moved in same
direction as the final entry method, and
dog is tripped.
Parameters final
entry method
Near-point dog
(b) When axis is moved in opposite
direction from final entry method,
and dog is tripped.
Parameters final
entry method
Near-point dog
Reference position Reference position

[Function]
The automatic initialization mode is selected.
[Operation]
This mode is selected when automatic initialization is to be carried out with the machine end stopper method of absolute position detection.
The initialization is started when the automatic initialization mode is selected, and the Feed axis selection signal (+Jn, -Jn) in the direction of the machine end of the axis to be initialized is turned ON.
(1) The automatic initialization mode is invalid when the absolute position encoder is not provided and when the machine end stopper method is not selected for the absolute position detection. (During feed axis selection, "M01 OPERATION ERROR 0024" occurs.)
(2) This mode will not start in the following cases of the machine end stopper method absolute position detection. (The message "Start not possible" is displayed.)
- When "#0 Absolute posn set" on the [ABS. POSITION SET] screen is not set to "1".
- When "#2 Zero-P" on the [ABS. POSITION SET] screen is set incorrectly.
- When "#2055 pushf" on the [ABS. POSITION PARAMETER] screen has not been set.
- When "Z71 0005" has occurred.
[Function]
Memory mode of automatic operation is selected.
In this mode of operation, automatic operation is based on programs stored in the memory.
[Operation]
Memory mode is selected when the "Memory mode" signal (MEM) turns ON.
The program is started with the "Automatic operation "start" command" signal (ST).
When the mode conflicts with any other automatic operation mode or when no automatic operation mode is selected while automatic operation is active, the NC alarm (operation error (M01 0101)) occurs and the operation stops at the block.
(1) Even if it is not in automatic operation, any invalid mode of operation triggers the operation error.
[Related signals]
(1) Automatic operation "start" command (ST: YC10)
(2) Automatic operation "pause" command (*SP: YC11)
[Function]
TAPE mode of automatic operation is selected.
In this mode of operation, automatic operation is based on tape command (RS232C input) programs stored in NC tape.
[Operation]
Tape mode is selected when the "Tape mode" signal (T) turns ON.
The program is started with the "Automatic operation "start" command" signal (ST).
When the mode conflicts with any other automatic operation mode or when no automatic operation mode is selected while automatic operation is active, the NC alarm (operation error (M01 0101)) occurs and the operation stops at the end of the block.
(1) Even if it is not in automatic operation, any invalid mode of operation will trigger the operation error.
[Related signals]
(1) Automatic operation "start" command (ST: YC10)
(2) Automatic operation "pause" command (*SP: YC11)
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Automatic initialization mode AST YC05 YD45 YE85 YFC5 Y1105 Y1245 Y1385 Y14C5
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Memory mode MEM YC08 YD48 YE88 YFC8 Y1108 Y1248 Y1388 Y14C8
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Tape mode T YC09 YD49 YE89 YFC9 Y1109 Y1249 Y1389 Y14C9
Note
Note
Note

[Function]
MDI (Manual Data Input) mode of automatic operation is selected.
Automatic operation is performed with the program set in the MDI screen.
[Operation]
MDI mode is selected when the "MDI mode" signal (D) turns ON.
The program is started with the "Automatic operation "start" command" signal (ST).
When the mode conflicts with any other automatic operation mode or when no automatic operation mode is selected while automatic operation is active, the NC alarm ("M01 operation error 0101") occurs, and the operation will stop at the block.
(1) Even if it is not in automatic operation, any invalid mode of operation triggers the operation error.
[Related signals]
(1) Automatic operation "start" command (ST: YC10)
(2) Automatic operation "pause" command (*SP: YC11)
[Function]
This signal specifies the sub part system in the sub part system control I.
After this signal turns ON and the sub part system control I mode is entered, the sub part system can be started by commanding the sub part system control I (G122).
[Operation]
In the part system in which this signal is turned ON, the "Sub part system control: Sub part system control I mode ON" signal (SBSMO: XC0E) is output to the PLC.
[Related signals]
(1) Sub part system control: Sub part system control I mode ON (SBSMO: XC0E)
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A MDI mode D YC0B YD4B YE8B YFCB Y110B Y124B Y138B Y14CB
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Sub part system control:
Sub part system control I mode SBSM YC0E YD4E YE8E YFCE Y110E Y124E Y138E Y14CE
Note

[Function]

This signal is used to start automatic operation in MEMORY mode, MDI mode or TAPE mode, or to restart after automatic operation pause (halt) or block stop.

[Operation]

The "Automatic operation "start" command" signal (ST) is enabled when the pressed "auto operation start" push button is released. That is, the operation starts when the automatic operation signal changes from ON to OFF. The signal must be ON at least 100 ms.

The "In automatic operation start"" signal (STL) turns ON when the pressed "auto operation start" push button is released, and turns OFF when "auto operation pause (or halt)" push button is pressed or block stop occurs in single block operation.

The "Automatic operation "start" command" signal (ST) is disabled when:

- Automatic operation starts.
- The "Automatic operation "pause" command" signal (*SP) is OFF.
- During reset (The "Reset & rewind" signal is ON)
- An alarm is occurring.
- Sequence No. is being searched for.

Automatic operation stops or is suspended or block stops when:

- The "Automatic operation "pause" command" signal (*SP) turns OFF.
- Reset occurs. (The "Reset & rewind" signal turns ON)
- Alarm which causes stop to automatic operation occurs.
- Automatic operation mode is changed to manual operation mode.
- Mode is changed to other automatic operation mode and then the block in execution is completed.
- Block in execution is completed after the "Single-block" signal (SBK) turns ON.
- Block in execution is completed after the "Automatic machine lock" signal (AMKL) turns ON.
- Program specified in MDI mode has been executed completely.

[Related signals]

(1) Memory mode (MEM: YC08)

(2) Tape mode (T: YC09)

(3) MDI mode (D: YC0B)

Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8

A Automatic operation "start" command

(Cycle start) ST YC10 YD50 YE90 YFD0 Y1110 Y1250 Y1390 Y14D0

[Function]

The axis movement can be decelerated and stopped halfway while the machine is moving by automatic operation with this command signal. The restart is based on the "Automatic operation "start" command" signal (ST).

[Operation]

When the "Automatic operation "pause" command" signal (*SP) turns OFF, the operation is as follows.

- During automatic operation, the automatic operation stops. The "In automatic operation "pause"" (SPL) will be turned ON.
- Restart with the automatic start (ST) button. (Perform it after turning OFF the *SP signal.)

Automatic operation does not immediately stop even when the "Automatic operation "pause" command" signal (*SP) is turned OFF. It will stop only after it reaches a place where it can be stopped.

- During tapping in fixed cycle. Automatic operation stops when tapping is completed and the tool returns to "R" point.
- During thread cutting. Automatic operation stops when a block for axis motion (other than thread cutting), which comes first after the "Automatic operation "pause" command" signal (*SP) turns OFF, is completed. If the "Auto matic operation "pause" command" signal (*SP) remains OFF, however, automatic operation stops immediately after a block (other than thread cutting) is started.
- When control variable "feed hold invalid" has been set by user macro. Automatic operation stops immediately after a block where the control variable "feed hold invalid" is cleared starts.

The "Automatic operation "pause" command" signal (*SP) is valid even during machine lock.

[Related signals]

(1) Memory mode (MEM: YC08)

(2) Tape mode (T: YC09)

(3) MDI mode (D: YC0B)

(4) Automatic operation "start" command (ST: YC10)

[Function]

Machining program can be executed block by block in automatic operation.

[Operation]

When the "Single block" signal (SBK) turns ON, the controller operates as follows.

If automatic operation is being executed, it will stop after the running block ends. To execute the command of the next block, the "Automatic operation "start" command" (ST) must be turned from ON to OFF again.

No particular operation occurs unless automatic operation is in progress. However, if automatic operation is started while the "Single block" signal (SBK) is ON, one block is executed and stopped. This allows the commanded program to be executed one block at a time.

If the "Single block" signal (SBK) is ON at the end of the block, operation usually stops immediately. However, in the following case, the operation will continue and stop only after it reaches the point where it can be stopped.

During cycle operation such as a fixed cycle.

At this time, which block during cycle operation accepts a single block depends on each cycle. Refer to the section for each cycle in the Programming Manual.

Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8

B Automatic operation "pause" command

(Feed hold) *SP YC11 YD51 YE91 YFD1 Y1111 Y1251 Y1391 Y14D1

Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8

A Single block SBK YC12 YD52 YE92 YFD2 Y1112 Y1252 Y1392 Y14D2

Single block signal (SBK)

Automatic operation "start"

command (ST)

Axis motion block

SBK turns ON at start

(INVALID)

SBK switches during axis motion

(VALID)

SBK turns ON after completion

of block

(VALID)

G00 X100 G01 Y100 G01 X10 Y20

[Function]
This signal prohibits start of the next block in automatic operation (memory, MDI or tape).
[Operation]
While the "Block start interlock" signal (*BSL) is OFF, execution of the next block will not be started in automatic operation.
When the signal is given during execution of a block, the execution of the block continues until it is completed.
Automatic operation is not suspended. Since a command for the next block is waiting as a valid command, execution of program starts when the "Block start interlock" signal (*BSL) turns ON.
(1) This signal is valid to all blocks including blocks internally generated in controller by fixed cycle, etc.
(2) The signal (*BSL) is ON when the power is turned ON. When the signal is not used, programming on the PLC is not required for this signal.
(3) When the machining surface is selected or canceled while the "Block start interlock" signal (*BSL) is OFF with the R Navi function, the operation error (M01 0109) occurs. After turning ON the "Block start interlock" signal (*BSL) again, the machining surface is selected or canceled.
When the axis is moved automatically or manually in machining surface indexing, the operation error (M01 0109) occurs in both cases.
[Related signals]
(1) Cutting block start interlock (*CSL: YC14)
[Function]
This signal prohibits start of an axis motion command block other than that for positioning in automatic operation (memory, MDI or tape).
[Operation]
While the "Cutting block start interlock" signal (*CSL) is OFF, execution of an axis motion command block other than that for positioning may not be started in automatic operation. When the signal is given during execution of a block, the execution of the block continues until it is completed.
Automatic operation is not suspended. Since a command for the next block is waiting validly, execution of program starts when the "Cutting block start interlock" signal (*CSL) turns ON.
(1) This signal is valid to all blocks including blocks internally generated in controller by fixed cycle, etc.
(2) The signal (*CSL) is ON when the power is turned ON. When the signal is not used, programming on the PLC is not required for this signal.
[Related signals]
(1) Block start interlock (*BSL: YC13)
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
B Block start interlock *BSL YC13 YD53 YE93 YFD3 Y1113 Y1253 Y1393 Y14D3
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
B Cutting block start interlock *CSL YC14 YD54 YE94 YFD4 Y1114 Y1254 Y1394 Y14D4
Note
Note

[Function]
Feedrate in automatic operation is specified by manually set value instead of program command value (F value).
[Operation]
<The "Dry run" signal given during cutting feed>
When the "Rapid traverse" signal (RT) is ON, the cutting feedrate is equal to the maximum cutting feedrate.
In this case, "cutting feedrate override" and "rapid traverse override" are ignored.
When the "Rapid traverse" signal (RT) is OFF, the manual feedrate (*JV1 to *JV16) is applied.
Cutting feed override will also be valid if the "Manual override method selection" signal (OVSL) is ON.
<The "Dry run" signal given during rapid traverse>
The parameter must be turned ON to enable dry run for rapid traverse (G0, G27, G28, G29, G30).
When the "Rapid traverse" signal (RT) is ON, the "Dry run" signal is ignored.
When "Rapid traverse" signal (RT) is OFF, the speed is equal to manually set speed.
(1) Dry run is not applicable to manual operation.
(2) Dry run is valid even during G84 or G74 operation.
<Dry run of thread cutting>
Whether to enable or disable dry run for thread cutting is set with "#1279 ext15/bit4" (Dry run OFF during thread cut ting).
When "#1279 ext15/bit4" (Dry run OFF during thread cutting) is set to "1", dry run is disabled. However, while the "Spin dle OFF mode" signal is ON, dry run is enabled regardless of the parameter setting, and the state of dry run follows the "Dry run" signal.
The feedrate by the dry run is not synchronized with the spindle rotation.
The "Dry run" signal is checked at the start of thread cutting. If the signal is changed during thread cutting, the change is ignored.
[Related signals]
(1) Manual feedrate code m (*JV1 to *JV16: YC70)
(2) Rapid traverse (RT: YC26)
(3) Manual override method selection (OVSL: YC59)
(4) Spindle OFF mode (YCD3)
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Dry run DRN YC15 YD55 YE95 YFD5 Y1115 Y1255 Y1395 Y14D5
Note

[Function]
Machine motion is stopped momentarily in transition from a cutting feed block to other block during automatic operation to provide time for determination whether in-position check is made or not before start of the next block.
Block-to-block transition may cause rounding in cutting because of delay caused by acceleration or deceleration, and servo response delay. Rounding can be eliminated by stopping the machine motion between the blocks by turning ON the "Error detection" signal (ERD).
[Operation]
When the "Error detection" signal (ERD) is ON in block-to-block transition during cutting in automatic operation, in-position check is accomplished. If this signal is OFF, the next block starts after completion of the preceding block without stop.
(1) Generally, this signal (ERD) is turned ON and OFF using an appropriate miscellaneous function (M code, etc.) so that command program can determine whether machine motion should be stopped or not. When this signal is ON, the sta tus is same as the case where G09 is specified by the command program. Consequently, it is recommended to use G function instead unless there is a specific reason.

Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Error detection ERD YC17 YD57 YE97 YFD7 Y1117 Y1257 Y1397 Y14D7
Error detection (ERD)
Axis motion
X axis cutting feed Y axis cutting
feed X axis cutting feed
OFF ON
X axis X axis
Y axis Y axis
The next motion starts
after machine stop.
The next motion starts
without machine stop.
Note

[Function]
This signal is used to reset the control unit.
[Operation]
When this signal (NRST1) is turned ON, the control unit can be reset.
Generally, the signal of the reset button on the NC operation board is set to the "NC reset 1" (NRST1). At this time, the control unit will be in the following states.
The G command modal is held.
The tool compensation data is held.
The memory is indexed.
The error/alarm is reset.
The MST code output is held.
The M code independent output (M00, M01, M02, M30) turns OFF.
The axis movement stops.
The "In reset" signal (RST) is output.
[Related signals]
(1) NC reset 2 (NRST2: YC19)
(2) Reset & rewind (RRW: YC1A)
(3) In "reset" (RST: XC15)
[Function]
This signal is used to reset the control unit.
[Operation]
When this signal (NRST2) is turned ON, the control unit can be reset.
Generally, this is turned ON when the miscellaneous function M02 or M30 is executed. In some cases, the "Reset & rewind" (RRW), which is explained later, may turn ON.
At this time, the control unit will be in the following states.
The G command modal is initialized.
The tool compensation data is canceled. (Will not be applied.)
The memory is not indexed.
The error/alarm is reset.
The MST code output is held.
The M code independent output (M00, M01, M02, M30) turns OFF.
The axis movement stops.
The "In reset" signal (RST) is output.
[Related signals]
(1) NC reset 1 (NRST1: YC18)
(2) Reset & rewind (RRW: YC1A)
(3) In "reset" (RST: XC15)
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A NC reset 1 NRST1 YC18 YD58 YE98 YFD8 Y1118 Y1258 Y1398 Y14D8
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A NC reset 2 NRST2 YC19 YD59 YE99 YFD9 Y1119 Y1259 Y1399 Y14D9
NC reset 1 (NRST1)
In reset (RST)
NC reset 2 (NRST2)
In reset (RST)

[Function]
This signal is used to reset the control unit.
During memory operation, the head of the machining program currently in operation can be called.
The reset key in the communication terminal is also set to YC1A by the sequence program.
[Operation]
When the "Reset & rewind" signal (RRW) turns ON, the controller operates as follows.
(1) The moving control axis decelerates and stops.
(2) After axis motion stops, the CNC is reset. In approximately 0.5 second after the CNC is reset, the "In reset" signal (RST) turns ON.
(3) The rewind is also applied at the same time as the reset, and the "In rewind" signal (RWD) turns ON.
In memory operation mode, the head of the program in execution is called. (Memory indexing)
(4) While the "Reset & rewind" signal (RRW) is ON, automatic operation and manual operation are not possible.
(5) G command modal is initialized.
(6) Tool compensation (offset) data are canceled. (The axis does not move.)
(7) Error/alarm is reset.
(8) M, S, T code outputs are held. (Strobe signal turns OFF.)
(9) M code independent output (M00, M01, M02 and M30) is turned OFF.
<Operation example>
The processing when M02 or M30 is commanded by the program is shown below.
Generally, when M02 (or M30) is executed by the program, this signal (RRW) is returned after the specified operation is completed. This signal is not returned to the "M function finish 1" (FIN1) or the "M function finish 2" (FIN2). (See *1 in the

figure below.)
[Related signals]
(1) In "reset" (RST: XC15)
(2) In rewind (RWD: XC17)
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Reset & rewind RRW YC1A YD5A YE9A YFDA Y111A Y125A Y139A Y14DA
M02 (M02), M30 (M30)
Reset & rewind (RRW)
In reset (RST)
In rewind (RWD)
M function finish 1,2 (FIN1, FIN2)
This interval is unknown.
About 0.5 s
*1

[Function]
Chamfering can be ignored in the thread cutting cycle.
[Operation]
Status of this signal is determined at start of thread cutting cycle.
<When the "Chamfering" (*CDZ) is OFF>
Chamfering (at end of thread cutting) is performed.
<When the "Chamfering" (*CDZ) is ON>
Chamfering is not performed (the signal is ignored).
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
B Chamfering *CDZ YC1B YD5B YE9B YFDB Y111B Y125B Y139B Y14DB
Chamfer section
Thread section
Tool nose path
Thread section
Tool nose path

[Function]
If this signal is turned ON after the end of the machining program execution, the same machining program is restarted.
[Operation]
The same machining program is restarted if this signal is turned ON during cycle start.
[Timing chart]
(1) The modal is initialized with this signal.
(2) This signal is valid only during cycle start.
(3) This signal is valid during the memory and MDI automatic operation modes.
(4) Normally, the "M code independent output" signal for M02 or M30 is input into this signal, but in this case, do not input
the completion signal (FIN1, FIN2) of M02 or M30.
(5) If the "Automatic operation "pause" command" signal (*SP) is valid, the "Automatic restart" signal is invalid.
(6) This signal is invalid during single block stop.
(7) Note that if an M command other than M02 or M30 is input into this signal, the program returns to the start point with out completing the program, and the program is restarted.
(8) If the "Reset & rewind" (RRW) is applied during the automatic restart process (*2 in the time chart above), modal ini tialization and rewind will be performed, but the "Automatic restart" signal will be disabled.
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Automatic restart ARST YC1C YD5C YE9C YFDC Y111C Y125C Y139C Y14DC
N03 ;
Program example
Machining program
M code
In automatic operation "start"
(STL)
M single output
In rewind
(RWD)
Automatic restart
(ARST)
N04 ; N05 M02 ; N01 ; N02 ;
M02
N04 ;
N05 M02 ;
Miscellaneous function strobe
Head block
*1
*2
*1:Rewind time During memory operation approx. 0.1 [s] + (is the PC cycle time)
During tape operation according to length of tape
*2:Refer to Note 8.
N01 ;
Program head
Automatic restart
Note

[Function] [Operation]
The NC starts the external search at the rising edge of this signal.
A block specified with program No. (R2526), sequence No. (R2528), and block No. (R2530) is searched for operation.
When program No. and/or sequence No. is omitted, the operation changes as shown in the following table.
(*1) "Not designated" indicates that the value of the signal is "0" (OFF).

[Related signals]
(1) External search finished (XC1D)
(2) External search device No. (R2525)
(3) External search program No. (R2526)
(4) External search sequence No. (R2528)
(5) External search block No. (R2530)
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A External search strobe YC1D YD5D YE9D YFDD Y111D Y125D Y139D Y14DD
Program No. (R2526) Sequence No. (R2528) Starting point for searching the block No. (R2530)
Designated Designated Designated sequence No. for designated program
Designated Not specified (*1) Head of designated program
Not specified (*1) Designated Designated sequence No. in currently selected program
Not specified (*1) Not specified (*1) Error: 4
Refer to "External search status" (R500).

[Function]
This status signal informs the controller that specified miscellaneous (M) function, spindle (S) function, tool (T) function or 2nd miscellaneous function (A, B or C) is completed on the PLC side.
[Operation]
If the M, S, T or 2nd M function command is executed during automatic operation, the code and each function strobe (MFn, SFn, TFn, BFn) turns ON.
The PLC executes the specified operation after verifying that one (or more) of the M, S, T and B functions has been commanded by each function strobe. After the execution is completed, turn ON the "M function finish 1" signal (FIN1).
When the controller verifies that the "M function finish 1" signal turns ON, each function strobe is turned OFF.
For PLC, check that each function strobe is turned OFF, and then turn OFF the "M function finish 1".
With the signal FIN1 turned OFF, the controller proceeds to the next block.
The following is an example of a time chart when the auxiliary function (M) is used.
M function finish signals include "M function finish 1" and "M function finish 2" (refer to the next page). The difference is whether to proceed to the next block at the falling edge or at the rising edge. These can be used properly for each operation in one PLC.
(1) The "M function finish 1" signal (FIN1) is common to M, S, T and B functions.
(2) The "M function finish 1" signal is also a signal for updating the spindle rotation speed output (S command data, etc.) when the S function is executed.
(3) If the "M function finish 1" signal is ON before M, S, T or B function is specified, data pertinent to M, S, T or B function are not output.
(4) When the "Reset & rewind" signal (RRW) is sent to the controller by the M02 or M30 command, do not return "M func tion finish 1" signal. If the "M function finish 1" signal is returned by the M02 command at the end of the machining pro gram, the NC alarm (the program error (P36)) occurs.
(5) This signal is not used in the high-speed method (parameter "#1278 ext14/bit1" is set to "1").
[Related signals]
(1) M function finish 2 (FIN2: YC1F)
(2) M function strobe n (MFn: XC60)
(3) S function strobe n (SFn: XC64)
(4) T function strobe n (TFn: XC68)
(5) 2nd M function strobe n (BFn: XC6C)
(6) M, S, T, B function data (output to file register R: R504 and later)
(7) Reset & rewind (RRW: YC1A)
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A M function finish 1 FIN1 YC1E YD5E YE9E YFDE Y111E Y125E Y139E Y14DE
Command program
M function strobe 1 (MF1)
M function finish 1 (FIN1)
M08 Next block
Note

[Function]
This status signal informs the controller that specified miscellaneous (M) function, spindle (S) function, tool (T) function or 2nd miscellaneous function (A, B or C) is completed on the PLC side. This signal is effective in shortening the cycle time in machining programs with more M, S, T, and 2nd miscellaneous function commands compared to the "M function finish 1" signal (FIN1).
[Operation]
If the M, S, T or 2nd M function command is executed during automatic operation, the code and each function strobe (MFn, SFn, TFn, BFn) turns ON.
The PLC executes the specified operation after verifying that one (or more) of M, S, T and 2nd M function has been commanded. After the execution is completed, turn ON the "M function finish 2" signal (FIN2).
When the controller verifies that the "M function finish 2" signal is turned ON, it turns OFF each function strobe and at the same time proceeds to the next block.
For PLC, confirm that each function strobe is turned OFF, and turn OFF the "M function finish 2" signal.
The following is an example of a time chart when the auxiliary function (M) is used.
The M function finish signals include the "M function finish 1" (refer to the previous page) and the "M function finish 2". The only difference is if the next block is proceeded to at the falling edge or at the rising edge. These can be used separately per operation in one PLC.
(1) The "M function finish 2" signal (FIN2) is common to M, S, T and B functions.
(2) The "M function finish 2" signal is also the signal for upgrading the spindle speed output (S analog data, etc.) during S function execution.
(3) If signal FIN2 has been ON before M, S, T or B function is specified, data pertinent to M, S, T or B function are not out put.
(4) When the "Reset & rewind" signal (RRW) is sent back to the controller by M02 or M30 command, do not send back the "M function finish 2" signal or the "M function finish 1" signal. If the "M function finish 2" signal or the "M function finish 1" signal is returned by the M02 command at the end of the machining program, the NC alarm (the program error (P36)) occurs.
(5) This signal is not used in the high-speed method (parameter "#1278 ext14/bit1" is set to "1").
[Related signals]
(1) M function finish 1 (FIN1: YC1E)

(2) M function strobe n (MFn: XC60)
(3) S function strobe n (SFn: XC64)
(4) T function strobe n (TFn: XC68)
(5) 2nd M function strobe n (BFn: XC6C)
(6) M, S, T, B function data (output to file register R: R504 and later)
(7) Reset & rewind (RRW: YC1A)
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A M function finish 2 FIN2 YC1F YD5F YE9F YFDF Y111F Y125F Y139F Y14DF
Command program
M function strobe
M function finish 2
M08 Next block
(FIN2)
(MF1)
Note

[Function]
The tool length manual measurement 1 is used by this signal. For M system, the tool length manual measurement 1 and 2 are used by this signal.
[Operation]
When the "Tool length measurement 1" signal (TLM) is turned ON (1), the tool length compensation amount starts to be calculated automatically inside the controller.
[Caution]
(1) This signal is invalid if the tool measurement screen is not selected.
(2) Turn this signal OFF before executing a program with manual speed command.
[Function]
Tool length measurement 2 is selected by this signal.
[Operation]
When the "Tool length measurement 2" signal (TLMS) is turned ON (1), calculation of tool length compensation amount is automatically started in the controller.
When a skip signal is input during the tool length measurement, the tool length compensation amount is calculated at that point.
[Timing chart]
[Caution]
(1) To use the tool length measurement 2 function, select manual operation mode. If the manual mode is not selected, the measurement mode will not be set.
(2) The tool length measurement 2 can be used with a machine equipped with tool measurement sensor.
(3) The tool length compensation amount calculation result is automatically written inside the controller.
(4) With the tool length measurement 2, multiple part systems cannot be measured simultaneously.
[Related signals]
(1) Tool length measurement 2 Tool No. (R2618)
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Tool length measurement 1 TLM YC20 YD60 YEA0 YFE0 Y1120 Y1260 Y13A0 Y14E0
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Tool length measurement 2 TLMS YC21 YD61 YEA1 YFE1 Y1121 Y1261 Y13A1 Y14E1
Measurement mode
Manual mode
Tool length measurement 2
(TLMS)
Manual feed
Tool measurement sensor
Controller internal interlock

[Function]
When the "M01 OPERATION ERROR 0051" (Synchronization error too large) occurs, the occurring error is corrected without changing the operation method with this mode.
[Operation]
In the correction mode, the operation is as follows.
The synchronous control is not carried out even in the synchronized axis, and the reference axis and synchronized axis are handled as independent two axes in the each control part. Thus, the reference axis and synchronized axis can be moved individually.
If the zero point is fixed, the synchronization error check is carried out.
If the correction mode switch is turned ON during selecting the mode except the handle or manual arbitrary feed mode, the "M01 OPERATION ERROR 0120" (Synchronization correction mode ON) occurs.
In the handle mode or manual arbitrary feed mode, the correction mode can be set by turning ON the correction mode switch, and "CORRECTION MODE is displayed at the operation mode display position.
The operation procedure is shown below.
[Related signals]
(1) Synchronous control operation method (R2589)
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Synchronization correction mode SYCM YC22 YD62 YEA2 YFE2 Y1122 Y1262 Y13A2 Y14E2
Start
Correction mode ON
Yes
No
Handle or manual
arbitrary feed mode?
Select the handle or manual
arbitrary feed mode.
Select the axis to be moved
between the reference axis and
synchronized axis.

Move the axis
Correction mode OFF
End
Display the message
"M01 OPERATION ERROR 0120" (in
the synchronization correction).
"CORRECTION MODE" is
displayed in the operation mode
display position.
Only the axis selected between
the reference axis and
synchronized axis is moved.
The mode returns to the
Synchronization mode,
and the mode display becomes
"HANDLE" or "MANUAL ARBITRARY".

[Function]
With the program restart function, when the axis is returned to the restart position with the manual mode after the restart search is performed, the direction can be checked and the axis can be stopped at the restart position.
[Operation]
If the "Program restart" signal (PRST) is turned ON after the restart search is performed and the axis is moved to the restart position direction with the manual mode, the axis is stopped at the restart position automatically. The [RESTART-R] values on the program restart screen are set to zero and "RP" appears by the side of the [RESTART-P] values. Attempting to move the axis in the opposite direction of the restart position results in an operation error.
When the parameter "#1302 AutoRP" (Automatic return by program restart) is set to "1", there is no need to use this signal (PRST:YC23). This is because when the parameter is set to "1", the machining is restarted after the axis has returned to the restart position at the same speed as when the "Dry run" signal (YC15) is turned ON at cycle start and all the axes have returned. Even when the parameter "#1302 AutoRP" is set to "1", the axis can be returned to the restart position manually by turning ON this signal (YC23).
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Program restart PRST YC23 YD63 YEA3 YFE3 Y1123 Y1263 Y13A3 Y14E3
[RESTART (G54)]
- 130.000RP
-10.000RP
0.000RP
X
Y
Z
[RESTART R]
0.000
0.000
0.000
X
Y
Z

[Function]
When the controller is ready for user macro interrupt, the program being in execution can be interrupted, or other program can be executed after the former program has been executed, by turning ON the "Macro interrupt" signal (UIT).
[Operation]
When the "Macro interrupt" signal (UIT) turns ON within time interval starting with M96 command and ending with M97 command or reset, the program being in execution can be interrupted for execution of other program.
The "Macro interrupt" signal (UIT) becomes valid when:
Memory, tape or MDI is selected.
Automatic operation is selected. (STL is ON.)
Other user macro is not being executed.
The "Macro interrupt" signal (UIT) is accepted in "status trigger" method or "edge trigger" method. The method is selected by the parameter #1112.
<Status trigger method>
While the "Macro interrupt" signal (UIT) is ON, the signal is accepted as valid.
When the "Macro interrupt" signal (UIT) is turned ON when the user macro interrupt is enabled by M96, the interrupt program is executed.
By keeping the "Macro interrupt" signal (UIT) ON, the interrupt program can be executed repeatedly.
<Edge trigger method>
When the "Macro interrupt" signal (UIT) status changes from OFF to ON at the rising edge, the signal is accepted as valid.
This method is used when interrupt program is executed only once.
<Command format>
Refer to the "Programming Manual for details on the user macro interrupt function, including the interrupt method and call method, when the "Macro interrupt" signal (UIT) is turned ON.
(1) M96 and M97 can be changed to other M code by using a parameter.
(2) The M code for user macro interrupt control is processed internally and is not output to an external source (PLC).
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Macro interrupt UIT YC25 YD65 YEA5 YFE5 Y1125 Y1265 Y13A5 Y14E5
M96 P_ H_ ;
Interrupt sequence No.
Interrupt program No.

M97; User macro interrupt
invalid
User macro interrupt
invalid

Note
M800V/M80V Series PLC Interface Manual
4 Explanation of Interface Signals
4.3 PLC Output Signals (Bit Type: Y***)
IB-1501616-F 438
[Function]
This signal is for setting the moving speed or feedrate of axis motion in the jog mode, incremental feed mode, or reference position return mode of manual operation as the rapid traverse speed.
[Operation]
When the "Rapid traverse" signal (RT) is turned ON, the controller operates as follows.
The jog and incremental feedrate will be the rapid traverse feedrate set with parameters.
The speed until the near-point detection dog signal is detected during dog-type reference position return will be the ref erence position return rapid traverse feedrate set with parameters.
The speed changes to rapid traverse feedrate when this signal (RT) is turned OFF during jog, incremental feed or refer ence position return. When the signal is turned OFF the speed changes to the previous speed or feedrate. During that time, the feed axis selection signal (J1 to 8) can be kept turned ON.
Turn ON this signal at the same time of selecting the mode or feed axis to move with rapid traverse feedrate from the beginning.
The "Rapid traverse override code 1,2" (ROV1, ROV2) is enabled when the "Rapid traverse" signal is ON.
(1) The "Rapid traverse" signal (RT) operates as an interrupt signal for jog mode, incremental feed mode, etc., not for mode.
(2) This signal can be used likewise during machine lock.
(3) For information on handling the "Rapid traverse" signal (RT) during a dry run, refer to the section of the "Dry run" sig nal (DRN).
[Related signals]
(1) Rapid traverse override code 1,2 (ROV1, ROV2: YC68, YC69)
[Function]
This signal is used to select reverse/forward run in the arbitrary reverse run.
[Operation]
Forward run is executed when this signal is OFF.
Reverse run is executed when this signal is ON.
This signal is available only in the reverse run control mode.
[Related signals]
(1) Reverse run from block start (RVSP: YD08)
(2) Macro interrupt priority (RVIT: YD09)
(3) Reverse run control mode (RVMD: YD0A)
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Rapid traverse RT YC26 YD66 YEA6 YFE6 Y1126 Y1266 Y13A6 Y14E6
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Reverse run VRV YC27 YACA YAD2 YADA Y1127 Y1267 Y13A7 Y14E7
JOG mode (J)
Feed axis selection (+J1)
Rapid traverse (RT)
1st axis motion [+]
Manual feedrate speed Manual feedrate speed
Rapid traverse
speed
Rapid traverse
speed
Note
M800V/M80V Series PLC Interface Manual
4 Explanation of Interface Signals
4.3 PLC Output Signals (Bit Type: Y***)
439 IB-1501616-F
[Function]
This signal selects whether to update the program coordinate system by the amount moved by manual operation (jog, handle, etc.).
[Operation]
<When the "Manual absolute" signal (ABS) is OFF>
The amount moved with manual operation is not added to the absolute position register in the controller. In other words, when manual intervention is performed during automatic operation, the axis moves in parallel at the end point of the intervened block and the end points of subsequent blocks by the amount of manual movement. (The axis moves in parallel regardless of the absolute command or incremental command on the machining program.)
<When the "Manual absolute" signal (ABS) is ON>
The amount moved by manual operation is added to the absolute position register in the controller, and the coordinate system is not changed. In other words, when manual intervention is performed during automatic operation by absolute command, the axis returns to the position commanded by the machining program at the block end point after the intervened block. However, if the incremental command is used after manual intervention, the axis moves in parallel by the amount manually moved. (At the end of the inserted block, the axis moves in parallel regardless of the absolute command or incremental command.)
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Manual absolute ABS YC28 YD68 YEA8 YFE8 Y1128 Y1268 Y13A8 Y14E8
W
W
X
-Y
M0
Feed hold stop Programmed path (absolute comma
Manual interrupt
(The coordinate system W is shi
Path after manual interrupt
Path is shifted by an amount equivalent to manual interrupt
(Zero point of the coordinate system W moves)
Manual interrupt
(The coordinate system W is shifted)
Manual interrupt amount
W
X
-Y
M0
Feed hold stop Programmed path (absolute comma

Manual interrupt
(The coordinate system W is not s
Path after manual interrupt
Tool passes along same path as that programmed

[Function]
By using this signal, the current position displayed on the display unit can be prevented from being updated even if the machine is moved by automatic operation or manual operation.
[Operation]
When the "Display lock" signal (DLK) is turned ON, the movement of the machine and the update of the program coordinate system are performed as usual, but the current position display of the display unit remains locked.
(1) This signal (DLK) is always valid and can be turned ON or OFF immediately.
(2) This signal is also valid during machine lock operation.
[Related signals]
(1) In display lock (DLKN: XC29)

Cont.	Signal name	Abbrev.	$1	$2	$3	$4	$5	$6	$7	$8
A	Display lock	DLK	YC29	YD69	YEA9	YFE9	Y1129	Y1269	Y13A9	Y14E9

Note

[Function]
When this signal is ON and F1-digit feed is commanded, the feedrate registered in the parameters can be increased or decreased by turning the manual handle.
[Operation]
<Enabling conditions of the speed change with the handle>
When the F1-digit command is valid, the feedrate can be increased or decreased by operating the first manual handle. (The feedrate cannot be changed by the 2nd and 3rd handles.)
Changing the feedrate by the handle is available satisfying the following conditions:
 The operation must be in automatic start.
 The operation must be in cutting feed, and F1-digit feedrate command must be issued.
 The F1-digit feed parameter must be ON.
 The F1-digit feed switch must be ON.
 The operation must not be in handle mode.
 The operation must not be in dry run.
 Upper limit of F1-digit feedrate ("#1506 F1_FM") and F1-digit feedrate change constant ("#1507 F1_K F1") are not zero.
<Conversion of the F1-digit feedrate changing with handle operation>
Once the F1-digit feedrate is changed with manual handle, the changed feedrate is valid until parameter is changed or the power is turned OFF. Changed feedrate can be checked only during the operation. However, if the parameter "#1246 set18/bit6" (Switch F1-digit feedrate change method) is set to "1", by changing the F1-digit feedrate parameter to the changed feedrate, operation is kept at the changed feedrate even after the power is turned OFF. In this case, if the screen is not switched, the changed parameter values are not reflected to the display.
The increase/decrease amount per handle gradient is expressed by the following formula.
F = P (FM / K)
P: Handle pulse ()
FM: Upper limit of F1-digit feedrate (#1506 F1_FM)
K: F1-digit feedrate change constant (#1507 F1_K)
(Example) When the handle scale unit is to be made 10 mm/min
Assuming that FM is 3600 mm/min, feedrate change constant (K) must be set "360" according to the following formula.
F = 10 = 1 (3600 / K)
 If F1-digit feedrate changing valid signal is turned ON when F1-digit feed is commanded and changing feedrate with the manual handle is valid, it is clamped at the upper limit of F1-digit feedrate if the F1-digit feedrate is greater than the upper limit of F1-digit feedrate.
 When the F1-digit feedrate is "0" with the handle operation during the F1-digit feedrate command, the alarm "M01 F1-digit feedrate zero 0104" occurs. This alarm can be cleared by returning the F1-digit feedrate to a value greater than "0" with the handle operation.
 When K is "0", the speed is not changed.
[Related signals]
(1) F1-digit commanded (F1DN: XC2A)
(2) F1-digit No. code (F11 to F18: XC30 to XC33)

Cont.	Signal name	Abbrev.	$1	$2	$3	$4	$5	$6	$7	$8
A	F1-digit speed change valid	F1D	YC2A	YD6A	YEAA	YFEA	Y112A	Y126A	Y13AA	Y14EA

[Function]
This signal is turned ON (1) when a calculated block (next block) is recalculated during operation of the machining program.
[Operation]
For example, when a mirror image etc. is operated with the miscellaneous (M) command in the program as follows.
 :
N1 M45 ;
N2 G0X100 ;
 :
When the N1 block is reached in the above program example, the "Recalculation request" signal turns ON before FIN is output or simultaneously with FIN. This enables the mirror image from the N2 block.
[Caution]
The "Recalculation request" signal (CRQ) latches the rising edge in the controller. Therefore, even if the "Recalculation request" signal (CRQ) is ON (1), "recalculation" is not performed except at the rising edge.
[Function]
The controller can be set to an emergency stop state in the same way as an external emergency stop is given by the user PLC.
[Operation]

When this signal is turned ON, emergency stop occurs in the controller and the signals such as "Servo ready completion" signal (SA: XC11) are turned OFF.
The "Machine group-based alarm stop: Machine group-based PLC interlock ON" signal (XBE0: GQEMGO) for all sets of groups turns ON.
(1) Since the "PLC emergency stop" signal (YC2C) is processed in software, response is somewhat slower, as compared with external emergency stop signal. The approximate response is equal to one scan by the user PLC plus 100 ms.
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Recalculation request CRQ YC2B YD6B YEAB YFEB Y112B Y126B Y13AB Y14EB
Cont. Signal name Abbrev. Common ($)
A PLC emergency stop QEMG YC2C
Execution block N1 M45;
M function strobe (MF)
Recalculate request (CRQ)
Auxiliary function finish (FIN)
Calculate next block
Mirror image
N2 G0X100 calculation start Recalculate N2 G0X100
N1 M45; N2 G0X100;
ON
Control unit latches rising edge
Note

[Function]
This function returns immediately to the specified reference position when the return signal is input. This function is used to return the tool to a fixed position for changing the tool with a single touch.
[Operation]
Reference position return is executed when this signal is turned ON. At the rising edge of this signal, the program is automatically reset (reset & rewind) and then reference position return is started.
During the automatic or MDI operation, the operation is interrupted and stopped by the reset, and reference position return is executed.
If this signal is input during execution of a tap cycle in the automatic or MDI operation mode, the "Tap retract possible" signal is output by the reset interruption, and the return operation will be the tap retract operation. The tap retract is completed at the initial point, and after that the reference position return is carried out.
If there are two or more axes, set the return order with the parameter "#2019 revnum".
When the reference position is reached, the corresponding "Reference position reached" signal is output.
This signal must be held until the "Reference position reached" signal is output. If it is turned OFF in the middle, the return operation will be interrupted and stopped. If the signal is input again, the operation will restart from execution of resetting.
The reference position return speed is handled in the same manner as the normal reference position return speed.
The reference position returned to during reference position retract depends on the YC90 and YC91 reference position selection code 1,2.
Even if the return signal is input during the thread cutting cycle, it is invalid. However, if the return signal is executed in a block other than the thread cutting block, the return operation is executed.
The return signal is invalid if the coordinate system is not established. The alarm "M01 Ref point retract invalid" occurs when the return signal is input.
[Timing chart]
[Related signals]
(1) Tap retract possible (TRVE: XCA5)
(2) Tap retract (TRV: YC5C)
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Reference position retract RTN YC2D YD6D YEAD YFED Y112D Y126D Y13AD Y14ED
Reference position retract
(RTN)
In reset
(RST)
Automatic operation
Reference position reached
(ZP1n)
Reset stop Reference position return
Approx.
100ms

[Function]
Interruption is executed with the interrupt program set with the R register when a signal is issued from the PLC during single block stop in automatic operation, or when the automatic operation is not in progress.
[Operation]
PLC interruption categorized as "start during the automatic operation" and "start with other mode" and some operations differ. Whether automatic operation is in progress is determined by whether the "In automatic operation" signal (OP) is output.
<Operation when the interrupt starts during the automatic operation>
The following operation is performed when this signal is turned ON at a single block stop during the cycle operation.
The PLC interruption is not executed if this signal is turned ON while the automatic operation is activated.
The operation error (M01 0129) occurs. Cancel the alarm by turning OFF or reset the "PLC interrupt" signal.
In memory mode, when a cycle operation is started, the program resumes from the next block of the block which was completed immediately before the interruption. When MDI operation is interrupted, the MDI program after the inter rupted block is cancelled.
<Operation example>
(Example 1) When program is interrupted during memory operation single block stop
After the O100 N10 block ends, the designated interrupt program (O9900) is called when this signal turns ON. The PLC interruption ends at the M99 block, and the block will stop. (When the block stops, it is possible to turn this signal ON and then execute the PLC interruption again.) O100 N20 is executed from the next cycle start.
(Example 2) When program is interrupted during MDI operation single block stop
After the MDI N10 block ends, the designated interrupt program (O9900) is called when this signal is turned ON. The PLC

interruption ends at the M99 block and the block stops. However, the next and subsequent blocks of the MDI program are canceled. Therefore, operation cannot be continued.

Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8

A PLC interrupt PIT YC2E YD6E YEAE YFEE Y112E Y126E Y13AE Y14EE

Interrupt program

O100

:

N10 G01 X10.;

N20 Z10.;

PLC interrupt

signal ON

O9900

:

M99;

Interrupt program

MDI

:

N10 G01 X10.;

N20 Z10.;

PLC interrupt

signal ON

O9900

:

Canceled M99;

<Operation when the interruption starts during other than automatic operation>

The following operation is performed if this signal is turned ON when the machine is in manual mode such as jog mode or handle mode, etc. or when the machine is not in program operation even it is in the memory mode.

<Operation example> When program is interrupted during manual mode

During manual mode, the designated interrupt program (O9900) is called when this signal is turned ON. The PLC interruption will be reset and finished at the M99 block, and the machine enters into the manual mode.

Note that the interrupt program will not be executed when this signal is turned ON during manual feed.

(1) To turn this signal ON during the manual mode, use the manual/automatic simultaneous function concurrently.

(2) Interrupt program is finished at M99 and reset 1 is input automatically.

[Caution]

(1) Single block operation and automatic operation pause are valid even when the interrupt program is executed. To dis able single block during the interrupt program execution, set system variable #3003. To disable automatic operation pause, set system variable #3004.

(2) Other PLC interruption and MDI interruption cannot be commanded during execution of the interrupt program.

(3) To disable the display of the interrupt program being executed on the Monitor screen, set the basic specification parameter "#1122 pglk_c" to "1" or "2".

(4) The "PLC interrupt" signal is ignored even if it is turned ON during cycle start or automatic operation pause.

(5) The "In cycle start" signal (OP) is output while the interrupt program is executed regardless of the operation mode which is active before the interruption.

(6) PLC interruption is valid for each part system.

(7) If PLC interruption is executed when there is no interrupt program or when program search has not been executed, the program error (P232) occurs when M99 is commanded.

(8) If the interrupt program No. set in the R register is not within the setting range, the program error (P232) occurs.

(9) Cancel the program error (P232) with reset.

(10)The interruption is not executed in the part system where the "PLC interrupt" signal is OFF.

(11)The "In automatic operation run"" signal (OP) and the "In automatic operation "start"" signal (STL) are output during the PLC interrupt program execution.

Likewise, they are output during the execution of the PLC interrupt program other than during automatic operation.

(12)Even though the "Memory mode" signal (MEM) is OFF, such as in manual feed mode or handle feed mode, when a PLC interruption is executed, the macro is automatically started and the CNC will be in cycle operation mode. At this time, when the "Single block" signal (SBK) is ON, a single block stop occurs. However, even though the "Automatic operation "start" command" signal (ST) is turned ON, the next block cannot be executed.

Make sure that a single block stop does not occur by turning ON the system variable "#3003/bit0" at the beginning of the macro to be called in advance.

Similarly, when the "Automatic operation "pause" command" signal (*SP) is turned ON, the machine decelerates and stops. However, the operation cannot be resumed even though the "Automatic operation "start" command" signal (ST) is turned ON.

Suppress feed hold by taking actions such as turning ON the system variable "#3004/bit0" at the beginning of the macro to be called.

When a single block stop or a feed hold stop occurs in a mode other than memory mode, reset the CNC.

(13)Register an interrupt program in NC memory. When an interrupt program is registered in a device other than NC memory, including NC memory 2, the program error (P232) occurs.

Interrupt program

:

:

PLC interrupt

signal ON

O9900

:

M99;/M30;

Manual mode

Note

[Related signals]

(1) PLC interrupt program No. (R2518)

(2) In PLC interrupt (PCINO: XC35)

[Function]

This signal enables the chopping function.

[Operation]
The chopping mode is entered at the rising edge of this signal.
[Caution]
(1) To use synchronous control and chopping together, turn this signal (YC30) ON or OFF during synchronous operation.
When the synchronous operation is started for the axis in chopping operation, the operation error (M01 1036) occurs,
and the synchronous operation is not started. When the synchronous operation is ended while the synchronous oper ation and the chopping are used together, the operation error (M01 1270) occurs, and all the axes decelerate and stop.
(2) For the axis where the synchronous control is performed, designate only master axis as the chopping axis. If the slave
axis is designated as the chopping axis and the chopping is started, the operation error (M01 1272) occurs and the
chopping operation is not performed.
(3) Simple synchronous control and chopping cannot be used together. For the axis to be used for the simple synchro nous control, do not set and start the chopping.
(4) In the loader-dedicated part system, chopping cannot be used. Even when the "Chopping" signal (YC30) is turned ON
in the loader-dedicated part system, the mode is not changed to the chopping mode, and an error is output to the
"Chopping error No." signal (R554).
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Chopping CHPS YC30 YD70 YEB0 YFF0 Y1130 Y1270 Y13B0 Y14F0

[Function]
This signal is input to the controller when the operation search is performed in the memory mode and cycle start is carried
out.
[Operation]
If this signal is input when the memory operation mode is selected, an operation search of the machining program with the
designated No. (R2562, R2563) will be carried out. After the search, the program will carry out cycle start.
If this signal is input during automatic operation, the program will be reset before the search. After the resetting is
completed, the search and cycle start operations will be executed.
(Example1) Search & start is executed by designating O900 machining program from the reset state.
(Example2) Search & start is executed by designating O900 machining program during the operation of the O1 machining
program.
[Caution]
(1) This signal is valid only when the memory mode is selected.
(2) An error signal will be output if the machining program No. is not designated or if the designated program No. is illegal
(0 or exceeding 99999999).
(3) This signal is valid at the rising edge.
(4) If this signal is input during resetting, the search & start will not be executed.
(5) When the multi-part system program management is valid, the search is executed for all part systems in batch with
the signal for 1st part system. Only the programs with "0" No. are searched.
[Related signals]
(1) Search & start program No. (R2562, R2563)
(2) Search & start Error (SSE: XC8A)
[Function]
This signal enables the chopping control data assigned to R register.
[Operation]
(1) The control data set to the R registers are validated at the rising edge of this signal (YC34). These R registers are
designated by the "Chopping control data address" signal (R2587).
(2) This signal (YC34) must be turned OFF after confirming that the "Chopping start ready completion" bit of the control
status (Rn) in the control data is turned ON.
The "Chopping start ready completion" is included in the control status of the chopping control data.
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Search & start RSST YC31 YD71 YEB1 YFF1 Y1131 Y1271 Y13B1 Y14F1
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Chopping parameter valid YC34 YD74 YEB4 YFF4 Y1134 Y1274 Y13B4 Y14F4
Program No. O900
In automatic operation
In reset
Search & start
O1
Program No. O900
In automatic operation
Search & start
O1
In reset

[Function]
This signal enables the inclined axis control.
[Operation]
When this signal is turned ON, the inclined axis control is performed in accordance with the set parameters.
If this signal is turned from ON to OFF, the inclined axis control will be invalid.
[Caution]
Even if this signal is changed over during the axis movement or the automatic operation, this signal will not be valid.
If this signal is changed over during the axis movement, this signal will be valid after the axis movement is stopped.
If this signal is changed over during the automatic operation, the block stop occurs.
[Function]
Selects whether or not the movement with respect to the inclined axis during the manual operation affects the
corresponding basic axis.
[Operation]
When this signal is turned ON and the manual operation for the inclined axis is executed, the corresponding basic axis is
not moved.
When this signal is turned OFF and the inclined axis is manually operated, the compensation operation is performed on
the corresponding basic axis as the inclined axis moves.
[Caution]
Even if this signal is changed over during the axis movement, this signal will not be valid.
If this signal is changed over during the axis movement, this signal will be valid after the axis movement is stopped.

Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Inclined axis control valid YC35 YD75 YEB5 YFF5 Y1135 Y1275 Y13B5 Y14F5
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Inclined axis control: No Z axis compen sation YC36 YD76 YEB6 YFF6 Y1136 Y1276 Y13B6 Y14F6

[Function]
Whether to execute the block with "/n" (n: 1 to 9) (slash) during automatic operation and search can be selected.
By creating a machining program with the "/" code, a different part can be machined with one program.
[Operation]
When a program that has a block with "/n" (slash code) at the head of block is executed with the "Optional block skip" signal turned ON, the block is skipped. Note that the block with the "/n" code in the middle of the block, not at the head, is executed.
When the "Optional block skip" signal is OFF, block with "/n" is executed.
(Example) If machining the two parts as shown in the figure below, create the following program. When the "Optional block skip m" signal is turned ON and machined, part 1 is obtained. When the signal is turned OFF, part 2 is obtained.
<Program>
N1 G54 ;
N2 G90G81X50. Z-20. R3. F100 ;
/1N3 X30. ;
N4 X10. ;
N5 G80 ;
M02 ;
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Optional block skip m BDT1 to
9
YC37 to
F
YD77 to
F
YEB7 to
F
YFF7 to
F
Y1137 to
F
Y1277 to
F
Y13B7 to
F
Y14F7 to
F
Part 1
Optional block skip ON
Part 2
Optional block skip OFF
N4 N2 N2 N4 N3

[Function]
In the handle mode, axis component to be moved is selected.
This signal is used to select the axis to be moved for the 1st handle.
The axis for the 2nd handle is selected with YC48, while that of the 3rd handle is selected with YC50.
[Operation]
(1) Select handle mode.
(2) Specify axis No. for n-th handle axis selection code (Refer to the table below, "Relationship between "handle axis No." and "corresponding axis"".)
(3) Turn ON the "n-th handle valid" signal (HSnS) .
(4) By turning the handle (hand wheel), the axis moves in accordance with the magnification (MP1 to MP4) at the time.
Relationship between "handle axis No." and "motion axis"
[Related signals]
(1) Handle mode (H: YC01)
(2) 1st handle valid (HS1S: YC47)
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A 1st handle axis selection code m HS11 to
116
YC40 to
4
YD80 to
4
YEC0 to
4
Y1000 to
4
Y1140 to
4
Y1280 to
4
Y13C0 to
4
Y1500 to
4
1 0 0 001
1 0 0 010

1 0 0 011
1 0 0 100
1 0 0 101
1 0 0 110
1 0 0 111
(HS1m) (HS2m) (HS3m)
1 0 1 0 0 0
HSn16 HSn8 HSn4 HSn2 HSn1
m=1,2,4,8,16
1st handle 2nd handle 3rd handle
Motion axis n-th handle
valid (HSnS)
n-th handle axis selection code
X axis (1st axis) selected
Y axis (2nd axis) selected
Z axis (3rd axis) selected
#4 axis (4th axis) selected
#5 axis (5th axis) selected
#6 axis (6th axis) selected
#7 axis (7th axis) selected
#8 axis (8th axis) selected
"n-th handle valid" signal
Set the No. of the axis to be moved with
the n-th handle.
1st handle axis
selection code m
2nd handle axis
selection code m
3rd handle axis
selection code m

[Function]
In HANDLE mode, axis No. of axis motion component to be moved is set to the "1st handle axis selection code" (HS11 to HS116). These signals are used to enable the specified handle axis Nos.
The axis No. for the 2nd handle is enabled with YC4F, while that of the 3rd handle is enabled with YC57.
[Operation]
Axis motion does not start when the 1st handle (hand wheel) is rotated after HANDLE mode is selected and the desired axis No. is set for the 1st handle axis selection code. To move the axis, this signal is required. Although it does not matter whether the "1st handle axis selection code" signal or the "1st handle valid" signal is issued first, both of these signals must be established at the same time when manual axis motion is started.
[Related signals]
(1) 1st handle axis selection code m (HS11 to 116: YC40 to 4)
[Function]
This signal is used to select the axis to be moved with the 2nd handle.
[Operation] [Related signals]
Refer to the section on "1st handle axis selection code m" (HS11 to 116: YC40 to 4).
[Function] [Operation]
This signal is the same as the "1st handle valid" signal in both function and operation.
For the relationship with the "2nd handle axis selection code" (HS21 to 216), refer to the section of 2nd handle axis number.
[Related signals]
(1) 2nd handle axis selection code m (HS21 to 216: YC48 to C)
[Function]
This signal is used to select the axis to be moved with the 3rd handle.
[Operation] [Related signals]
Refer to the section on "1st handle axis selection code m" (HS11 to 116: YC40 to 4).
[Function] [Operation]
This signal is the same as the "1st handle valid" signal in both function and operation.
Refer to the section of the "3rd handle axis selection code" for the relationship with the "3rd handle axis selection code" (HS31 to HS316).
[Related signals]
(1) 3rd handle axis selection code m (HS31 to HS316: YC50 to YC4)
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A 1st handle valid HS1S YC47 YD87 YEC7 Y1007 Y1147 Y1287 Y13C7 Y1507
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A 2nd handle axis selection code m HS21 to
216
YC48 to
C
YD88 to
C
YEC8 to
C
Y1008 to
C
Y1148 to
C
Y1288 to
C
Y13C8 to
C
Y1508 to
C
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A 2nd handle valid HS2S YC4F YD8F YECF Y100F Y114F Y128F Y13CF Y150F

Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A 3rd handle axis selection code m HS31 to
316
YC50 to
4
YD90 to
4
YED0 to
4
Y1010 to
4
Y1150 to
4
Y1290 to
4
Y13D0 to
4
Y1510 to
4
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A 3rd handle valid HS3S YC57 YD97 YED7 Y1017 Y1157 Y1297 Y13D7 Y1517

[Function]
This signal is used to fix the feedrate according to the issued F command, ignoring the value of the cutting feed override input from the PLC to the controller in automatic operation.
[Operation]
When the "Override cancel" signal (OVC) turns ON, the controller operates as follows.
The setting of the cutting feed override code (*FV1 to *FV16) is ignored and the feedrate specified by F command is used.
When the set cutting override is "0%", the "Override cancel" signal (OVC) is invalid. That is, the feedrate is "0" and no motion occurs. (The set cutting override "0%" takes precedence over this signal.)
The signal does not affect to the manual feedrate and the rapid traverse speed.
[Related signals]
(1) Cutting feedrate override code m (*FV1 to 16: YC60)
[Function]
Cutting override can be applied to control the manual feedrate such as manual feed for jog feed and incremental feed.
[Operation]
When this signal (OVSL) is turned ON in the manual operation mode in which the manual feedrate is enabled and operating, the actual feedrate is obtained by multiplying the manual feedrate at that time by the cutting feed override.
(1) For details of manual feedrate, cutting feed override, and 2nd cutting feed override, refer to the relevant descriptions.
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Override cancel OVC YC58 YD98 YED8 Y1018 Y1158 Y1298 Y13D8 Y1518
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Manual override method selection OVSL YC59 YD99 YED9 Y1019 Y1159 Y1299 Y13D9 Y1519

=

Manual feedrate
(1) Code method (*JV1 to 16)
(2) File register method
(Setting value)
Cutting federate override
(1) Code method (*FV1 to 16)
(2) File register method
(Setting value)
ON
OFF
OVSL
2nd curring
feedrate override
Actual manual feedrate
Note

[Function]
The output of each function strobe of the commanded miscellaneous function (M, S, T and B) in automatic operation can be disabled with this signal. This signal (AFL) can be used to check machining program, for example.
[Operation]
When the "Miscellaneous function lock" signal (AFL) turns ON, the controller operates as follows.
Miscellaneous function (M, S, T and B) specified in automatic operation cannot be executed. That is, the output of code data and function strobe signals (MF1 to 4, SF1 to 4, TF1 to 4, BF1 to 4) stops.
If this signal is turned ON after the code data has already been output, the output continues normally until the M function finish (FIN1, FIN2) is received and the function strobe is turned OFF.
The M00, M01, M02 and M30 commands included in the miscellaneous function are executed even when this signal (AFL) is ON and the decoded signals, code data, and the "M function strobe" signal are also output as usual.
Miscellaneous functions which are executed only inside the controller and do not output code data and the "M function strobe" signal (M98 and M99 commands), are executed normally even when this signal is ON.
(1) As for the S command output data, even when the "Miscellaneous function lock" signal (AFL) is turned ON, the data before it is turned ON is retained. When this signal is ON from the time the power is turned ON, S command data will be 0V.
[Related signals]
(1) M function strobe (MFn: XC60)
(2) M code data (R504)

(3) S function strobe (SFn: XC64)
(4) S code data (R512)
(5) T function strobe (TFn: XC68)
(6) T code data (R536)
(7) 2nd M function strobe (BFn: XC6C)
(8) 2nd M function data (R544)
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Miscellaneous function lock AFL YC5A YD9A YEDA Y101A Y115A Y129A Y13DA Y151A
Note

[Function]
This function is used to remove the tap from the workpiece when the tap cycle is interrupted by emergency stop, etc.
[Operation]
If the "Tap retract" signal (TRV: YC5C) is turned ON while the "Tap retract possible" signal (TRVE: XCA5) is ON due to an interruption in the tap cycle, the tap retract operation can be started.
The following items are conditions for tap retract. (The "Tap retract possible" signal (XCA5) turns ON at this time.)
Emergency stop during tap cycle
Reset during tap cycle
Power OFF during tap cycle (Only in absolute position detection system)
Tap retract is executed as follows:
Execute the synchronous tap cycle command. -> (a)
The tap cycle is interrupted by emergency stop. -> (b)
The "Tap retract possible" signal (XCA5) is turned ON. -> (c)
Release the emergency stop. (The "Servo ready completion" signal (SA: XC11) is turned ON.) -> (d)
Turn ON the "Tap retract" signal (YC5C). -> (e)
The tap axis moves toward the initial point of the tap cycle while the spindle rotates in the reverse direction. Refer to <Feedrate at the tap retract> for the feedrate. -> (f)
When the tap axis reaches the tap cycle initial point, the spindle and tap axis stop and the tap retract is completed. The "Tap retract possible" signal (XCA5) is turned OFF. -> (g)
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Tap retract TRV YC5C YD9C YEDC Y101C Y115C Y129C Y13DC Y151C
(a)
Tapping
Tap cycle command
Initial point
R point
(spindle
reverse run)
Tap feed
(spindle
forward run)
Tap base
Normal tap cycle
Tap cycle command
Tap retract operation
Stop
R point
Tap feed
(spindle
forward run) (b)
Emergency stop
(c) Interruption
(f)
Tap retract
(spindle
reverse run)
Tap base
(e)
Tap retract Emergency
stop release
(d)
(g)Initial point
(a)
(b)
(c)
(d)
(e)
(f) (g)
(NC)Tap cycle command
(NC)During tap cycle
Emergency stop
(NC)Tap retract possible(TRVE)
(PLC)Tap retract(TRV)
(NC)Tap retract operation
Tap retract operation

(1) The "Tap retract possible" signal (XCA5) is turned ON when the reset or emergency stop occurs during tapping oper ation. (The "Tap retract possible" signal (XCA5) is not turned ON even when the reset or the emergency stop occurs in the area other than the area between R point and tap bottom.)
(2) The tap retract is started when the "Tap retract" signal (YC5C) is turned ON while the "Tap retract possible" signal (XCA5) is ON. The tap retract is interrupted when the "Tap retract" signal (YC5C) is turned OFF during the tap retract.
(3) When an emergency stop or reset occurs, the tap retract is not performed even if the "Tap retract" signal (YC5C: TRV) is turned ON.

(4) When the parameter "#1234 set06/bit3" is set to "0", the tap retract operation is not performed even if the "Tap retract" signal (YC5C: TRV) is turned ON while the operation error (M01 0057) occurs.
(5) Even in the R point return mode, the tap retract is performed till the initial point.
<Feedrate at the tap retract>
The tap retract is performed at the following feedrate.
Tap retract feedrate = Tap cycle feedrate x Tapping retract override
(The tapping retract override is set with the parameter "#1171 taprov".)
However, after the power is turned ON again, the tap retract is performed at the Z phase detection speed when "#3106 zrn_typ/bit3" is set to "1" (Phase Z detection operation ON) and the Z phase detection speed is less than the tap retract feedrate.
When the parameter "#13018 SP018 SPEC2/bit5" is set to "1" and "#1239 set11/bit0" is set to "1", the spindle speed at the tap retract is clamped at "#13028 SP028 SDTS" (Speed detection set value).
[Caution]
(1) When the parameter "#1234 set06/bit3" is set to "1", the axis interlock control is not performed on the CNC side even if the tapping is interrupted by emergency stop, etc. The axis moves according to the movement command even during the tap retract operation. Safety measures are required on the machine side.
(2) When the parameter "#13018 SP018 SPEC2/bit5" is set to "1" and "#1239 set11/bit0" is set to "0", perform the coil switch, and then turn ON the "Tap retract" signal (YC5C) after the total time set to the parameter "#13114 SP114 MKT" and the parameter "#13115 SP115 MKT2" has passed.
Each parameter means as follows.
[Related signals]
(1) Tap retract possible (TRVE: XCA5)
(2) Tap retract possible state cancel (TRVEC: YCD6)
No. Name Meaning
#13018 SP018 SPEC2/bit5 0: Coil switch is invalid.
1: Coil switch is valid.
#1239 set11/bit0 0: Coil switch is performed via PLC.
1: Coil switch is performed by the NC internal process.
#13114 SP114 MKT Coil switch gate cutoff timer
#13115 SP115 MKT2 Coil switch current limit timer
Note

[Function]
When this signal is turned ON, the tool handle feed mode is activated.
In the tool handle feed mode, the axis can be moved with the manual pulse generator in each of the tool axis direction, the tool radius direction X, and the tool radius direction Y in the hypothetical coordinate system on the tool axis.
[Operation]
When the tool handle feed mode is selected, the axis is moved by the manual pulse generator in the tool axis direction, the tool radius direction X, and the tool radius direction Y.
Operate in the following procedure.
(1) Select handle mode at the mode selection.
(2) Turn ON the signal (YC5E).
(3) Move in the tool axis direction and the tool radius directions X and Y.
Handle feed magnification is shown as below.
(1) When the signal (YC5E) is "0", it is treated as normal handle mode.
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Tool handle feed mode YC5E YD9E YEDE Y101E Y115E Y129E Y13DE Y151E
Handle feed magnification YC82 YC81 YC80
1-fold 0/1 0 0
10-fold 0/1 0 1
100-fold 0/1 1 0
1000-fold 0/1 1 1
Note

[Function]
This is a signal to apply an override (magnification) to the cutting feedrate (F speed) during automatic operation.
[Operation]
In the cutting feed during automatic operation, the actual feedrate is the obtained by multiplying the commanded speed by override value specified by this signal.
However, the override is 100% regardless of this signal, in the following cases:
- When the "Override cancel" signal (YC58) is ON.
- During tapping mode.
- During thread cutting.

These signals (*FV1 to 16) are set with the code method. The following table shows the relationship.
(1) Only when override value is 0%, override is exerted even on rapid traverse speed. However, when the file register method for rapid traverse override is selected and the parameter "#12116 CutOvrZeroMovRap" is set to "1", the rapid traverse is according to the rapid traverse override value irrespective of the curring feed override value. When over ride value is 0%, the operation error (M01 0102) occurs.
[Related signals]
(1) Override cancel (YC58:OVC)
(2) 2nd cutting feedrate override valid (YC66:FV2E)
(3) Cutting feedrate override method selection (YC67:FVS)
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
B Cutting feed override code m *FV1 to
16
YC60 to
4
YDA0 to
4
YEE0 to
4
Y1020 to
4

Y1160 to
4
Y12A0 to
4
Y13E0 to
4
Y1520 to
4
*FV16 *FV8 *FV4 *FV2 *FV1 Cutting feed override
Generally, a rotary switch (5-step, 21-notch, compliment
binary code output) is connected to the operation board
and used between 0% and 200%.
When *FV1 to *FV16 are all OFF, the previous value is
retained. The value will change to 0% when the power
is turned OFF.
1 1 1 1 1 0%
1 1 1 1 0 10%
1 1 1 0 1 20%
1 1 1 0 0 30%
1 1 0 1 1 40%
1 1 0 1 0 50%
1 1 0 0 1 60%
1 1 0 0 0 70%
1 0 1 1 1 80%
1 0 1 1 0 90%
1 0 1 0 1 100%
1 0 1 0 0 110%
1 0 0 1 1 120%
1 0 0 1 0 130%
1 0 0 0 1 140%
1 0 0 0 0 150%
0 1 1 1 1 160%
0 1 1 1 0 170%
0 1 1 0 1 180%
0 1 1 0 0 190%
0 1 0 1 1 200%
0 1 0 1 0 210%
0 1 0 0 1 220%
0 1 0 0 0 230%
0 0 1 1 1 240%
0 0 1 1 0 250%
0 0 1 0 1 260%
0 0 1 0 0 270%
0 0 0 1 1 280%
0 0 0 1 0 290%
0 0 0 0 1 300%
Note

[Function]
Override normally exerted on the cutting feedrate in automatic operation is within a range from 0% to 300%. When this signal is used, an additional override (ranging from 0% to 327.67%) can be applied.
[Operation]
By turning ON the "2nd cutting feedrate override valid" signal (FV2E), the override set by the code method (*FV1 to *FV16) or file register method (by setting numerals manually) can be further overridden. Applicable range of the override is from 0% to 327.67% in 0.01% increments. The value is set in the file register in binary.
[Function]
When override is exerted on cutting feedrate in automatic operation, override method can be selected between "code method" and "file register method".
[Operation]
When the "Cutting feedrate override method selection" signal (FVS) is OFF, code method (*FV1 to *FV16) is selected.
When the "Cutting feedrate override method selection" signal (FVS) is ON, file register method (value is specified by manual setting) is selected.
(1) For details of code method and file register method, refer to the relevant descriptions.
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A 2nd cutting feed override valid FV2E YC66 YDA6 YEE6 Y1026 Y1166 Y12A6 Y13E6 Y1526
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Cutting feedrate override method selec tion FVS YC67 YDA7 YEE7 Y1027 Y1167 Y12A7 Y13E7 Y1527
FV2E
Code method override (*FV1 to *FV16)
File register method override
(File register)

ON
OFF
2nd override
= True override
or
= Cutting feedrate
(Fmm/min)
FVS
OFF: Code method
ON: File register method
*FV1 to *FV16 (0 to 300%, 10% increment)
File register (0 to 300%, 1% increment)
True feedrate

Note

[Function]
These signals are used to exert override on rapid traverse speed set by parameter (for rapid traverse) in automatic operation (memory, MDI or tape) or manual operation.
[Operation]
The actual feedrate at the time of rapid traverse is the value obtained by multiplying rapid traverse speed set by parameter by override value specified by these signals.
These signals are invalid when the "Rapid traverse" signal (RT) is OFF during cutting feed during automatic operation or during manual operation.
These signals (YC68, YC69) are set with the code method. The following table shows the relationship.
(1) When the cutting feed override is 0%, the rapid traverse stops.
[Related signals]
(1) Rapid traverse override method selection (YC6F:ROVS)
(2) Rapid traverse override (R2502)
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Rapid traverse override code 1 ROV1 YC68 YDA8 YEE8 Y1028 Y1168 Y12A8 Y13E8 Y1528
A Rapid traverse override code 2 ROV2 YC69 YDA9 YEE9 Y1029 Y1169 Y12A9 Y13E9 Y1529
ROV2 ROV1 Rapid traverse override
0 0 100%
0 1 50%
1 0 25%
1 1 1%
Note

[Function]
This is used to switch the machining condition parameter group.
[Operation]
After a desired machining condition parameter group is set in "Machining condition selection I: Selection of machining application" (R22564) and "Machining condition selection I: Selection of machining condition" (R22565), the machining condition parameter group is switched to the set one at the rising edge of this request signal (YC6D).
[Operation sequence]
(In the figure, "Machining condition selection I:" in the signal name is omitted.)
[Caution]
Hold the state that the "Machining condition selection I: Machining condition parameter group switch request" signal (YC6D) is ON until the "Machining condition selection I: Machining condition parameter group switch completed" signal (XCBD) is turned ON. If the request signal (YC6D) is turned OFF before the completion signal (XCBD) is turned ON, it cannot be recognized whether the machining condition parameter group switch is completed as intended. (The machining condition parameter group switch is performed to the end.)
[Related signals]
(1) Machining condition selection I: Machining condition parameter group switch completed (XCBD: MCSLF)
(2) Machining condition selection I: Selection of machining application (R22564: MCSLSA)
(3) Machining condition selection I: Selection of machining condition (R22565: MCSLSC)
(4) Machining condition selection I: Current machining condition (application) (R20580: MCSLPA)
(5) Machining condition selection I: Current machining condition (condition) (R20581: MCSLPC)
(6) Machining condition selection I: Current machining condition status (R20582: MCSLSTS)
(7) Machining condition selection I: Machining condition parameter group switch error status (R20583: MCSLERR)
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A
Machining condition selection I: Ma chining condition parameter group
switch request
MCSLR YC6D YDAD YEED Y102D Y116D Y12AD Y13ED Y152D
1
1
2
3
1
1
2
3
0
0x02
Machining condition parameter group switch
Selection of machining application
(R22564)
Selection of machining condition
(R22565)
Machining condition parameter group
switch request (YC6D)
Machining condition parameter group
switch completed (XCBD)
Current machining condition (application)
(R20580)
Current machining condition (condition)
(R20581)
Current machining condition
status (R20582)
Machining condition parameter group
switch error status (R20583)
0x10 (bit4 is "1")

[Function]
This is used to switch the machining condition parameter group to the current one (selected group).
[Operation]
At the rising edge of this signal, the machining condition parameter group is switched to the current one (selected group).
[Operation sequence]
(In the figure, "Machining condition selection I:" in the signal name is omitted.)
[Caution]
Hold the state that the "Machining condition selection I: Machining condition parameter group switch cancel request" signal (YC6E) is ON until the "Machining condition selection I: Machining condition parameter group switch cancel completed" signal (XCBE) is turned ON. If the request signal (YC6E) is turned OFF before the completion signal (XCBE) is turned ON, it cannot be recognized whether the machining condition parameter group switch is completed as intended.
(The machining condition parameter group switch is performed to the end.)
[Related signals]
(1) Machining condition selection I: Machining condition parameter group switch cancel completed (XCBE: MCSLCF)
(2) Machining condition selection I: Current machining condition (application) (R20580: MCSLPA)
(3) Machining condition selection I: Current machining condition (condition) (R20581: MCSLPC)
[Function]
When speed override is exerted on rapid traverse speed specified in automatic operation or manual operation, override method is selected between code method and file register method (manually set).
[Operation]
When the "Rapid traverse override method selection" signal (ROVS) is OFF, code method (ROV1, 2) is used.
When the "Rapid traverse override method selection" signal (ROVS) is ON, file register method is used.
(1) For details of code method and file register method, refer to the relevant descriptions.
[Related signals]
(1) Rapid traverse override code 1 (YC68: ROV1)
(2) Rapid traverse override (R2502)
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A
Machining condition selection I: Ma chining condition parameter group
switch cancel request
MCSLCR YC6E YDAE YEEE Y102E Y116E Y12AE Y13EE Y152E
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Rapid traverse override method selec tion ROVS YC6F YDAF YEEF Y102F Y116F Y12AF Y13EF Y152F
2
3
0
0x10
Machining condition parameter group switch
Machining condition parameter group switch
cancel request (YC6E)
Machining condition parameter group switch
cancel completed (XCBE)
Current machining condition (application)
(R20580)
Current machining condition (condition)
(R20581)
Current machining condition status
(R20582)
Machining condition parameter group switch
error status (R20583)
0x20 (bit5 is "1")
Current machining condition parameter group
(application)
Current machining condition parameter group
(condition)
Rapid traverse speed
(parameter setting)
ROVS
OFF: Code method
ON: File register method
ROV1, 2 (1, 25, 50, 100%)
File register (0 to 100%, 1% increment)
True rapid = Traverse speed
Note

[Function]
Feedrate in manual operation (JOG mode, incremental feed mode, etc.) or in dry run of automatic operation (memory, MDI, tape) is selected.
[Operation]
This signal is valid in the following cases. However, it is invalid when the "Rapid traverse" signal (RT) is ON.
Jog mode, incremental mode or reference position return mode is ON.
During cutting feed in automatic operation and the "Dry run" signal (DRN) is ON.
The "Dry run" signal is ON during rapid traverse in the automatic operation. Note that the parameter #1085 G00Drn" (G00 dry run) must be ON.
These signals (*JV1 to *JV16) are set with the code method. The following table shows the relationship.
When *JV1 to *JV16 are all OFF, the previous value is retained. The value is set to "0" when the power is turned OFF.
(1) In JOG mode, if this signal changes during feed motion, the actual feedrate will also change.
(2) In incremental mode, if this signal changes during feed motion, the actual feedrate does not change.
[Related signals]
(1) Manual feedrate method selection (JVS: YC77)
(2) Manual override method selection (OVSL: YC59)
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
B Manual feedrate code m *JV1 to

16
YC70 to
4
YDB0 to
4
YEF0 to
4
Y1030 to
4
Y1170 to
4
Y12B0 to
4
Y13F0 to
4
Y1530 to
4
*JV16 *JV8 *JV4 *JV2 *JV1
Manual feedrate
Machine parameter set in meters Machine parameter set in inches
Metric mode
(mm/min)
Inch mode
(inch/min)
Metric mode
(mm/min)
Inch mode
(inch/min)
11111 0.00 0.000 0.00 0.000
11110 1.00 0.040 0.51 0.020
11101 1.40 0.054 0.71 0.028
11100 2.00 0.079 1.02 0.040
11011 2.70 0.106 1.37 0.054
11010 3.70 0.146 1.88 0.074
11001 5.20 0.205 2.64 0.104
11000 7.20 0.283 3.66 0.144
1 0 1 1 1 10.00 0.394 5.08 0.200
1 0 1 1 0 14.00 0.551 7.11 0.280
1 0 1 0 1 20.00 0.787 10.16 0.400
1 0 1 0 0 27.00 1.060 13.72 0.540
1 0 0 1 1 37.00 1.460 18.80 0.740
1 0 0 1 0 52.00 2.050 26.42 1.040
1 0 0 0 1 72.00 2.830 36.58 1.440
10000 100.00 3.940 50.80 2.000
01111 140.00 5.510 71.12 2.800
01110 200.00 7.870 101.60 4.000
01101 270.00 10.600 137.16 5.400
01100 370.00 14.600 187.96 7.400
01011 520.00 20.500 264.16 10.400
01010 720.00 28.300 365.76 14.400
01001 1000.00 39.400 508.00 20.000
01000 1400.00 55.100 711.20 28.000
00111 2000.00 78.700 990.60 39.000
00110 2700.00 106.000 1371.60 54.000
00101 3700.00 146.000 1879.60 74.000
00100 5200.00 205.000 2641.60 104.000
00011 7200.00 283.000 3657.60 144.000
00010 10000.00 394.000 5080.00 200.000
00001 14000.00 551.000 7112.00 280.000
Note

[Function]
This signal selects the maximum speed for handle feed or jog feed during manual operation.
[Operation]
<When "#1449 m_clamp_on" (Manual feed rate clamp ON) is set to "0" (Invalid)>
ON: The speed designated with "#2641 m_clamp" (Manual feed clamp speed) is used as the maximum speed.
OFF: The speed designated with "#2001 rapid" (Rapid traverse rate) is used as the maximum speed.
<When "#1449 m_clamp_on" (Manual feed rate clamp ON) is set to "1" (Valid)>
The speed designated with "#2641 m_clamp" (Manual feed clamp speed) is used as the maximum speed regardless of the state of this signal.
[Function]
When feedrate is specified in manual operation (JOG mode, incremental feed mode, etc.) or dry run (automatic operation), feedrate command method is selected between code method and file register method.
[Operation]
When the "Manual feedrate method selection" signal (JVS) is OFF, code method (*JV1 to *JV16) is selected.
When the "Manual feedrate method selection" signal (JVS) is ON, file register method is selected.
(1) For details of code method and file register method, refer to the relevant descriptions.
(2) For axes for which a value other than "0" is set for "#2642 jogfeed" (Jog feed rate), the setting value is treated as the feedrate.
[Function]
When the manual feedrate is specified in file register method (JVS is "ON") or when manual arbitrary feed is performed, the speed is specified by R2504 and R2505 of the file registers (R). In this case, least increment of feedrate entered into file registers R2504 and R2505 is specified by this signal.
[Operation]
The relationship between PCF1/PCF2 and least increment is as follows:

Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Manual speed clamp ON MCLMP YC76 YDB6 YEF6 Y1036 Y1176 Y12B6 Y13F6 Y1536
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Manual feedrate method selection JVS YC77 YDB7 YEF7 Y1037 Y1177 Y12B7 Y13F7 Y1537
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Feedrate least increment code 1, 2 PCF1, 2 YC78, 9 YDB8, 9 YEF8, 9 Y1038, 9 Y1178, 9 Y12B8, 9 Y13F8, 9 Y1538, 9
PCF2 PCF1 Least increment (mm/min or
inch/min) Operation
0 0 10 10 mm/min (inch/min) when "1" is set in file registers.
0 1 1 1 mm/min (inch/min) when "1" is set in file registers.
1 0 0.1 0.1 mm/min (inch/min) when "1" is set in file registers.
1 1 0.01 0.01 mm/min (inch/min) when "1" is set in file registers.
JVS
OFF: Code method
ON: File register method
=
*JV1 to 16 (0 to 14000mm/min) Feedrate in automatic operation or
dry run (automatic operation)
File register (0 to 100000mm/min)
Note

[Function]
Jog feed and handle feed can be carried out without changing the operation mode.
[Operation]
If the Jog mode" signal (J) and this signal are input simultaneously, the "jog/handle synchronous mode" is entered.
If the "Rapid traverse" signal (RT) is turned ON during the "jog/handle synchronous mode", the jog feed is carried out at the rapid traverse feedrate. When the "Rapid traverse signal is OFF, the jog feed is carried out at the manual feedrate.
During the "jog/handle synchronous mode", jog feed and handle feed can be carried out arbitrarily. However, jog feed and handle feed cannot be carried out on the same axis simultaneously. If both are carried out simultaneously, the jog feed has priority. The changeover between jog feed and handle feed on the same axis is carried out when the relevant axis has stopped.
(1) If only the "Jog handle synchronous" signal is input, "M01 OPERATION ERROR 0101 occurs. Even though the "Jog handle synchronous" signal is input simultaneously with an operation mode signal other than the "Jog mode", the "Jog handle synchronous" signal is ignored.
[Function]
This signal enables manual feed using at the manual feedrate B for each axis.
[Operation]
When manual feed is performed in jog mode and this signal and the "Manual feedrate B valid" signal of the correspond ing axis are enabled, the axis moves at the speed commanded by each axis manual feedrate B, which is separate from the manual feedrate or manual feedrate B.
This signal is common for all axes.
[Related signals]
(1) Manual feedrate B valid (FBEn: Y940 to Y947)
(2) Each axis manual feedrate B (R5764 to R5779)
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Jog handle synchronous JHAN YC7B YDBB YEFB Y103B Y117B Y12BB Y13FB Y153B
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Each axis manual feedrate B valid YC7C YDBC YEFC Y103C Y117C Y12BC Y13FC Y153C
Operation
mode
Jog handle synchronous
signal (JHANn)
Rapid traverse
signal (RTn)
Operation
during jog feed
Handle
feed
On Rapid traverse feedrate Possible
On
Off Possible
On Rapid traverse feedrate Impossible
Jog feed
Off
Off Manual feedrate Impossible
Manual feedrate
If handle feed is carried out on an axis that is
being jog fed, the jog feed will have a priority,
so after movement with jog feed has completed
(the axis has stopped), handle feed movement
will start.
If jog feed is carried out on an axis that is being
handle fed, the handle feed movement will
stop at the rising edge of the jog feed
command. After the axis stops, the jog feed
movement will start.
Jog feed
command
Handle pulse
Axis
movement
Handle pulses as this
section are ignored.
Jog movement Handle movement
Jog feed
command

Handle pulse
Axis
movement
Jog movement Handle movement
Handle pulses as this
section are ignored.
Note

[Function]
This signal enables the manual feedrate B surface speed control.
[Operation]
The manual feedrate B surface speed control is enabled for a rotary axis selected by the "Manual feedrate B valid" signal.
Setting this signal to "0" disables the control.
This signal is common for all axes.
Normally, when machining is performed by moving the orthogonal axis while rotating the rotary table with the manual feedrate B surface speed control function, the relative speed of tool nose and workpiece decreases as the tool approaches the center of rotation under the condition that the rotation speed ofthe table is constant.
The table rotation speed can be controlled according to the distance from the rotation center by enabling the manual feedrate B surface speed control.
As shown below, the distances (radiuses) from the rotation center to two points (R1 and R2) and the rotary axis speed at the two points (R1 and R2) are set as parameters. When the "Manual feedrate B surface speed control valid" signal (YC7D) is turned ON, the rotary axis speed is calculated automatically in accordance with a current radius.
Override can be applied in the range of 0% to 200% in respect to the rotary axis speed.
[Caution]
(1) For a linear axis, the manual feedrate B surface speed control is not valid. However, the manual feedrate B override is valid.
(2) When the power is turned ON, enable the manual feedrate B surface speed control after returning the orthogonal axis to the reference position and establishing the coordinate system. If the surface speed control is applied to the rotary axis without establishing the coordinate system, the rotary axis moves at unexpected speed.
[Related signals]
(1) Manual feedrate B valid (FBEn: Y940 to Y947)
(2) Manual feedrate B override (R2524)
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Manual feedrate B surface speed con trol valid YC7D YDBD YEFD Y103D Y117D Y12BD Y13FD Y153D
(1) If R R1, V1 is applied.
(2) If R < R2, the speed V is calculated with the following ex pression.
(3) If R2 R, V2 is applied.
Rotary axis speed
R1 R2
V1
V2
Radius
(1) (2) (3)
(V2 - V1)
(R2 - R1) V= *(R - R1)+V1

[Function]
This signal is used to execute JOG or handle feed for the H and V axes on the specified coordinate ("linear-linear" or "circular-linear").
[Operation]
After this signal turns ON in the JOG or handle mode, the H and V axes move on the specified hypothetical coordinate.
(Coordinates etc. are specified with the R registers explained below.)
[Caution]
(1) This signal does not effect on the operation of the axes other than H and V axes, nor the PLC axis.
(2) This signal does not turn ON in the following conditions.
(i) Either H axis or V axis is in machine lock. (In this case, even machine lock is not performed.)
(ii) The reference position return of either H axis or V axis is not completed.
(iii) Either H axis or V axis is in servo OFF.
(iv) Either H axis or V axis is detached.
(v) The NC is in one of the following states.
- Automatic operation (OP)
- Emergency stop
- Reset
(vi) The current position is outside of the specified movable range.
(vii) The setting value which is specified with R register is illegal.
[Related signals]
(1) In circular feed in manual mode (XC4F)
(2) Circular feed in manual mode Operation mode data (R2636,7)
(3) Circular feed in manual mode Reference point H data (R2644,5)
(4) Circular feed in manual mode Reference point V data (R2648,9)
(5) Circular feed in manual mode Gradient/arc center H data (R2668,9)
(6) Circular feed in manual mode Gradient/arc center V data (R2672,3)
(7) Circular feed in manual mode Travel range H (+) data (R2652,3)
(8) Circular feed in manual mode Travel range H (-) data (R2656,7)
(9) Circular feed in manual mode Travel range V (+) data (R2660,1)
(10)Circular feed in manual mode Travel range V (-) data (R2664,5)
(11)Circular feed in manual mode Current position H (R636,7)
(12)Circular feed in manual mode Current position V (R640,1)
[Function]
This signal specifies whether or not the manual operation (jog feed, incremental feed, manual handle feed) operates with the coordinate system rotated by the coordinate rotation by parameter.
[Operation]

When this signal is turned OFF, the manual operation is operated with the machine coordinate system.
When this signal is turned ON, the manual operation is operated with the coordinate system rotated by the coordinate rotation by parameter.
[Related signals]
(1) Coordinate rotation by parameter: Manual feed coordinate system (XC5F)
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Circular feed in manual mode valid YC7E YDBE YEFE Y103E Y117E Y12BE Y13FE Y153E
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Coordinate rotation by parameter: Co ordinate switch for manual feed YC7F YDBF YEFF Y103F Y117F Y12BF Y13FF Y153F

[Function]
This signal is used to specify the magnification of one pulse of the handle in the HANDLE feed mode, or the amount of feed motion per shot when the "Feed axis selection" signal (J1 to 8) in incremental feed mode is ON.
When the "Handle/incremental feed magnification method selection" signal (MPS) is OFF, this magnification is applied for the hand pulse from handy terminal.
[Operation]
This signal (MP1 to 4) is set with the code method.
The amount of movement per handle feed and incremental feed (1 pulse feed in the case of handle feed, and " Jn" value per change from OFF to ON in the case of incremental feed) is the magnification determined by MP1, MP2, and MP4.
When the parameter "#1003 iunit" is set to either "B" or "C", only values of 1000 or less can be set regardless of whether MP4 is ON or OFF.
The relationship between multiplier code (MP1 to 4) and multiplication in each feed mode is as follows.
[Related signals]
(1) Handle mode (H: YC01)
(2) Incremental mode (S: YC02)
(3) Handle/incremental feed magnification method selection (MPS: YC87)
[Function] [Operation]
This signal sets magnification for each handle when the feed magnification is set arbitrarily.
<When the signal is ON>
When the feed magnification is set with an arbitrary value, magnification can be set for each handle. When the magnification is selected with code method, the feed magnification is common to all handles.
<When the signal is OFF>
When the feed magnification is set with an arbitrary value, the "1st handle/incremental feed magnification" (R2508, R2509) is enabled for all handles. When the magnification is selected with code method, the feed magnification is common to all handles.
[Related signals]
(1) Handle/incremental feed magnification method selection (MPS: C87)
(2) Handle/Incremental feed magnification code m (MP1, MP2, MP4: YC80, YC81, YC82)
(3) 1st handle/incremental feed magnification (R2508, R2509)
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Handle/Incremental feed magnification
code m MP1 to 4 YC80 to
2
YDC0 to
2
YF00 to
2
Y1040 to
2
Y1180 to
2
Y12C0 to
2
Y1400 to
2
Y1540 to
2
MP4 MP2 MP1 Movement amount per handle feed or incremental feed
#1003 iunit: B or C #1003 iunit: Other than B or C
0 0 0 1 1
0 0 1 10 10
0 1 0 100 100
0 1 1 1000 1000
1 0 0 1 5000
1 0 1 10 10000
1 1 0 100 50000
1 1 1 1000 100000
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Magnification valid for each handle MPP YC86 YDC6 YF06 Y1046 Y1186 Y12C6 Y1406 Y1546
Handle Magnification of feed
File register method Code method
1st handle R2508, 2509
2nd handle R2510, 2511 YC80 to YC82
3rd handle R2512, 2513

[Function]
This signal is a signal to switch whether the movement magnification for the basic movement amount of handle feed and incremental feed is performed by the "code method" and the "file register method".
[Operation]
When the "Handle/incremental feed magnification method selection" signal (MPS) is OFF, the MP1, MP2, MP4 code method is selected.
When the "Handle/incremental feed magnification method selection" signal (MPS) is ON, the file register magnification

method is selected.
(1) For details of the code method and the file register method, refer to the relevant descriptions.
[Related signals]
(1) Handle/Incremental feed magnification code m (MP1, MP2, MP4: YC80, YC81, YC82)
(2) 1st handle/incremental feed magnification (R2508, R2509)
[Function]
This signal sets the spindle tool status during tool life management to status 3 (Tool alarm 1/Tool skip).
[Operation]
By turning ON the signal in the tool life management specification, the tool status of a spindle tool can be changed to "3".
When the tool life is managed for each tool group, the tool status of a tool selected when a tool group No. is designated can be changed to "3".
However, the "Tool life management input" signal (YC8B) needs to be turned ON to enable this function.
[Function]
This signal sets the tool data status during tool life management to status 4 (Tool alarm 2).
[Operation]
By turning ON the signal in the tool life management specification, the tool status of a spindle tool can be changed to "4".
When the tool life is managed for each tool group, the tool status of a tool selected when a tool group No. is designated can be changed to "4".
However, the "Tool life management input" signal (YC8B) needs to be turned ON to enable this function.
[Function]
This signal enables tool life count during the tool life management.
[Operation]
For the tool life management specifications, the tool life count (usage time or usage count corresponding to tool) is enabled.
However, the "Tool life management input" signal (YC8B) needs to be turned ON to enable this function.
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Handle/incremental feed magnification
method selection MPS YC87 YDC7 YF07 Y1047 Y1187 Y12C7 Y1407 Y1547
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Tool alarm 1/Tool-skip TAL1 YC88 YDC8 YF08 Y1048 Y1188 Y12C8 Y1408 Y1548
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Tool alarm 2 TAL2 YC89 YDC9 YF09 Y1049 Y1189 Y12C9 Y1409 Y1549
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Usage data count valid TCEF YC8A YDCA YF0A Y104A Y118A Y12CA Y140A Y154A
MPS

OFF: Code method
ON: File register method
Basic amount of feed
(1m)
Multiplier by MP1, MP2, MP4
Multiplier by value set in file register
= True amount
of motion
Note

[Function]
This signal enables the tool life management.
[Operation]
When the tool life management specification is specified, the tool life management process is executed by turning ON this signal.
[Function]
This signal is used to turn all the tools of a group into an unused state in the tool life management II.
[Operation]
Select with the tool group No. designation (file register R2590, 2591) whether all groups that have exceeded their lifetimes or specific group to turn the tool into an unused state.
After this signal is input, the first tool of the group is selected at the next group selection.
(1) When the tool change reset or the tool skip is performed on the group currently selected, usage data count is carried out on the tool used at the time of signal input until the next tool selection. Therefore, if a tool selected needs to be changed along with the signal input, select a group again. However, a tool may not be selected due to a preceding process if there is no movement command up to the next group selection after the signal input. In this case, contents of the preceding process can be disabled by turning ON the "Recalculation request" signal (CRQ) before selecting the group.
[Related signals]
(1) Recalculation request (CRQ: YC2B)
[Function]
With the tool escape and return function, a transit point can be designated by pressing the transit point switch when the tool escapes. The tool returns to the position where machining was interrupted via the designated transit point.
This signal turns ON when the transit point switch is pressed and turns OFF when recognition of the transit point is completed.
[Operation]
Refer to the section of the "In tool escape and return mode" signal (XC4A).
[Related signals]
(1) In tool escape and return mode (XC4A)
(2) Tool escape and return transit point recognition finish (XC87)
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Tool life management input TLF1 YC8B YDCB YF0B Y104B Y118B Y12CB Y140B Y154B
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Tool change reset TRST YC8C YDCC YF0C Y104C Y118C Y12CC Y140C Y154C
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Tool escape and return Transit point
designation YC8D YDCD YF0D Y104D Y118D Y12CD Y140D Y154D
Note

[Function]
The n-th reference position return can be performed even in the manual reference position return mode. This signal is used to select "n" of the n-th reference position return. Normally, both the "Reference position selection code 1" signal (ZSL1n) and the "Reference position selection code 2" signal (ZSL2n) are turned OFF to return to the 1st reference position.
[Operation]
The reference position to be returned to is selected among the 1st to the 4th reference positions by using these signals (YC90, YC91).
To perform the 2nd, the 3rd, or the 4th reference position return, establish the 1st reference position beforehand.
For the absolute position detection system, when the coordinate system is set, all the reference position returns can be performed after the power is turned ON.
[Operation sequence]
[Related signals]
(1) Reference position return mode (ZRN: YC04)
(2) Feed axis selection (+Jn: Y1D8, -Jn: Y900)
(3) N-th reference position reached (ZP11 to 48: X800 to X867)
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Reference position selection code 1 ZSL1 YC90 YDD0 YF10 Y1050 Y1190 Y12D0 Y1410 Y1550
A Reference position selection code 2 ZSL2 YC91 YDD1 YF11 Y1051 Y1191 Y12D1 Y1411 Y1551
Reference position selection code 2 Reference position selection code 1 Return position
0 0 1st reference position
0 1 2nd reference position
1 0 3rd reference position
1 1 4th reference position
Reference position return mode
Reference position selection code
Manual start
(Feed axis selection (+)/(-))
In axis motion
N-th reference position reached
Even when "Reference position selection code"
signal changes during axis movement, point
selected at start of motion is held.
N-th reference position return request
Goes to n-th reference position
No change
(ZP1n to ZP4n)

[Function]
This signal controls the tool length compensation along the tool axis compensation amount change mode.
[Operation]
When the signal is ON:
When the handle is operated, only compensation amount of tool length compensation along the tool axis will be changed. Handle interrupt function will be invalid.
When the signal is OFF:
Compensation amount of tool length compensation along the tool axis cannot be changed by the manual handle even during the tool length compensation along the tool axis mode.
[Related signals]
(1) Mechanical axis specifications 1st rotary axis angle/2nd rotary axis angle (R2628,R2629/R2630,R2631)
[Function]
This signal enables the feed forward control during the thread cutting.
[Operation]
When this signal is turned ON, the feed forward control is enabled during the thread cutting.
Turn ON this signal prior to the thread cutting command which performs the feed forward control.
[Related signals]
(1) Thread cutting: Feed-forward control ON (FFCO: XCA4)
[Function]
This signal selects whether the reference position selection is common for all axes or independent for each axis.
[Operation]
When this signal is OFF, the reference position selection is common for all axes, and ZSL1 and ZSL2 are valid.
When this signal is ON, the reference position selection is independent for each axis, and "Each axis reference position selection" is valid.
[Related signals]
(1) Reference position selection code 1, 2 (ZSL1, 2: YC90, YC91)
(2) Each axis reference position selection (R2584)
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A
Tool length compensation along the tool
axis Compensation amount change
mode
YC92 YDD2 YF12 Y1052 Y1192 Y12D2 Y1412 Y1552
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Thread cutting: Feed-forward control re quest FFC YC94 YDD4 YF14 Y1054 Y1194 Y12D4 Y1414 Y1554
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Reference position selection method M YC97 YDD7 YF17 Y1057 Y1197 Y12D7 Y1417 Y1557

[Function]
This signal temporarily cancels the "Tool life over" signal.
[Operation]
If the corresponding "Tool life over" signal is ON at the falling edge, this signal turns OFF the "Tool life over" signal.

The "Tool life over" signal temporarily canceled by this signal turns ON again if the lifetime of the tool in use is expired after NC reset.
The timing chart for this signal is shown below.
[Caution]
This signal is used only for resetting the "Tool life over" signal temporarily and does not affect other operations.
[Related signals]
(1) Tool life over (TLOV: XC2E)
(2) NC reset 1 (NRST1: YC18)
(3) NC reset 2 (NRST2: YC19)
(4) Reset & rewind (RRW: YC1A)
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Tool life management:
Temporary cancel of tool life expiration YC98 YDD8 YF18 Y1058 Y1198 Y12D8 Y1418 Y1558
Tool life over signal (TLOV)
NC reset 1 (NCRST)
Tool life management:
Temporary cancel of tool life expiration signal (YC98)
Tool life management:
Temporary cancel of tool life expiration ON signal (XC2C)

[Function]
This signal temporarily cancels the Tool group life over signal.
[Operation]
If the corresponding "Tool group life over" signal is ON at the falling edge, this signal turns OFF the "Tool group life over" signal.
The "Tool group life over" signal temporarily canceled by this signal turns ON again if the lifetimes of all tools in a group that are mounted after NC reset are expired.
The timing chart for this signal is shown below.
[Caution]
This signal is used only for resetting the "Tool group life over" signal temporarily and does not affect other operations.
[Related signals]
(1) Tool group life over (XC2F)
(2) NC reset 1 (NRST1: YC18)
(3) NC reset 2 (NRST2: YC19)
(4) Reset & rewind (RRW: YC1A)
[Function]
After the completion of external search, this signal is input to the control unit to return the previous program selected before the external search.
[Operation]
The control returns the previous program selected before the external search at the rising edge of this signal.
To enable this signal, set "#1288 ext24/bit3" (Restore previous program before external search by Program restore signal) to "1".
[Caution]
(1) When "#1288 ext24/bit3" (Restore previous program before external search by Program restore signal) is set to "0", the program does not return to the previous one selected before the external search even if this signal is turned ON.
(2) When another search operation is executed after the external search is completed, the program does not return to the previous one selected before the external search even if this signal is turned ON.
(3) When the macro interruption function is executed after the external search is completed or while the externally searched program is operating, the program does not return to the previous one selected before the external search even if this signal is turned ON.
(4) Even if this signal is turned ON while the externally searched program is operating, the program does not return to the previous one selected before the external search.
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A
Tool life management:
Temporary cancel of tool group life ex piration
YC99 YDD9 YF19 Y1059 Y1199 Y12D9 Y1419 Y1559
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A External search: Program return PRTN YC9A YDDA YF1A Y105A Y119A Y12DA Y141A Y155A
Tool group life over signal
NC reset 1 (NCRST)
Tool life management:
Temporary cancel of tool group life expiration signal (YC99)
Tool life management:
Temporary cancel of tool group life expiration ON signal (XC2C)

[Function]
This signal sends the request of DB operation to the arbitrary information accumulation table in the database.
[Operation]
The processing of DB operation for the arbitrary information accumulation table in the database starts at the rising edge of this signal.
[Related signals]
(1) MES interface library: Sending user arbitrary information (XD30 to X15F0)
(2) MES interface library: DB operation selection (R14598)
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A MES interface library:
User arbitrary information send request YC9B YDDB YF1B Y105B Y119B Y12DB Y141B Y155B

[Function]

This signal is used to run the machining program with handle feedrate or JOG feedrate (manual feedrate).
[Operation]
When this signal is turned ON, the manual speed (handle feedrate or manual feedrate) is applied to all subsequent axis feedrate for automatic operation, and the speed specified by the program is not used.
If the program has not started, the automatic operation start is executed with handle or manual feedrate.
Whether to use the manual feedrate or the handle feedrate depends on the manual operation mode.
<In handle mode>
The program under operation is executed at the feedrate of the 1st handle, 1st axis.
During the reset, block stop or pause in the automatic operation mode, the automatic operation starts at the time when the handle feedrate has been commanded.
When the reverse run is valid, a command with "+" direction progress the movement in the programmed direction, while a command with "-" direction reverses the movement against the program. The reversed movement, however, is available only within the current block.
<In JOG mode>
The program under operation is executed at the manual feedrate as long as the JOG mode signal is ON for the 1st axis.
During the reset, block stop or pause in the automatic operation mode, the automatic operation starts at the time when the JOG mode has been turned ON.
When the reverse run is valid, a command with "+" direction progress the movement in the programmed direction, while a command with "-" direction reverses the movement against the program. The reversed movement, however, is available only within the current block.
When the "Rapid traverse" signal is ON, the axis moves at the rapid traverse feedrate.
[Caution]
(1) Turning ON this signal in the automatic operation leads to an automatic operation pause.
(2) While this signal is ON, the "Automatic operation "start" command" signal is invalid.
(3) When the automatic operation is carried out with the manual speed command, the "In automatic operation "pause"" signal is output regardless of the axis movement.
(4) The manual speed command makes the movement follow the command on the 1st axis, even though the other axis is commanded in the program. If a command is given to another axis, the operation error (M01 0005) (Internal interlock axis exists) occurs.
(5) The following G commands and the operation during modal are different from the operation during normal automatic operation. G00: The manual feedrate is applied, not the rapid traverse feedrate.
G28: The manual feedrate is applied, not the reference position return feedrate. G31: The manual feedrate is applied, not the skip feedrate. The movement when the skip signal is input, however, is the same as the normal operation.
G33, G34 to 36 (L system): The thread cutting (G33), the variable lead thread cutting (G34: L system only), and the arc thread cutting (G35/36: L system only) operate the same as the dry run. The manual feedrate is applied.
(When the parameter "#1247 set19/bit1" is set to "1", it operates in accordance with the program command.) G95:
The feed per rotation operates the same as the dry run.
F1-digit feed: The manual feedrate is applied, not the F1-digit feedrate. The "F1-digit commanded" signal is not out put, either.
(6) Only the 1st handle is used. The other handles are ignored.
(7) When this signal is valid, the feedrate is not changed by the inch/metric changeover command (G20/G21). If the rotary axis command speed is set to "10-fold", it is also disabled.
(8) The manual interruption and the thread cutting cycle retract are available when this signal is ON. The automatic han dle interruption, as well as the manual operation in the manual/auto simultaneous mode, cannot be used on the 1st axis because the axis applies the manual input upon this signal.
[Related signals]
(1) Manual speed command sign reversed (YC9E)
(2) Manual speed command reverse run valid (YC9F)
(3) In automatic operation "pause" (SPL: XC14)
(4) In manual speed command valid (XC48)
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Manual speed command valid YC9D YDDD YF1D Y105D Y119D Y12DD Y141D Y155D

[Function]
When the manual speed is commanded, this signal reverses the direction that has been commanded with the handle feed or JOG feed.
[Operation]
When this signal is ON, a speed command in the (+) direction reverses the movement against the program. (Note that this operation is not available unless the reverse run is valid.) A command in the (-) direction makes the movement as commanded in the program.
[Caution]
(1) This signal is not valid when the "Manual speed command reverse run valid" signal is OFF.
[Related signals]
(1) Manual speed command valid (YC9D)
(2) Manual speed command reverse run valid (YC9F)
[Function]
This signal allows the manual speed command in the (-) direction to reverse the movement against the program.
[Operation]
When this signal turns ON during the manual speed is commanded, a speed command in the (-) direction in handle or JOG mode reverses the movement against the program.
When this signal is OFF, a command in the (-) direction makes the same movement as commanded in the (+) direction: the movement follows the program.
[Caution]
(1) The reverse run is available within the block in execution. The reversed axis movement stops at the start point of the block in execution.
(2) Unless all the axes stop, this signal cannot be changed ON/OFF. The ON/OFF change of this signal during the axis movement is realized after all the axes have stopped.
(3) The reverse run is not allowed in the following operations. The axis stays stopped if a speed command is given in the (-) direction.
(i) In the reference position return (G28, G29). When G28 is commanded, however, the reverse run is available from the start point and to the intermediate point. When G29 is commanded, the reverse run is available from the inter mediate point to the end point.
(ii) In cutting cycle in the synchronous or asynchronous tap.
(iii) In shift amount operation in a fixed cycle.
(iv) In tool center point control.
(v) In normal line control.
(vi) In milling interpolation, pole coordinate rotation or cylindrical interpolation.
(vii) When the thread cutting command (G33) is given.

(viii)In exponential interpolation.
(ix) In spline interpolation.
(x) In NURBS interpolation.
(xi) In tool change position return or 2nd/3rd/4th reference position return (from the intermediate point to the block end).
[Related signals]
(1) Manual speed command valid (YC9D)
(2) Manual speed command sign reversed (YC9E)
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Manual speed command sign reversed YC9E YDDE YF1E Y105E Y119E Y12DE Y141E Y155E
Manual speed com mand
Reverse run valid
Manual speed com mand
Sign reversed
Movement direction
by (+) operation by (-) operation
OFF (Invalid) + +
ON OFF + -
ON ON - +
In the modals that do not allow the reverse run
(thread cutting and synchronous tapping) + The operation is ig nored
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Manual speed command reverse run
valid YC9F YDDF YF1F Y105F Y119F Y12DF Y141F Y155F

[Function]
This signal specifies a number of the axis component to move in manual arbitrary feed mode.
Up to three axes can be moved simultaneously in manual arbitrary feed mode. This signal is for specifying the axis number of one of them.
[Operation]
The "Manual arbitrary feed 1st axis selection code m" (CX11 to CX116) must be set before the "Manual arbitrary feed Strobe" signal (CXS8) is turned ON. An attempt to set it during motion shall fail.
Besides this signal (CX11 to CX116), there are two signals to specify a "Manual arbitrary feed 2nd axis selection code m" (CX21 to CX216) and a "Manual arbitrary feed 3rd axis selection code m" (CX31 to CX316). The axis numbers need not be specified in ascending order.
The "Manual arbitrary feed 1st axis selection code m" is enabled by turning ON the "Manual arbitrary feed 1st axis valid" signal (CX1S) described later. Similarly, the specific validity signals (CX2S and CX3S) are also provided for the 2nd and 3rd axis number signals.
Axis numbers can be specified as follows:
Motion of the specified axis component is as follows:
- The motion of the axis component specified by the "Manual arbitrary feed 1st axis selection code m" signal corresponds to the contents of the "Manual arbitrary feed 1st axis travel amount" (R2544 and R2545).
- The motion of the axis component specified by the "Manual arbitrary feed 2nd axis selection code m" signal corre sponds to the contents of the "Manual arbitrary feed 2nd axis travel amount" (R2548 and R2549).
- The motion of the axis component specified by the "Manual arbitrary feed 3rd axis selection code m" signal corresponds to the contents of the "Manual arbitrary feed 3rd axis travel amount" (R2552 and R2553).
[Related signals]
For related signals, refer to the section on "Manual arbitrary feed mode" (PTP: YC03).
[Function]
This signal is used to enable the axis specified by the "Manual arbitrary feed 1st axis selection code m" signal so that the axis component can move in manual arbitrary feed mode.
[Operation]
The specification of the axis by the "Manual arbitrary feed 1st axis selection code m" signal explained earlier is enabled only when this signal (CX1S) is turned ON.
[Related signals]
For related signals, refer to the section on "Manual arbitrary feed mode" (PTP: YC03).
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Manual arbitrary feed 1st axis selection
code m
CX11 to
116
YCA0 to
4
YDE0 to
4
YF20 to
4
Y1060 to
4
Y11A0 to
4
Y12E0 to
4
Y1420 to
4
Y1560 to
4
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Manual arbitrary feed 1st axis valid CX1S YCA7 YDE7 YF27 Y1067 Y11A7 Y12E7 Y1427 Y1567
n: 1 to 3
Signal
Axis
specification
CXnS CXn16 CXn8 CXn4 CXn2 CXn1
1st axis 1 0 0 0 0 1
2nd axis 1 0 0 0 1 0

3rd axis 1 0 0 0 1 1
4th axis 1 0 0 1 0 0
Validity signal Axis number

[Function] [Operation]
For both function and operation, refer to the section of the "Manual arbitrary feed 1st axis selection code m" signal (CX11 to CX116: YCA0 to 4) explained above.
[Function] [Operation]
For both function and operation, refer to the section of the "Manual arbitrary feed 1st axis valid" signal (CX1S: YCA7) explained above.
[Function] [Operation]
For both function and operation, refer to the section of the "Manual arbitrary feed 1st axis selection code m" signal (CX11 to CX116: YCA0 to 4) explained above.
[Function] [Operation]
For both function and operation, refer to the section of the "Manual arbitrary feed 1st axis valid" signal (CX1S: YCA7) explained above.
[Function]
This signal is used to move an axis component under the condition where the acceleration/deceleration time constant is "0" in the manual arbitrary feed mode.
[Operation]
When manual arbitrary feed is performed with the "Manual arbitrary feed Smoothing off" signal (CXS1) turned ON, the axis moves in the same state as when the acceleration/deceleration time constant is set to "0".
(1) Since the axis moves when the acceleration/deceleration time constant is "0", if the axis is moved too fast, a servo alarm (excessive error) may occur. Move it at a slow speed.
[Related signals]
For related signals, refer to the section on "Manual arbitrary feed mode" (PTP: YC03).
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Manual arbitrary feed 2nd axis selection
code m
CX21 to
216
YCA8 to
C
YDE8 to
C
YF28 to
C
Y1068 to
C
Y11A8 to
C
Y12E8 to
C
Y1428 to
C
Y1568 to
C
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Manual arbitrary feed 2nd axis valid CX2S YCAF YDEF YF2F Y106F Y11AF Y12EF Y142F Y156F
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Manual arbitrary feed 3rd axis selection
code m
CX31 to
316
YCB0 to
4
YDF0 to
4
YF30 to
4
Y1070 to
4
Y11B0 to
4
Y12F0 to
4
Y1430 to
4
Y1570 to
4
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Manual arbitrary feed 3rd axis valid CX3S YCB7 YDF7 YF37 Y1077 Y11B7 Y12F7 Y1437 Y1577
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Manual arbitrary feed Smoothing off CXS1 YCB8 YDF8 YF38 Y1078 Y11B8 Y12F8 Y1438 Y1578
Note

[Function]
This signal can be used to position each axis independently without performing interpolation when two or more axis components are moved simultaneously in the manual arbitrary feed mode.
[Operation]
When manual arbitrary feed is executed for two or more axes at the same time with "Manual arbitrary feed Axis independent" (CXS2) turned ON, positioning is performed independently for each axis without interpolation. Normally, the

"Manual arbitrary feed Axis independent" (CXS2) signal is used when the "Manual arbitrary feed G0/G1" signal (CXS4) described later is OFF (G0 selected).
Specific examples are shown below when the rapid traverse speeds of the X-axis and Z-axis are both 9600 mm/min, and the movement amounts of the X-axis and Z-axis are 300 mm and 200 mm, respectively.
[Related signals]
For related signals, refer to the section on "Manual arbitrary feed mode" (PTP: YC03).
[Function]
This signal selects whether a manual arbitrary feed in G1 mode is done at manual feed rate or at modal speed in automatic operation.
[Operation]
When the "Manual arbitrary feed G0/G1" signal (CXS4) described later is ON, the operation is as follows:
<When the "Manual arbitrary feed EX.F/MODAL.F" (CXS3) is OFF>
When the "Manual feedrate method selection" signal (JVS) is OFF, the speed selected by the manual feedrate code (*JV1 to *JV16) is applied.
When the "Manual feedrate method selection" signal (JVS) is ON, the speed moves at the speed determined by the relationship between the contents of the corresponding file register (R) and the "Feedrate least increment code 1, 2" signal (PCF1 or PCF2).
<When the "Manual arbitrary feed EX.F/MODAL.F" (CXS3) is ON>
Manual arbitrary feed is done at a modal speed (F***) set in automatic operation. However, if the F command has never been executed, manual arbitrary feed does not work.
[Related signals]
For related signals, refer to the section on "Manual arbitrary feed mode" (PTP: YC03).
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Manual arbitrary feed Axis independent CXS2 YCB9 YDF9 YF39 Y1079 Y11B9 Y12F9 Y1439 Y1579
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Manual arbitrary feed EX.F/MODAL.F CXS3 YCBA YDFA YF3A Y107A Y11BA Y12FA Y143A Y157A
(Example 1)
End point
Z-axis
X-axis
200
300
f z
f x
X-axis effective speed: 9600 mm/min
Start point
Z-axis effective speed:
9600 mm/min
End point
(Example 2) Z-axis
X-axis
300
200
Z-axis effective speed:
6400 mm/min
f z
f x
Start point
X-axis effective speed: 9600 mm/min
File register (R)
Manual feedrate code *JV1~*JV16
PCF1, PCF2
F command modal (F***)
Off
On
JVS
Off
On
EX. F/MODAL. F (CX3n)
Moving speed

[Function]
This signal selects a manual feed speed or rapid traverse speed in manual arbitrary feed mode.
[Operation]
This signal operates as shown below depending on the status of the "Manual arbitrary feed G0/G1" signal (CXS4).
<When the "Manual arbitrary feed G0/G1" signal is OFF>
The rapid traverse speed originally set to the corresponding axis applies. Rapid traverse override is also valid. The rapid traverse speed applicable when moving two or more axis components at the same time varies with the status of the "Manual arbitrary feed Axis independent" signal (CXS2). See the descriptions on the "Manual arbitrary feed axis independent" signal (CXS2).
<When the "Manual arbitrary feed G0/G1" signal is ON>
The manual feed speed or the speed specified by the F command in automatic operation apply. For details, refer to the section on "Manual arbitrary feed EX.F/MODAL.F" (CXS3).
Cutting override, "2nd cutting override" and "Override cancel" are valid as well.
[Related signals]
For related signals, refer to the section on "Manual arbitrary feed mode" (PTP: YC03).
[Function]
This signal selects a machine coordinate system or a modal workpiece coordinate system on which positioning is done in manual arbitrary feed mode.
[Operation]
The "Manual arbitrary feed MC/WK" signal (CXS5) becomes valid when the "Manual arbitrary feed ABS/INC" signal (CXS6) described later is OFF in manual arbitrary feed mode.
<When the "Manual arbitrary feed MC/WK" signal is OFF>
Manual arbitrary feed n-th axis travel amount set in a file register (R) is used for positioning on the machine coordinate system.

<When the "Manual arbitrary feed MC/WK" signal is ON>
Manual arbitrary feed n-th axis travel amount set in a file register (R) is used for positioning on the modal workpiece coordinate system.
[Related signals]
For related signals, refer to the section on "Manual arbitrary feed mode" (PTP: YC03).
[Function]
This signal is used to select whether the traveling data given for the manual arbitrary feed is to be handled as positioning point (absolute position) or as travel distance (incremental value).
[Operation]
<When the "Manual arbitrary feed ABS/INC" signal (CXS6) is OFF>
Manual arbitrary feed n-th axis travel amount set in a file register (R) is handled as a positioning point (absolute position).
For the coordinate systems, see the descriptions on the "Manual arbitrary feed MC/WK" signal (CXS5) explained before.
<When the "Manual arbitrary feed ABS/INC" signal is ON>
Manual arbitrary feed n-th axis travel amount set in a file register (R) is handled as a travel distance (incremental value).
[Related signals]
For related signals, refer to the section on "Manual arbitrary feed mode" (PTP: YC03).
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Manual arbitrary feed G0/G1 CXS4 YCBB YDFB YF3B Y107B Y11BB Y12FB Y143B Y157B
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Manual arbitrary feed MC/WK CXS5 YCBC YDFC YF3C Y107C Y11BC Y12FC Y143C Y157C
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Manual arbitrary feed ABS/INC CXS6 YCBD YDFD YF3D Y107D Y11BD Y12FD Y143D Y157D
Amount of motion =
Manual arbitrary feed n-th travel amount - Coordinate value on machine coordinate system
- Coordinate value on modal workpiece coordinate system
Amount of motion =
Manual arbitrary feed n-th travel amount

[Function]
This signal stops an ongoing axis component halfway in manual arbitrary feed mode.
The function of this signal is equivalent to those of the "Manual interlock+ n-th axis" signal (*+MITn) and the "Manual interlock- n-th axis" signal (*-MITn).
[Operation]
When the "Manual arbitrary feed stop" signal (*CXS7) is turned OFF (0), the following operations are performed.
Motion of axis in manual arbitrary feed mode is decelerated and stopped.
The axis component which is going to move in manual arbitrary feed mode remains stopped. When the "Manual arbi trary feed stop" signal (*CXS7) is turned ON (1) while an axis component is in the stop state, the axis movement is resumed immediately.
(1) When the power is turned ON, the "Manual arbitrary feed stop" signal (*CXS7) is automatically set to "1". If the "Man ual arbitrary feed stop" signal is not to be used, there is no need to make a sequence program for it.
[Related signals]
For related signals, refer to the section of the "Manual arbitrary feed mode" (PTP: YC03).
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
B Manual arbitrary feed stop *CXS7 YCBE YDFE YF3E Y107E Y11BE Y12FE Y143E Y157E
Note

[Function]
This signal is a trigger signal for moving an axis component in manual arbitrary feed mode. The axis component starts moving at the rising edge of this signal.
[Operation]
The "Manual arbitrary feed Strobe" signal (CXS8) turns ON after the signal necessary for manual arbitrary feed are set to the specified value.
<Signals that must be appropriately set before turning ON the strobe signal>
(a) Manual arbitrary feed mode (PTP)
(b) Manual arbitrary feed n-th axis selection code (CXn1 to CXn16)
(c) Manual arbitrary feed n-th axis valid (CXnS)
(d) Manual arbitrary feed n-th axis travel amount (file registers R2544 to R2553)
(e) Manual arbitrary feed Smoothing off (CXS1)
(f) Manual arbitrary feed Axis independent (CXS2)
(g) Manual arbitrary feed EX.F/MODAL.F (CXS3)
(h) Manual arbitrary feed G0/G1 (CXS4)
(i) Manual arbitrary feed MC/WK (CXS5)
(j) Manual arbitrary feed ABS/INC (CXS6)
<The following signals can be changed even after this strobe signal is turned ON>
(k) Manual feedrate code m
(l) Rapid traverse override for a rapid traverse speed when the "Manual arbitrary feed G0/G1" signal (CXS4) is OFF.
(m) Manual arbitrary feed Stop (*CXS7)
(1) This strobe signal can be accepted even when the "Manual arbitrary feed Stop" signal (*CXS7) is OFF (0).
(2) This strobe signal (CXS8) must be ON for at least 100 ms.
[Related signals]
Signals listed in (a) to (m) above
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Manual arbitrary feed Strobe CXS8 YCBF YDFF YF3F Y107F Y11BF Y12FF Y143F Y157F
Note
Example of operation timing chart
Manual arbitrary feed mode, etc.
Manual arbitrary feed strobe
Axis motion
Axis selected (Axn: X7A0)
Manual arbitrary feed stop
In manual arbitrary feed
Manual arbitrary feed
((a) to (j)) above)
(CXS8n: YCBF)

(*CXS7n: YCBE)
(CXNn: XC16)
completion (CXFINn: XC1C)

[Function]
This signal selects process of current limit reached.
[Operation]
When the current reaches its limit during current control, the "Current limit reached" signal is output and the following modes are selected and performed.
<Normal mode>
Movement command is executed in the current state.
In automatic operation, the movement command is executed to the end and moves to the next block with droops accumulated.
<Interlock mode>
Movement command is blocked (internal interlock).
In automatic operation, the operation stops at the corresponding block and does not move to the next block.
In manual operation, the subsequent commands to the same direction will be ignored.
[Related signals]
(1) In current limit n-th axis (ILI1 to 8: X900 to 7)
(2) Current limit reached n-th axis (ILA1 to 8: X920 to 7)
(3) Current limit changeover n-th axis (ILC1 to 8: Y9A0 to 7)
(4) Droop cancel request n-th axis (DOR1 to 8: Y9C0 to 7)
(5) Current limit changeover (R2593)
[Function]
The axis is interlocked at a designated position during manual 2nd reference position return.
[Operation]
In 2nd reference point return while this signal is valid (the base specification parameter "#1505 ckref2" is set to "1"), when this signal is OFF, the axis that has reached the designated position stops moving and an interlock is applied. The axis that has not reached the designated position are interlocked after reaching the designated position.
When this signal is ON, the axis movement does not stop and the 2nd reference position return continues.
[Function]
The cutting operation of the small diameter deep hole drilling cycle is skipped.
[Operation]
The remaining cutting command is skipped and move on to the next operation by turning ON this signal during the cutting operation of the small diameter deep hole drilling cycle.
[Caution]
(1) The cutting operation is skipped when this signal is turned ON.
[Related signals]
(1) In small diameter deep hole cycle (XCC1)
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Current limit mode 1 ILM1 YCC0 YE00 YF40 Y1080 Y11C0 Y1300 Y1440 Y1580
A Current limit mode 2 ILM2 YCC1 YE01 YF41 Y1081 Y11C1 Y1301 Y1441 Y1581
Current limit mode 2 Current limit mode 1 Mode
00 Normal
0 1 Interlock
10 Normal
11 Normal
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
B 2nd reference position return interlock *ZRIT YCC8 YE08 YF48 Y1088 Y11C8 Y1308 Y1448 Y1588
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Small diameter deep hole drilling cycle YCCA YE0A YF4A Y108A Y11CA Y130A Y144A Y158A

[Function]
This signal designates the part system to ignore the timing synchronization command. The timing synchronization command in the machining program can be ignored. It is possible to operate with only a single part system without deleting the timing synchronization command in the machining program.
[Operation]
1: The timing synchronization is not executed. The timing synchronization command issued during the machining program is ignored.
0: The timing synchronization is executed.
(1) This signal is valid only when "#1279 ext15/bit0" (Part system synchronization method) is set to "1" (Timing synchroni zation between part systems ignore method).
[Function]
Spindle-spindle polygon machining is canceled.
[Operation]
If this signal is input during spindle-spindle polygon, the spindle-spindle polygon machining mode is canceled.
[Related signals]
(1) In spindle-spindle polygon mode (XCB2)
(2) Spindle-spindle polygon synchronization completion (XCB3)
[Function]
Specifies whether to reverse the rotation direction of the spindle during synchronous tapping.
[Operation]
When the "Synchronous tapping command polarity reversal" signal is turned ON, the spindle rotation direction is reversed during synchronous tapping.
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Timing synchronization ignore YCD0 YE10 YF50 Y1090 Y11D0 Y1310 Y1450 Y1590
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Spindle-spindle polygon cancel YCD1 YE11 YF51 Y1091 Y11D1 Y1311 Y1451 Y1591
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Synchronous tapping command polarity
reversal YCD2 YE12 YF52 Y1092 Y11D2 Y1312 Y1452 Y1592
Note
T command

Command
polarity reversal
Synchronous
tapping
Command to
spindle
Basically, the reverse run
command signal is input
simultaneously with the T
command
The spindle will not rotate
in reverse even if turned
ON during synchronous
tapping
The spindle will not return to
forward run even if turned
OFF during synchronous
tapping

[Function]
This function is used to check the program by moving the machine without rotating the spindle.
[Operation]
<Synchronized tapping mode>
By turning on the spindle OFF mode, the spindle does not turn ON or rotate.
Even if the spindle OFF mode is changed during the synchronized tapping mode, the operation does not change until the synchronized tapping mode is turned OFF. It is recommended to turn ON this signal from the beginning of operation.
<Asynchronous tapping mode>
During synchronous (every revolution) feed
In addition to M03, M04 processing and dry run signal, turn ON the spindle OFF mode. The program proceeds when the signal is turned ON.
During asynchronous feed (every minute) feed
The program proceeds even if the spindle OFF mode is not turned ON.
<Thread cutting>
When the parameter "#1279 ext15/bit4" (Dry run OFF during thread cutting) is set to "1", the dry run is disabled for thread cutting. However, when the "Spindle OFF mode" signal is ON, dry run is enabled regardless of the parameter setting, and the status of dry run is determined by the "Dry run" signal.
[Related signals]
(1) Dry run (DRN: YC15)
[Function]
This signal is used to specify the hole drilling axis for the longitudinal hole drilling fixed cycle (G87, G88, G88.1, and G89).
[Operation]
When this signal is OFF (0), the X axis becomes the hole drilling axis.
When this signal is ON (1), the Y axis becomes the hole drilling axis.
When a hole edge chamfering cycle is executed while this signal is ON, the program error (P188) occurs.
[Function]
Turning ON this signal allows to move the axis, both automatically and manually, without tap retract.
This signal is used when it is judged that the spindle rotation due to tap retract is dangerous, such as when the tap is damaged.
[Operation]
Turning this signal ON turns OFF the "Tap retract possible" signal (TRVE).
[Related signals]
(1) Tap retract (TRV: YC5C)
(2) Tap retract possible (TRVE: XCA5)
[Function] [Operation]
The chopping compensation amount is not updated while this signal (YCD7) is ON.
[Related signals]
(1) Chopping compensation update prevented (CHPRCC: XC7F)
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Spindle OFF mode YCD3 YE13 YF53 Y1093 Y11D3 Y1313 Y1453 Y1593
ext15/bit4 Dry run Spindle OFF mode Thread cutting motion
0 0 0/1 Command speed
0 1 0/1 Dry run speed
1 0 0/1 Command speed
1 1 0 Command speed
1 1 1 Dry run speed
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Longitudinal hole drilling axis selection - YCD4 YE14 YF54 Y1094 Y11D4 Y1314 Y1454 Y1594
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Tap retract possible state cancel TRVEC YCD6 YE16 YF56 Y1096 Y11D6 Y1316 Y1456 Y1596
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Chopping compensation update pre vention request CHPRCR YCD7 YE17 YF57 Y1097 Y11D7 Y1317 Y1457 Y1597

[Function]
This signal is used to enable the left (right) barrier range for the chuck/tailstock barrier function.
[Operation]
The chuck/tailstock barrier function's barrier range is enabled when this signal turns ON. If the tool nose attempts to enter the range, an error occurs.
However, to enable the barrier function, this signal must be ON, and the parameter "#8310 Barrier ON" must be set to "1", and "#8315 BARRIER TYPE (L)" ("#8316 BARRIER TYPE (R)") must not be set to "0" on the BARRIER screen. (Except when a special display unit is used.)
The barrier range can be enabled or disabled with the G22/G23 command instead of this signal input. In this case, the left and right settings are changed at the same time. (Depending on the selected G code series, some systems may not be

able to issue G22/G23 commands.)
[Function]
This signal is used to implement retract during hob machining.
[Operation]
When this signal is turned ON during hobbing, the retract (axis movement) is performed and the automatic operation is stopped.
The movement amount speed of the axis to be retracted are set by the following parameters.
Movement amount: "#8219 Hob retract amount 1" and "#8220 Hob retract amount 2"
Speed: "#8221 Hob retract speed"
Retract operation continues even if this signal is turned OFF during the retract operation.
[Related signals]
(1) Hob machining: Retract amount selection (HOBRTV: YB20)
(2) Hob machining: Retracting (HOBRTM: XCAE)
(3) Hob machining: Retract complete (HOBRTF: XCAF)
[Function]
This signal is used to inhibit retract operation caused by an alarm during hob machining.
[Operation]
While this signal is ON, retract operation is not carried out even if a program error or operation error occurs during hob machining.
Whether to perform retract due to a program error or operation error while this signal is OFF depends on the setting of the parameter "#19406 Hob retract ON at alarm".
Retract operation continues even if this signal is turned ON during the retract operation.
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Barrier valid (left) YCD8 YE18 YF58 Y1098 Y11D8 Y1318 Y1458 Y1598
A Barrier valid (right) YCD9 YE19 YF59 Y1099 Y11D9 Y1319 Y1459 Y1599
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Hob machining: Retract request HOBRTR YCDE YE1E YF5E Y109E Y11DE Y131E Y145E Y159E
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Hob machining: Alarm retract inhibit HO BARTC YCDF YE1F YF5F Y109F Y11DF Y131F Y145F Y159F

[Function]
This signal stops all axes and shuts OFF the contactor.
[Operation]
The NC carries out the following operations when the "Door open II" signal turns ON.
A deceleration stop is carried out for all axes (servo axes and spindles). (Axis interlock)
After all axes are stopped, the contactor of each drive unit is shut OFF. The "Servo ready completion" signal (SA) does not turn OFF.
The "Door open enable" signal turns ON.
The NC carries out the following operations when the "Door open II" signal turns OFF.
A ready ON and servo ON state occurs for all axes.
The "Door open enable" signal turns OFF.
[Caution]
<Handling of the PLC axis>
For the PLC axis, stop it at the PLC and then output a door open signal to the NC. If a door open signal is input without stopping the PLC axis, the axis stops with a dynamic brake method due to the ready OFF state. The remaining distance will be held in the R register being used in the PLC axis control.
<Handling of the analog spindle>
When an analog spindle is connected, it is not possible to confirm that the spindle has completely stopped with the NC. Thus, confirm that the spindle has completely stopped using the PLC before opening the door.
Since the spindle may resume rotation immediately after the door is closed, for safety, turn the forward run and reverse run signals OFF when the door is opened.
<Opening the door during ATC operation>
To open the door while ATC is operating, apply an interlock with the user PLC.
[Related signals]
(1) Door open enable (DROPNS: XCD8)
[Function]
This signal informs the door open or close state to the spindle drive unit with the spindle speed monitor function.
[Operation]
When the door is in the open state, turn ON (1) this signal.
The compatibility check of this signal and the door close signal connected with the spindle drive unit is performed in the spindle drive unit.
If those signals are not compatible for continuous 3 seconds, the servo alarm (S01 5D) occurs.
[Related signals]
(1) Door open enable (DROPNS: XCD8)
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Door open II DOOR2 YCE1 YE21 YF61 YF61 Y11E1 Y1321 Y1461 Y15A1
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Door open signal input (spindle speed
monitor) YCE2 YE22 YF62 Y10A2 Y11E2 Y1322 Y1462 Y15A2

[Function]
This signal is used to change the spindle's clamp speed.
[Operation]
When the "Door interlock spindle speed clamp" signal is turned ON, the spindle rotation speed is limited by the clamp speed set value.
The table below shows the relationship between the "Door interlock spindle speed clamp" signal and the clamp speed parameter for each operation.
[Caution]
(1) This signal is valid only when the parameter "#1239 set11/bit5" (Door interlock spindle speed clamp valid) is set to "1".
(2) The clamp speed parameter setting value that is enabled when the "Door interlock spindle speed clamp" signal is ON must be smaller than the original clamp speed setting value (the clamp speed that is valid when the signal is OFF).
The clamp speed is switched when the signal turns ON regardless of the size of the parameter setting values.

(3) Do not change the state of the "Door interlock spindle speed clamp" signal during multi-point indexing. If the signal state changes during operation, the clamp speed also changes.
(4) Even if the "Door interlock spindle speed clamp" signal is switched during orientation, during zero point return at syn chronized tapping, or during reference position return after changing from the spindle mode to the C axis mode under the spindle/C-axis control function, the clamp speed does not change. The rotation speed is clamped by the clamp speed set with the signal state before each operation is executed.
(5) The combination of the "Door interlock spindle speed clamp" signal with the spindle for which the clamp speed is to be switched differs depending on the "#1154 pdoor" setting and system configuration. The combinations are shown below.
[Function]
This signal disables barriers of chuck barrier and tail stock barrier (G22).
[Operation]
When this signal is ON, the chuck barrier and tail stock barrier is disabled regardless of whether the chuck barrier and tail stock barrier command (G22/G23) is ON/OFF during the machining program.
[Function]
This signal disables the functions for synchronization between part systems such as the "Single block between part systems" (MSBK) operation.
[Operation]
If the "Synchronization between part systems OFF" signal (MSYNC) is ON, the functions for synchronization between part systems such as the "Single block between part systems" (MSBK) operation are ignored.
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Door interlock spindle speed clamp YCE3 YE23 YF63 Y10A3 Y11E3 Y1323 Y1463 Y15A3
Spindle operation
Clamp speed parameter (spindle parameter)
Door interlock spindle speed
clamp OFF
Door interlock spindle speed
clamp ON
Orientation (multi-point orientation) #3205 SP005 #3315 SP115
Turret indexing #3312 SP112 #3211 SP011
Synchronized tapping (zero point return) #3414 SP214 #3315 SP115
Spindle C axis (C axis zero point return) #3349 SP149 #3315 SP115
#1154 pdoor
setting value
The number
of part sys tems
Door interlock spindle speed clamp signal
0 1 YCE3
0 2 YCE3
1 1 YCE3
1 2 YCE3
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Barrier check invalid BCHK YCF4 YE34 YF74 Y10B4 Y11F4 Y1334 Y1474 Y15B4
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Synchronization between part systems
OFF MSYNC YCF8 YE38 YF78 Y10B8 Y11F8 Y1338 Y1478 Y15B8
M800V/M80V Series PLC Interface Manual
4 Explanation of Interface Signals
4.3 PLC Output Signals (Bit Type: Y***)
489 IB-1501616-F
[Function]
This signal disables dry run in dry run operation.
[Operation]
When the "Dry run invalid" signal (DRNC) is ON, the NC ignores the "Dry run" (DRN) function and operates at the specified speed.
[Related signals]
(1) Dry run (DRN: YC15)
[Function]
With the "Automatic error detection" signal (AUTED), the timing for starting the next cutting block is controlled until the amount of position error becomes equal to or less than the parameter value (corner deceleration check width), in order to cut edges with high precision.
The timing for starting the next block is controlled when the result of corner angle calculation is smaller than the parameter value (corner deceleration check angle).
[Operation]
The following operation is performed when the "Automatic error detection" signal (AUTED) is ON.
<Corner angle calculation control>
The timing for starting the next cutting block is controlled only when the corner angle (interior angle) calculated for consecutive cutting blocks is equal to or smaller than the parameter value (corner deceleration check angle). The timing for starting the next cutting block is not controlled when the corner angle is larger than the parameter value.
Angle calculation is performed for the plane axis selected with the plane selection command. Angle calculation is not performed for the rotational axes.
<Start timing control>
Checking the amount of error is started after deceleration starts in the currently executed block. The next cutting block starts when the amount of error (remaining distance after composition) between the machine position of the target axis and the feedback machine position becomes equal to or less than the parameter value (corner deceleration check width).
(1) Turn OFF the normally used "Error detection" signal (ERD) before using the "Automatic error detection" signal (AUTED). When the "Error detection" signal (ERD) is ON, the normal error detection is given priority.
[Related signals]
(1) Error detection (ERD: YC17)
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Dry run invalid DRNC YCFA YE3A YF7A Y10BA Y11FA Y133A Y147A Y15BA
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Automatic error detection AUTED YCFB YE3B YF7B Y10BB Y11FB Y133B Y147B Y15BB
= 180 = 0
= 90
G01 G01
G01
G02
Parameter setting example

G01X_ G01Z_
X axis
Servo
Command
Servo
Command
Execution
block
Position error amount <
Parameter value (Corner deceleration check width)
Position error amount =
Machine position - Feedback machine position
Next block
Z axis
Note

[Function]
Turning this signal ON can prohibit reverse run of an MSTB command, which is executed when manual arbitrary reverse run operation is in the forward run, in a part system.
[Operation]
By inputting the "MSTB reverse run prohibited" signal from the ladder, reverse run of any MSTB in a machining program can be prohibited.
If this signal turns ON when an MSTB is completed in the forward run, reverse run prohibition that can be set for each part system is set for the MSTB block.
[Caution]
(1) This signal is enabled only when an MSTB is completed (when the NC inputs FIN signal) in the forward run. This sig nal is disabled in the reverse run.
(2) If this signal is input when the miscellaneous function high-speed output is enabled, the NC inputs FIN signal after the MSTB command block. Therefore, the block when the FIN signal is input is the target of reverse run prohibition.
[Related signals]
(1) Manual arbitrary reverse run mode ON (PCHKO: X715)
(2) Manual arbitrary reverse run: Reverse run ON (MOREV: X716)
(3) Thread, tap block stopping in manual arbitrary reverse run (MBSTP: X74D)
(4) Thread, tap reverse run prohibition alarm in manual arbitrary reverse run (MRVNG: X74E)
(5) Manual arbitrary reverse run mode (MORR: Y73C)
(6) Manual arbitrary reverse run speed selection (MORSP: Y73D)
(7) Actual cutting mode (thread, tap) in manual arbitrary reverse run (MRCMD: Y761)
(8) Manual arbitrary reverse run: Reverse run block stop designated part system (RBSSY: YD01)
(9) Manual arbitrary reverse run speed multiplier (R379)
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Manual arbitrary reverse run: MSTB re verse run prohibited MRPSG YCFC YE3C YF7C Y10BC Y11FC Y133C Y147C Y15BC
G0 X100. ;
M10 ; <- If this M command is the miscellaneous function high-speed output command, opera tion goes to the next block without waiting for FIN signal.
G1 Z200. ;
G0 X50. ; <- If FIN signal and the "MSTB reverse run prohibited" signal are input while this block is executed, reverse run is prohibited for this block.
:
:

[Function]
This signal starts or ends the program format switch.
[Operation]
When this signal turns ON, the control starts the program format switch. When this signal turns OFF, the program format switch is finished (canceled).
L-system operation example
There are two types of means to switch the program format: G code method and PLC I/F method (this signal). The two methods interact with each other. Thus, even though this signal is ON, it does not always mean the "Program format switch in progress" (PFCHS: XCF0) is ON. (The "Program format switch in progress" (PFCHS: XCF0) is dynamically changed by G188/G189 during automatic operation. After automatic operation is finished; however, the "Program format switch in progress" (PFCHS: XCF0) is updated based on this signal, regardless of whether the "Program format switch in progress" (PFCHS: XCF0) is ON or OFF at the completion of automatic operation.)
Interaction with G code method
(*1) The G group 24 modal state is refreshed only during automatic operation.
[Caution]
(1) If this signal is turned ON during automatic cycle operation (while the "In automatic operation "run"" (OP: XC12) is ON), the operation error (M01 0215) occurs and the program format switch is not implemented. When this signal is turned OFF, the operation error (M01 0215) disappears.
(2) When this signal is switched from OFF to ON and automatic operation is started, the program error (P29) occurs and the automatic operation is not implemented if the program format cannot be switched during G modal.
(3) After this signal is turned ON, wait until the "Program format switch in progress" (PFCHS: XCF0) turns ON before you execute automatic cycle operation. Otherwise, it cannot be assured that "the control runs a program based on the switched G code system from the top block of the program".
(4) Program format switch is available for the maximum number of M-system part systems specified by the system. If this signal is turned ON for a part system where the switch is disabled, the signal is ignored.
(5) When the modal retention reset is performed while the parameter "#1319 Grp24_mdrst_off" (G group 24 modal reten tion reset OFF) is set to "0", the state of the program format switch or the switch cancel is held even if the automatic operation is started with this signal OFF.
[Related signals]
(1) Program format switch in progress (PFCHS: XCF0)
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Program format switch request PFCHR YD00 YE40 YF80 Y10C0 Y1200 Y1340 Y1480 Y15C0
Program format switch
request(PFCHR:YD00)
Program format switch in

progress (PFCHS: XCF0)
In automatic operation
"Run" (OP)
Execute program with M system G code system
G189
Program format switch
reques(PFCHRt: YD00)
Program format switch in
progress (PFCHS: XCF0)
In automatic operation "Run"
(OP)
Program to execute
G group 24 modal(*1)
G189
G189 G189 G189
G188
G188 G188

[Function]
Turning this signal ON specifies the part system in which single-block stop occurs when reverse run is executed during the manual arbitrary reverse run.
[Operation]
This signal is ON.
The "Single block between part systems" is ON.
Modal information memory block
Block stop occurs for reverse run only when all of the above three conditions are met.
[Related signals]
(1) Manual arbitrary reverse run mode ON (PCHKO: X715)
(2) Manual arbitrary reverse run: Reverse run ON (MOREV: X716)
(3) Thread, tap block stopping in manual arbitrary reverse run (MBSTP: X74D)
(4) Thread, tap reverse run prohibition alarm in manual arbitrary reverse run (MRVNG: X74E)
(5) Single block between part systems (MSBK: Y73A)
(6) Manual arbitrary reverse run mode (MORR: Y73C)
(7) Manual arbitrary reverse run speed selection (MORSP: Y73D)
(8) Actual cutting mode (thread, tap) in manual arbitrary reverse run (MRCMD: Y761)
(9) Manual arbitrary reverse run: MSTB reverse run prohibited (MRPSG: YCFC)
(10)Manual arbitrary reverse run handle selection (R375)
(11)Manual arbitrary reverse run speed multiplier (R379)
[Function]
This signal is used to designate where a reverse run starts in the arbitrary reverse run.
[Operation]
When this signal is OFF, a reverse run starts from the block stop point.
When this signal is ON, a reverse run starts from the start point of the block where the movement stopped.
Return to the start point for the reverse run from block start, turn this signal ON, and then start an automatic operation.
Keep this signal ON until the "In auto operation "start"" signal (STL) turns ON.
This signal is available only in the reverse run control mode.
[Related signals]
(1) Macro interrupt priority (RVIT: YD09)
(2) Reverse run control mode (RVMD: YD0A)
(3) Reverse run (VRV: YC27)
[Function]
In the arbitrary reverse run, turning ON the "Macro interrupt" signal (UIT) executes a block stop during the reverse run.
Then this signal is used to select the operation when an automatic operation is started while the "Reverse run" signal (VRV) is OFF.
[Operation]
When this signal is OFF, a forward run is executed with the falling edge of the "Automatic operation "start" command" signal.
When this signal is ON, a macro interrupt program is executed with the falling edge of the "Automatic operation "start" command" signal.
This signal is available only in the reverse run control mode.
[Related signals]
(1) Reverse run from block start (RVSP: YD08)
(2) Reverse run control mode (RVMD: YD0A)
(3) Reverse run (VRV: YC27)
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Manual arbitrary reverse run: Reverse
run block stop designated part system RBSSY YD01 YE41 YF81 Y10C1 Y1201 Y1341 Y1481 Y15C1
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Reverse run from block start RVSP YD08 YE48 YF88 Y10C8 Y1208 Y1348 Y1488 Y15C8
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Macro interrupt priority RVIT YD09 YE49 YF89 Y10C9 Y1209 Y1349 Y1489 Y15C9

[Function]
This signal is used to save the reverse run information used for the reverse run control in the arbitrary reverse run.
[Operation]
When this signal is ON, the reverse run information is saved.
Turn this signal ON at the start of the block where the reverse run control is executed and turn it OFF at the time of reset.
Turn ON the "Recalculation request" signal (CRQ) when this signal is turned ON.
When a recalculation request is not made, blocks already created by pre-reading are not retained as reverse run information.
[Related signals]
(1) Reverse run from block start (RVSP: YD08)

(2) Macro interrupt priority (RVIT: YD09)
(3) Reverse run (VRV: YC27)
(4) Recalculation request (CRQ: YC2B)
[Function]
The rapid traverse time constant can be switched over.
1: Switch the rapid traverse time constant of all axes in the part system to the axis specification parameter "#2598 G0tL_2", and switch the rapid traverse time constant (primary delay)/second-step time constant for soft acceleration/deceleration to the axis specification parameter "#2599 G0t1_2".
0: Switch back the rapid traverse time constant of all axes in the part system to the axis specification parameter "#2004 G0tL", and switch back the rapid traverse time constant (primary delay)/second-step time constant for soft acceleration/deceleration to the axis specification parameter "#2005 G0tL".
[Operation]
When this signal is turned ON (1), the NC operates as follows:
When any of the axes in the part system is moving, the time constant is switched after all the axes in the part system have decelerated to a stop.
When any of the axes in the part system is at a standstill, the time constant is switched immediately.
When this signal is turned OFF (0), the NC operates as follows:
When any of the axes in the part system is moving, the time constant is switched back after all the axes in the part sys tem have decelerated to a stop.
When any of the axes in the part system is at a standstill, the time constant is switched back immediately.
[Related signals]
(1) Rapid traverse time constant: In switchover (G0AC: XD0B)
[Function]
This signal automatically switches acceleration/deceleration time constant in the real-time tuning 2 function.
[Operation]
While this signal is ON, the acceleration/deceleration time constant is always switched to a value based on the current estimated inertia ratio.
While this signal is OFF, the switching process is not performed for the acceleration/deceleration time constant.
[Related signals]
(1) Real-time tuning 2: Acceleration/deceleration time constant in switchover (RT2CHG: XD0C)
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Reverse run control mode RVMD YD0A YE4A YF8A Y10CA Y120A Y134A Y148A Y15CA
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Rapid traverse time constant: Switcho ver request ACCG YD0B YE4B YF8B Y10CB Y120B Y134B Y148B Y15CB
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A
Real-time tuning 2: Acceleration/decel eration time constant in automatic swi tchover
RT2CH GA YD0C YE4C YF8C Y10CC Y120C Y134C Y148C Y15CC

[Function]
This signal manually switches acceleration/deceleration time constant in the real-time tuning 2 function.
[Operation]
While this signal is ON, the acceleration/deceleration time constant is manually switched to a value based on the current estimated inertia ratio.
While this signal is OFF, the switching process is not performed for the acceleration/deceleration time constant.
[Related signals]
(1) Real-time tuning 2: Acceleration/deceleration time constant in switchover (RT2CHG: XD0C)
[Function]
This signal maximizes the value of acceleration/deceleration time constant in the real-time tuning 2 function.
This signal is valid only at rising edge of the signal.
[Operation]
While this signal is ON, the control maximizes the value of acceleration/deceleration time constant.
While this signal is OFF, the maximizing process is not performed for acceleration/deceleration time constant.
[Related signals]
(1) Real-time tuning 2: Acceleration/deceleration time constant in switchover (RT2CHG: XD0C)
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A
Real-time tuning 2: Acceleration/decel eration time constant in manual swi tchover
RT2CH GM YD0D YE4D YF8D Y10CD Y120D Y134D Y148D Y15CD
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Real-time tuning 2: Acceleration/decel eration time constant reset RT2RST YD0E YE4E YF8E Y10CE Y120E Y134E Y148E Y15CE

[Function]
Reserved tool wear compensation memory is reflected to tool wear compensation memory.
[Operation]
This signal is available when the reservation of tool wear compensation function is valid.
(a) When the reserved tool wear compensation memory or the tool wear compensation memory is set, the "Reserved tool wear compensation not reflected" signal (TWNIN) is turned ON.
(b) When the "Request for reflecting reserved tool wear compensation" signal (TWIN) is turned ON, reflection of data from the reserved tool wear compensation memory to the tool wear compensation memory starts.
(c) When the reserved value has been reflected, the "Reflection of reserved tool wear compensation is complete" signal (TWOUT) turns ON and the "Reserved tool wear compensation not reflected" signal (TWNIN) turns OFF. However, when writing is performed to the reserved tool wear compensation memory or the tool wear compensation memory while the "Request for reflecting reserved tool wear compensation" signal (TWIN) is ON, the "Reserved tool wear compensation not reflected" signal (TWNIN) will not turn OFF.
This is because the reflection of the reserved value is not guaranteed. When the "Reserved tool wear compensation not reflected" signal (TWNIN) does not turn OFF even though the "Reflection of reserved tool wear compensation is complete" signal (TWOUT) is turned ON, turn OFF the "Request for reflecting reserved tool wear compensation" sig nal (TWIN) once then turn it ON again.
(d) When the "Request for reflecting reserved tool wear compensation" signal (TWIN) is turned OFF, the "Reflection of re served tool wear compensation is complete" signal (TWOUT) also turns OFF.
(1) When the parameter "#1051 MemTol" is set to "1", a signal of the first part system (TWNIN, TWIN, TWOUT) is used.
[Related signals]
(1) Reservation of tool wear compensation (TWR: Y1CB8)
(2) Reflection of reserved tool wear compensation is complete (TWOUT: XD0F)

(3) Reserved tool wear compensation not reflected (TWNIN: XD0E)
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Request for reflecting reserved tool
wear compensation TWIN YD0F YE4F YF8F Y10CF Y120F Y134F Y148F Y15CF
(a)
(d) (c)
(b)
Valid/Invalid of reservation of tool wear
compensation function
Setting of tool wear compensation
memory or reserved tool wear
compensation memory
Reserved tool wear compensation not
reflected (TWNIN)
Request for reflecting reserved tool wear
compensation (TWIN)
Reflecting reserved tool wear
compensation memory
Reflection of reserved tool wear
compensation is complete (TWOUT)
Note

[Function]
When the "3D coordinate conversion: Manual feed valid signal" signal (XD14) is ON and this signal (YD14) is turned ON, manual operation (jog feed, incremental feed, or manual handle feed) can be performed on the coordinate system generated by the 3D coordinate conversion command (G68 for M system or G68.1 for L system).
[Operation]
This signal (YD14) is enabled while the "3D coordinate conversion: Manual feed valid" signal (XD14) is ON.
When this signal (YD14) is OFF, manual operation is performed with respect to the machine coordinate system.
When this signal (YD14) is ON, manual operation is performed with respect to the G68/G68.1 program coordinate system.
[Related signals]
(1) 3D coordinate conversion: Manual feed valid (XD14)
[Function]
The signal enables the rotation center error compensation.
[Operation]
While this signal is set to "1", rotation center error compensation is enabled.
(1) Do not switch ON/OFF of this signal during machining.
If ON/OFF of the signal is switched, the error compensation amount is immediately be reflected on the machine travel amount.
[Related signals]
(1) Rotation center error compensation in progress (RCEI: XD15)
[Function]
This signal enables the spatial error compensation.
Do not switch ON/OFF of the "Spatial error compensation enabled" signal during machining. If the signal is switched, the error compensation amount is immediately reflected on the machine travel amount.
[Operation]
When this signal is set to "0", the spatial error compensation is invalid.
When this signal is set to "1", the spatial error compensation is valid.
The spatial error compensation function can compensate errors only in the first part system.
[Related signals]
(1) Spatial error compensation in progress (SECI: XD17)
[Function]
This signal is used to select the coordinate system for the 3D manual feed.
It is possible to set different coordinate systems for each manual mode or each handle to be used.
[Operation]
This signal is used to select the coordinate system when the 3D manual feed is carried out in the jog mode or incremental mode.
[Related signals]
(1) Jog mode (J: YC00)
(2) Incremental mode (S: YC02)
(3) Tool center point rotation (TCPRC: YD27)
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A 3D coordinate conversion: Manual feed
coordinates switch YD14 YE54 YF94 Y10D4 Y1214 Y1354 Y1494 Y15D4
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Rotation center error compensation en abled RCEE YD15 YE55 YF95 Y10D5 Y1215 Y1355 Y1495 Y15D5
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Spatial error compensation enabled SECE YD17 YE57 YF97 Y10D7 Y1217 Y1357 Y1497 Y15D7
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A 3D manual feed (JOG, INC): Tool axis
coordinate system selection MJCT YD18 YE58 YF98 Y10D8 Y1218 Y1358 Y1498 Y15D8
A 3D manual feed (JOG, INC): Table co ordinate system selection MJCB YD19 YE59 YF99 Y10D9 Y1219 Y1359 Y1499 Y15D9
A 3D manual feed (JOG, INC): Feature
coordinate system selection MJCF YD1A YE5A YF9A Y10DA Y121A Y135A Y149A Y15DA
Note

[Function]
This signal is used to select the coordinate system for the 3D manual feed.
It is possible to set different coordinate systems for each manual mode or each handle to be used.
[Operation]
This signal is used to select the coordinate system when the 3D manual feed is carried out by the 1st handle, in this device.

[Related signals]
(1) 1st handle axis selection code (HS11 to HS116: YC40 to 4)
(2) 1st handle valid (HS1S: YC47)
(3) Tool center point rotation (TCPRC: YD27)
[Function]
This signal is used to select the coordinate system for the 3D manual feed.
It is possible to set different coordinate systems for each manual mode or each handle to be used.
[Operation]
This signal is used to select the coordinate system when the 3D manual feed is carried out by the 2nd handle, in this device.
[Related signals]
(1) 2nd handle axis selection code (HS21 to HS216: YC48 to C)
(2) 2nd handle valid (HS2S: YC4F)
(3) Tool center point rotation (TCPRC: YD27)
[Function]
This signal is used to select the coordinate system for the 3D manual feed.
It is possible to set different coordinate systems for each manual mode or each handle to be used.
[Operation]
This signal is used to select the coordinate system when the 3D manual feed is carried out by the 3rd handle, in this device.
[Related signals]
(1) 3rd handle axis selection code (HS31 to HS316: YC50 to 4)
(2) 3rd handle valid (HS3S: YC57)
(3) Tool center point rotation (TCPRC: YD27)
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A 3D manual feed (1st handle): Tool axis
coordinate system selection MH1CT YD1B YE5B YF9B Y10DB Y121B Y135B Y149B Y15DB
A 3D manual feed (1st handle): Table co ordinate system selection MH1CB YD1C YE5C YF9C Y10DC Y121C Y135C Y149C Y15DC
A 3D manual feed (1st handle): Feature
coordinate system selection MH1CF YD1D YE5D YF9D Y10DD Y121D Y135D Y149D Y15DD
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A 3D manual feed (2nd handle): Tool axis
coordinate system selection MH2CT YD1E YE5E YF9E Y10DE Y121E Y135E Y149E Y15DE
A 3D manual feed (2nd handle): Table co ordinate system selection MH2CB YD1F YE5F YF9F Y10DF Y121F Y135F Y149F Y15DF
A 3D manual feed (2nd handle): Feature
coordinate system selection MH2CF YD20 YE60 YFA0 Y10E0 Y1220 Y1360 Y14A0 Y15E0
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A 3D manual feed (3rd handle): Tool axis
coordinate system selection MH3CT YD21 YE61 YFA1 Y10E1 Y1221 Y1361 Y14A1 Y15E1
A 3D manual feed (3rd handle): Table co ordinate system selection MH3CB YD22 YE62 YFA2 Y10E2 Y1222 Y1362 Y14A2 Y15E2
A 3D manual feed (3rd handle): Feature
coordinate system selection MH3CF YD23 YE63 YFA3 Y10E3 Y1223 Y1363 Y14A3 Y15E3

[Function]
This signal is used to select the operation of the rotary axis of 3D manual feed (JOG/incremental/handle).
[Operation]
It operates with keeping the positional relationship of tool center point looking from the workpiece, when the rotation axis of 3D manual feed (JOG/incremental/handle) is operated.
[Related signals]
(1) 3D manual feed (JOG, INC): Tool axis coordinate system selection (MJCT: YD18)
(2) 3D manual feed (JOG, INC): Table coordinate system selection (MJCB: YD19)
(3) 3D manual feed (JOG, INC): Feature coordinate system selection (MJCF: YD1A)
(4) 3D manual feed (1st handle): Tool axis coordinate system selection (MH1CT: YD1B)
(5) 3D manual feed (1st handle): Table coordinate system selection (MH1CB: YD1C)
(6) 3D manual feed (1st handle): Feature coordinate system selection (MH1CF: YD1D)
(7) 3D manual feed (2nd handle): Tool axis coordinate system selection (MH2CT: YD1E)
(8) 3D manual feed (2nd handle): Table coordinate system selection (MH2CB: YD1F)
(9) 3D manual feed (2nd handle): Feature coordinate system selection (MH2CF: YD20)
(10)3D manual feed (3rd handle): Tool axis coordinate system selection (MH3CT: YD21)
(11)3D manual feed (3rd handle): Table coordinate system selection (MH3CB: YD22)
(12)3D manual feed (3rd handle): Feature coordinate system selection (MH3CF: YD23)
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Tool center point rotation TCPRC YD27 YE67 YFA7 Y10E7 Y1227 Y1367 Y14A7 Y15E7
Input Output
#7912 NO_MANU AL
Hypothetical coordinate
system selection signal
Tool center point
rotation signal Selection coordinate
system
Tool center point
rotation
YD18 YD19 YD1A YD27 valid/invalid
Valid
All 0
0 Machine coordinate
system selection
Invalid
1 Valid
Only any one of them is 1
0 In accordance with the
hypothetical coordinate
system selection signal
Invalid
1 Valid

Other than the above. 0/1 The operation error (M01 0231)
Invalid 0/1 0/1 0/1 0/1 Machine coordinate
system selection Invalid

[Function]
This status signal informs the controller that specified miscellaneous (M) function is accomplished on the PLC side when the high-speed method is selected for the miscellaneous command completion method.
[Operation]
If the M function command is executed during automatic operation, the M function data is output and the "M function strobe" signals (MFn) are logically inverted.
When the PLC verifies that one or more M functions are commanded by the auxiliary function strobe, it performs the specified operation, and after the execution is completed, logically invert this signal.
When the controller verifies that the "M function strobe" and the "High-speed M function finish" match at the logic level, the M function is considered to be completed and the controller proceeds to the next block.
The following is an example of a time chart when the auxiliary function (M) is used.
(1) At NC reset, those signals must be set to "0" because the "M function strobe" signals (MFn) are also set to "0" at NC reset.
(2) This signal is not used in the normal method (the parameter "#1278 ext14/bit1" is set to "0").
[Related signals]
(1) M function strobe n (MFn: XC60)
(2) M, S, T, B function data (output to file register R: R504 and later)
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Miscellaneous function command high speed output: M function finish 1 to 4
MFIN 1 to
4
YD28 to
B
YE68 to
B
YFA8 to
B
Y10E8 to
B
Y1228 to
B
Y1368 to
B
Y14A8 to
B
Y15E8 to
B
Command program M08
M function strobe n (MFn)
Next block
M function finish n (MFINn)
Miscellaneous Function Command
High-speed Output:
Note

[Function]
This status signal informs the controller that specified spindle (S) function is accomplished on the PLC side when the high speed method is selected for the miscellaneous command completion method.
[Operation]
If the S function command is executed during automatic operation, the S function data is output and the S function strobe signals (SFn) are logically inverted.
When the PLC verifies that one or more S function has been specified, it performs that function (s) and, after completion of the function (s), those signals are logically inverted.
When the controller verifies that the "S function strobe" and the "High-speed S function finish" have become the same logic level, the S function is considered to be completed and the controller will proceed to the next block.
An example of timing chart, where S function is specified, is as follows:
(1) At NC reset, those signals must be set to "0" because the S function strobe signals (SFn) are also set to "0" at NC reset.
(2) This signal is not used in the normal method (the parameter "#1278 ext14/bit1" is set to "0").
[Related signals]
(1) S function strobe n (SFn: XC64)
(2) M, S, T, B function data (output to file register R: R504 and later)
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Miscellaneous function command high speed output: S function finish 1 to 8
SFIN1 to
8
YD2C to
F,
YD38 to
B
YE6C to
F,
YE78 to
B
YFAC to
F,
YFB8 to
B
Y10EC

to F,
Y10F8 to
B
Y122C to
F,
Y1238 to
B
Y136C to
F,
Y1378 to
B
Y14AC
to F,
Y14B8 to
B
Y15EC
to F,
Y15F8 to
B
Command program S1000
S function strobe (SF1)
Next block
S function finish (SFIN1)
Miscellaneous Function Command
High-speed Output:
Note

[Function]
This status signal informs the controller that specified tool (T) function is accomplished on the PLC side when the high speed method is selected for the miscellaneous command completion method.
[Operation]
If the T function command is executed during automatic operation, the T function data is output and the T function strobe signals (TF1 to 4) are logically inverted.
When the PLC verifies that one or more T function has been specified, it performs that function (s) and, after completion of the function (s), those signals are logically inverted.
When the controller verifies that the "T function strobe" and the "High-speed T function finish" have become the same logic level, the T function is considered to be completed and the controller will proceed to the next block.
An example of timing chart, where T function is specified, is as follows:
(1) At NC reset, those signals must be set to "0" because the T function strobe signals (TF 1 to 4) are also set to "0" at NC reset.
(2) This signal is not used in the normal method (the parameter "#1278 ext14/bit1" is set to "0").
[Related signals]
(1) T function strobe 1 to 4 (TF1 to 4: XC68)
(2) M, S, T, B function data (output to file register R: R504 and later)
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A
Miscellaneous function command high speed output: T function finish
1 to 4
TFIN1 to
4
YD30 to
3
YE70 to
3
YFB0 to
3
Y10F0 to
3
Y1230 to
3
Y1370 to
3
Y14B0 to
3
Y15F0 to
3
Command program T01
T function strobe (TF1)
Next block
T function finish (TFIN1)
Miscellaneous Function Command
High-speed Output:
Note

[Function]
This status signal informs the controller that specified 2nd miscellaneous (B) function is accomplished on the PLC side when the high-speed method is selected for the miscellaneous command completion method.
[Operation]
If the B function command is executed during automatic operation, the B function data is output and the 2nd M function strobe signals (BF1 to 4) are logically inverted.
When the PLC verifies that one or more B function has been specified, it performs that function (s) and, after completion of the function(s), those signals are logically inverted.
When the controller verifies that the "2nd M function strobe" and the "High-speed 2nd M function finish" have become the

same logic level, the B function is considered to be completed and the controller will proceed to the next block.
An example of timing chart, where 2nd miscellaneous (B) function is specified, is as follows:
(1) At NC reset, those signals must be set to "0" because the 2nd M function strobe signals (BF 1 to 4) are also set to "0" at NC reset.
(2) This signal is not used in the normal method (the parameter "#1278 ext14/bit1" is set to "0").
[Related signals]
(1) 2nd M function strobe 1 to 4 (BF1 to 4: XC6C)
(2) M, S, T, B function data (output to file register R: R504 and later)
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A
Miscellaneous function command high speed output: 2nd M function finish
1 to 4
BFIN1 to
4
YD34 to
7
YE74 to
7
YFB4 to
7
Y10F4 to
7
Y1234 to
7
Y1374 to
7
Y14B4 to
7
Y15F4 to
7
Command program B03
2nd M function strobe (BF1)
Next block
2nd M function finish (BFIN1)
Miscellaneous Function Command
High-speed Output:
Note
M800V/M80V Series PLC Interface Manual
4 Explanation of Interface Signals
4.3 PLC Output Signals (Bit Type: Y***)
503 IB-1501616-F
[Function]
This signal indicates that the edit/search state has been entered.
[Operation]
Turning this signal ON identifies the edit/search state, displaying the Edit/Search window on the Monitor screen when the basic specification parameter "#11031 Cursor pos search" (Cursor position search) is set to "2". Moving the cursor at a position in the Edit/Search window and turning this signal OFF starts an operation search of the cursor position.
Allow at least 500 ms between turning the "Edit/Search" signal ON and OFF.
[Timing chart]
[Related signals]
(1) Edit/Search window displayed (X1878)
Cont. Signal name Abbrev. Common ($)
A Edit/Search Y1878
Screen display
Edit/Search (Y1878)
Operation search state
Any display Edit/Search window Any display
At least 500ms required At least 500ms required
Edit/Search window displayed
(X1878)
M800V/M80V Series PLC Interface Manual
4 Explanation of Interface Signals
4.3 PLC Output Signals (Bit Type: Y***)
IB-1501616-F 504
[Function]
This signal changes the spindle speed to the speed (S command) specified in the machining program.
This signal is used to smoothly perform the spindle speed (S command, etc.) control.
[Operation]
To match the actual spindle speed to the speed specified by the S command during automatic operation (memory, MDI, or tape), turn ON the "Gear shift completion" (GFIN), or "M function finish 1" (FIN1) or "M function finish 2" (FIN2).
The timing chart for operation example is shown below: When this signal is used, the following two conditions should be considered.
Whether gear shift (gear change) is applicable. (Whether there are two or more states of gear shift)
Whether the "Spindle up-to-speed" signal output from the spindle controller is used to check the rotation of the spindle.
<(Operation example 1) There is no gear shift and the "Spindle up-to-speed" signal is not used.>
<(Operation example 2) There is no gear shift, but the "Spindle up-to-speed" signal is used.>
Cont. Signal name Abbrev. 1stSP 2ndSP 3rdSP 4thSP 5thSP 6thSP 7thSP 8thSP
A Gear shift completion GFIN Y1885 Y18E5 Y1945 Y19A5 Y1A05 Y1A65 Y1AC5 Y1B25
S command + Spindle command speed Spindle
Rising edge of GFIN, FIN1, or FIN2
Command program
S function strobe (SF)
M function finish 1 (FIN1)
Spindle speed
S100 Next block
Command program
S function strobe (SF)
Gear shift completion

(GFIN)
M function finish 1 (FIN1)
Spindle up-to-speed (USO)
Spindle speed
S100 Next block

<(Operation example 3) There is gear shift, but the "Spindle up-to-speed" signal is not used.>
<(Operation example 4) There is gear shift and the "Spindle up-to-speed" signal are used.>
[Related signals]
(1) S function strobe 1, 2 (SFn: XC64)
(2) Spindle gear shift (GR1, GR2: X1885, X1886)
(3) M function finish (FIN1, FIN2: YC1E, YC1F)
(4) Spindle gear selection code 1, 2 (GI1, GI2: Y1890, Y1891)
(5) Spindle stop (SSTP: Y1894), Spindle gear shift (SSFT: Y1895)
Command program
S function strobe (SF)
Spindle gear shift
(GR1, GR2)
Spindle stop (SSTP)
Spindle gear shift (SSFT)
Spindle gear selection
code 1,2 (GI1, GI2)
Gear shift completion
(GFIN)
M function finish 1 (FIN1)
Spindle speed
The same operation will be
executed even if gear shift
completion signal is not used.
S100 Next block
Command program
S function strobe (SF)
Spindle gear shift
(GR1, GR2)
Spindle stop (SSTP)
Spindle gear shift (SSFT)
Gear shift completion
(GFIN)
M function finish 1 (FIN1)
Spindle up-to-speed (USO)
Spindle speed
Spindle gear selection
code 1,2 (GI1, GI2)
S100 Next block

[Function]
This is a signal for applying an override (magnification) to the S command issued by automatic operation (memory, MDI, tape).
[Operation]
By selecting the "Spindle speed override code m" signal (SP1 to 4), override ratio can be selected from the range of 50% to 120% in 10% increments.
Override cannot be set when:
- The "Spindle stop" signal is ON.
- During tapping mode
- During thread cutting

This signal (SP1 to 4) is set with the code method. The following table shows the relationship.
[Related signals]
(1) Spindle override method selection (SPS: Y188F)
[Function]
This is a signal to switch whether to apply the override (magnification) to the S command issued in automatic operation (memory, MDI or tape) by the above mentioned "code method" or "file register method".
[Operation]
When the "Spindle override method selection" (SPS) is OFF, code method override (signal SP1 to SP4 is applicable) is selected.
When the "Spindle override method selection" (SPS) is ON, file register method override (value set in file register is applicable) is selected.
(1) For each operation of the code method and file register method, refer to the relevant descriptions.
Cont. Signal name Abbrev. 1stSP 2ndSP 3rdSP 4thSP 5thSP 6thSP 7thSP 8thSP
A Spindle speed override code m SP1 to 4 Y1888 to
A
Y18E8 to
A
Y1948 to
A
Y19A8 to
A
Y1A08 to
A
Y1A68 to
A
Y1AC8 to
A

Y1B28 to
A
SP4 SP2 SP1 Spindle override
111 50%
011 60%
010 70%
110 80%
100 90%
0 0 0 100%
0 0 1 110%
1 0 1 120%
Cont. Signal name Abbrev. 1stSP 2ndSP 3rdSP 4thSP 5thSP 6thSP 7thSP 8thSP
A Spindle override method selection SPS Y188F Y18EF Y194F Y19AF Y1A0F Y1A6F Y1ACF Y1B2F
S command =
SP1 to SP4 (50 to 120%, 10% increment)
OFF: Code method
ON: File register method
SPS
File register (0 to 200%, 1% increment)
Spindle speed
Note

[Function]
This signal informs the controller which spindle gear has been selected on the machine side.
[Operation]
This signal is set according to the machine's spindle gear stage. The controller calculates the S command data (data is transferred when the spindle controller is the high-speed serial connection specification) based on this signal.
The flow after the S command is executed and output to the spindle is shown below.
The relation of the gear stage, spindle gear selection code signal and spindle limit speed is as shown below.
Slimt1 to 4 are set with parameters. These set the rotation speed of the spindle when the S command data is maximum, that is, when the motor rotates at the maximum rotation.
This setting is used for each gear unit, and is determined by the deceleration ratio (gear ratio) of the motor and spindle.
For example, if the maximum motor speed is 6000 r/min, and the 1st gear stage is decelerated to half, "3000" will be set in parameter Slimt1.
The controller calculates the spindle speed output data as shown below.
For example, when S command is issued, gear selection input is the 2nd stage ("GI1" is ON and "GI2" is OFF), spindle override value (%) is SOVR, and S command data's maximum value is "10":
Specifically, when S1300 command is executed with the S command output (maximum 10V), Slimt2 is "2000", and the spindle override is "100%":
The S command is clamped with a value of Smaxn (n = 1 to 4).
In the same state as the previous example, the S command output when Smax2 is "1000" is:
Cont. Signal name Abbrev. 1stSP 2ndSP 3rdSP 4thSP 5thSP 6thSP 7thSP 8thSP
A Spindle gear selection code 1, 2 GI1, 2 Y1890, 1 Y18F0, 1 Y1950, 1 Y19B0, 1 Y1A10, 1 Y1A70, 1 Y1AD0, 1 Y1B30, 1
Gear stage Spindle gear selection code Spindle speed limit GI2 GI1
1 0 0 Slimt1
2 0 1 Slimt2
3 1 0 Slimt3
4 1 1 Slimt4
Spindle speed output
Spindle gear selection code 1,2 (GI1, GI2)
Spindle parameter (Slimt1 to 4, Smax1 to 4)
Spindle speed override code m (SP1 to SP4)
S command Spindle speed output Calculation S command data Spindle
S command data = 10 S command
Slimt2
SOVR
100
S command output = 10 (V) = 6.5 (V) 1300
2000
100
100
S command output = 10 (V) = 5.0 (V) 1000
2000
100
100

[Function]
This signal is used to enable the disturbance observer of the spindle drive unit to increase the spindle torque up.
[Operation]
(1) Confirm the spindle is stopped and turn this signal ON.
(2) Turning ON this signal enables the disturbance observer.
(3) When the spindle holding force gets high enough to execute the cutting, NC outputs the "Holding power of spindle increased" signal (EXOFN).
(4) To cancel the increase holding power of spindle, confirm the spindle is stopped and then turn this signal OFF.
[Related signals]
(1) Holding power of spindle increased (EXOFN: X18B5)
[Function]
In spindle control, S command data (spindle speed) can be set to "0" by using this signal (SSTP). Usually, the signal is not used alone, but combined with the "Spindle gear shift" signal (SSFT) explained later.
[Operation]
When the "Spindle stop" signal (SSTP) is turned ON, S command data is set to "0". Analog data is restored when the signal is turned OFF.

When the "Spindle gear shift" signal (SSFT) turns ON while the "Spindle stop" signal is ON, S command data which corresponds to speed set by the spindle speed parameter is output.
The "Spindle speed override code m" (SP1 to 4) is ignored while the "Spindle stop" signal is ON.
[Function]
This signal is used to rotate the spindle motor at a slow and constant rotation to smoothly shift the gear stage of the spindle.
[Operation]
When the "Spindle gear shift" signal (SSFTn) is turned ON, the S command data corresponding to the shift rotation speed previously set by the parameter is output.
When gears are not engaged properly when the gear stage is shifted, turn on this signal (SSFTn) and slowly rotate the spindle (motor) to align the gear teeth
Note that, to turn this signal (SSFTn) ON, the "Spindle stop" signal (SSTPn) must be turned ON in advance.
At the same time as this signal (SSFTn), the forward run signal or the reverse run signal must be turned ON.
The shift rotation speed when the spindle gear is shifted is selected by the "Spindle gear selection code m" (GImn). The relationship is shown in the following table.
S command data (spindle speed data) while the "Spindle gear shift" signal (SSFTn) is ON can be calculated by the following formula.
For example, when the "Spindle gear selection code m" (GImn) is the 1st stage ("GI1n" is OFF and "GI2n" is OFF), the spindle rotation speed data is as follows:
Actual value is as follows: Spindle command final data (SBINn) = Ssift1 / Slimt1 4095
When the spindle command final data (SBINn) is "4095", the rotation speed of the motor becomes maximum.
Cont. Signal name Abbrev. 1stSP 2ndSP 3rdSP 4thSP 5thSP 6thSP 7thSP 8thSP
A Increase holding power of spindle EXOBS Y1893 Y18F3 Y1953 Y19B3 Y1A13 Y1A73 Y1AD3 Y1B33
Cont. Signal name Abbrev. 1stSP 2ndSP 3rdSP 4thSP 5thSP 6thSP 7thSP 8thSP
A Spindle stop SSTP Y1894 Y18F4 Y1954 Y19B4 Y1A14 Y1A74 Y1AD4 Y1B34
Cont. Signal name Abbrev. 1stSP 2ndSP 3rdSP 4thSP 5thSP 6thSP 7thSP 8thSP
A Spindle gear shift SSFT Y1895 Y18F5 Y1955 Y19B5 Y1A15 Y1A75 Y1AD5 Y1B35
Gear stage Spindle gear selection code Spindle speed at gear shift Spindle speed limit GI2n GI1n
1 0 0 Ssift1 Slimt1
2 0 1 Ssift2 Slimt2
3 1 0 Ssift3 Slimt3
4 1 1 Ssift4 Slimt4
Spindle rotation speed
(Motor rotation speed)
Maximum motor rotation speed
Ssift1 =
Slimt1

[Function]
This signal is used to run the spindle motor at low speed when executing mechanical orientation(*1) during spindle control.
<Supplement>
Since most spindle drive/control units recently marketed are equipped with spindle orientation function, this signal (SORCn) is rarely used for mechanical orientation. This signal (SORCn) is used for application such as rotating the spindle by constant rotation speed.
(*1) The mechanical orientation is assumed to be in the form of orientation by performing the following operations.
(1) Rotate the spindle at low speed.
(2) It detects when the spindle has reached the area where such as proximity switch is used and then stops the spindle. The spindle coasts to some extent and stops.
(3) The position (the orientation position) is determined by hitting the pin against the spindle under the status of (2).
[Operation]
When the "Spindle orientation" signal (SORCn) is turned ON, the spindle can be rotated at the rotation speed set with the parameter in advance. Note that, to turn this signal (SORCn) ON, the "Spindle stop" signal (SSTPn) must be turned ON in advance.
At the same time as this signal (SORCn), the forward run signal or the reverse run signal is required.
The table below shows the relationship between the oriented spindle speed and the "Spindle gear selection code m" (GImn).
Spindle speed data while the "Spindle orientation" signal (SORCn) is ON can be calculated by the following formula.
For example, when the "Spindle gear selection code m" (GImn) has a combination of "0" for "GI2n" and "1" for "GI1n", the spindle rotation speed data is as follows:
Actual spindle rotation speed is as follows: Spindle command final data (SBINn) = SORI / Slimt2 4095
When the spindle command final data (SBINn) is "4095", the rotation speed of the motor becomes maximum.
Cont. Signal name Abbrev. 1stSP 2ndSP 3rdSP 4thSP 5thSP 6thSP 7thSP 8thSP
A Spindle orientation SORC Y1896 Y18F6 Y1956 Y19B6 Y1A16 Y1A76 Y1AD6 Y1B36
Gear stage Spindle gear selection code Orientation spindle speed Spindle speed limit GI2n GI1n
1 00
SORI
Slimt1
2 0 1 Slimt2
3 1 0 Slimt3
4 1 1 Slimt4
Orientation spindle speed data
(Motor rotation speed)
Maximum motor rotation speed SORI = Slimt2

Spindle controller (spindle drive) with high-speed serial coupling specifications:
[Function]
When this signal turns ON, the spindle motor starts rotating in CCW direction as viewed from the shaft side.
[Operation]
When this signal is turned ON, the spindle can be rotated at the speed specified by S command (S command data) at that time.

When this signal is turned OFF, the spindle decelerates and stops.
When this signal is turned OFF during acceleration of spindle forward rotation, the acceleration is interrupted and the spindle decelerates to stop immediately.
When this signal is turned OFF during deceleration stop of spindle forward rotation, the spindle deceleration is interrupted and the acceleration starts immediately.
Spindle decelerates to stop if this signal and the "Spindle reverse run start" signal (SRI) are turned ON at the same time. To resume forward rotation, turn OFF both signals and then turn ON this signal.
The operation may stop even during forward rotation due to an emergency stop, spindle alarm or reset. Turn this signal OFF and ON after the "Servo ready completion" signal (SA) turns ON.
The motor does not rotate if the S command data is "0". In this case, the motor rotates at the equivalent rotation speed every time the S command data changes.
When the "Spindle orientation command" signal (ORC) is turned ON, an orientation takes precedence over this signal.
Servo ON command (SRV) of the spindle control input signal is controlled by the NC side to turn ON when the spindle rotation starts and to turn OFF when the spindle decelerates to stop.
[Related signals]
(1) Spindle reverse run start (SRI: Y1899)
(2) Spindle orientation command (ORC: Y189E)
For spindle control with pulse train output:
[Function]
This signal initiates the forward rotation of the spindle by outputting pulse trains for forward spindle rotation from RIO1 and RIO2.
[Operation]
When this signal is turned ON for the pulse train output spindle, the spindle starts rotating in the forward direction at the current S command speed.
In this case, the NC outputs the command without performing acceleration/deceleration.
Note that the "Spindle orientation command" signal (ORC: Y189E) becomes invalid.
[Related signals]
(1) Spindle reverse run start (SRI: Y1899)
(2) Spindle orientation command (ORC: Y189E)
Cont. Signal name Abbrev. 1stSP 2ndSP 3rdSP 4thSP 5thSP 6thSP 7thSP 8thSP
A Spindle forward run start SRN Y1898 Y18F8 Y1958 Y19B8 Y1A18 Y1A78 Y1AD8 Y1B38
Spindle forward run (SRN)
start
Spindle reverse run (SRI)
start
(Forward rot.) Variation at
spindle position (Reverse rot.)

Spindle controller (spindle drive) with high-speed serial coupling specifications:
[Function]
When this signal is turned ON, the spindle motor starts rotating in CW direction as viewed from the shaft side.
[Operation]
Spindle starts running at speed specified by S command (S command data) when the signal is turned ON. (The operation of this signal is the same as the "Spindle forward run start" (SRN) except for its rotation direction.)
When this signal is turned OFF, spindle motion decelerates and stops.
When this signal is turned OFF during acceleration of spindle reverse rotation, the acceleration is interrupted and the spindle decelerates to stop immediately.
When this signal is turned OFF during deceleration to stop of spindle reverse rotation, the spindle deceleration is interrupted and the acceleration starts immediately.
Spindle decelerates to stop if this signal and the "Spindle forward run start" signal (SRN) turn ON at the same time. To resume reverse rotation, turn OFF both signals and then turn this signal ON.
The operation may stop even during reverse rotation due to an emergency stop, spindle alarm or reset. Turn this signal OFF and ON once after the "Servo ready completion" signal (SA) turns ON.
The motor does not rotate if the S command data is "0". The motor rotates at the equivalent rotation speed every time the S command data changes.
When the "Spindle orientation command" signal (ORC) is turned ON, an orientation takes precedence over this signal.
The servo ON command (SRV) of the spindle control input signal is controlled on the NC side so that it turns ON when the spindle rotation starts and turns OFF when the spindle decelerates to stop.
[Related signals]
(1) Spindle forward run start (SRN: Y1898)
(2) Spindle orientation command (ORC: Y189E)
For spindle control with pulse train output:
[Function]
This signal initiates the reverse rotation of the spindle by outputting pulse trains for reverse spindle rotation from RIO1 and RIO2.
[Operation]
When this signal is turned ON for the pulse train output spindle, the spindle starts rotating in the reverse direction at the current S command speed, when the NC outputs the command without performing acceleration/deceleration.
In this case, the NC outputs the command without performing acceleration/deceleration.
Note that "Spindle orientation command" signal (ORC: Y189E) becomes invalid.
[Related signals]
(1) Spindle forward run start (SRN: Y1898)
(2) Spindle orientation command (ORC: Y189E)
Cont. Signal name Abbrev. 1stSP 2ndSP 3rdSP 4thSP 5thSP 6thSP 7thSP 8thSP
A Spindle reverse run start SRI Y1899 Y18F9 Y1959 Y19B9 Y1A19 Y1A79 Y1AD9 Y1B39
Spindle forward run (SRN)
start
Spindle reverse run (SRI)
start
(Forward rot.) Variation at
spindle position (Reverse rot.)
Spindle forward run (SRN)
start
Spindle reverse run (SRI)
start

(Forward rot.) Variation at
spindle position (Reverse rot.)

[Function]
This signal is for the spindle controller (spindle drive) with high-speed serial coupling specifications. When this signal is turned ON, the output torque of the spindle motor can be temporarily reduced to rotate the motor.
This signal is used for mechanical spindle orientation and gear shift.
[Operation]
There are two types of torque limit signals: the "Spindle torque limit 1" (TL1) and the "Spindle torque limit 2" (TL2).
Torque limit ratio is determined depending on the combination of the "Spindle torque limit 1" (TL1) and the "Spindle torque limit 2" (TL2), and the output torque decreases accordingly.
(Example) When TL1 is "1", TL2 is "1", and SP067 is "50"
(1) This signal is valid only for systems that are high-speed serially coupled to the spindle controller.
Cont. Signal name Abbrev. 1stSP 2ndSP 3rdSP 4thSP 5thSP 6thSP 7thSP 8thSP
A Spindle torque limit 1 TL1 Y189A Y18FA Y195A Y19BA Y1A1A Y1A7A Y1ADA Y1B3A
A Spindle torque limit 2 TL2 Y189B Y18FB Y195B Y19BB Y1A1B Y1A7B Y1ADB Y1B3B
Signal selection Spindle torque limit
(TL1)
Spindle torque limit
(TL2) Note
Torque limit invalid 0 0
Torque limit 001 1 0 Limits with value of the spindle parameter SP065
002 0 1 Limits with value of the spindle parameter SP066
003 1 1 Limits with value of the spindle parameter SP067
Torque
100%
50%
Rated motor torque
Torque limit ratio when TL1=1 and
TL2=1 is 50%.
Rotation speed
Note

[Function]
This signal is used for the spindle forward run index in multi-point indexing.
[Operation]
<Multi-point indexing>
This signal turns ON after the "Spindle in-position" signal (ORAO) is output.
Indexing can be carried out continuously by turning this signal ON and OFF while the "Spindle orientation command" signal (ORC) is ON.
When the "Spindle orientation command" signal (ORC) is turned ON and this signal is turned ON before the "Spindle in position" signal (ORAO) is output, first, the "Spindle orientation command" signal (ORC) turns ON, and the orientation is completed with the read "Multi-point orientation position data" (R7009). Then, the spindle is indexed to the read position command value when this signal is ON.
If the position command value is the same when the "Spindle orientation command" (ORC) is ON and when this signal is ON, the indexing operation is not carried out.
The index position command value is read at the rising edge of this signal. Therefore, the stop position does not change even if the index position command value is changed after this signal is input.
Even if this signal is turned OFF while the "Spindle orientation command" (ORC) is ON, the spindle will continue to stop at the position before this signal was turned OFF. Even if this signal is turned OFF during the indexing operation, the spindle stops at the position command value read at the rising edge of this signal.
If the stop point and indexing position command value are close to each other(within the in-position range), the indexing operation may be carried out without turning OFF the "Spindle in-position" signal (ORAO).
If the "Spindle orientation command" signal (ORC) is turned OFF during indexing operation or stop, the servo lock turns OFF and the motor coasts. Orientation must be carried out again the next time the indexing operation is performed.
Cont. Signal name Abbrev. 1stSP 2ndSP 3rdSP 4thSP 5thSP 6thSP 7thSP 8thSP
A Spindle forward run index WRN Y189C Y18FC Y195C Y19BC Y1A1C Y1A7C Y1ADC Y1B3C
Multi-point orientation
position data (index) (R7009)
Spindle orientation command
(ORC)
Spindle in-position (ORAO)
Spindle forward run index
(WRN)
Spindle speed waveform Index stop Index stop
Orienting operation Indexing operation Indexing operation
Orientation stop T : 100ms or more
t
t

<Indexing operation according to encoder installation direction>
(1) Case 1 above applies when using the motor built-in encoder with Z-phase.
[Related signals]
(1) Multi-point orientation position data (R7009)
(2) Spindle in-position (ORAO: X188E)
(3) Spindle orientation command (ORC: Y189E)
[Function]
This signal is used for the spindle reverse run index in multi-point indexing.
[Operation]
The operation is the same as forward run indexing, except that the direction is different. Refer to the section on "Spindle

forward run index".
[Related signals]
(1) Spindle forward run index (WRN: Y189C)
Case 1 Case 2
Installation
method
Indexing
Orienting
Cont. Signal name Abbrev. 1stSP 2ndSP 3rdSP 4thSP 5thSP 6thSP 7thSP 8thSP
A Spindle reverse run index WRI Y189D Y18FD Y195D Y19BD Y1A1D Y1A7D Y1ADD Y1B3D
Encoder
Belt
Motor View A
Encoder
Belt
Motor View A
Forward run Reverse run 0
6978H
(270)
2328H
(90)
4650H
(180)
Forward run Reverse run 0
2328H
(90)
6978H
(270)
4650H
(180)
Forward run 0 Reverse run
6978H
(270)
2328H
(90)
4650H
(180)
Forward run Reverse run 0
2328H
(90)
6978H
(270)
4650H
(180)
Note
M800V/M80V Series PLC Interface Manual
4 Explanation of Interface Signals
4.3 PLC Output Signals (Bit Type: Y***)
515 IB-1501616-F
[Function]
When this signal is turned ON, the spindle can be positioned at the specified indexing position.
[Operation]
If the "Spindle orientation command" signal (ORC) turns ON while the spindle is rotating or stopped, the spindle starts orientation (stops at set position). When the positioning is completed at the specified position, the "Spindle in-position" signal (ORAO) is output and the orientation is completed.
While oriented spindle is at a standstill, the spindle is in the servo lock state. Servo lock is released when the "Spindle orientation command" signal (ORC) is turned OFF. While the servo lock is required, keep the "Spindle orientation command" signal turned ON.
The encoder or proximity switch method can be used for orientation.
The orientation rotation direction is determined with the parameters.
The orientation stop position is determined by the Z-phase for the encoder method, and by the sensor installation position for the proximity switch method. The stopping position can be changed with the following items when the encoder method is used.
By parameters (position shift amount)
By multi-point orientation position data (data specification by R7009) value
The multi-point orientation position data by the parameter and R7009 is added.
The timing chart for basic orientation is shown below.
(1) The "Spindle orientation command (ORC) takes precedence over the "Spindle forward run start" signal (SRN) and the "Spindle reverse run start" signal (SRI).
(2) This signal is valid only for systems that are high-speed serially coupled to the spindle controller.
[Related signals]
(1) Multi-point orientation position data (R7009)
(2) Spindle in-position (ORAO: X188E)
(3) Spindle 2nd in-position (ORAO2: X1888)
Cont. Signal name Abbrev. 1stSP 2ndSP 3rdSP 4thSP 5thSP 6thSP 7thSP 8thSP
A Spindle orientation command ORC Y189E Y18FE Y195E Y19BE Y1A1E Y1A7E Y1ADE Y1B3E
Spindle orientation command
(ORC)
Motor speed
Spindle in-position
(ORAO)
Note
M800V/M80V Series PLC Interface Manual
4 Explanation of Interface Signals
4.3 PLC Output Signals (Bit Type: Y***)
IB-1501616-F 516
[Function]
This signal is used to select the low-speed coil in the spindle coil changeover function.

[Operation]
The high-speed coil and low-speed coil are changed over only with the "L coil selection" (LRSL) in the 2-step coil changeover specification. The high-speed coil, middle- speed coil and low-speed coil are changed over with the combination of the "L coil selection" (LRSL) and the "M coil selection" (LRSM) in the 3-step coil changeover specification.
(1) The coil is not changed over during the position loop control mode even if this signal is changed.
The coil selected immediately before the position loop control mode is entered is retained.
<2-step coil changeover>
<3-step coil changeover>
[Related signals]
(1) M coil selection (LRSM: Y18A6)
(2) In L coil selection (LCSA: X188F)
(3) In M coil selection (MCSA: X189E)
Cont. Signal name Abbrev. 1stSP 2ndSP 3rdSP 4thSP 5thSP 6thSP 7thSP 8thSP
A L coil selection LRSL Y189F Y18FF Y195F Y19BF Y1A1F Y1A7F Y1ADF Y1B3F
Selected coil L coil selection
(LRSL)
In L coil selection
(LCSA)
High-speed (H) OFF OFF
Low-speed (L) ON ON
Selected coil L coil selection
(LRSL)
M coil selection
(LRSM)
In L coil selection
(LCSA)
In M coil selection
(MCSA)
High-speed (H) OFF OFF OFF OFF
Middle-speed
(M) OFF ON OFF ON
Low-speed (L)
ON OFF ON OFF
ON ON ON ON
Note

[Function]
When the program command method ("#3129 cax_spec/bit0" is set to "1") is selected for the spindle of the spindle position control, this signal can be used to switch between the C axis mode and spindle mode during manual operation.
[Operation]
When this signal is ON, the C axis mode is entered, and when this signal is OFF, the spindle mode is entered.
(1) This signal is valid only when the program command method is selected for spindle position control.
(2) The "Spindle position control (Spindle/C axis control): C axis mode ON" signal (X18C1: SVMD), which gives the mode information during spindle position control in the program command method, is not notified when switching is per formed by selecting the C axis.
When the mode is switched from the spindle mode to the C axis mode by this signal (Y18A5), or when the power is turned ON while "Mode selection at power ON" is "C axis mode" ("#3129 cax_spec/bit2" is set to "1"), the operation differs depending on the combination of the parameters.
The following is the C axis changeover timing chart during the manual operation mode.
<Zero point return type>
Cont. Signal name Abbrev. 1stSP 2ndSP 3rdSP 4thSP 5thSP 6thSP 7thSP 8thSP
A
Spindle position control (Spindle/C
axis control):
C axis selection
CMOD Y18A5 Y1905 Y1965 Y19C5 Y1A25 Y1A85 Y1AE5 Y1B45
#1711 cfg11
bit3
#3106 zrn_typ
bit8 Operation
0 - Zero point return type
1 0
1 Deceleration stop type
Note
SVMD
RDYn
(+J/-J)
CMOD
*SVFn
NCPLC
PLCNC
SRN
Spindle
Zero point
return
C axis
Spindle position control (Spindle/C axis control) : In C axis mode
Spindle position control (Spindle/C axis control) : C axis selection
Manual mode ON
Servo OFF signal
Servo ready
Forward run command
C axis feed axis selection

<Deceleration stop type>
[Function]
This signal is used to select the middle-speed coil in the 3-step coil changeover specification of the spindle coil changeover function.
[Operation]
The coil is selected depending on the combination of this signal and the "L coil selection" (LRSL).
(1) The coil is not changed over during the position loop control mode even if this signal is changed. The coil selected immediately before the position loop control mode is entered is retained.
[Related signals]
(1) L coil selection (LRSL: Y189F)
(2) In L coil selection (LCSA: X188F)
(3) In M coil selection (MCSA: X189E)
Cont. Signal name Abbrev. 1stSP 2ndSP 3rdSP 4thSP 5thSP 6thSP 7thSP 8thSP
A M coil selection LRSM Y18A6 Y1906 Y1966 Y19C6 Y1A26 Y1A86 Y1AE6 Y1B46
Selected coil L coil selection
(LRSL)
M coil selection
(LRSM)
In L coil selection
(LCSA)
In M coil selection
(MCSA)
High-speed (H) OFF OFF OFF OFF
Middle-speed
(M) OFF ON OFF ON
Low-speed (L)
ON OFF ON OFF
ON ON ON ON
SVMD
RDYn
(+J/-J)
SRN
CMOD
*SVFn
NCPLC
PLCNC
Spindle C axis
Spindle position control (Spindle/C axis control) : C axis selection
Manual mode ON
Servo OFF signal
Servo ready
Forward run command
C axis feed axis selection
Spindle position control (Spindle/C axis control) : C axis mode ON
Note

[Function]
The spindle to which the S command for the spindle is output is selected when the multi-spindle control II is valid.
0: Not select
1: Select
[Operation]
Cont. Signal name Abbrev. 1stSP 2ndSP 3rdSP 4thSP 5thSP 6thSP 7thSP 8thSP
A Spindle selection SWS Y18A8 Y1908 Y1968 Y19C8 Y1A28 Y1A88 Y1AE8 Y1B48
S command $4
S command $3
S command $2
S command $1
Y18A8
Y1894
Y1908
Y1968
Y19C8
1st spindle
Y18F4
2nd spindle
Y1954
3rd spindle
Y19B4
4th spindle
X18A0
X1900
X1960
X19C0
R7002
R7052
R7102
R7152
Encoder input $2
Encoder input $1
R2567
R2767
PLC side
PLC side
PLC side

PLC side
Spindle command
selection
Spindle
selection Spindle rotation
speed input
Spindle rotation
speed output
Spindle
stop
Spindle enable
Encoder selection
Y1A28
Y1A88
Y1A14
5th spindle
Y1A74
6th spindle
X1A20
X1A80
R7202
R7252
PLC side
PLC side
Encoder input $3
R2967
Encoder input $4
R3167
R6500/6501
R6550/6551
R6600/6601
R6650/6651
R7000/7001
R7050/7051
R7100/7101
R7150/7151
R6700/6701
R6750/6751
R7200/7201
R7250/7251

When the "Spindle selection" (SWS) and the "Spindle command selection" (SLSP) are input in advance through different blocks, the S command to the spindle is output as a rotation speed command for the selected spindle. The selected spindle rotates at the output rotation speed. The spindles which were deselected by turning OFF the "Spindle selection" signal (SWS) continue to rotate at the same speed as the rotation speed immediately before the deselection. This allows each spindle to be rotated simultaneously at a different rotation speed. The "Spindle command selection" signal is used to select from which part system each spindle receives the S command.
[Caution]
Even though the "Spindle selection" (SWS) or the "Spindle command selection" (SLSP) is performed with an M command given in the same block as an S command, the spindle selection command (spindle rotation speed) is not updated.
[Related signals]
(1) Spindle command selection (SLSP: R7002)
(2) Spindle stop (SSTP: Y1894)
(3) Spindle enable (ENB: X18A0)
(4) Encoder selection (R2567)
(5) Spindle forward run start (SRN: Y1898)
(6) Spindle reverse run start (SRI: Y1899)
[Function]
This signal is for the spindle controller (spindle drive). This signal can reverse the rotation signals of the spindle (the "Spindle forward run start" signal (SRN: Y1898) and the "Spindle reverse run start" signal (SRI: Y1899)).
This signal is valid only when the "Spindle rotation direction switch method selection" signal (SPRS: Y18AB) is ON.
[Operation]
Turning ON this signal reverses the direction of the spindle rotation command.
This signal is also valid for the following functions.
Synchronous tapping cycle command
This signal reverses the rotation direction of the tapping spindle motor.
Spindle synchronization
This signal reverses the rotation direction of the reference and synchronized spindles.
Tool spindle synchronization I A (Spindle-Spindle, Polygon)
This signal reverses the rotation direction of the reference and synchronized spindles.
Tool spindle synchronization I B (Spindle-Spindle, Polygon)
This signal reverses the rotation direction of the workpiece and rotary tool spindles.
Tool spindle synchronization I C (Spindle-NC axis, Polygon)
This signal reverses the rotation direction of the polygon-related spindles.
Tool spindle synchronization II (Hobbing)
This signal reverses the rotation direction of the reference spindle.
Spindle superimposition control
This signal reverses the rotation direction of the reference and superimposed spindles.
Cont. Signal name Abbrev. 1stSP 2ndSP 3rdSP 4thSP 5thSP 6thSP 7thSP 8thSP
A Spindle rotation reversal SPRR Y18AA Y190A Y196A Y19CA Y1A2A Y1A8A Y1AEA Y1B4A
Rotation signal Spindle rotation reversal (SPRR:
Y18AA) Motor rotation direction
Spindle forward run start (SRN:
Y1898)
OFF Forward rotation

ON Reverse rotation
Spindle reverse run start (SRI:
Y1899)
OFF Reverse rotation
ON Forward rotation

(1) While the above functions are being executed, a change of this signal is disabled for the target spindle. Thus, change this signal before executing the program command of each function.
If none of the above functions are executed, this signal is enabled immediately upon input.
(2) This signal is disabled for the following functions and conditions.
At zero point return in the C axis mode of spindle position control (spindle/C axis control)
In C axis mode of spindle position control (spindle/C axis control)
Spindle orientation command
Spindle forward run indexing/Spindle reverse run indexing
Turret indexing
<Synchronous tapping cycle command>
Turning ON the "Spindle rotation reversal" signal (SPRR: Y18AA) reverses the spindle rotation direction at the synchronous tapping cycle command. For the "Spindle rotation reversal" signal, the signal corresponding to the tapping spindle specified in the synchronous tapping cycle command is valid. As listed below, the motor rotation direction of the tapping spindle differs depending on the combination of the "Spindle rotation reversal" signal and #3052 spplr" (Spindle synchronization relative polarity).
Forward tapping command
(when a synchronous tapping command is given with the unsigned D (tapping spindle No.))
Reverse tapping command
(when a synchronous tapping command is given, the sign of the tapping spindle No. (D address) is "-")
(1) Turn ON the "Spindle rotation reversal" signal for the tapping spindle before the synchronous tapping cycle command is issued. Even though the "Spindle rotation reversal" signal is switched from ON to OFF or from OFF to ON during the synchronous tapping cycle, the direction of the spindle motor rotation does not change.
Spindle rotation re versal (SPRR:
Y18AA)
spplr Spindle motor rotation in the cutting Spindle motor rotation in the return ing
OFF
0 Forward rotation Reverse rotation
1 Reverse rotation Forward rotation
ON
0 Reverse rotation Forward rotation
1 Forward rotation Reverse rotation
Spindle rotation re versal (SPRR:
Y18AA)
spplr Spindle motor rotation in the cutting Spindle motor rotation in the return ing
OFF
0 Reverse rotation Forward rotation
1 Forward rotation Reverse rotation
ON
0 Forward rotation Reverse rotation
1 Reverse rotation Forward rotation
Note
Note

<Spindle synchronization control command>
Turning ON the "Spindle rotation reversal" signal (SPRR: Y18AA) reverses the rotation direction of the reference spindle motor and the synchronized spindle motor at the spindle synchronization control command. When the "Spindle rotation reversal" signal for the reference spindle is ON, the reference spindle motor rotates in the opposite direction to the spindle rotation signal (the "Spindle forward run start" signal (SRN: Y1898) or the "Spindle reverse run start" signal (SRI: Y1899)). However, the synchronized spindle motor remains in the same rotation direction as when the "Spindle rotation reversal" signal is OFF for the reference spindle. When the "Spindle rotation reversal" signal is ON for the synchronized spindle, the rotation direction of the synchronized spindle motor is reversed.
<Motion example>
Listed below are the state of the "Spindle rotation reversal" signal and the rotation direction of the reference and synchronized spindle motors when you execute a spindle synchronous control command that rotates the reference and synchronized spindles in the same direction while the forward run command is issued for the reference spindle.
(1) Turn ON the "Spindle rotation reversal" signal for the reference spindle and the synchronized spindle before the spin dle synchronization control command is issued. Even though the "Spindle rotation reversal" signal is switched from ON to OFF or from ON to OFF during the spindle synchronization, the direction of the spindle motor rotation does not change.
Reference spindle Synchronized spindle
Rotation signal
Spindle rotation re versal (SPRR:
Y18AA)
Motor rotation direc tion
Spindle rotation re versal (SPRR:
Y18AA)
Motor synchronous
rotation direction
Spindle forward run
start
(SRN: Y1898)
Invalid Forward rotation
Invalid Forward rotation
Valid Reverse rotation
Valid Reverse rotation
Invalid Forward rotation
Valid Reverse rotation

Spindle reverse run
start
(SRI: Y1899)
Invalid Reverse rotation
Invalid Reverse rotation
Valid Forward rotation
Valid Forward rotation
Invalid Reverse rotation
Valid Forward rotation
Note

<Tool spindle synchronization I A (Spindle-Spindle, Polygon) command>
Turning ON the "Spindle rotation reversal" signal (SPRR: Y18AA) reverses the rotation direction of the reference spindle motor and the synchronized spindle motor at the tool spindle synchronization I A command. When the "Spindle rotation reversal" signal for the reference spindle is ON, the reference spindle motor rotates in the opposite direction to the spindle rotation signal (the "Spindle forward run start" signal (SRN: Y1898) or the "Spindle reverse run start" signal (SRI: Y1899)). However, the synchronized spindle motor remains in the same rotation direction as when the "Spindle rotation reversal" signal is OFF for the reference spindle. When the "Spindle rotation reversal" signal is ON for the synchronized spindle, the rotation direction of the synchronized spindle motor is reversed.
<Motion example>
Listed below are the state of the "Spindle rotation reversal" signal and the rotation direction of the reference and synchronized spindle motors when you execute a tool spindle synchronization control I A command that rotates the reference and synchronized spindles in the same direction while the forward run command is issued for the reference spindle.
(1) Turn ON the "Spindle rotation reversal" signal for the reference spindle and the synchronized spindles before the tool spindle synchronization control I A command.
Even though the "Spindle rotation reversal" signal is switched from ON to OFF or from OFF to ON during the tool spin dle synchronization I A, the direction of the spindle motor rotation does not change.
Reference spindle Synchronized spindle
Rotation signal
Spindle rotation re versal (SPRR:
Y18AA)
Motor rotation direc tion
Spindle rotation re versal (SPRR:
Y18AA)
Motor synchronous
rotation direction
Spindle forward run
start
(SRN: Y1898)
Invalid Forward rotation
Invalid Forward rotation
Valid Reverse rotation
Valid Reverse rotation
Invalid Forward rotation
Valid Reverse rotation
Spindle reverse run
start
(SRI: Y1899)
Invalid Reverse rotation
Invalid Reverse rotation
Valid Forward rotation
Valid Forward rotation
Invalid Reverse rotation
Valid Forward rotation
Note

<Tool spindle synchronization I A (Spindle-Spindle, Polygon) command>
Turning ON the "Spindle rotation reversal" signal (SPRR: Y18AA) reverses the rotation direction of the workpiece spindle motor and the rotary tool spindle motor at the tool spindle synchronization I B command. When the "Spindle rotation reversal" signal for the workpiece spindle is ON, the workpiece spindle motor rotates in the opposite direction to the spindle rotation signal (the "Spindle forward run start" signal (SRN: Y1898) or the "Spindle reverse run start" signal (SRI: Y1899)). At this time, the synchronized rotation direction of the rotary tool spindle motor remains the same as when the "Spindle rotation reversal" signal for the workpiece spindle is OFF. When the "Spindle rotation reversal" signal for the rotary tool spindle is ON, the synchronized rotation direction of the rotary tool spindle motor is reversed.
<Motion example>
Listed below are the state of the "spindle rotation reversal" signal and the rotation direction of the workpiece and rotary tool spindle motors when you execute a tool spindle synchronization control I B command that rotates the workpiece and rotary tool spindles in the same direction while the forward run command is ON for the workpiece spindle.
(1) Turn ON the "Spindle rotation reversal" signal for the workpiece spindle and rotary tool spindle before the tool spindle synchronization control I B command is issued. Even though the "Spindle rotation reversal" signal is switched from ON to OFF or from OFF to ON while the tool spindle synchronization IB is being executed, the direction of the spindle motor rotation does not change.
Workpiece spindle Synchronized spindle
Rotation signal
Spindle rotation re versal (SPRR:
Y18AA)
Motor rotation direc tion
Spindle rotation re versal (SPRR:
Y18AA)
Motor synchronous
rotation direction
Spindle forward run

start
(SRN: Y1898)
Invalid Forward rotation
Invalid Forward rotation
Valid Reverse rotation
Valid Reverse rotation
Invalid Forward rotation
Valid Reverse rotation
Spindle reverse run
start
(SRI: Y1899)
Invalid Reverse rotation
Invalid Reverse rotation
Valid Forward rotation
Valid Forward rotation
Invalid Reverse rotation
Valid Forward rotation
Note

<Tool spindle synchronization II (hob machining) command>
Turning ON the "Spindle rotation reversal" signal (SPRR: Y18AA) reverses the rotation direction of the reference spindle motor at the tool spindle synchronization II command. When the "Spindle rotation reversal" signal for the reference spindle is ON, the reference spindle motor rotates in the opposite direction to the spindle rotation signal (the "Spindle forward run start" signal (SRN: Y1898) or the "Spindle reverse run start" signal (SRI: Y1899)). At this time, the rotation direction of the C axis motor remains the same rotation direction as when the "Spindle rotation reversal" signal for the reference spindle of the spindle synchronization control and spindle superimposition control is OFF.
<Motion example>
Listed below are the state of the "spindle rotation reversal" signal and the rotation direction of the reference and synchronized spindle motors when you execute a tool spindle synchronization control II command that rotates the C axis motor to CCW direction in the reference spindle motor forward run while the forward run command is issued for the reference spindle.
(1) Select the "Spindle rotation reversal" signal for the reference spindle before the tool spindle synchronization control II command is issued. Even though the "Spindle rotation reversal" signal is switched from ON to OFF or from OFF to ON while the tool spindle synchronization II is being executed, the direction of the spindle motor rotation does not change.
<Spindle superimposition control command>
Turning ON the "Spindle rotation reversal" signal (SPRR: Y18AA) reverses the rotation direction of the workpiece spindle motor and the rotary tool spindle motor at the spindle superimposition control command. When the "Spindle rotation reversal" signal for the reference spindle is ON, the reference spindle motor rotates in the opposite direction to the spindle rotation signal (the "Spindle forward run start" signal (SRN: Y1898) or the "Spindle reverse run start" signal (SRI: Y1899)). At this time, the synchronized rotation direction of the superimposed spindle motor remains the same as when the "Spindle rotation reversal" signal for the reference spindle is OFF. The superimposed spindle motor for the spindle rotation signal of the superimposed spindle (the "Spindle forward run start" signal (SRN: Y1898) or "Spindle reverse run start"" signal (SRI: Y1899)) rotates in the same direction as the command. When the "Spindle rotation reversal" signal for the superimposed spindle is ON, the rotation direction of the superimposed spindle motor rotates in the opposite direction. The superimposed spindle motor for the spindle rotation signal of the superimposed spindle (the "Spindle forward run start" signal (SRN: Y1898) or "Spindle reverse run start" signal (SRI: Y1899)) rotates in the opposite direction to the command.
Reference spindle C axis
Rotation signal
Spindle rotation re versal (SPRR:
Y18AA)
Motor rotation direc tion
Motor synchro nous rotation direc tion
Spindle forward run
start
(SRN: Y1898)
Invalid Forward rotation
CCW
Valid Reverse rotation
Spindle reverse run
start
(SRI: Y1899)
Invalid Reverse rotation
CW
Valid Forward rotation
Note

<Motion example>
Listed below are the state of the "Spindle rotation reversal" signal and the rotation direction of the reference spindle motor and superimposed spindle motor when the spindle superimposition control command in which the reference spindle motor and superimposed spindle motor rotate synchronously in the same direction at the time of the reference spindle forward rotation command.
(1) Turn ON the "Spindle rotation reversal" signal for the reference spindle and the superimposed spindle before the spin dle superimposition control command is issued. Even though the "Spindle rotation reversal" signal is switched from ON to OFF or from OFF to ON during the spindle superimposition control, the direction of the spindle motor rotation does not change.
[Function]
This signal is used to select the method to reverse the rotation signals (forward run start and reverse run start) of the spindle.
[Operation]
Depending on the status of this signal, the spindle rotation signal (forward run start or reverse run start) can be switched to the opposite direction by "#3127 SPECSP/bit3" (Spindle specification/Spindle rotation direction) or the "Spindle rotation

reversal" signal (SPRR: Y18AA).
OFF: Switched by "#3127 SPECSP/bit3" (Spindle specification/Spindle rotation direction).
ON: Switched by the "Spindle rotation reversal " signal (SPRR: Y18AA).
Reference spindle Superimposed spindle
Rotation sig nal
Spindle rotation
reversal (SPRR:
Y18AA)
Motor rotation
direction
Spindle rotation
reversal (SPRR:
Y18AA)
Motor synchronous
rotation direction
(Synchronous rota tion for the refer ence spindle)
Rotation sig nal
Motor rotation direction
(Rotation command for
the superimposed spin dle)
Spindle for ward run start
(SRN: Y1898)
Invalid Forward rotation
Invalid Forward rotation
Spindle for ward run start Forward rotation
Spindle re verse run start Reverse rotation
Valid Reverse rotation
Spindle for ward run start Reverse rotation
Spindle re verse run start Forward rotation
Valid Reverse rotation
Invalid Forward rotation
Spindle for ward run start Forward rotation
Spindle re verse run start Reverse rotation
Valid Reverse rotation
Spindle for ward run start Reverse rotation
Spindle re verse run start Forward rotation
Spindle re verse run start
(SRI: Y1899)
Invalid Reverse rotation
Invalid Reverse rotation
Spindle for ward run start Forward rotation
Spindle re verse run start Reverse rotation
Valid Forward rotation
Spindle for ward run start Reverse rotation
Spindle re verse run start Forward rotation
Valid Forward rotation
Invalid Reverse rotation
Spindle for ward run start Forward rotation
Spindle re verse run start Reverse rotation
Valid Forward rotation
Spindle for ward run start Reverse rotation
Spindle re verse run start Forward rotation
Cont. Signal name Abbrev. 1stSP 2ndSP 3rdSP 4thSP 5thSP 6thSP 7thSP 8thSP
A Spindle rotation direction switch meth od selection SPRS Y18AB Y190B Y196B Y19CB Y1A2B Y1A8B Y1AEB Y1B4B
Note

[Function]
When the coil changeover is the NC internal process, the coil changeover with the PLC signal can be performed with this signal.
[Operation]
If the coil changeover is the NC internal process, the NC internal process selection is interrupted and changed to the selection with the PLC signal when this signal is turned ON.
The coil changeover in the NC internal process and the coil changeover via the PLC are changed over with the parameter "#1239 set11/bit0".
0: Via PLC
1: NC internal process
<H/L coil changeover>
The L -> H coil changeover is changed over at the same time when the H coil selection is entered.
The H -> L coil changeover is not changed over during the "Speed detection" signal (VRO) OFF even if the L coil selec tion is entered. This is changed over after the "Speed detection" signal (SD) is turned ON.
<H/M/L coil changeover>
The L -> M coil changeover is changed over at the same time when the M coil selection is entered.
The L -> H coil changeover is changed over at the same time when the H coil selection is entered.
The M -> H coil changeover is changed over at the same time when the M coil selection is entered.
The H -> M coil changeover is not changed over during the "Speed detection 2" signal (SD2) OFF even if the M coil selection is entered. The coil changeover is changed over after the "Speed detection 2" signal (SD2) is turned ON.
The H -> L coil changeover is not changed over during the "Speed detection" signal (VRO) OFF even if the L coil selec tion is entered. The coil changeover is changed over after the "Speed detection" signal (VRO) is turned ON.
The M -> L coil changeover is not changed over during the "Speed detection" signal (VRO) OFF even if the L coil selec tion is entered. The coil changeover is changed over after the "Speed detection" signal (VRO) is turned ON.
(1) This signal must be turned ON after the "L coil selection" signal (LRSL)/"M coil selection" signal (LRSM) has been decided. The NC internal changeover process is entered when this signal is turned OFF, so note the spindle rotation speed.
[Related signals]
(1) L coil selection (LRSL: Y189F)
(2) M coil selection (LRSM: Y18A6)
(3) In L coil selection (LCSA: X188F)
(4) In M coil selection (MCSA: X189E)

Cont. Signal name Abbrev. 1stSP 2ndSP 3rdSP 4thSP 5thSP 6thSP 7thSP 8thSP
A PLC coil changeover MPCSL Y18AF Y190F Y196F Y19CF Y1A2F Y1A8F Y1AEF Y1B4F
Note

[Function]
The spindle synchronous control mode is entered by turning this signal ON.
[Operation]
The spindle synchronous control mode is entered by inputting the "Spindle synchronous control" signal (SPSY). During the spindle synchronous control mode, the synchronized spindle is controlled in synchronization with the rotation speed commanded for the reference spindle.
Set the reference spindle, synchronized spindle and rotation direction beforehand.
[Related signals]
(1) In spindle synchronization (SPSYN1: X18A8)
(2) Spindle rotation speed synchronization completion (FSPRV: X18A9)
(3) Spindle synchronous rotation direction (SPSDR: Y18B2)
(4) Spindle phase synchronization (SPPHS: Y18B1)
(5) Spindle phase synchronization completion (FSPPH: X18AA)
(6) Spindle synchronization: Reference spindle selection (R7016)
(7) Spindle synchronization: Synchronized spindle selection (R7017)
Cont. Signal name Abbrev. 1stSP 2ndSP 3rdSP 4thSP 5thSP 6thSP 7thSP 8thSP
A Spindle synchronization SPSY Y18B0 Y1910 Y1970 Y19D0 Y1A30 Y1A90 Y1AF0 Y1B50
Device No. Signal name Abbrev. Explanation
R7016 Spindle synchro nous control
reference spindle
selection
- Select the spindle to be controlled as the reference spindle from the serially connected
spindles.
(0: 1st spindle), 1: 1st spindle, 2: 2nd spindle, 3: 3rd spindle, 4: 4th spindle, 5: 5th spin dle, 6: 6th spindle
<Note>
Spindle synchronization control will not take place if a spindle not connected in serial
is selected.
When "0" is designated, the 1st spindle will be controlled as the reference spindle.
R7017 Spindle synchro nous control
synchronized spin dle selection
- Select the spindle to be controlled as the synchronized spindle from the serially con nected spindles.
(0: 2nd spindle), 1: 1st spindle, 2: 2nd spindle, 3: 3rd spindle, 4: 4th spindle, 5: 5th
spindle, 6: 6th spindle
<Note>
When a spindle that is not serially connected is selected or if the same spindle as
the reference spindle is selected, spindle synchronous control will not be executed.
When "0" is designated, the 2nd spindle will be controlled as the synchronized spin dle.
Y18B2 Spindle synchro nous rotation direc tion
- Designate the rotation direction for the reference spindle and synchronized spindle
during spindle synchronous control.
0: Synchronized spindle rotates in the same direction as the reference spindle.
1: The synchronized spindle rotates in the reverse direction of the reference spindle.

[Function]
Spindle phase synchronization starts when this signal is turned ON during the spindle synchronous control mode.
[Operation]
Spindle phase synchronization starts when the "Spindle phase synchronous control" signal (SPPHS) is input during the spindle synchronous control mode. The "Spindle phase synchronization completion" signal is output when the value reached the spindle phase synchronization attainment level setting value (#3051 spplv).
(1) This signal is ignored even if it is turned ON during a mode other than the spindle synchronous control mode.
(*1) This signal is turned OFF once to change the rotation speed during phase synchronization.
[Related signals]
(1) In spindle synchronization (SPSYN1: X18A8)
(2) Spindle rotation speed synchronization completion (FSPRV: X18A9)
(3) Spindle synchronization (SPSY: Y18B0)
(4) Spindle synchronous rotation direction (SPSDR: Y18B2)
(5) Spindle phase synchronization completion (FSPPH: X18AA)
(6) Spindle synchronization: Phase shift amount (R7018)
[Function]
The rotation direction of the synchronized spindle is designated with this signal. Select whether the direction is the same as or the reverse of the reference spindle.
[Operation]
Designate the rotation direction of the reference spindle and synchronized spindle during spindle synchronous control.
0: Synchronized spindle rotates in same direction as reference spindle.
1: Synchronized spindle rotates in reverse direction of reference spindle.
[Related signals]
(1) In spindle synchronization (SPSYN1: X18A8)
(2) Spindle rotation speed synchronization completion (FSPRV: X18A9)
(3) Spindle synchronization (SPSY: Y18B0)
(4) Spindle phase synchronization (SPPHS: Y18B1)
(5) Spindle phase synchronization completion (FSPPH: X18AA)
(6) Spindle synchronization: Phase shift amount (R7018)
Cont. Signal name Abbrev. 1stSP 2ndSP 3rdSP 4thSP 5thSP 6thSP 7thSP 8thSP
A Spindle phase synchronization SPPHS Y18B1 Y1911 Y1971 Y19D1 Y1A31 Y1A91 Y1AF1 Y1B51
Cont. Signal name Abbrev. 1stSP 2ndSP 3rdSP 4thSP 5thSP 6thSP 7thSP 8thSP
A Spindle synchronous rotation direc tion SPSDR Y18B2 Y1912 Y1972 Y19D2 Y1A32 Y1A92 Y1AF2 Y1B52
Note
Spindle synchronization (SPSY)

Spindle rotation speed
synchronization completion ON
In spindle synchronous control ON
Spindle synchronous control OFF
In spindle synchronous control OFF
Spindle phase synchronous
control ON
Spindle phase synchronization
completion ON
Spindle phase
synchronous
control OFF
(*1) In spindle synchronization
(SPSYN1)
Spindle rotation speed
synchronization completion
(FSPRV)
Spindle phase synchronization
(SPPHS)
Spindle phase synchronization
completion (FSPPH)

[Function]
This signal requests that the phase error of the reference spindle during rotation synchronization be calculated and saved in the NC memory.
[Operation]
The phase error of the reference spindle and synchronized spindle is saved in the NC memory when this signal is ON and the rotation synchronization command's (with no R address command) spindle synchronization is completed (when the "Spindle rotation speed synchronization completion" signal is turned ON).
This signal turns ON when the spindle rotation is stopped before the rotation synchronization command.
(1) The phase cannot be aligned when calculating the phase shift.
To perform the phase alignment, cancel the spindle synchronization once.
(2) If the handle mode is selected as the manual operation mode, the synchronized spindle cannot be rotated with the handle.
[Related signals]
(1) Phase offset request (SSPHF: Y18B4)
(2) Spindle synchronization: Phase error/Hob axis delay angle (R6516)
(3) Spindle synchronization: Phase offset data (R6518)
Cont. Signal name Abbrev. 1stSP 2ndSP 3rdSP 4thSP 5thSP 6thSP 7thSP 8thSP
A Phase shift calculation request SSPHM Y18B3 Y1913 Y1973 Y19D3 Y1A33 Y1A93 Y1AF3 Y1B53
Spindle synchronous
control ON
Phase shift calculation request ON Phase shift calculation request OFF
Spindle synchronous
control OFF
Phase shift calculation
request (SSPHM)
The phase error occurred in this interval is
saved.(Synchronized spindle can be controlled
with handle.)
Spindle synchronization
(SPSY)
In spindle synchronization
(SPSYN1)
Spindle rotation speed
synchronization completion
(FSPRV)
Note

[Function]
This signal requests that the phase be aligned to the value obtained by adding the value commanded with the phase synchronization command's R address to the phase error of the reference spindle and synchronized spindle saved with the "Phase shift calculation request" signal (SSPHM).
[Operation]
If phase synchronization is commanded (with R address command) while this signal is ON, the reference spindle and synchronized spindle phases will be aligned to attain the phase error obtained by adding the value commanded with the R address command to the phase error of the reference spindle and synchronized spindle saved in the NC memory.
(1) Refer to the signal of the 1st spindle when the parameter #1440 multi_sp_syn" (Multiple spindle synchronization valid) is set to "0".
(2) Refer to the synchronized spindle's signal when the parameter "#1440 multi_sp_syn" (Multiple spindle synchroniza tion valid) is set to "1".
[Related signals]
(1) Phase shift calculation request (SSPHM: Y18B3)
(2) Spindle synchronization: Phase error/Hob axis delay angle (R6516)
(3) Spindle synchronization: Phase offset data (R6518)
Cont. Signal name Abbrev. 1stSP 2ndSP 3rdSP 4thSP 5thSP 6thSP 7thSP 8thSP
A Phase offset request SSPHF Y18B4 Y1914 Y1974 Y19D4 Y1A34 Y1A94 Y1AF4 Y1B54
Note

[Function]

This signal cancels the error caused by the speed fluctuation when the chuck is closed.
When the chuck is closed, the speed will fluctuate due to external causes. An error will occur between the reference spindle's position and the synchronized spindle's position due to this speed fluctuation. This signal is used to cancel this error. (If spindle synchronization is attempted when closing the chuck without canceling this error, torsion could occur.)
[Operation]
The error between the reference spindle's position and synchronized spindle's position is saved when this signal changes from OFF to ON. The saved error is canceled and the spindle is synchronized while this signal is ON. (Even if the chuck close signal is OFF, the error will be canceled while the "Error temporary cancel" signal is ON.)
(1) Refer to the signal of the 1st spindle when the parameter #1440 multi_sp_syn" (Multiple spindle synchronization valid) is set to "0".
(2) Refer to the synchronized spindle's signal when the parameter "#1440 multi_sp_syn" (Multiple spindle synchroniza tion valid) is set to "1".
(3) Turn this signal ON after the chucks on both the reference spindle side and synchronized spindle side have closed and grasped the workpiece.
(4) Turn this signal OFF when the either the reference spindle side or synchronized spindle side chuck is open.
(Example)
(1) Close the reference spindle side chuck.
(2) Start spindle synchronization (G114.1).
(3) Close the synchronized spindle side chuck.
(The speed will fluctuate due to external causes at this time, and an error occurs.)
(4) Using the "Chuck close confirmation" signal (SPCMP), check that the chucks are closed.
(5) Turn the "Error temporary cancel" signal (SPDRPO) ON, and cancel the error.
(6) Execute machining with spindle synchronous control.
(7) Open the chuck on the synchronized spindle side.
(8) Using the "Chuck close confirmation" signal (SPCMP), check that the chuck is opened.
(9) Turn the "Error temporary cancel" signal (SPDRPO) OFF, and stop the error cancellation.
[Related signals]
(1) In spindle synchronization (SPSYN1: X18A8)
(2) Spindle rotation speed synchronization completion (FSPRV: X18A9)
(3) Spindle phase synchronization completion (FSPPH: X18AA)
(4) Chuck close confirmation (SPCMP: X18AC)
(5) Chuck close (SPCMPC: Y18B9)
Cont. Signal name Abbrev. 1stSP 2ndSP 3rdSP 4thSP 5thSP 6thSP 7thSP 8thSP
A Error temporary cancel SPDRPO Y18B5 Y1915 Y1975 Y19D5 Y1A35 Y1A95 Y1AF5 Y1B55
Note

[Function]
This signal is used to cancel the spindle synchronous control and spindle superimposition with the G114.n command.
The spindle synchronous control with the "Spindle synchronization" signal (Y18B0) is not canceled.
[Operation]
The spindle synchronous control mode and spindle superimposition can be canceled by turning this signal ON.
(1) Refer to the signal of the 1st spindle when the parameter "#1440 multi_sp_syn" (Multiple spindle synchronization valid) is set to "0".
(2) Refer to the signal of the hob axis during hobbing, or refer to the signal of the synchronized spindle during other machining when the parameter "#1440 multi_sp_syn" (Multiple spindle synchronization valid) is set to "1".
[Related signals]
(1) In spindle synchronization (SPSYN1: X18A8)
(2) Spindle rotation speed synchronization completion (FSPRV: X18A9)
(3) Spindle phase synchronization completion (FSPPH: X18AA)
(4) Spindle phase synchronization (SPPHS: Y18B1)
(5) Spindle synchronization: Phase error 1 (R6522)
(6) Spindle synchronization: Phase error 2 (R6523)
[Function]
This signal is turned ON while the reference spindle and synchronized spindle clamp the same work.
[Operation]
The "Spindle chuck close confirmation" signal is turned ON when the "Chuck close" signal is ON.
The "Spindle chuck close confirmation" signal is turned OFF when the "Chuck close" signal is OFF.
(1) Refer to the signal of the 1st spindle when the parameter #1440 multi_sp_syn" (Multiple spindle synchronization valid) is set to "0".
(2) Refer to the synchronized spindle's signal when the parameter "#1440 multi_sp_syn" (Multiple spindle synchroniza tion valid) is set to "1".
(3) Use the "Error temporary cancel" signal only when the rotation error between the reference spindle and synchronized spindle occurs because of the "Chuck close" signal.
[Related signals]
(1) Chuck close confirmation (SPCMP: X18AC)
Cont. Signal name Abbrev. 1stSP 2ndSP 3rdSP 4thSP 5thSP 6thSP 7thSP 8thSP
A Spindle synchronization/superimposi tion cancel SPSYC Y18B8 Y1918 Y1978 Y19D8 Y1A38 Y1A98 Y1AF8 Y1B58
Cont. Signal name Abbrev. 1stSP 2ndSP 3rdSP 4thSP 5thSP 6thSP 7thSP 8thSP
A Chuck close SPCMPC Y18B9 Y1919 Y1979 Y19D9 Y1A39 Y1A99 Y1AF9 Y1B59
Note
Chuck open Chuck close Chuck close
Spindle synchronization
(SPSY)
Error temporary cancel
(SPDRPO)
In spindle synchronization
(SPSYN1)
In error cancel
Synchronized spindle chuck
Spindle rotation speed
synchronization completion
(FSPRV)
Reference spindle chuck Chuck close Chuck close Chuck open
Chuck close
confirmation
Chuck open
confirmation

Chuck close
(SPCMPC)
Note

[Function]
This signal commands to exclude the spindle from CNC control.
[Operation]
The corresponding spindle will be excluded from CNC control when this signal is ON.
[Related signals]
(1) In spindle off (SPOFFA: X18B6)
[Function]
This signal is used to start or stop the spindle oscillation.
[Operation]
The spindle oscillation is started by turning this signal ON.
The spindle oscillation is stopped by turning this signal OFF.
[Related signals]
(1) Spindle oscillation amplitude (R7020)
(2) Spindle oscillation frequency (R7021)
(3) Spindle oscillation in progress (X18C8)
Cont. Signal name Abbrev. 1stSP 2ndSP 3rdSP 4thSP 5thSP 6thSP 7thSP 8thSP
A Exclude spindle SPOFF Y18BF Y191F Y197F Y19DF Y1A3F Y1A9F Y1AFF Y1B5F
Cont. Signal name Abbrev. 1stSP 2ndSP 3rdSP 4thSP 5thSP 6thSP 7thSP 8thSP
A Spindle oscillation command Y18C8 Y1928 Y1988 Y19E8 Y1A48 Y1AA8 Y1B08 Y1B68

[Function]
This signal is used to stop speed control gain switching of the real-time tuning 1 function. Speed control gain switching is stopped if this signal turns ON while this function is enabled.
[Operation]
ON: Speed control gain switching is stopped.
OFF: Speed control gain switching is not stopped.
[Related signals]
(1) Real-time tuning 1: Speed control gain changeover hold-down ON (VGHLD: X18CA)
[Function]
This signal is used to request the database for one of the update, delete, and extract operations.
[Operation]
The operations perform for the database at the rising edge of this signal.
The operation details follow the bitD to bitF of R14598 (DB operation selection), and operation target table follows the R14599 (Operation table selection).
[Related signals]
(1) MES interface library: DB operation selection (R14598)
(2) MES interface library: Operation table selection (R14599)
(3) MES interface library: Operation trigger status (X74F)
Cont. Signal name Abbrev. 1stSP 2ndSP 3rdSP 4thSP 5thSP 6thSP 7thSP 8thSP
A
Real-time tuning 1:
Speed control gain changeover hold down command
VGHLDC Y18CA Y192A Y198A Y19EA Y1A4A Y1AAA Y1B0A Y1B6A
Cont. Signal name Abbrev. Common ($)
A MES interface library: Operation trigger Y1C80
G0 G1 G0
In cutting command
Speed control gain
changeover prevented
command
In speed control gain
changeover prevented
Inertia value
Speed control gain
Value
maintained
Switch restart
Switch restart
Value
maintained

[Function]
This signal protects the data on the front side SD (memory card).
[Operation]
When the "Data protection key (memory card)" is turned OFF (0), the editing operation of the memory card will be prohibited.
[Caution]
(1) If a setting is changed while the "Data protection key (memory card)" is OFF (0), "Data protect" appears in the mes sage section of the screen.
(2) This signal is set to ON (1) when the power is turned ON. This means that data protection has been canceled. There fore, when the sequence program has no line to use data protection key, the signal is always turned ON (1).
[Related signals]
(1) Data protect key 1 (*KEY1: Y708)
(2) Data protect key 2 (*KEY2: Y709)
(3) Data protect key 3 (*KEY3: Y70A)
(4) Data protect key (DS) (*KEY_DS: Y1C82)
[Function]

This signal protects the data on the back side SD2 (DS).
[Operation]
When the "Data protection key (DS)" is turned OFF (0), the editing operation of the DS will be prohibited.
[Caution]
(1) If a setting is changed while the "Data protection key (DS)" is OFF (0), "Data protect" appears in the message section of the screen.
(2) This signal is set to ON (1) when the power is turned ON. This means that data protection has been canceled. There fore, when the sequence program has no line to use data protection key, the signal is always turned ON (1).
[Related signals]
(1) Data protect key 1 (*KEY1: Y708)
(2) Data protect key 2 (*KEY2: Y709)
(3) Data protect key 3 (*KEY3: Y70A)
(4) Data protect key (memory card) (*KEY_MemC: Y1C81)
[Function]
This signal turns ON the buzzer.
[Operation]
While this signal is turned ON, the buzzer keeps sounding.
The buzzer stops by turning OFF this signal.
[Function]
This signal resets the warning of equivalent load factor over limit.
[Operation]
When this signal is turned ON, the operation error (M01 1120) is reset.
Cont. Signal name Abbrev. Common ($)
B Data protection key (memory card) *KEY_MemC Y1C81
Cont. Signal name Abbrev. Common ($)
B Data protection key (DS) *KEY_DS Y1C82
Cont. Signal name Abbrev. Common ($)
A Buzzer sound control: Buzzer ON BZR Y1C83
Cont. Signal name Abbrev. Common ($)
A Spindle protection: Resetting alarm of equivalent load factor over limit EQLDWR Y1C84

[Function]
This signal is used to select the screen to display on the CNC display unit.
This signal is valid when the parameter "#1057 disp_input" is set to any of "2" to "4".
[Operation]
At CNC startup, regardless of the signal status, the operation follows the parameter setting.
When the PLC signal is switched, the display contents are changed accordingly.
[When the parameter #1057 is "2" or "3"]
[When the parameter #1057 is "4"]
When the image input from the image input expansion unit is partially displayed, it is possible to switch whether the operation information of the CNC keyboard, menu key and touch screen is output to the partial display screen (IPC screen or camera image), depending on the PLC signal (R328/bit0).
[Caution]
(1) This signal is valid only when the image input expansion unit is connected to the CNC unit.
[Related signals]
(1) Image input I/F: Display range (DSPSZH: R322, DSPSZV: R323)
(2) Image input I/F: IPC screen transfer range (IPCSZH: R326, IPCSZV: R327)
(3) Image input I/F: Behavior at key entry (DSPACT: R328/bit0)
[Function]
This signal clears the "External encoder 1: Position output".
[Operation]
Input this signal as a pulse instruction.
At the rising edge of this signal, the "External encoder 1: Position output" signal (ENC1POS: ZR13020, ZR13021) is set to zero.
The external encoder position (angle) displayed in the "Machine end FB" section of the "Servo unit" on the Drive monitor screen is also set to "0" at the same time.
[Related signals]
(1) External encoder 1: Position output (ENC1POS: ZR13020,1)
[Function] [Operation]
The IPC screen displayed on the Mitsubishi Electric standard screen is inverted vertically or horizontally.
[Caution]
(1) This signal is valid in the following cases.
- The image input expansion unit is connected to the CNC unit.
- The parameter "#1057 disp_input" is set to "4", and the IPC screen or camera image is partially displayed on the Mitsubishi Electric standard screen.
[Related signals]
(1) Image input I/F: Screen selection (DSPCRD: Y1C85)
(2) Image input I/F: Display range (DSPSZH: R322, DSPSZV: R323)
Cont. Signal name Abbrev. Common ($)
A Image input I/F: Screen selection DSPCRD Y1C85
Status of this sig nal Display contents Operation information of CNC keyboard, menu key and touch screen
OFF Image input from the image input expansion unit Output to the partial display screen (IPC screen or camera image).
ON Mitsubishi Electric standard screen Output to the CNC display unit.
Not output to the partial display screen (IPC screen or camera im age).
Cont. Signal name Abbrev. Common ($)
A External encoder 1: Position output clear request ENC1PCLR Y1C88
Cont. Signal name Abbrev. Common ($)
A Image input I/F: IPC screen vertical inversion DSPFLPV Y1C8D
A Image input I/F: IPC screen horizontal inversion DSPFLPH Y1C8E

[Function]

This signal informs the CNC that the current machining condition is changed from the "Laser Processing Condition" screen or the "Set Laser Process Cond." screen and the specified operation is completed on the PLC side.
[Operation]
When the current machining condition is changed on the "Laser Processing Condition" screen or the "Set Laser Process Cond." screen, the "Laser condition change strobe" signal (X1CA6) turns ON.
On the PLC side, turn ON the "Laser: Laser condition change complete" signal (Y1CA6) after gas control and lens position control are completed.
When the CNC confirms that the "Laser: Laser condition change complete" signal (Y1CA6) is turned ON, the CNC turns OFF the "Laser: Laser condition change strobe" signal (X1CA6).
On the PLC side, confirm that the "Laser: Condition of laser changed strobe" signal (X1CA6) is turned OFF and then turn OFF the "Laser: Laser condition change complete" signal (Y1CA6).
The following is an example of a time chart when the "Laser: Laser condition change strobe" signal (X1CA6) is used.
[Related signals]
(1) Laser: Laser condition change strobe (X1CA6)
[Function]
This signal makes the laser oscillator to irradiate the laser.
[Operation]
When this signal is turned ON during manual operations, the laser oscillator starts laser irradiation at the rising edge of this signal.
When the laser irradiation of the laser oscillator is started by this signal, the "Laser: Laser beam irradiating" signal (X1CA7) turns ON.
When the "Laser: Laser beam irradiation ready" signal (Y1CE0) is not ON, the laser irradiation is not started even by turning ON this signal.
[Caution]
Laser beam is turned OFF when NC reset or the emergency stop is made.
After the reset or the emergency stop is canceled, the laser beam remains OFF until the operation or the command to turn the laser beam ON again is made.
[Related signals]
(1) Laser: Laser beam irradiating (X1CA7)
(2) Laser: Laser beam irradiation ready (Y1CE0)
Cont. Signal name Abbrev. Common ($)
A Laser: Laser condition change complete Y1CA6
Cont. Signal name Abbrev. Common ($)
A Laser: Laser beam irradiation ON Y1CA7
The current machining conditions
are changed from the "Laser
Processing Condition" screen.
Laser: Laser condition change strobe
(X1CA6)
Current machining condition output to
R register
Laser: Laser condition change
complete (Y1CA6)

[Function]
The reservation of tool wear compensation function is enabled.
[Operation]
The reservation of tool wear compensation function is enabled when the power is turned ON again with the parameter "#8140 Reserve T wear com" set to "1" and this signal is turned ON.
When this signal is turned OFF, the "Reserved tool wear compensation not reflected" signal (TWNIN) does not turn ON.
The "Request for reflecting reserved tool wear compensation" signal (TWIN) cannot be used either.
[Related signals]
(1) Request for reflecting reserved tool wear compensation (TWIN: YD0F)
(2) Reflection of reserved tool wear compensation is complete (TWOUT: XD0F)
(3) Reserved tool wear compensation not reflected (TWNIN: XD0E)
[Function]
This signal starts the height control.
[Operation]
When this signal is turned ON, the approach control is performed at the rising edge of this signal, and the height control is started.
When the approach operation is completed, trace control is performed.
When this signal is turned OFF, the retract control is performed, and the height control is completed.
[Caution]
(1) Even though the automatic machine lock or manual machine lock is valid, when the "Laser: Height control" signal (Y1CD8) is turned ON, the approach operation of the height control is performed. To prevent the approach operation during the machine lock, make a sequence program not to turn ON Y1CD8.
(2) When the "Laser: Height control" signal (Y1CD8) is turned ON during the axis movement, the approach operation is performed after all the axes stop (*1).
(*1) It depends on the parameter "#1254 set26/bit3" (Select timing for updating axis parameter) whether it is after the axes of all part systems stop or after the axes in the part system stop.
[Related signals]
(1) Laser: Height control in progress (X1CA0)
[Function]
This signal starts the height retention control.
[Operation]
When this signal is turned ON while the "Laser: Approach in height control completed" signal (X1CA1) is ON, the height retention control is started.
When this signal is turned OFF, the approach control is started to perform the trace control.
[Related signals]
(1) Laser: Height control (Y1CD8)
(2) Laser: Approach in height control completed (X1CA1)
[Function] [Operation]
This signal enables the laser oscillator to irradiate laser.
Turn ON this signal after all the processes necessary for laser irradiation are completed, for example, peripheral devices such as chiller, gas feeder, etc. are operated, emission of the laser oscillator is turned ON.

Laser irradiation is enabled when this signal is turned ON.
[Related signals]
(1) Laser: Laser beam irradiating (X1CA7)
Cont. Signal name Abbrev. Common ($)
A Reservation of tool wear compensation TWR Y1CB8
Cont. Signal name Abbrev. Common ($)
A Laser: Height control Y1CD8
Cont. Signal name Abbrev. Common ($)
A Laser: Enable height retention in height control Y1CD9
Cont. Signal name Abbrev. Common ($)
A Laser: Laser beam irradiation ready Y1CE0

[Function] [Operation]
When the axis movement stops while the laser beam is ON, if the time set by the parameter "#90005 lsr_max_stop_t" (Maximum stop time with beam ON) has passed since the axis movement stop, the laser beam is automatically turned OFF.
By turning this signal ON, the beam irradiation can be continued even after the time set by the parameter #90005 has passed.
This signal is used to calibrate the output of the laser beam.
[Caution]
(1) Turn this signal ON only while the output is calibrated. In the other cases, turn it OFF for safety.
(2) The operation error (M95 9509) occurs while this signal is ON.
When this signal is ON, even if the beam is ON and the axis movement still stops after the time set by the parameter #90005 has passed, the laser beam is not turned OFF. The operation error also does not occur.
[Related signals]
(1) Laser: Laser beam irradiation ON (Y1CA7)
Cont. Signal name Abbrev. Common ($)
A Laser: Axis stop time with beam ON monitoring OFF Y1CE1

[Function]
An interlock is applied on the axis when outside the position switch range, and movement of the axis targeted by the position switch is prohibited.
[Operation]
When this signal turns ON and the axis targeted for the corresponding position switch is outside the range, an interlock is applied on the axis, and movement is prohibited. Movement is possible within the set range.
<Movement in interlock range>
[For linear axis]
The axis can move only in the direction toward the position switch range. If a command is issued in the direction that moves away from the position switch range, "M01 OPERATION ERROR 0004 *" ("*" is axis name) occurs.
[For rotary axis]
If axis movement is commanded in the interlock state, "M01 OPERATION ERROR 0004 *" ("*" is axis name) occurs. To move the axis, turn OFF the "Position switch interlock" signal input and cancel the interlock state. Note that even if the axis is moved away from the position switch range in this state, the interlock will not be applied.
<Coasting distance>
The coasting distance when outside the position switch range by axis movement depends on the commanded speed and parameter setting.
<Coasting distance for position switch interlock>
[Caution]
(1) When the axis moves from the set range to outside the set range, the coasting distance until the axis stops depends on the method switching of the position switch.
(2) The position switch interlock is invalid for a reference position return incomplete axis (incremental specifications), absolute position initialization incomplete axis, and an axis for which absolute position initialization is being carried out.
(3) The position switch range is judged with the machine coordinate system. Thus, the inclined axis is judged with the oblique (actual axis).
If the basic axis moves with a command issued for the inclined axis, the axis interlock will not be applied even if the basic axis moves out of the position switch range. (The interlock is valid only for the commanded axis.)
[Related signals]
(1) Position switch (PSW1 to 24: X1D00 to X1D17)
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Position switch n interlock Y1D00 to
17
Y1D20 to
37
Y1D40 to
57
Y1D60 to
77
Y1D80 to
97
Y1DA0
to B7
Y1DC0
to D7
Y1DE0
to F7
Pcheck <check> Coasting distance
0 0 The acceleration/deceleration delay is added to the movement distance within the commanded speed
0.060 [s] or less.
0 1 Same as the above distance. (When Pcheck is "0", the <check> setting is invalid.)
1 0 Within commanded speed 0.015 [s] or less (During manual mode, commanded speed 0.030 [s] or less)

1 1 Acceleration/deceleration delay or position loop gain delay is added to above distance.

4.4 PLC Output Signals (Data Type: R***)
[Function]
An analog voltage can be output from the designated connector on the remote I/O unit with analog output or built-in AI/AO by setting designated data in the file registers.
[Operation]
Analog voltage signal (for speed control) can be output by setting signed binary data to the corresponding file register.
The analog output interface is explained below.
Cont. Signal name Abbrev. Common ($)
A Analog output m AOn R200 to 3
Channel File register (R)
AO1 R200
AO2 R201
AO3 R202
AO4 R203
Analog output (V)
-4095
4095
-1000 0
10
-2.44
10
File register details
Output voltage : -10V to +10V (5%)
Resolution : 2-12 (1/4095) x Fullscale (10V)
Load conditions : 10kohm resistance load
(standard)
Output impedance : 220ohm
Output voltage = x 10V = -2.44V -1000
4095
The output voltage is
When -1000
(FC18 with hexadecimal)
<Relation of file register details and output voltage>
Rn n = 100 to 103
215 214 213 212 211 210 29 28 27 26 25 24 23 22 21 20
1 1 1 1 1 1 0 0 0 0 0 1 1 0 0 0

[Function] [Operation]
The No. of the displayed screen is output.
The following table shows the corresponding Nos. to be output to this register.
[Caution]
(1) This register is not retained after the power is turned OFF. The data is initialized to "0" when the power is turned ON.
(2) The displayed screen No. is not output to this register when the PLC onboard or the custom application (EXE) is closed without the screen change keys (e.g., [x] or [Close] button). When the standard screen is displayed in the fore front after the application has been closed, the displayed screen No. on the standard screen is output to this register.
[Function]
When this signal is used, key data can be entered on the user PLC side instead of the CNC keyboard.
[Operation]
(1) Key data is set to file registers R8 and R212 at the head of user PLC main program.
(2) The user PLC refers to the key data and performs required processing.
(3) The user PLC sets the key data which matches the keyboard used at that time in R212.
(4) The controller processes the valid key data according to the settings of R8 and R212 after the main program of user PLC has been processed.
[Related signals]
(1) KEY IN 1 (R8)
Cont. Signal name Abbrev. Common ($)
A Displayed screen No. R210
Screen
Displayed screen No. to
be output to the R regis ter
Monitor 1
Setup 2
Edit 3
Diagnosis 4
Maintenance 5
SFP 9
F0 10
Window display 13
Window selection 14
Cont. Signal name Abbrev. Common ($)
A KEY OUT 1 R212
(1)
(2)
(3)
(4)
Key data processing
(CNC)
User
PLC
R8
R212

For monitor
KEY IN 1
KEY OUT 1

[Function] [Operation]
This signal sets the Y device No. that notify the power OFF of the control unit.
The setting range is 0 to 5FF (HEX).
Set the Y device No. taking the hardware configuration into consideration.
Designate binary data for Y device No.
When a Y device No. outside the setting range is set, this signal will not be output to the Y device.
Refer to the "Automatic power OFF request" signal (Y75D) for details.
[Related signals]
(1) Power OFF processing (X707)
(2) Automatic power OFF request (Y75D)
Cont. Signal name Abbrev. Common ($)
A Power OFF indication Y device No. R215

[Function] [Operation]
The detailed screen No. of the displayed screen is output.
The following table shows the correspondence between the screen menus and the detailed screen numbers set in this register.
(*1) As there is no screen for [Next axis] and [Dsp change] menu keys, use the detailed screen No. for the operation screen (100).
Cont. Signal name Abbrev. Common ($)
A Detailed screen No. R216
Monitr Setup Edit Diagn Mainte
Monitor
Screens
100 T-ofs 201 Edit 301 Config 401 Mainte 501
Search 101 T-meas 202 Check (3D) 302 Option 402 Param 502
Reserch 102 T-reg 203 Check (2D) 351 I/F dia 403 I/O 503
Edit 103 T-life 204 NAVI MILL 10001 Drv mon 404 HA Adj. 504
Trace (2D) 104 Coord 205 NAVI LATHE 10301 Mem dia 405
Trace (3D) 152 W-meas 206 I/O 305 Alarm 406 All backup 551
Check (3D) 105 User 207 - - HMI config. 552
Check (2D) 151 MDI 208 - - Adjust S-ana 553
Cnt exp 106 Cnt set 209 - - To Abs pos 554
T-ofs 107 MST 210 - - Protect setting 555
Coord 108 T-list 211 Selfdia 411 Servo diagn 556
Cnt set 109 Pallet 212 NC Smp 412 Collect set 557
MST 110 T-Mng. 213 Safety 413 Open device 558
Modal 111 - - WLAN 414 Open SRAM 559
Tree 112 Storage 215 Ext PLC link 560
Time 113 Surf 216
Com var 114 Mac cond 217 RCE mea 562
Loc var 115 Barrier data 218
P corr 116 E-mail 219 Home screen 601
PLC SW 117 WE mea. 220
G92 set 118 Range 221 PLC onboard 11000
Col stp 119 History 222
LD MTR 120 LsrCond 223
Sp-stby 121
TipDisp 122
All sp 123
Dsp sw. (*1)
- -
S-sel 126
Next axis (*1)
W-shift 128
Laser 131
Custom open screen
F0 open (compile method, interpreter method) 6000 to 7999
Menu open (compile method, interpreter method) 8000 to 9999
Menu open (execution file registration method) 20000 to 20099
F0 open (execution file registration method) 20100

[Caution]
(1) This register is not retained when the power is turned OFF. The data is initialized to "0" when the power is turned ON.
(2) When the application is terminated with a key other than the screen switching keys ([x], [Close] button, etc.) while the PLC onboard or custom application (EXE) is displayed, the detailed screen No. is not output to this register. However, when the standard screen is displayed in the forefront after the application has been closed, the detailed screen No. on the standard screen is output to this register.
(3) Even though the guidance screen and the menu list screen are displayed, the display screen No. and detailed screen No. are not output.
The previously displayed screen No. and detailed screen No. remain the same.
[Function]
The user sequence program version can be displayed with the software version that controls the other controller on the diagnosis screen of the setting and display unit (communication terminal).
[Operation]

The ASCII code that corresponds to the character to be displayed in the version display interface is set.
<Display format and usage example>
<Program example>
Cont. Signal name Abbrev. Common ($)
A User sequence program version code R224 to 7
PLCu BND W
: Alphabet is used.
: Numeric is used.
3 digits can be used (no restriction).
4 digits can be used (no restriction).
Version code ("A0" for 1st version)
: Renewed at major revision A to Z
(I and O should not be used.)
: Renewed at minor revision 0 to 9
: Renewed at supplemental revision A to Z
(I and O should not be used.)
,
BND 1 2 3 4 W 5 6 7 A 0 B
R224 Set to "B" in ASCII code (42) for the
high-order side
Set to "FF" code for the low-order side]
R225 Set to "A0" in ASCII code]
R226 Set to 567 in binary notation]
R227 Set to 1234 in binary notation]
ACT
MOV H 4 2 F F R224
"FF" (Fixed)
MOV H 4 1 3 0 R225
"0"
"A"
MOV K 5 6 7 R226
MOV H 1 2 3 4 R227
Always set to "FF" when displaying 2 digits
Always turn ON at the first scan of the user PLC (constant also possible)
M800V/M80V Series PLC Interface Manual
4 Explanation of Interface Signals
4.4 PLC Output Signals (Data Type: R***)
547 IB-1501616-F
[Function]
The user sequence program version can be displayed with the software version that controls the other controller on the diagnosis screen of the setting and display unit (communication terminal).
[Operation]
The ASCII code that corresponds to the character to be displayed in the version display interface is set.
<Display format and usage example>
<Program example>
Cont. Signal name Abbrev. Common ($)
A User sequence program version code 2 R232 to 9
P L C u : Random alphanumeric
Total of 14 characters characters are used.
P L C u 6 L 8 4 0 1 2 3 4 5 6 7 8 9 "HIGH" side of R*
"LOW" side of R*
R232 (38 39)
R233 (36 37)
R234 (34 35)
R235 (32 33)
R236 (30 31)
R237 (38 34)
R238 (36 4C)

Interface ASCII code
DMOV H36 37 38 39 R232
DMOV H32 33 34 35 R234
DMOV H38 34 30 31 R236
MOV H36 4C R238
ACT
Always turn ON at the 1st scan of the user PLC.
(Can be left ON constantly.)
M800V/M80V Series PLC Interface Manual
4 Explanation of Interface Signals
4.4 PLC Output Signals (Data Type: R***)
IB-1501616-F 548
[Function]
This signal indicates APLC software version.
[Operation]
File register R240 to R243 is as the following data.
R240 to R243 is as the following data.
(*1) If the version is 1-digit No., set the version in bits 7 to 0 of R242, and set "00H" in bits F to 8 of R242 and bits 7 to 0 of R243.
(*2) Always set "FFH" in bits F to 8 of R243. If "FFH" is not set, it will not be displayed correctly.
Cont. Signal name Abbrev. Common ($)
A APLC version R240 to 3
Item File register Type Example

(1) Model function No. R240 Binary 1003=03EBH
(2) Serial No. R241 Binary 400=0190H
(3) Version bits 7 to 0 of R242 ASCII code A=41H
bits F to 8 of R242 ASCII code(*1) 0=30H
bits 7 to 0 of R243 ASCII code(*1) B=42H
- - bits F to 8 of R243 Always FFH(*2) FFH
BND-1003W400-A0B
(1) (2) (3)
(Example)

[Function]
When the "OT ignored" signal is used, a "stroke end error" can be prevented without external wiring for the stroke end signal (remote I/O connector pin No. fixed signal) provided for each axis. The stroke end signal of the axis for which the "OT ignored" signal is set can be used for other purposes.
[Operation]
When the "OT ignored" signal is used at all times or as necessary, the stroke end signal of the corresponding control axis can be ignored.
The interface for this signal is as follows:
(1) The signal is applicable to (+) and (-) motion at the same time. (Ignored when it turns ON.)
(2) "OT" is abbreviation of "Over Travel".
Cont. Signal name Abbrev. Common ($)
A OT ignored R248, 9
R248
R249
:
:
FEDCBA9 8 7 6 5 4 3 2 1 0
:
:
:
:
FEDCBA9 8 7 6 5 4 3 2 1 0
:
:
1st part system 1st axis
:
:
2nd part system 1st part system
1st part system 8th axis
2nd part system 1st axis :
: 2nd part system 8th axis
3rd part system 1st axis
:
:
4th part system 3rd part system
3rd part system 8th axis
4th part system 1st axis :
:
4th part system 8th axis
Note

[Function]
When the "PLC axis OT ignored" signal is used, a "stroke end error" can be prevented without external wiring of the stroke end signal (remote I/O connector pin No. fixed signal) provided for each axis. The stroke end signal of the axis for which the "PLC axis OT ignored" signal is set can be used for other purposes.
[Operation]
When the "PLC axis OT ignored" signal is used at all times or as necessary, the stroke end signal of the corresponding control axis can be ignored.
The interface for this signal is as follows:
(1) The "PLC axis OT ignored" signal is applicable to "+" and "-" motion at the same time. (Ignored when it turns ON.)
(2) "OT" is abbreviation of "Over Travel".
[Function]
When this signal is used, the "Near point detection" signal (remote I/O connector pin No. fixed signal) which is used for dog type reference position return can be ignored (dog not-passed state).
Furthermore, the "Near point detection" signal for an axis to which the "Near-point ignored" signal is set can be used for other applications.
[Operation]
When the signal is turned ON, the "Near point detection" signal for the corresponding control axis can be ignored.
The interface for this signal is as follows: Near-point dog is ignored when Near-point dog ignored signal is turned ON.
Cont. Signal name Abbrev. Common ($)
A PLC axis OT ignored R255
Cont. Signal name Abbrev. Common ($)
A Near-point dog ignored R272, 3
R272
R273
FEDCBA9 8 7 6 5 4 3 2 1 0
1st axis
:
:
8th axis
File register
Note

:
:
FEDCBA9 8 7 6 5 4 3 2 1 0
:
:
:
:
FEDCBA9 8 7 6 5 4 3 2 1 0
:
:
1st part system 1st axis
:
:
2nd part system 1st part system
1st part system 8th axis
2nd part system 1st axis :
: 2nd part system 8th axis
3rd part system 1st axis
:
:
4th part system 3rd part system
3rd part system 8th axis
4th part system 1st axis :
:
4th part system 8th axis

[Function]
When this signal is used, the "Near point detection" signal (remote I/O connector pin No. fixed signal) which is used for dog type reference position return can be ignored (dog not-passed state).
Furthermore, the "Near point detection" signal for an axis to which the "PLC axis near-point ignored" signal is set can be used for other applications.
[Operation]
When the signal is turned ON, the "Near point detection" signal for the corresponding control axis can be ignored.
The interface for this signal is as follows: PLC axis near-point dog is ignored when Near-point dog ignored signal is turned ON.
Cont. Signal name Abbrev. Common ($)
A PLC axis near-point dog ignored R279
FEDCBA9 8 7 6 5 4 3 2 1 0
1st axis
:
:
8th axis
File register

[Function]
This signal executes speed monitor function for the control axis for which a valid door No. is selected with the parameter "#2118 SscDrSel" and the spindle for which a valid door No. is selected with the parameter "#3071 SscDrSelSp".
The door No. corresponds to the following bits.
[Operation]
NC performs as follows by turning ON the "Speed monitor mode" signal.
(1) Checks compatibility of speed monitor parameter
(2) Checks if NC's speed monitor parameter matches with the speed monitor parameter sent to servo drive unit and spin dle drive unit.
(3) Notifies speed monitor command to the drive unit
(4) Executes the speed monitor function on NC
(5) Turns ON speed monitor door open possible signal when NC receives the in speed monitor mode signal from the drive unit
The followings are performed while the speed monitor function is executed.
[Caution]
(1) Be sure to turn ON the "Speed monitor mode" signal (SOMD) after confirming deceleration of all axes.
If the "Speed monitor mode" signal (SOMD) is turned ON without deceleration, and the motor rotation speed exceeds the set speed, a speed monitor alarm will occur, resulting in an emergency stop state. Then, power of the drive sec tion will be shut off.
(2) Turn OFF the "Speed monitor mode" signal after confirming the door lock is OFF.
(3) Even if the "Speed monitor mode" signal (SOMD) is turned ON while parameter error is output, speed monitoring is not initiated. Set the parameter with appropriate value, and then turn ON the "Speed monitor mode" signal (SOMD).
(4) While the axis is being removed, it will be taken off from the watch list even if the parameters "#2313 SV113/bitF" (safety observation function) and "#13229 SP229/bitF" are ON. However, the emergency stop will occurs when axis detachment is performed for all axes in the group which the door state signal is turned ON with "#2282 SV082/bitF-C" (Digital signal input selection) and "#13227 SP227/bitF-C" (Digital signal input selection). Do not remove the axis which the door state signal is to be input.
[Related signals]
(1) Speed monitor door open possible (SMDOEN: R96)
Cont. Signal name Abbrev. Common ($)
A Speed monitor mode SOMD R296
Item Details
Monitoring command speed When a command speed NC outputs to the drive unit exceeds a safety speed set with parameter, an emergency stop occurs.
Monitoring feed back speed When a motor rotation speed sent to NC from the drive unit exceeds a safety rotation speed set with parameter, an emergency stop occurs.
Monitoring feed back position When a difference between feedback position sent to NC from the drive unit and a position commanded by NC is large, an emergency stop occurs.
Door 1
Door 2

Bit F E D C B A 9 8 7 6 5 4 3 2 1 0

[Function]
The top address of the area that stores the data to be transmitted to and received from the handy terminal is set.
[Operation]
Set the R register top address on the CNC side corresponding to D0 on the handy terminal side to the "Handy terminal Data area top address" (R297), and set the number of registers required for communication to the "Handy terminal Data valid number of registers" (R298).
<Setting example>
The following is the setting value used for allocating the data from R9800 to R9849, the CNC side user area, by using 50 registers from D0 to D49 in the handy terminal side.
"9800 (0x2648)" for "Handy terminal Data area top address" (R297)
"50 (0x32)" for "Handy terminal Data valid number of registers" (R298)
<Image drawing of internal register>
Cont. Signal name Abbrev. Common ($)
A Handy terminal Data area top address R297
CNC control unit Handy terminal
Top address = 9800
No. of valid registers=50
Data area for
transmission/
reception with
handy terminal
Data area for
transmission/
reception
with CNC
(D0-49)
Communication
valid
(D50-1023)
Communication
invalid
Valid size set in R298
= 50 registers
R297
R298
R9800
R9850
D0
D50
D1023
D49
R9849
RS232C

[Related signals]
(1) Handy terminal key 1 to 45 (X1CD0 to X1CFC)
(2) Handle pulse encoder communication connector priority (Y70D)
(3) Handle/Incremental feed magnification code m (MP1, MP2, MP4: YC80, YC81, YC82)
(4) Handle/incremental feed magnification method selection (MPS: YC87)
(5) Handy terminal Data valid number of registers (R298)
(6) Handy terminal Cause of communication error (R299)
(7) 1st handle/incremental feed magnification (R2508, R2509)
[Function] [Operation]
Set the number of valid registers from D0 within the handy terminal transmission/reception area (D0 to 1023).
With CNC, the range of handy terminal transmission/reception area is the number of registers set starting from the "Handy terminal Data area top address" (R297).
Refer to the section of the "Handy terminal Data area top address" for details.
[Related signals]
(1) Handy terminal key 1 to 45 (X1CD0 to X1CFC)
(2) Handle pulse encoder communication connector priority (Y70D)
(3) Handle/Incremental feed magnification code m (MP1, MP2, MP4: YC80, YC81, YC82)
(4) Handle/incremental feed magnification method selection (MPS: YC87)
(5) Handy terminal Data area top address (R297)
(6) Handy terminal Cause of communication error (R299)
(7) 1st handle/incremental feed magnification (R2508, R2509)
[Function] [Operation]
For details on communication error, refer to the table below.
[Related signals]
(1) Handy terminal key 1 to 45 (X1CD0 to X1CFC)
(2) Handle pulse encoder communication connector priority (Y70D)
(3) Handle/Incremental feed magnification code m (MP1, MP2, MP4: YC80, YC81, YC82)
(4) Handle/incremental feed magnification method selection (MPS: YC87)
(5) Handy terminal Data valid number of registers (R298)
(6) Handy terminal Cause of communication error (R299)
(7) 1st handle/incremental feed magnification (R2508, R2509)
Cont. Signal name Abbrev. Common ($)
A Handy terminal Data valid number of registers R298
Cont. Signal name Abbrev. Common ($)
A Handy terminal Cause of communication error R299
Hexadecimal (HEX) Decimal (DEC) Details

0000 0 No error
FFFE -2 Serial port in use
FFFC -4 Timeout terminated
FFF9 -7 Serial driver forcibly terminated
FFF6 -10 Serial driver not ready
(SIO cable is disconnected)
FFF1 -15 Parity error
FFEF -17 Number of received characters over
FFEC -20 Flaming error, H/W error
FC18 -1000 Handy terminal data area illegal
(Out of user area)

[Function]
This signal sets the power consumption of devices other than drive system.
[Operation]
This data is set with the PLC.
Setting size is 2 words, Setting unit is 1 (W), Setting range is -2147483648 to 2147483647 (W)
[Caution]
(1) When the power is turned on again, the state before the power was turned on is retained.
(2) The positive value represents power consumption and the negative value represents power regeneration.
[Related signals]
(1) Power consumption computation: Enable consumption accumulation 1 to 4 (IPCE1 to 4: Y724 to 7)
(2) Power consumption computation: Accumulated consumption of devices other than drive system 1 to 4 (NDIPC1 to 4:
R130 to 137)
[Function]
This signal sets the drive system's fixed consumption correction amount.
[Operation]
This data is set with the PLC.
With this data, the parameter "#1372 DrvBasePwr" (Fixed drive system power consumption) can be adjusted by the
ladder.
Setting size is 2 words, Setting unit is 1 (W), Setting range is -2147483648 to 2147483647 (W)
[Caution]
(1) When the power is turned ON again, the state before the power was turned ON is retained.
(2) The positive value represents power consumption and the negative value represents power regeneration.
[Related signals]
(1) Power consumption computation: Enable consumption accumulation 1 to 4 (IPCE1 to 4: Y724 to 7)
(2) Power consumption computation: Present consumption of entire drive system (DTPPC: R120, 1)
(3) Power consumption computation: Accumulated consumption of entire drive system 1 to 4 (DTIPC1 to 4: R122 to 9)
[Function]
The desired operator message created by the PLC development tool (personal computer) can be displayed by setting a
value (binary code) in the operator message interface file register (Rn). An operator message appears on the alarm
diagnosis screen of the setting display unit.
[Operation]
If table No. of previously prepared operator message table has been set to operator message interface file register,
operator message can be displayed on alarm diagnosis screen. The operator message can be erased by setting interface
file register to "0".
For details on displaying operator messages, refer to the "PLC Programming Manual".
[Caution]
(1) Set the machine parameter PLC "#6450/bit2" to "1" to display the operator messages.
(2) There are two types of interface for operator messages: the R method which uses the file register (R) and the F
method which uses the temporary memory. The selection of R method and F method depends on the machine
parameter PLC "#6455/bit3".
(3) In both R method and F method, displaying an operator message does not cause any alarm on the controller side. If
the controller needs to be stopped, take appropriate action on the PLC side, including the "Automatic operation
"pause" command" (*SP), the "Single block" (SBK) and the interlock.
(4) R2560 and R308 cannot be used at a time. When you use R308, set "0" to R2560. R309 to R311 can be used regard less of the value of R2560.
Cont. Signal name Abbrev. Common ($)
A Power consumption computation: Consumption of devices
other than drive system NDPC R304, 5
Cont. Signal name Abbrev. Common ($)
A Power consumption computation: Drive system's fixed con sumption correction DFPCC R306, 7
Cont. Signal name Abbrev. Common ($)
A Operator message I/F 1 to 4 R308 to
R311

[Function] [Operation]
These are the registers to set the display position and display range of the partial display screen (IPC screen or camera
image) to be displayed on the Mitsubishi Electric standard screen.
The reference coordinate on the Mitsubishi Electric standard screen is set to R320 and R321.
The display range (width and height) of the partial display screen is set to R322 and R323.
Based on the coordinate set to R320 and R321, the IPC screen or camera image is displayed in the range set to R322 and
R323.
When "0" is set to both R322 and R323, the IPC screen is displayed on the entire Mitsubishi Electric standard screen.
(*1) When a value out of the setting range is set, no error message is displayed; however, the touch position or the dis play of the IPC screen or camera image may be incorrect.
(*2) When "0" is set, the IPC screen or camera image is displayed on the entire Mitsubishi Electric standard screen.
(*3) When "0" is set, the width and height of the IPC screen or camera image are set as the transfer range.
(*4) When the setting values of R326 and R327 are different from those of R322 and R323, the display is enlarged/
reduced.
Cont. Signal name Abbrev. Common ($)
A Image input I/F: Image display position (H) DSPPOSH R320
A Image input I/F: Image display position (V) DSPPOSV R321
A Image input I/F: Display range (width) DSPSZH R322

A Image input I/F: Display range (height) DSPSZV R323
Display position on Mitsubishi Electric standard
screen
Display contents
(IPC screen or camera image)
Device Range (*1)
VGA XGA SXGA DVD HD FullHD
R320 0 to 639
(0x27F)
0 to 1023
(0x3FF)
0 to 1279
(0x4FF)

R321 0 to 479
(0x1DF)
0 to 767
(0x2FF)
0 to 1023
(0x3FF)

R322 (*2) (*4) 0 to 640
(0x280)
0 to 1024
(0x400)
0 to 1280
(0x500)

R323 (*2) (*4) 0 to 480
(0x1E0)
0 to 768
(0x300)
0 to 1024
(0x400)

R324 0 to 639
(0x27F)
0 to 1023
(0x3FF)
0 to 1279
(0x4FF)
0 to 719
(0x2CF)
0 to 1279
(0x4FF)
0 to 1919
(0x77F)
R325 0 to 479
(0x1DF)
0 to 767
(0x2FF)
0 to 1023
(0x3FF)
0 to 479
(0x1DF)
0 to 719
(0x2CF)
0 to 1079
(0x437)
R326 (*3) (*4) 0 to 640
(0x280)
0 to 1024
(0x400)
0 to 1280
(0x500)
0 to 720
(0x2D0)
0 to 1280
(0x500)
0 to 1920
(0x780)
R327 (*3) (*4) 0 to 480
(0x1E0)
0 to 768
(0x300)
0 to 1024
(0x400)
0 to 480
(0x1E0)
0 to 720
(0x2D0)
0 to 1080
(0x438)
(R320, R321)
R323
R322
(R324, R325)
R327

R326
M800V/M80V Series PLC Interface Manual
4 Explanation of Interface Signals
4.4 PLC Output Signals (Data Type: R***)
557 IB-1501616-F
[Caution]
(1) This signal is valid in the following cases.
- The image input expansion unit is connected.
- The parameter "#1057 disp_input" is set to "4", and the contents of the IPC screen or camera image are partially displayed.
(2) When the resolution of the partial display screen (IPC screen or camera image) is changed, the entire screen is dis played with the changed resolution regardless of the setting of the R registers R320 to R327 even while the screen is partially displayed. When the resolution of the partial display screen (IPC screen or camera image) is changed after the CNC is started, turn the CNC OFF and ON.
[Function] [Operation]
These are the registers to set the transfer start position and transfer range of the IPC screen to be displayed on the Mitsubishi Electric standard screen.
Set the reference coordinate on the IPC screen to these registers (R324 and R325).
Based on the coordinate set to R324 and R325, the IPC screen is transferred in the range set to R326 and R327. (See the figure of R320.)
When "0" is set to both "R326" and "R327", the width and height of the IPC screen are set as the transfer range.
Refer to "Image input I/F: Image display position (H)" (R320: DSPPOSH) for the setting range of R324 to R327.
[Caution]
(1) This signal is valid in the following cases.
- The image input expansion unit is connected.
- The parameter "#1057 disp_input" is set to "4", and the contents of the IPC screen or camera image are partially displayed.
(2) When the resolution of the partial display screen (IPC screen or camera image) is changed, the entire screen is dis played with the changed resolution regardless of the setting of the R registers R320 to R327 even while the screen is partially displayed.
When the resolution of the partial display screen (IPC screen or camera image) is changed after the CNC is started, turn the CNC OFF and ON.
[Related signals]
(1) Image input I/F: Screen selection (DSPCRD: Y1C85)
(2) Image input I/F: Display range (DSPSZH: R322, DSPSZV: R323)
(3) Image input I/F: Behavior at gesture (DSPACT: R328/bit1)
Display mode Resolution
VGA (10.4-type) 640 x 480 (32 bits), 60 Hz
XGA (15-type) 1024 x 768 (32 bits), 60 Hz
SXGA 1280 x 1024 (32 bits), 60 Hz
DVD 720 x 480 (32 bits), 60 Hz
HD 1280 x 720 (32 bits), 60 Hz
FullHD 1920 x 1080 (32 bits), 60 Hz
Cont. Signal name Abbrev. Common ($)
A Image input I/F: IPC screen transfer start position (H) IPCPOSH R324
A Image input I/F: IPC screen transfer start position (V) IPCPOSV R325
A Image input I/F: IPC screen transfer range (width) IPCSZH R326
A Image input I/F: IPC screen transfer range (height) IPCSZV R327
M800V/M80V Series PLC Interface Manual
4 Explanation of Interface Signals
4.4 PLC Output Signals (Data Type: R***)
IB-1501616-F 558
[Function]
This signal is used to specify the behavior when the input from the keyboard, menu key or gesture operation is made.
[Operation]
[Caution]
(1) This signal is valid in the following cases.
- The image input expansion unit is connected to the CNC unit.
- The parameter "#1057 disp_input" is set to "4", and the IPC screen or camera image is partially displayed on the Mitsubishi Electric standard screen.
[Related signals]
(1) Image input I/F: Screen selection (DSPCRD: Y1C85)
(2) Image input I/F: Display range (DSPSZH: R322, DSPSZV: R323)
(3) Image input I/F: IPC screen transfer start position (IPCPOSH: R324, IPCPOSV: R325)
(4) Image input I/F: IPC screen transfer range (IPCSZH: R326, IPCSZV: R327)
[Function]
This function is used to prevent the end user from illegally rewriting the user PLC created by the machine tool builder. The password required for the editing and input/output of the user PLC can be changed to one unique to the machine tool builder.
R354/R355 are the registers that are used for the password management method type 1 ("#1761 cfgPR11/bit6" is set to "0").
[Operation]
The machine tool builder's original password is registered in R354[L]/R355[H] with the user PLC.
Set the password in the range of "2" to "99999999". "0" and "1" cannot be set. When the R354/R355 value is "0" or "1", "5963" (default value) will be used as the password No.
[Caution]
(1) When the password management method type 2 is enabled ("#1761 cfgPR11/bit6" is set to "1"), the R354/R355 value is "2". Do not change the value with a sequence program or custom API, etc. (If the value is changed, the machine tool builder macro cannot be registered and edited.)
Cont. Signal name Abbrev. Common ($)
A Image input I/F: Behavior at operation DSPACT R328
R328 Name Operation
bit0 Image input: Be havior at key entry
The screen to be the operation target of the function key and menu key is switched.
The contents operated on the touch screen are transmitted to the touched screen. It is transmitted to the IPC screen when the IPC screen is touched and to the Mitsubishi Electric standard screen when the Mitsubishi Electric standard screen is touched.
However, only when the IPC is connected to the image expansion unit by USB, touch operation is available on the IPC screen partially displayed.
0 The operation using the keyboard is handled as that for the IPC screen.

The CNC keyboard and menu key operation information is transmitted to the IPC screen via
the image expansion unit.
1 The operation using the keyboard is handled as that for the Mitsubishi Electric standard
screen.
The CNC keyboard and menu key operation information is transmitted to the Mitsubishi Elec tric standard screen.
bit1 Image input: Be havior at gesture
The behavior when the gesture operation is performed in the area on the partial display screen (IPC
screen or camera image) is switched.
0 The gesture operation is handled as that for the IPC screen.
The gesture operation information is transmitted to the IPC screen via the image expansion
unit.
1 The gesture operation is handled as that for the Mitsubishi Electric standard screen.
The gesture operation information is not transmitted to the IPC screen.
When the gesture operation is performed, the contents in partial display screen (IPC screen
or camera image) on the standard screen can be moved and enlarged/reduced.
The transfer start position (R324, R325) can be changed by drag/flick.
The transfer range (R326, R327) can be changed by pinch-in/pinch-out.
Cont. Signal name Abbrev. Common ($)
A Machine tool builder macro password No. R354, 5

[Function]
This signal allows an automatic transition to a desired screen by setting the screen selection information in the file register
through the user PLC.
[Operation]
The following table describes the file registers.
Specify the function No., main menu No. (or menu and screen Nos. of a customized screen), and sub menu No. (or win dow No. of a customized screen). Then, set the selection request completion data to "1" at the end.
Make sure to specify the function No. If the function No. is not specified, screen transition is not performed.
If you omit specifying the main menu No. (or menu and screen of a customized screen) (if you leave the No. zero), the
NC transitions to a screen specified with the function No. To which screen to transition is determined according to the
destination assigned to each function key.
When the sub menu No. has been set, the main menu No. has also to be set. When no main menu No. is set, the oper ation is the same as when only the function No. is set.
When a screen No. is specified, the NC opens the customized screen of the specified function No., and then transitions
to the screen of the specified screen No.
When a window No. is specified, the window of the specified No. appears after the screen transition (when a screen No.
is specified, the specified screen is displayed). Thus, even when no screen No. is specified (0), a window can be dis played by specifying the window No.
If you specify either the function No., main menu No. (or screen No.), or sub menu No. outside the range, the screen
transition is not executed. In this case, the selection request/completion data (R356: R_DRCTSTS) remains "1".
Specify the values in the following table for each file register.
Setting options of R358/R359 are different according to the specified function No.
Cont. Signal name Abbrev. Common ($)
A Direct screen selection R356 to 9
Register
No. Signal name Meaning Abbreviations in this manual Supplementary informa tion
R356 R_DRCTSTS Selection re quest completion
data
(1) User PLC confirms the initial state (=0), and then
sets data in R357 to R359.
(2) User PLC sets the screen selection request (=1).
(3) NC confirms the screen selection request, and
sets the screen selection completion (=4) to per form screen transition.
(4) After the transition, User PLC confirms the screen
selection completion (=4) and then sets the initial
state (=0).
0: Initial state
1: Screen selection re quest
4: Screen selection com pletion
8: No screen selection re quest application
R357 R_DRCTFUNCTION Function No. Set "4" to transition to the alarm message display
screen.
Selection request
R358 R_DRCTMANMENU Main menu No. Set "6" to transition to the alarm message display
screen.
Menu No. Set "1" to specify the 1st menu of a customized
screen.
Screen No. Set "6001" to transition to the customized screen No.
6001.
R359 R_DRCTSUBMENU Sub menu No. Set "1" to transition to the alarm display screen, or "2"
to transition to the PLC alarm display screen.
Window No. Set "8002" to display the window No. 8002 of a cus tomized screen.
Screen R357 value
Function No. R358 value R359 value
Monitor 1
Main menu
(0 to 30)
Sub menu
(0 to 70)
Setup 2
Edit 3
Diagnostic 4
Maintenance 5

Main menu No. (R358) and sub menu No. (R359) are designated using the position from the left-end of menu.

Menu No. = Number of menu changes 10 + Position from the left-end of menu (1 to 10)
If you specify no menu, set main menu No. and sub menu No. to "0".
Refer to "Direct Screen Selection Specifications Manual" to enable direct screen selection for customized screens.
[Timing chart]
Set the screen selection completion (R356=4) after completion of screen transition.
If screen transition is disabled, the selection completion data (R356) may remain "1".
If R356 remains unchanged for two seconds or longer after the screen selection request (R356=1), set "0" in R356 through the PLC.
[Precautions and restrictions]
(1) If screen selection request is made while any screen process is executed, the subsequent operation will be the same as when a key that causes a screen transition (a function key, for example) is pressed. The operation examples are given below.
When a file is being edited on the edit screen, the screen transits after the file is saved.
When a data is being input/output, the screen transits immediately. At this time, the input/output is executed in the back ground.
When buffer correction is being performed, the screen transits immediately. The buffer correction data is not saved.
When operation search is being performed, the screen transits after the search is completed.
(2) For a screen that requires a password entry before it is displayed, a screen transition to the said screen is disabled if no password is input.
(3) If the target main menu designation or screen No. designation is not processed, processing of sub menu or window No. will not be carried out.
(4) When screen transition is disabled, no specific error is set or displayed, and the selection completion data (R356) remains "1". If there is no changes for 2 seconds or longer after the screen selection request (R356=1), set "0" in R356 through the PLC. However, if the control fails to find the application for the direct screen selection request, "8" is set in R356.
(5) This function implements a screen transition to each display screen of Monitor, Setup, Edit, Diagnosis, Maintenance and customized screens. The execution file registration type customized screens do not transit.
(6) If a transition to the identical window screen is carried out, the target window screen is closed once, and then dis played again.
(7) The menu No. specified for direct screen selection (R358) is applied to the menus configured when the menu selec tion parameter "#11032 Menu sel para lkof" (Validate menu selection parameter setting) is set to either "0" or "1". Thus, the control may transition to a screen not intended by the machine tool builder.
(8) While NAVI MILL or NAVI LATHE is displayed, screen transition may fail depending on the working condition.
0 to 1
1 to 4
4 to 0
Before transition After transition
PLC
NC
Screen

[Function]
This operation level signal switches the protection level of various data.
The operation levels with R361 setting value are as follows.
Other than 1 to 3: Operation level 0
1: Operation level 1
2: Operation level 2
3: Operation level 3
[Operation]
The operation level is switched depending on the state of the user level-based data protection operation level signal.
Various data is protected according to the operation level.
[Function]
When the parameter "#11018 M password hold" is valid and the parameter "#1222 aux06/bit3" is valid, this signal switches the lock/release state of the setup parameter.
The lock/release state corresponds to the following bits.
[Operation]
Turning ON the "Machine parameter lock I/F" signal releases the machine parameter lock.
Turning OFF this signal locks the machine parameter.
[Function]
This signal outputs an estimated machining time during the high-speed simple program check.
The unit of time output is [ms].
[Operation]
During the high-speed simple program check, this signal outputs the time from the start of the machining program execution until NC reset.
[Related signals]
(1) High-speed simple program check mode (SMLK: Y73E)
(2) High-speed simple program check mode ON (SMLKO: X712)
(3) High-speed simple program check: Time reduction coefficient (R378)
Cont. Signal name Abbrev. Common ($)
A User level-based data protection: Operation level R361
Cont. Signal name Abbrev. Common ($)
A Machine parameter lock I/F R364
Cont. Signal name Abbrev. Common ($)
A High-speed simple program check: Time measurement out put R372,3
FEDCBA 9 87654 3 210 Bit
Lock state
Temporary cancel of unlock alarm

[Function]
This signal is used to select which handle to use for the manual arbitrary reverse run.
[Operation]
The setting value "n" of this signal (R375) corresponds to the ordinal number of the handle. For example, when the setting value is "2", the machine follows the pulse input of the handle selected in "#1396 H2_pno" (2nd handle selection).
The handle selected at the start of the manual arbitrary reverse run mode is used during the mode.
If any non-existent handle number is set in the "Manual arbitrary reverse run selection" (R375) at the start of the mode, the

1st handle is used.
[Operation sequence]
[Related signals]
(1) Manual arbitrary reverse run mode ON (PCHKO: X715)
(2) Manual arbitrary reverse run: Reverse run ON (MOREV: X716)
(3) Thread, tap block stopping in manual arbitrary reverse run (MBSTP: X74D)
(4) Thread, tap reverse run prohibition alarm in manual arbitrary reverse run (MRVNG: X74E)
(5) Manual arbitrary reverse run mode (MORR: Y73C)
(6) Manual arbitrary reverse run speed selection (MORSP: Y73D)
(7) Actual cutting mode (thread, tap) in manual arbitrary reverse run (MRCMD: Y761)
(8) Manual arbitrary reverse run: Reverse run block stop designated part system (RBSSY: YD01)
(9) Manual arbitrary reverse run: MSTB reverse run prohibited (MRPSG: YCFC)
(10)Manual arbitrary reverse run speed multiplier (R379)
[Function]
This signal reduces an execution time for the high-speed simple program check.
[Operation]
With the time reduction coefficient, the time for operations such as axis movement and dwell can be reduced.
If a machining program that requires T seconds for normal execution is performed while the "High-speed simple program check mode ON" (SMLKO: X712) is ON, the execution time is calculated by the following formula.
<When the "High-speed simple program check mode ON" (SMLKO:X712) is ON>
Execution time = T x (1/2n) n: High-speed simple program check: Time reduction coefficient
<When the "High-speed simple program check mode ON" (SMLKO:X712) is OFF>
Execution time = T
[Related signals]
(1) High-speed simple program check mode (SMLK: Y73E)
(2) High-speed simple program check mode ON (SMLKO: X712)
(3) High-speed simple program check: Time measurement output (R372,3)
Cont. Signal name Abbrev. Common ($)
A Manual arbitrary reverse run handle selection R375
Cont. Signal name Abbrev. Common ($)
A High-speed simple program check: Time reduction coeffi cient R378
(R375)
(PCHKO X715)
(MORR Y73C)
ON
OFF
ON
OFF
12 3
The handle for manual
arbitrary reverse run
Manual arbitrary
reverse run handle selection
Manual arbitrary
reverse run mode ON
Manual arbitrary
reverse run mode
1st handle 2nd handle

[Function]
This signal adjusts the speed for manual arbitrary reverse run when jog mode or handle mode is selected for speed control during manual arbitrary reverse run.
[Operation]
If the "Manual arbitrary reverse run speed selection" signal (MORSP) turns ON, the parameter "#19007 program check constant" is used for speed control. If the "Manual arbitrary reverse run speed selection" signal (MORSP) is OFF, the command speed of the normal machining program is used.
The feedrate for manual arbitrary reverse run is controlled by the ratio of the "Manual arbitrary reverse run speed multiplier" (R379) and the parameter "#19007 program check constant" when operation is in jog mode. In handle mode, the feedrate is controlled by the sum of the handle pulses per unit time and manual arbitrary reverse run speed multiplier, and the ratio of the parameter "#19007 program check constant".
If the "Manual arbitrary reverse run speed selection" signal (MORSP) is OFF, the command speed of the normal machining program is used.
<The speed used when the "Manual arbitrary reverse run speed selection" (MORSP) is ON>
When jog mode is selected:
The manual arbitrary reverse run speed can be calculated from the following formula.
When handle mode is selected:
The manual arbitrary reverse run speed can be calculated from the following formula.
Rapid traverse override or cutting override can be exerted on the command speed in the machining program.
Reverse motion is performed if the value of the manual arbitrary reverse run speed calculated with the above formula is a negative value.
As the same rate of change of the manual arbitrary reverse run speed is applied to all part systems, synchronization of the part systems can be maintained. However, synchronization is not guaranteed when synchronization relationship is broken due to rapid traverse override or cutting override.
If the value of the "Manual arbitrary reverse run speed multiplier" (R379) or the amount of change of handle pulses exceeds "#19007 program check constant", the value is clamped at the program check constant. The manual arbitrary reverse run speed never exceeds the command speed.
[Related signals]
(1) Manual arbitrary reverse run: Reverse run ON (MOREV: X716)
(2) Thread, tap block stopping in manual arbitrary reverse run (MBSTP: X74D)
(3) Thread, tap reverse run prohibition alarm in manual arbitrary reverse run (MRVNG: X74E)
(4) Manual arbitrary reverse run mode (MORR: Y73C)
(5) Manual arbitrary reverse run speed selection (MORSP: Y73D)
(6) Actual cutting mode (thread, tap) in manual arbitrary reverse run (MRCMD: Y761)
(7) Manual arbitrary reverse run: Reverse run block stop designated part system (RBSSY: YD01)
(8) Manual arbitrary reverse run: MSTB reverse run prohibited (MRPSG: YCFC)

Cont. Signal name Abbrev. Common ($)
A Manual arbitrary reverse run speed multiplier R379
Manual arbitrary reverse run speed multiplier
Program check speed constant
Command speed in the
machining program
Change amount of handle pulse per unit time
Manual arbitrary reverse run speed multiplier
Program check speed constant
Command speed in the
machining program

[Function]
Set the magnification for the position error compensation amount obtained the first time and the number of times to update the compensation amount after the "G/B spindle synchronization: Position error compensation" signal (GBCMON) is turned ON.
[Operation]
(1) Magnification for the first compensation amount
(2) The number of times of compensations
In "Magnification for the first compensation amount", set the magnification for the position error compensation amount obtained the first time after the "G/B spindle synchronization: Position error compensation" signal (GBCMON) is turned ON. (Setting increment: 1/10 times)
When "0" is set, it will be treated as "1".
In "The number of times of compensations", set the number of times to update the compensation amount after the "G/B spindle synchronization: Position error compensation" signal (GBCMON) is turned ON.
When "0" is set, compensation is repeated by 16 times.
Cont. Signal name Abbrev. Common ($)
A G/B spindle synchronization: Position error compensation
scale, and the number of times of compensations R390
R390
F 87 0
(1) (2)

<Setting example>
<Operation example: When R390 is set to "0F05">
<Refreshing the position error compensation amount after turning ON the "G/B spindle synchronization: Position error compensation" (GBCMON)>
When the "G/B spindle synchronization: Position error compensation" (GBCMON) is turned ON, the first position error compensation amount is measured and compensation is carried out. (*1 in the figure above)
Next, the second position error compensation amount is measured and compensation is carried out. (*2 in the figure above)
In the same manner, the third and fourth measurements are carried out.
The data of the fifth measurement are dealt as the final data to carry out the compensation. (*5 in the figure above)
The compensation scale is applied only to the first position error compensation.
[Related signals]
(1) G/B spindle synchronization valid (GBON: Y778)
(2) G/B spindle synchronization: Position error compensation (GBCMON: Y77C)
(3) G/B spindle synchronization: Keep position error compensation amount (GBCMKP: Y77E)
(4) G/B spindle synchronization: Position error compensating (GBPCM: X77B)
(5) G/B spindle synchronization: Position error compensation amount (R465)
Compensation scale ap plied to the first compen sation
The number of times of
compensations R390's setting value
1.5 times 5 times 0F05 (HEX)
*1
*2
*3
*4
*5
0
0
Time
[Signal from PLC to CNC]
(a) G/B spindle synchronization valid
(GBON : Y778)
(b) G/B spindle synchronization:
position error compensation
(GBON : Y77C)
[Signal from CNC to PLC]
(c) G/B spindle synchronizing mode
(GBMOD : X778)
(d) G/B spindle synchronization:
position error compensating
(GBPCM : X77B)
Gap between the
feedback position of
guide bushing (G/B) spindle
synchronization and the
workpiece' s torsion
Compensation
amount of
the first time

Guide bushing spindle synchronization
position error compensation amount
1.5 times of the
first compensation
amount

[Function]
These signals use R register as interface for PLC and NC. Up to 4 sets of axis can be set in R register, including axis No., offset amount, and max. compensation amount in one set.
[Operation]
Part-system, axis No. (raxno): R402
Offset amount (offset): R400
Set compensation amount for the farthest negative side (mdvno position) in the compensation range by using ladder, etc.
Max. compensation amount (maxcmp): R401
Set compensation amount for the farthest positive side (pdvno position) in the compensation range by using ladder, etc.
This compensation amount is a value using offset position as a criterion.
Compensation amount (legcmp): R72
This is compensation amount for the current machine position set by NC.
Refer to the section on "Ball screw thermal displacement compensation Compensation amount" (R72) for details.
(1) Raxno, offset, and maxcmp cannot be set from the program or NC screen.
Set them in R register by using ladder, etc.
(2) Unit of the offset amount, the maximum compensation amount, the compensation amount follows the setting of "#1006 mcmpunit".
Parameters (backlash and pitch error compensation, etc.) regarding machine error compensation and external machine coordinate system compensation also follow this unit.
Cont. Signal name Abbrev. 1st axis 2nd axis 3rd axis 4th axis
A Ball screw thermal displacement compensation: Offset
amount n-th axis R400 R403 R406 R409
A Ball screw thermal displacement compensation: Max. com pensation amount n-th axis R401 R404 R407 R410
A Ball screw thermal displacement compensation: Part-sys tem, axis No. n-th axis R402 R405 R408 R411
F
7
8
0
bit0 Compensation ON/OFF 0 OFF
1 - ON
bit1 to bit7 Axis No. 0 1 axis
1 2 axis
2 3 axis
:
:
Note

<Setting example>
When only the ball screw thermal displacement compensation is valid:
When the ball screw thermal displacement compensation is used with the machine error compensation:
[Related signals]
(1) Ball screw thermal displacement compensation Offset amount n-th axis (R400)
(2) Ball screw thermal displacement compensation Max. compensation amount n-th axis (R401)
(3) Ball screw thermal displacement compensation Part-system, axis No. n-th axis (R402)
(4) Thermal expansion compensation amount (R72)
(Example 1)
Compensation range
cmpax
drcax
rdvno
mdvno
pdvno
spcdv
Compensation amount
offset
maxcmp
raxno
Compensation
amount (mm)
Machine position (mm)
Reference
position
0.3
0.1
-0.1
-0.3
-5. 5.
offset maxcmp
X
X
4105
4101
4110
1000
-600

1000
1
(Example 2)
Compensation range
cmpax
drcax
rdvno
mdvno
pdvno
spcdv
(Absolute value method)
Division Compensation
No. amount
Compensation amount
offset
maxcmp
raxno
Compensation
amount (mm)
Machine position (mm)
Reference
position
0.3
0.1
-0.1
-0.3
-5. 5.
maxcm
offset
Thermal expansion compensation
Machine position compensation
Total compensation amount
X
X
4105
4101
4110
1000
200
200
100
100
-100
-200
-200
-300
-200
-100
1
2
3
4
5
6
7
8
9
10
-600
1000
1

[Function]
The PLC axis control information address stores control information head R register for each PLC axis.
[Operation]
PLC axis control information address is designated by the following devices.
(1) The following R registers can be used.
R8300 to R9799 (Battery backup area)
R9800 to R9899 (Non battery backup area)
R18300 to R19799 (Battery backup area)
R19800 to R19899 (Non battery backup area)
R28300 to R29799 (Battery backup area)
R29800 to R29899 (Non battery backup area)
[Related signals]
(1) PLC axis control buffering mode valid (PABMI: Y723)
(2) PLC axis control valid (PLCAEn: Y770 to Y775)
[Function] [Operation]
The PLC axis control buffering mode information is stored in the R device set in this register and succeeding area.
[Related signals]
(1) PLC axis control buffering mode valid (PABMI: Y723)
Cont. Signal name Abbrev. Common ($)
A PLC axis control information address n-th axis R440 to 7
Device No. Signal name
R440 PLC axis control information address 1st axis
R441 PLC axis control information address 2nd axis

R442 PLC axis control information address 3rd axis
R443 PLC axis control information address 4th axis
R444 PLC axis control information address 5th axis
R445 PLC axis control information address 6th axis
R446 PLC axis control information address 7th axis
R447 PLC axis control information address 8th axis
Cont. Signal name Abbrev. Common ($)
A PLC axis control buffering mode information address R448
Note

[Function]
Encoder pulse input used to be fixed to 1024 pulse input in the conventional analogue I/F. With this function, arbitrary pulse can be input by parameters set in R register. The maximum number of input pulse is 76800.
[Operation]
In order to input encoder arbitrary pulse, set the number of pulses necessary in R register. Switch encoder to be used by ON/OFF on the PLC device, and turn ON the arbitrary pulse input valid signal.
Turn OFF the arbitrary pulse input valid signal when the conventional 1024 pulse encoder is used.
[Caution]
(1) Arbitrary pulse cannot be input from a bus-connected encoder.
(2) Input 1/2 of the number of pulses actually used with the encoder 1 arbitrary pulse 1 and 2 (R456 to 457), and the encoder 2 arbitrary pulse 1 and 2 (R458 to 459) in hexadecimal. If a different number of pulses is input, the speed at feed per rotation changes. If a different number of pulses is input, the speed at feed per rotation changes.
(3) When 0 to 0x1FF are set in R456 to R459, the encoder input pulse will be 1024 pulse input. When a value exceeding 0x9600 is set, it will be 76800 pulse input.
[Related signals]
(1) Encoder 1 arbitrary pulse selection (Y764)
(2) Encoder 2 arbitrary pulse selection (Y765)
(3) Encoder 1 arbitrary pulse valid (Y766)
(4) Encoder 2 arbitrary pulse valid (Y767)
Cont. Signal name Abbrev. Common ($)
A Encoder 1 arbitrary pulse 1 R456
A Encoder 1 arbitrary pulse 2 R457
A Encoder 2 arbitrary pulse 1 R458
A Encoder 2 arbitrary pulse 2 R459
Device No. Signal name Details
R456 Encoder 1 arbitrary pulse 1
This signal is selected when
the "Encoder 1 arbitrary
pulse selection" (Y764) is
OFF.
Input 1/2 of the number of pulses necessary for arbitrary
pulse input with the encoder input 1. This number of pulses
must be in hexadecimal but not in quad edge evaluation.
The setting range is 0x200 (512) to 0x9600 (38400). R457 Encoder 1 arbitrary pulse 2
This signal is selected when
the "Encoder 1 arbitrary
pulse selection" (Y764) is
ON.
R458 Encoder 2 arbitrary pulse 1
This signal is selected when
the "Encoder 2 arbitrary
pulse selection" (Y765) is
OFF.
Input 2/2 of the number of pulses necessary for arbitrary
pulse input with the encoder input 1. This number of pulses
must be in hexadecimal but not in quad edge evaluation.
The setting range is 0x200 (512) to 0x9600 (38400). R459 Encoder 2 arbitrary pulse 2
This signal is selected when
the "Encoder 2 arbitrary
pulse selection" (Y765) is
ON.

[Function]
This signal outputs the maximum range of the relative position error during acceleration/deceleration after the spindle motor completes the acceleration/deceleration.
[Operation]
During guide bushing spindle (G/B) synchronization mode, the following five values are calculated based on the relative position error between the reference spindle and the guide bushing spindle, and they are output to the registers when the state changes between the acceleration/deceleration state and the steady state. (Unit is pulse, 1pulse 0.088)
Maximum range of the relative position error during acceleration/deceleration
Maximum value of the relative position error during acceleration/deceleration
Maximum range of the relative position error during the steady state
Maximum value of the relative position error during the steady state
Average value of the relative position error during the steady state
This sampling is constantly carried out during the guide bushing spindle synchronization mode. It stops when the guide bushing spindle synchronization mode is canceled.
(1) The relative position error is calculated by ""Reference spindles feedback position" - "Guide bushing spindles feed back position"".
[Related signals]
(1) G/B spindle synchronization valid (GBON: Y778)
Cont. Signal name Abbrev. Common ($)
A G/B spindle synchronization: Maximum range of the relative
position error R460

R460 Maximum range ((a) above) of the relative position error is written after the spindle motor completes acceleration.
Maximum range ((b) above) of the relative position error is written after the spindle motor deceler ates and stops.
R461 Maximum value ((c) above) of the relative position error is written after the spindle motor completes acceleration.
Maximum value ((d) above) of the relative position error is written after the spindle motor.
R462 Average value ((e) above) of the relative position error is written after the spindle motor finishes steady rotation.
R463 Maximum range ((f) above) of the relative position error is written after the spindle motor finishes steady rotation.
R464 Maximum value ((g) above) of the relative position error is written after the spindle motor finishes steady rotation.
(a)
(b)
(c) (d)
(f) (e) (g)
0
Spindle rotation speed
Relative position error
(1) Accelerating (2) Steady rotation (3) Decelerating
Time
Note

[Function]
This signal outputs the maximum value of the relative position error after the spindle motor completes the acceleration/deceleration.
[Operation]
Refer to "G/B spindle synchronization: Maximum range of the relative position error" (R460).
[Related signals]
(1) G/B spindle synchronization valid (GBON: Y778)
(2) G/B spindle synchronization: Maximum range of the relative position error (R460)
[Function]
This signal outputs the average value of the relative position error during steady rotation after the spindle motor completes steady rotation.
[Operation]
Refer to "G/B spindle synchronization: Maximum range of the relative position error" (R460).
[Related signals]
(1) G/B spindle synchronization valid (GBON: Y778)
(2) G/B spindle synchronization: Maximum range of the relative position error (R460)
[Function]
This signal outputs the maximum range of the relative position error during steady rotation after the spindle motor completes steady rotation.
[Operation]
Refer to "G/B spindle synchronization: Maximum range of the relative position error" (R460).
[Related signals]
(1) G/B spindle synchronization valid (GBON: Y778)
(2) G/B spindle synchronization: Maximum range of the relative position error (R460)
[Function]
This signal outputs the maximum value of the relative position error during steady rotation after the spindle motor completes steady rotation.
[Operation]
Refer to "G/B spindle synchronization: Maximum range of the relative position error" (R460).
[Related signals]
(1) G/B spindle synchronization valid (GBON: Y778)
(2) G/B spindle synchronization: Maximum range of the relative position error (R460)
Cont. Signal name Abbrev. Common ($)
A G/B spindle synchronization: Maximum value of the relative position error R461
Cont. Signal name Abbrev. Common ($)
A G/B spindle synchronization: Average value of the relative position error during the steady state R462
Cont. Signal name Abbrev. Common ($)
A G/B spindle synchronization: Maximum range of the relative position error during the steady state R463
Cont. Signal name Abbrev. Common ($)
A G/B spindle synchronization: Maximum value of the relative position error during the steady state R464

[Function]
This signal outputs the position error compensation amount in the guide bushing (G/B) spindle synchronization position error compensation state.
[Operation]
When the "G/B spindle synchronization: Position error compensation" signal (GBCMON) is turned ON, this signal outputs the position error compensation amount during the guide bushing spindle synchronization position error compensation.
(Unit is pulse, 1pulse 0.088)
When the guide bushing spindle synchronization position error compensation is finished, this signal becomes "0".
[Related signals]
(1) G/B spindle synchronization valid (GBON: Y778)
(2) G/B spindle synchronization: position error compensation (GBCMON: Y77C)
(3) G/B spindle synchronization: keep position error compensation amount (GBCMKP: Y77E)
(4) G/B spindle synchronization: Position error compensation scale and the number of times of compensations (R390)
(5) G/B spindle synchronization: position error compensating (GBPCM: X77B)

[Function]
This signal outputs the phase error (relative position) of the reference spindle and guide bushing (G/B) spindle saved when the "G/B spindle synchronization: Phase memory" signal (GBPHM) was turned ON.
[Operation]
This signal displays the phase error (relative position) of the reference spindle and guide bushing spindle saved when the "G/B spindle synchronization: Phase memory" signal (GBPHM) was turned ON during guide bushing spindle synchronization. (Unit is pulse, 1pulse 0.088)
When guide bushing spindle synchronization is canceled, this signal becomes "0".
[Related signals]
(1) G/B spindle synchronization valid (GBON: Y778)
(2) G/B spindle synchronization: Phase memory (GBPHM: Y77B)
[Function] [Operation]
This signal designates the R register head No. which is used for the setting of the interfering object or coordinate system of the interference check between part systems.
[Caution]
(1) Set an even number in the R register.
(2) Set the R register number within the range of user backup area or user work area.
[Related signals]
(1) Interference check between part systems: Setting error alarm information (R101)
Cont. Signal name Abbrev. Common ($)
A G/B spindle synchronization: Position error compensation
amount R465
Cont. Signal name Abbrev. Common ($)
A G/B spindle synchronization: Phase shift amount R466
Cont. Signal name Abbrev. Common ($)
A Interference check between part systems: Data address R468

[Function]
When the "Cutting feed override method selection" (YC67) is set to "file register method", override control can be performed in the range of 0% to 300% in 1% increments. Desired value is set to file register (R) in binary code.
[Operation]
As for the cutting feed during the automatic operation, the actual feedrate is the value obtained by multiplying the specified feedrate (F) by this override ratio. (When the "2nd cutting feed override" is not valid).
However, the override ratio is fixed to 100%, irrespective of this override setting, under the following conditions:
 The "Override cancel" signal (YC58) is ON.
 During tapping in fixed cycle
 During tapping mode
 During thread cutting
(1) Only when override value is 0%, override is exerted even on rapid traverse speed. However, when the file register method for rapid traverse override is selected and the parameter "#12116 CutOvrZeroMovRap" is set to "1", the rapid traverse is according to the rapid traverse override value irrespective of the curring feed override value.
When override value is 0%, the operation error (M01 0102) occurs.
[Related signals]
(1) Cutting feed override code m (YC60:*FV1 to *FV16)
(2) Cutting feed override method selection (YC67:FVS)
(3) 2nd cutting feed override valid (YC66:FV2E)
(4) 2nd cutting feed override (R2501)
(1) For relationship among these signals, refer to the description for the cutting feedrate override.
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A 1st cutting feed override R2500 R2700 R2900 R3100 R3300 R3500 R3700 R3900
Note
Note

[Function]
When the "2nd cutting feed override valid" signal (YC66) is used, another override can be exerted on the "Cutting feed override code m" (YC60 and later), or on the "1st cutting feed override" (R2500) when the "Cutting feed override method selection" (YC67) is set to file register method. Applicable range of the override is 0% to 327.67% in 0.01% increments. The value is set in the file register in binary.
[Operation]
When this override function is used, the actual feedrate is the value obtained by multiplying commanded feedrate (F) by the "1st cutting feed override" ratio and the "2nd cutting feed override" ratio.
Since the least increment of 2nd feedrate override is 0.01%, override setting "10000" corresponds to 100%.
The override ratio is fixed to 100%, irrespective of the "1st cutting feed override" or the "2nd cutting feed override" setting, under the following condition:
 The "Override cancel" signal (YC58) is ON.
 During tapping in fixed cycle
 During TAPPING mode
 During thread cutting
(1) Only when the 1st cutting feed override or the 2nd cutting feed override is 0% or both of them are 0%, override is exerted not only on the cutting feedrate but on rapid traverse rate. However, when the file register method for rapid traverse override is selected and the parameter "#12116 CutOvrZeroMovRap" is set to "1", the rapid traverse is according to the rapid traverse override value irrespective of the curring feed override value. When override setting is 0%, the operation error (M01 0102) occurs.
[Related signals]
(1) Cutting feed override code m (YC60:*FV1 to *FV16)
(2) Cutting feed override method selection (YC67:FVS)
(3) 2nd cutting feed override valid (YC66:FV2E)
(4) 1st cutting feed override (R2500)
(1) For relationship among these signals, refer to the description for the cutting feedrate override.
[Function]
When the "Rapid traverse override method selection" signal (ROVS) is set to "file register method", override can be exerted, besides the code method override (ROV1, ROV2), by setting within the range of 0% to 100% by 1% increments.

Desired value is set to file register (R) in binary code.
[Operation]
During rapid traverse in the automatic or manual operation, the actual feedrate will be the result of multiplying the rapid traverse speed set in a parameter by this override ratio.
(1) The override will be clamped at 100%.
(2) The operation error (M01 0125) occurs when the override value is 0%.
(3) Even when rapid traverse override is not 0%, when the cutting feed override is 0%, the rapid traverse stops.
However, when the file register method for rapid traverse override is selected and the parameter "#12116 CutOvrZer oMovRap" is set to "1", the rapid traverse is according to the rapid traverse override value irrespective of the curring feed override value.
[Related signals]
(1) Rapid traverse override code 1, 2 (YC68,YC69:ROV1,ROV2)
(2) Rapid traverse override method selection (YC6F:ROVS)
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A 2nd cutting feed override R2501 R2701 R2901 R3101 R3301 R3501 R3701 R3901
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Rapid traverse override R2502 R2702 R2902 R3102 R3302 R3502 R3702 R3902
Note
Note
Note

[Function]
This signal is used to designate the override value for the operation between the upper dead center and the bottom dead center of the chopping axis.
[Operation]
Set the override value (0% to 100%) for the operation between the upper dead center and the bottom dead center with a numerical value.
If a value outside the range is set, the override value is 100%.
Select the setting unit 1% or 0.01% with the control data "the setting unit of the chopping override".
(Example) When the setting unit is 1% and R2503 is set to "100" (0x0064), the override value is 100%.
When the setting unit is 0.01% and R2503 is set to "10000" (0x2710), the override value is 100%.
When the override value is set to "0", the operation error (M01 0150) occurs.
As for the override value for the operation between the basic position and the upper dead center, select valid or invalid with the control data "rapid traverse override valid/invalid". When it is valid, rapid traverse override (code method or value-setting method) is performed.
[Related signals]
(1) Chopping (YC30: CHPS)
(2) Chopping parameter valid (YC34)
(3) Chopping control data address (R2587)
(4) Rapid traverse override method selection (YC6F: ROVS, R2502)
(5) Rapid traverse override code 1,2 (YC68: ROV1, YC69: ROV2)
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Chopping override CHPOV R2503 R2703 R2903 R3103 R3303 R3503 R3703 R3903

[Function]
When the "file register method" of the "Manual feedrate method selection" signal (JVS) is selected, the manual feedrate can be specified separately from the manual feedrate by the normal code method (*JV1 to *JV16). The value is set in the file register (R) in binary.
[Operation]
This mode of feedrate setting can be used in JOG feed, incremental feed, reference position return feed and manual arbitrary feed mode. For JOG, incremental, and reference position return mode, the "Rapid traverse speed" signal (RT) should be turned OFF. For manual arbitrary feed mode, the "Manual arbitrary feed EX.F/MODAL.F" signal (CXS3) should be turned OFF. This manual feedrate is also effective for the feedrate during dry run operation in the case of automatic operation.
Other conditions for using this signal are as follows:
When the "Manual override method selection" signal (OVSL) is OFF, the originally set feedrate is applied.
When the "Manual override method selection" signal (OVSL) is ON, the actual feedrate can be obtained by multiplying the feedrate specified by the 1st/2nd cutting feed override value.
Manual feedrate is set to file registers Rn and Rn+1. The feedrate depends on the "Feedrate least increment code 1" (PCF1) or the "Feedrate least increment code 2" (PCF2) as listed below.
The speed clamp depends on the cutting clamp speed of the axis parameter. (When the "Rapid traverse" signal (RT) is OFF)
(1) In incremental feed mode, the actual feedrate does not change even when the manual feedrate setting is changed while moving.
(2) The file registers that specify the manual feedrate include Rn and Rn+1, with Rn being the lower order. As for the file register that specifies the speed, if the value is within 2 bytes (1 word) of Rn and Rn+1, the higher one does not need to do anything.
[Related signals]
(1) Manual feedrate code m (*JV1 to *JV16: YC70 to YC74)
(2) Manual feedrate method selection (JVS: YC77)
[Function] [Operation]
Designate the manual feedrate for the axis selected with the "Manual feedrate B valid" signal.
[Caution]
(1) The speed designated with this register is valid for the manual feedrate of an axis for which the "Manual feedrate B valid" signal is valid.
(2) Cutting override and manual override are invalid for this register's speed.
(3) This register is not related to the dry run speed.
(4) A binary value is directly set for this register. The setting unit is 0.01 mm/min (/min).
(5) This signal is a register common for all axes.
[Related signals]
(1) Manual feedrate B valid (FBEn: Y940 to Y947)
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Manual feedrate R2504, 5 R2704, 5 R2904, 5 R3104, 5 R3304, 5 R3504, 5 R3704, 5 R3904, 5

PCF2 PCF1 Least increment
(mm/min or inch/min) Operation
0 0 10 10 mm/min (inch/min) when "1" is set in file registers.
0 1 1 1 mm/min (inch/min) when "1" is set in file registers.
1 0 0.1 0.1 mm/min (inch/min) when "1" is set in file registers.
1 1 0.01 0.01 mm/min (inch/min) when "1" is set in file registers.
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Manual feedrate B R2506, 7 R2706, 7 R2906, 7 R3106, 7 R3306, 7 R3506, 7 R3706, 7 R3906, 7
Note

[Function]
By selecting the handle/incremental feed magnification method (MPS), an arbitrary magnification can be designated separately from magnification set by regular code method. The numerical value specified by the magnification is set in the file register (R) in binary.
When the "Handle/incremental feed magnification method selection" signal (MPS) is ON, this magnification is applied for the hand pulse from handy terminal.
[Operation]
Magnification is applied to amount of feed per pulse in handle feed mode (output from manual pulse generator), or to amount of feed per signal in incremental feed mode (+J1, -J1, etc.).
For example, when the magnification is set to "500" and one pulse is given in handle feed mode, 500 m of feed motion occurs. (Time constant for feed motion is equal to time constant for cutting feed or step.)
When the magnification is set to "30000" and once the feed axis selection signal is turned ON in incremental feed mode, 30 mm of feed motion occurs. (Time constant for feed motion is equal to time constant for rapid traverse.)
(1) Changing magnification during feed motion is invalid.
(2) Considerably large magnification can be set in the arbitrary magnification setting method. Be especially careful when setting the magnification.
[Related signals]
(1) Handle mode (H: YC01)
(2) Incremental mode (S: YC02)
(3) Handle/Incremental feed magnification code m (MP1, MP2, MP4: YC80, YC81, YC82)
(4) Handle/incremental feed magnification method selection (MPS: YC87)
[Function]
By selecting the handle/incremental feed magnification method, an arbitrary magnification can be designated separately from magnification set by regular code method. Magnification value (multiplier) is set in file register (R) in binary.
When the 2nd or 3rd handle is used, the arbitrary magnification is designated here.
[Operation]
When 1 pulse is sent by 2nd or 3rd handle, its feed amount conforms to this feed magnification.
For example, when 1 pulse is sent in handle mode with magnification set at "500", its feed amount will be 500 m. (Time constant for feed motion is equal to time constant for cutting feed or step.)
(1) Changing magnification during feed motion is invalid.
(2) Considerably large magnification can be set in the handle/incremental feed magnification method. Pay extra attention when setting magnification.
[Related signals]
(1) Handle mode (H: YC01)
(2) Incremental mode (S: YC02)
(3) Handle/incremental feed magnification code m (MP1,MP2,MP4: YC80,C81,C82)
(4) 1st handle/incremental feed magnification (R2508)
(5) Handle/incremental feed magnification method selection (MPS: YC87)
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A 1st handle/incremental feed magnifica tion R2508, 9 R2708, 9 R2908, 9 R3108, 9 R3308, 9 R3508, 9 R3708, 9 R3908, 9
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A 2nd handle feed magnification R2510, 1 R2710, 1 R2910, 1 R3110, 1 R3310, 1 R3510, 1 R3710, 1 R3910, 1
A 3rd handle feed magnification R2512, 3 R2712, 3 R2912, 3 R3112, 3 R3312, 3 R3512, 3 R3712, 3 R3912, 3
Note
Note

[Function]
Set the program No. to execute the PLC interrupt.
[Operation] [Caution]
Refer to "PLC interrupt" (PIT) for details of PLC interrupt operation.
[Related signals]
(1) PLC interrupt (PIT: YC2E)
(2) In PLC interrupt (PCINO: XC35)
[Function]
Override for manual feedrate B valid axis is set.
[Operation]
The override set with this register will be valid for the axis selected with the "Manual feedrate B valid" signal.
This register can be set within the range of 0% to 200% in 0.01% increment.
When a value larger than 200% (the setting value is "20000") is set, the value is regarded as 200% during the operation.
This register is common for axes.
[Caution]
(1) When the manual feedrate B override commanded by the user PLC is 0%, even if the "Feed axis selection" signal for the axis selected by the "Manual feedrate B valid" signal is turned ON, an error occurs and the axis will not move.
(2) For a linear axis, the manual feedrate B surface speed control is not valid. However, the manual feedrate B override is valid.
(3) To use the manual feedrate B override, the additional specification of the manual feedrate B surface speed control is required.
[Related signals]
(1) Manual feedrate B valid (FBEn: Y940 to Y947)
(2) Manual feedrate B surface speed control valid (YC7D)
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A PLC interrupt program No. R2518, 9 R2718, 9 R2918, 9 R3118, 9 R3318, 9 R3518, 9 R3718, 9 R3918, 9

Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Manual feedrate B override
(File register method) R2524 R2724 R2924 R3124 R3324 R3524 R3724 R3924

[Function] [Operation]
The device storing the machining program to be searched is designated with a No.
When a front-side SD card is selected in M800VS/M80V Series, select either "2" or "4" for the device number.
When a rear-side SD card is selected in M800VS/M80V Series, select "1" for the device number.
When a front USB port of the display unit is selected, select "6" for the device number.
HD operation with industrial personal computer (IPC) connection can be specified only for M80V Series.
To enable HD operation with industrial personal computer, the following parameter settings are required.
Set "#1760 cfgPR10/bit2" (Enable HD mode on IPC) to "1".
Set the IP address of industrial personal computer to connect to "#11005 PC IP address" (IP address setting).
[Related signals]
(1) External search program No. (R2526)
(2) External search sequence No. (R2528)
(3) External search block No. (R2530)
(4) External search strobe (YC1D)
[Function] [Operation]
Designate the machining program number, the sequence number, the block number to be searched as a binary.
[Related signals]
(1) External search device No. (R2525)
(2) External search strobe (YC1D)
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A External search device No. R2525 R2725 R2925 R3125 R3325 R3525 R3725 R3925
Setting value Device
0 Memory
1 Display unit-side high-speed program server
2 Memory card (E drive), front-side SD card
3 -
4 Control unit-side high-speed program server
5 Tape (RS232C)
6 Front-side USB port of display unit
7 HD for industrial personal computer (D: /NCFILE) (Only for M80V Series)
8 Extended area (memory 2)
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A External search program No. R2526, 7 R2726, 7 R2926, 7 R3126, 7 R3326, 7 R3526, 7 R3726, 7 R3926, 7
A External search sequence No. R2528, 9 R2728, 9 R2928, 9 R3128, 9 R3328, 9 R3528, 9 R3728, 9 R3928, 9
A External search block No. R2530, 1 R2730, 1 R2930, 1 R3130, 1 R3330, 1 R3530, 1 R3730, 1 R3930, 1
Number type Device Setting range
Program number R2526, R2527 0 to 99999999 (8 digits)
Sequence number R2528, R2529 0 to 99999999 (8 digits)
Block number R2530, R2531 0 to 999999999 (9 digits)

[Function]
In handle mode, the axis movement direction for the pulse of manual pulse generator can be reversed.
[Operation]
When the "Handle polarity" signal turns ON, the axis corresponding to the bit moves in the reverse direction of the pulse of manual pulse generator.
The "Handle polarity" signal when the axis to be moved is selected (when the "n-th handle valid" signal turns ON while the "n-th handle axis selection code" signal is set, or when the "n-th handle axis selection code" signal is changed with the "n th handle valid" signal ON) is used.
When the "Handle polarity" signal is changed, select the axis to be moved again.
[Caution]
(1) During the manual speed command, the handle polarity with the "Handle polarity" signal cannot be switched. To reverse the command direction input with the handle during manual speed command, use the "Manual speed com mand sign reversed" signal (YC9E).
(2) During the manual arbitrary reverse run, the handle polarity cannot be switched with the "Handle polarity" signal.
[Related signals]
(1) 1st handle axis selection code (HS11 to HS116: YC40 to YC44), 1st handle valid (HS1S: YC47)
(2) 2nd handle axis selection code (HS21 to HS216: YC48 to YC4C), 2nd handle valid (HS2S: YC4F)
(3) 3rd handle axis selection code (HS31 to HS316: YC50 to YC54), 3rd handle valid (HS3S: YC57)
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Handle polarity R2540 R2740 R2940 R3140 R3340 R3540 R3740 R3940
R2540
1st axis
2nd axis
3rd axis
4th axis
5th axis
6th axis
7th axis
8th axis
9th axis
10th axis
11th axis
12th axis
13th axis
14th axis
15th axis
16th axis
Handle mode signal
(YC01)
1st handle axis selection

code signal(YC40YC44)
1st handle valid
signal(YC47)
Handle polarity signal
(R2540)
Handle polarity
(NC internal state)
Handle pulse
Commanded speed
1st axis 2nd axis

[Function]
This data specifies the travel amount or positioning point in manual arbitrary feed mode.
[Operation]
"Manual arbitrary feed 1st axis travel amount" is the movement data corresponding to the axis number specified by the "Manual arbitrary feed 1st axis selection code m" (CX11 to 116: YCA0 to YCA4).
The meaning of the "Manual arbitrary feed 1st axis travel amount" differs depending on the ON/OFF status of the "Manual arbitrary feed MC/WK" signal (CXS5) and the "Manual arbitrary feed ABS/INC" signal (CXS6).
When the "Manual arbitrary feed ABS/INC" signal (CXS6) is ON:
"Manual arbitrary feed 1st axis travel amount" means travel amount (incremental amount).
When the "Manual arbitrary feed ABS/INC" signal (CXS6) is OFF, it depends on the status of the "Manual arbitrary feed MC/WK" signal (CXS5) as follows:
- When the "Manual arbitrary feed MC/WK" signal (CXS5) is OFF:
"Manual arbitrary feed 1st axis travel amount" means a coordinate position (positioning point) of the machine coordinate system.
- When the "Manual arbitrary feed MC/WK" signal (CXS5) is OFF:
"Manual arbitrary feed 1st axis travel amount" means a coordinate position (positioning point) of the modal workpiece.
"Manual arbitrary feed 1st axis travel amount" is written in binary notation with a sign. The unit of the specified value matches that of data entered.
(Example) When "1" is specified for (R2545, R2544) in a 1-micrometer system, the axis moves 1m (when the increment amount is specified).
[Caution]
(1) Set the data in millimeters. The data cannot be set by inch system.
(2) "Manual arbitrary feed 1st axis travel amount" forms one data by R2544 and R2545 or R2744 and R2745. Handle negative data carefully.
(3) Travel amount is within 360 when a positioning is carried out with the absolute command for the following axes. (The axis does not move in the short-cut direction.)
A rotation-type rotary axis
A linear-type rotary axis of workpiece coordinate (to be positioned on the machine coordinate system)
[Related signals]
For related signals, refer to the section on "Manual arbitrary feed mode" (PTP: YC03).
[Function] [Operation]
"Manual arbitrary feed 2nd axis travel amount" is the movement data corresponding to the axis number specified by the "Manual arbitrary feed 2nd axis selection code m" (CX21 to CX216).
The other conditions are the same as the "Manual arbitrary feed 1st axis travel amount" explained in the previous section.
[Function] [Operation]
"Manual arbitrary feed 3rd axis travel amount" is the movement data corresponding to the axis number specified by the "Manual arbitrary feed 3rd axis selection code m" (CX31 to CX316).
The other conditions are the same as the "Manual arbitrary feed 1st axis travel amount" explained in the previous section.
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Manual arbitrary feed 1st axis travel
amount R2544, 5 R2744, 5 R2944, 5 R3144, 5 R3344, 5 R3544, 5 R3744, 5 R3944, 5
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Manual arbitrary feed 2nd axis travel
amount R2548, 9 R2748, 9 R2948, 9 R3148, 9 R3348, 9 R3548, 9 R3748, 9 R3948, 9
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Manual arbitrary feed 3rd axis travel
amount R2552, 3 R2752, 3 R2952, 3 R3152, 3 R3352, 3 R3552, 3 R3752, 3 R3952, 3

[Function]
Desired alarm messages prepared using PLC development tool (personal computer) can be displayed in alarm diagnosis screen of the setting and display unit by setting values (binary code) to alarm interface file registers (Rn, Rn+1, Rn+2, Rn+3).
[Operation]
By setting the table No. of the alarm message table created in advance in the file register for the alarm interface, the alarm message is displayed on the alarm diagnosis screen. Up to 4 alarm messages can be displayed at the same time.
Alarm message can be cleared by setting "0" to alarm interface file registers.
For details on alarm message display, refer to the "PLC Programming Manual".
[Caution]
(1) Set machine parameter PLC "#6450/bit0" to "1" to display the alarm messages.
(2) For alarm message interface, file register (R method) or temporary storage (F method) can be used. The selection is made with machine parameter PLC "#6450/bit1".
(3) In either R method (file register) or F method (temporary storage), the alarm display does not cause an alarm on the controller side. When it is necessary to stop the controller according to the type of alarm, take appropriate action on the PLC side, including the "Automatic operation "pause" command" (*SP), the "Single block" (SBK), and the inter lock.
[Function]
Desired operator message prepared using PLC development tool (personal computer) can be displayed by setting value (binary code) to operator message interface file register (Rn). Operator message appears in alarm diagnosis screen of the setting and display unit.
[Operation]
If table No. of previously prepared operator message table has been set to operator message interface file register, operator message can be displayed in alarm diagnosis screen. Operator message can be cleared by setting "0" to

operator message interface file register.
For details on displaying operator messages, refer to the "PLC Programming Manual".
[Caution]
(1) Set the machine parameter PLC "#6450/bit2" to "1" to display the operator messages.
(2) There are two types of interface for an operator message: type R which uses a file register (R) and type F which uses a temporary memory. The selection of R method and F method depends on the machine parameter PLC "#6455/bit3".
(3) In either R method or F method, the alarm does not occur on the controller by displaying the operator message. If the controller needs to be stopped, take appropriate action on the PLC side, including the "Automatic operation "pause" command" (*SP), the "Single block" (SBK) and the interlock.
(4) R2560 and R308 cannot be used at the same time. When you use R308, set "0" to R2560. R309 to R311 can be used regardless of the value of R2560.
[Function]
The No. of the program to be searched with search & start is designated.
[Operation]
Set the No. of the program to be searched with search & start with a binary value.
(1) The program No. must be set before the "Search & start" signal is input.
(2) If a machining program No. is not designated or if an illegal No. is designated, and error signal will be output when the search operation is executed.
[Related signals]
(1) Search & start (RSST: YC31)
(2) Search & start Error (SSE: XC8A)
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Alarm message I/F
1 to 4
R2556 to
9
R2756 to
9
R2956 to
9
R3156 to
9
R3356 to
9
R3556 to
9
R3756 to
9
R3956 to
9
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Operator message I/F R2560 R2760 R2960 R3160 R3360 R3560 R3760 R3960
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Search & start program No. R2562, 3 R2762, 3 R2962, 3 R3162, 3 R3362, 3 R3562, 3 R3762, 3 R3962, 3
Note

[Function]
Using a binary setting, select which spindle's encoder feedback to use.
0: 1st spindle
1: 2nd spindle
2: 3rd spindle
3: 4th spindle
4: 5th spindle
5: 6th spindle
6: 7th spindle
7: 8th spindle
(1) If a setting exceeds the number of connected spindles, it will be interpreted that a selection has not been made.
[Related signals]
(1) Spindle selection (SWS: X18A8)
(2) Spindle command selection (SLSP: R7002)
(3) Spindle stop (SSTP: Y1894)
(4) Spindle enable (ENB: X18A0)
(5) Spindle forward run start (SRN: Y1898)
(6) Spindle reverse run start (SRI: Y1899)
[Function]
The "C axis selection" signal is used to issue the commands with the axis name command address to the axis selected from the Spindle/C-axis having the same axis name in the part system.
[Operation]
Using the axis number, set which spindle or C axis to output the commands to.
0: First C axis, 1: 1st axis, 2: 2nd axis, 3: 3rd axis, 4: 4th axis, ... 8: 8th axis
The setting is made with the axis number used in the part system.
(1) This signal must always be input simultaneously with the "Recalculation request" signal (CRQ).
(2) This signal is valid even when the multi-spindle function is invalid.
(3) If an axis name (#1013 axname) is different from the initial C axis name, the operation error (M01 1031) will occur.
[Function]
The axes to perform the effective torque output, cutting torque (estimated disturbance torque) output and disturbance torque output of the spindle and servo axis are designated.
[Operation]
The cutting torque (estimated disturbance torque), disturbance torque and effective torque output for all the spindle and servo axis designated with this signal are output simultaneously.
[Caution]
Specify the servo axes in the devices of each part system.
Specify the spindle in the device of the 1st part system.
[Related signals]
(1) Load monitoring I: Cutting torque output n-th axis (R5492)

(2) Load monitoring I: Effective torque output n-th axis (R5620)
(3) Load monitoring I: Estimated spindle disturbance torque output (R6541)
(4) Load monitoring I: Effective spindle torque output (R6542)
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Encoder selection R2567 R2767 R2967 R3167 R3367 R3567 R3767 R3967
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A C axis selection R2568 R2768 R2968 R3168 R3368 R3568 R3768 R3968
Cont. Signal name Abbrev. $1 $2 $3 $4
A Load monitoring I: Axis selection R2580 R2780 R2980 R3180
Note
Note
S2S1 S3 S4 S5 S6 S7 S8 8 7 456 123
Spindle Servo axis

[Function]
Select the each axis reference position return position for manual reference position return.
[Operation]
(1) This signal is valid when the reference position select method is ON.
(2) Two bits are used for each axis to select the reference position.
R register and corresponding axis
Each axis reference position selection
Setting value and reference position No.
[Related signals]
(1) Reference position selection method (M: YC97)
[Function] [Operation]
This signal designates the chopping control data head No. (R register No.) assigned to R register.
R register area that can be used for assigning the chopping control data is as shown below.
R8300 to R9768 (Backup area)
R9800 to R9886 (Non back up area)
[Caution]
(1) Setting error occurs if an odd number is set.
(2) When the backup area is used, set the area ahead of the compensation amount record area (#1324 chop_R).
(3) An error occurs if the chopping control data overlaps with the other part system or the compensation amount record area.
[Function] [Operation]
This signal is a flag that sorts the required/unnecessary tool life data.
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Each axis reference position selection R2584 R2784 R2984 R3184 R3384 R3584 R3784 R3984
High-order bit Low-order bit Return position
0 0 1st reference position
0 1 2nd reference position
1 0 3rd reference position
1 1 4th reference position
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Chopping control data address R2587 R2787 R2987 R3187 R3387 R3587 R3787 R3987
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Tool life management data sort R2588 R2788 R2988 R3188 R3388 R3588 R3788 R3988
FEDCBA9876543210
1st axis setting value
2nd axis setting value
3rd axis setting value
4th axis setting value
5th axis setting value
6th axis setting value
7th axis setting value
8th axis setting value

Synchronous control:
[Function] [Operation]
Synchronous control for the 1st part system is designated with the R2589 register, and for the 2nd part system with the R2789 register.
Synchronous control can be turned ON and OFF by setting the bits corresponding to each axis in this register.
The CNC changes the operation when all axes reach the in-position state.
Designating the synchronous operation method
Turn ON both of bits corresponding to the axes, which are in a master-slave relationship, with the base specification parameter "#1068 slavno".
(Example) To operate the 2nd axis (master axis) and 3rd axis (slave axis) in synchronization
Designating the independent operation method
Turn ON the bit corresponding to only one of the axes to be moved with the command of the master axis.
(Example) To move only the 3rd axis (slave axis)
When it is necessary to keep the synchronous state immediately after the power is turned ON due to the machine structure, set the R2589 register with the first ladder after the power is turned ON.
<Example of ladder creation>
When changing the operation with this register during automatic operation, turn ON the "Recalculation request" signal (YC2B) to calculate the coordinates again.
After slave axis independent operation is carried out, the end point coordinates of the slave axis are substituted in the program end point coordinates for the master axis. Thus, unless the coordinates are recalculated, the master axis movement command is not created properly.
Request recalculation immediately after this register is changed.
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Synchronous control operation method R2589 R2789 R2989 R3189 R3389 R3589 R3789 R3989
7 6 5 4 3 2 1 0 HEX

R2589 0
0
0
0
0
0
0
0
0
0
0
1
0
1
0
0
00
06
7 6 5 4 3 2 1 0 HEX
R2589 0
0
0
0
0
0
0
0
0
0
0
1
0
0
0
0
00
04
:
:
76543210 bit
File register
(R)
1st axis
8th axis
MOV H0C R2589
Only first ladder after power ON
M800V/M80V Series PLC Interface Manual
4 Explanation of Interface Signals
4.4 PLC Output Signals (Data Type: R***)
IB-1501616-F 586
<Example of ladder creation>
Example of when the 2nd axis is the master axis, the 3rd axis is the slave axis, and the M code is assigned as follows
M10: Asynchronous operation
M20: Independent operation
M40: Synchronous operation
XC60
= H10 R504 M2000 Miscellaneous function strobe (MF1) ON
and M10 commanded M2000 ON
= H20 R504 M2001
XC60
= H40 R504 M2002
XC60
M2000 XC18
MOV H00 R2589 M2000 ON and motion command completion (DEN)
Asynchronous operation signal set
M2001 XC18
MOV H04 R2589
M2002 XC18
MOV H06 R2589
M2000
M2001
M2002
YC2B M2000 or M2001 or M2002 ON
Recalculation request (CRQ) set
Miscellaneous function strobe (MF1) ON
and M20 commanded M2001 ON
Miscellaneous function strobe (MF1) ON
and M40 commanded M2002 ON
M2001 ON and motion command completion (DEN)
Independent operation signal set
M2002 ON and motion command completion (DEN)
Synchronous operation signal set
Execution block
MF
DEN
Synchronous control
operation method
(R2589)

All axes in-position
Operation method
Recalculation
request (CRQ)
FIN
Calculation of next
block
Movement (1) M code (Synchronous operation) Movement (2)
Asynchronous Synchronous
Asynchronous Synchronous
Recalculation
NC latches at
rising edge

[Caution]
(1) During synchronous operation or independent operation, the master axis signals are valid for the "Interlock" and "Machine lock" signals, etc.
(2) The conditions of the "Reference position reached" signal (X800) of the master axis in the synchronous operation method follow the setting of the parameter "#1282 ext18/bit1".
(3) When any of G27, G28 and G30 is commanded during the slave axis independent operation, the slave axis returns to its own zero point.
(4) The position switches are processed independently for the master axis and slave axis.
(5) When bit5 of the parameter #1261 is OFF, use the same "Stroke end" signal for the master axis and slave axis.
Set the same soft limit value for the master axis and slave axis.
If the above settings cannot be made because of the machine specifications, observe the following points.
- If stroke end or soft limit occurs during the manual operation mode, the master axis does not stop even when an alarm occurs for the slave axis. Thus, make sure that the master axis alarm turns ON before the slave axis alarm.
- Stroke end during the manual operation mode causes the slave axis to stop when the "Stroke end" signal for the master axis turns ON. The master axis is stopped by the position controller, and the slave axis is stopped by the NC control unit. Thus, there may be a difference in their stop positions. If an excessive error alarm occurs because of stroke end, enter the correction mode, and cancel the alarm.
(6) In the slave axis independent operation, even when the machine lock signal is ON, the current value counter of the master axis is updated. The master axis and the slave axis are not identified in the playback. The movement amount of the specified axis is set as it is.
(7) The master axis independent operation is handled as asynchronous. Therefore, the PLC input/output signal is not reflected on the slave axis.
(8) Immediately after the synchronous control operation method is changed when the parameter "#1281 ext17/bit6" is ON, the compensation amount used for the slave axis in the external machine coordinate compensation and the ball screw thermal expansion compensation is as follows.
- When the synchronous operation is switched to the independent operation method; the slave axis compensation amount is applied instead of the master axis compensation amount.
- When the independent operation is switched to the synchronous operation method; the master axis compensation amount is applied instead of the slave axis compensation amount.
(9) When the parameter "#1281 ext17/bit6" is ON and the synchronous operation method is designated, the slave axis is compensated with the master axis compensation amount in the ball screw thermal expansion compensation, and the compensation amount of each axis is output to "Ball screw thermal displacement compensation: Compensation amount" (R72 to R75).
(10)When the "Synchronous control operation method" (R2589) is changed (when the independent operation or synchro nous operation is finished) for the axis (master axis or slave axis) where both synchronous operation and chopping are performed, the operation error (M01 1270) occurs and all the axes decelerate and stop.
(11)While the operation error (M01 1036) is occurring, the axes other than the chopping axis is interlocked and the syn chronous control operation method cannot be changed.
(12)While the operation error "M01 1270", "M01 1271" or "M01 1272" is occurring, all the axes are interlocked and the synchronous control operation method cannot be changed.
(13)The "Reference position reached" signal (ZP1n to Zp4n) (X800) of the main axis and the sub axis in the simple syn chronous control is output when the main axis reaches the reference position.
(14)In the simple synchronous control, the signals to output to the sub axis (from NC to PLC) are uncertain except for the "Reference position reached" signal.
(15)In the simple synchronous control, the signals to input to the sub axis (from PLC to NC) are ignored.
The sub axis in the simple synchronous control follows the "Servo OFF" signal (*SVFn) (Y7A0) of the main axis in the simple synchronous control.
When the main axis in the simple synchronous control is used as the slave axis in the synchronous control, the sub axis follows the "Servo OFF" signal of the master axis.
(16)Simple synchronous control and chopping cannot be used together.

Multiple-axis synchronization control:
[Function] [Operation]
Multiple-axis synchronization control for the 1st part system is designated with the R2589 register, and for the 2nd part system with the R2789 register.
Multiple-axis synchronization control can be turned ON and OFF by setting the bits corresponding to each axis in this register.
The CNC changes the operation when all axes reach the in-position state.
Designating the synchronous operation method
Turn ON both of bits corresponding to the axes, which are in a master-slave relationship, with the axis specification parameter "#2674 primno".
(Example) To operate the 2nd axis (master axis), 3rd axis (slave axis) and 4th axis (slave axis) in synchronization
Designating the independent operation method
This does not support the independent operation method.
When it is necessary to keep the synchronous state immediately after the power is turned ON due to the machine structure, set the R2589 register with the first ladder after the power is turned ON.
<Example of ladder creation>
When changing the operation with this register during automatic operation, turn ON the "Recalculation request" signal (YC2B) to calculate the coordinates again.
Request recalculation immediately after this register is changed.
7 6 5 4 3 2 1 0 HEX

R2589 0
0
0
0
0
0
0
0
0
1
0
1
0
1
0
0
00
0E
:
:
76543210 bit
File register
(R)
1st axis
8th axis
MOV H0C R2589
Only first ladder after power ON

[Caution]
(1) When bit5 of the parameter #1261 is OFF, use the same "Stroke end" signal (OT) for the master axis and slave axis.
Set the same soft limit value for the master axis and slave axis.
If the above settings cannot be made because of the machine specifications, observe the following points.
- If stroke end or soft limit occurs during the manual operation mode, the master axis does not stop even when an
alarm occurs for the slave axis. Thus, make sure that the master axis alarm turns ON before the slave axis alarm.
- Stroke end during the manual operation mode causes the slave axis to stop when the "Stroke end" signal (OT) for
the master axis turns ON; however, there may be a difference in their stop positions.
(2) Set the same value of the SBT operation setting parameter for the master axis and slave axis.
The safe brake test (SBT: Safe Brake Test) of the master axis and slave axis is started by inputting the SBT start sig nal to the master axis during multiple-axis synchronization control.
When the SBT start signal is input to the slave axis, the smart safety observation alarm (V51 0005) occurs during mul tiple-axis synchronization control.
(3) When the following signals are turned ON during multiple-axis synchronization control, the operation error (M01 0186)
occurs.
When the multiple-axis synchronization control is performed while these functions are valid, the operation error (M50
5005) occurs.
- "Tool handle feed mode" signal (YC5E)
- "Rotation center error compensation enabled" signal (YD15)
- "Spatial error compensation enabled" signal (YD17) (Machine with 4 axes or machine with 5 axes)
(4) During multiple-axis synchronization operation, the master axis signals are valid for the "Interlock" and "Machine lock"
signals, etc.
(5) Do not turn OFF only the bit of the master axis while both bits of the master axis and the slave axis of this signal
(R2589) are ON. To turn ON only the bit of the slave axis of this signal (R2589), once turn OFF all the bits of this sig nal (R2589), and then turn ON the bit of the slave axis.
(6) Multiple-axis synchronization control and chopping cannot be used together.
(7) When the parameter "#2699 mult syn polar" (Relative polarity of secondary axis) is set to "1", turn ON/OFF the PLC
signal for the master axis while considering that the master axis and the slave axis move in opposite directions to
each other. For example, when the "Manual interlock+ n-th axis" (Y860) is turned OFF for the master axis during man ual operation, the slave axis stops moving in the "-" direction.
[Function]
The group No. is designated when the unused tool of a group that has exceeded lifetime with the tool life management II
or when forcibly changing tools currently in use.
[Operation]
The group designation range is as follows.
For group designation: 1 to 9999 of group No.
For all groups: 65535 (all 1)
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Tool group No. designation R2590, 1 R2790, 1 R2990, 1 R3190, 1 R3390, 1 R3590, 1 R3790, 1 R3990, 1

[Function] [Operation]
Upon the completion of the reference position adjustment to establish the reference position in the dog-type reference
position return, turn ON the bit corresponding to the master axis of the part system from PLC.
Then, turn OFF this signal after the corresponding bit of the "Reference position adjustment value parameter setting
completed" signal is turned ON.
When the axis is outside the position switch range, execute an interlock on the axis and prohibit the movement of the
target axis of the position switch.
(Example) When the 2nd axis is the master axis, set the bits as follows after the completion of the reference position
adjustment for the slave axis.
[Caution]
A change of the reference position adjustment value requires another reference position return. If the automatic operation
is started without the reference position return, an alarm occurs to inform the incompleted return.
[Related signals]
(1) Reference position adjustment value parameter setting completed (R576)
[Function] [Operation]
Droop will be released when the corresponding bit for the droop cancel request signal is OFF.
[Related signals]
(1) In current limit n-th axis (ILI1 to 8: X900 to 7)

(2) Current limit reached n-th axis (ILA1 to 8: X920 to 7)
(3) Current limit changeover n-th axis (ILC1 to 8: Y9A0 to 7)
(4) Droop cancel request n-th axis (DOR1 to 8: Y9C0 to 7)
(5) Current limit mode 1 and 2 (ILM1,2: YCC0,1)
[Function]
To clear the wear compensation amount after measuring the tool compensation amount with manual tool length measurement, set the wear compensation No. in a BCD code.
[Operation]
When the sensor is touched by the tool, wear data of the compensation No. automatically specified will be cleared to "0".
If "0" or a non-existing compensation No. is set, the wear data will not be cleared.
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Reference position adjustment comple tion R2592 R2792 R2992 R3192 R3392 R3592 R3792 R3992
7 6 5 4 3 2 1 0 HEX
R2592 o o o o o o o o 0 0
o o o o o o 1 o 0 2
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Current limit changeover R2593 R2793 R2993 R3193 R3393 R3593 R3793 R3993
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Wear compensation No. (tool presetter) R2594 R2794 R2994 R3194 R3394 R3594 R3794 R3994
1st axis
:
:
8th axis
R2592 . . . 7 6 5 4 3 2 1 0
F E D C B A 9 8 7 6 5 4 3 2 1 0
1st axis
2nd axis
:
:
8th axis
R2593
M800V/M80V Series PLC Interface Manual
4 Explanation of Interface Signals
4.4 PLC Output Signals (Data Type: R***)
591 IB-1501616-F
[Function]
<External workpiece coordinate offset measurement function>
Set the tool No. (R2602, 2603) and the tool compensation No. (R2600, 2601) used for workpiece coordinate offset measurement in a BCD code.
<Chuck barrier check>
Set the tool No. (R2602, 2603) and the compensation No. (R2600, 2601) selected for the chuck barrier check.
[Operation]
<Workpiece coordinate offset measurement function>
Set the tool No. and the tool compensation No. used for workpiece coordinate offset measurement in a BCD code.
This is set with the user PLC. This tool No. (R2602, 2603) is interpreted as the tool offset No. by the CNC.
<Chuck barrier check>
The file register used differs according to the parameter (#1097 Tlno.).
If the tool length compensation No. is not designated (if the contents are 0), the tool length and tool nose wear offset will both follow the T command modal.
The T command modal will also be followed if the designated offset No. is not within the specified range.
If the T command modal value is "0", the compensation amount will be interpreted as "0".
[Function] [Operation]
Refer to the explanation for R2600 and R2601 for details.
[Function]
<Workpiece coordinate offset measurement function>
Set the tool compensation No. used in the sub spindle side for external workpiece coordinate offset measurement in a BCD code.
<Chuck barrier check>
Designate the tool No. and compensation No. selected on the sub-spindle side for chuck barrier check.
[Operation]
<Workpiece coordinate offset measurement function>
Set the tool compensation No. used in the sub spindle side for external workpiece coordinate offset measurement in a BCD code.
This is set with the user PLC.
<Chuck barrier check>
The file register used differs according to the parameter (#1097 Tlno.).
If the tool length compensation No. is not designated (if the contents are 0), both the tool length and tool nose wear offset follow the details designated for the main spindle. The details for the main spindle will also be set if the designated offset No. is not within the specified range.
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A
Workpiece coordinate offset measure ment:
Tool compensation No./Selected com pensation tool No. (main)
R2600, 1 R2800, 1 R3000, 1 R3200, 1 R3400, 1 R3600, 1 R3800, 1 R4000, 1
#1097 Tlno. R2600,2601/R2800,2801 R2602,2603/R2802,2803
0 Tool length, tool nose wear offset No. Tool No.
1 Tool nose wear offset No. Tool No., tool length compensation No.
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Workpiece coordinate offset measure ment: Tool No./Selected tool No. (main) R2602, 3 R2802, 3 R3002, 3 R3202, 3 R3402, 3 R3602, 3 R3802, 3 R4002, 3
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Selected tool compensation No. (sub) R2604, 5 R2804, 5 R3004, 5 R3204, 5 R3404, 5 R3604, 5 R3804, 5 R4004, 5
#1097 Tlno. R2604,2605/R2804,2805 R2606,2607/R2806,2807
0 Tool length, tool nose wear offset No. Tool No.
1 Tool nose wear offset No. Tool No., tool length compensation No.
M800V/M80V Series PLC Interface Manual
4 Explanation of Interface Signals

[Function] [Operation]
Refer to the section for the "Selection tool compensation No. (sub) (R2604, 5)".
[Function]
Designate the presence of a tool mounted on the tool post (tool compensation amount validity).
[Operation]
When the tool designated for tool mounting is selected, the tool compensation amount will be added to the chuck barrier check.
<Bit allocation>
Bit OFF: Tool not mounted (tool compensation amount not added)
Bit ON: Tool mounted (tool compensation amount added)
In a machine that uses tools 1 to 12 on the main spindle's tool post and tools 17 to 28 on the sub-spindle's tool post, if the tools are mounted in either tool post, H0FFF is set for both R2608 and R2609.
When tool 28 is detached from the sub-spindle side next, R2609 will be set to H07FF.
[Remark]
This signal is initialized to HFFFF when the power is turned ON.
Thus, if this signal is not used, the tool compensation amount will always be added to the chuck barrier check.
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Selected tool wear No. (sub) R2606, 7 R2806, 7 R3006, 7 R3206, 7 R3406, 7 R3606, 7 R3806, 7 R4006, 7
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Tool mounting information m R2608, 9 R2808, 9 R3008, 9 R3208, 9 R3408, 9 R3608, 9 R3808, 9 R4008, 9
Tool mounting
information
(high order)
R2609/
R2809
bitF bitE bitD bitC bitB bitA bit9 bit8
Tool 32 Tool 31 Tool 30 Tool 29 Tool 28 Tool 27 Tool 26 Tool 25
bit7 bit6 bit5 bit4 bit3 bit2 bit1 bit0
Tool 24 Tool 23 Tool 22 Tool 21 Tool 20 Tool 19 Tool 18 Tool 17
Tool mounting
information
(low order)
R2608/
R2808
bitF bitE bitD bitC bitB bitA bit9 bit8
Tool 16 Tool 15 Tool 14 Tool 13 Tool 12 Tool 11 Tool 10 Tool 9
bit7 bit6 bit5 bit4 bit3 bit2 bit1 bit0
Tool 8 Tool 7 Tool 6 Tool 5 Tool 4 Tool 3 Tool 2 Tool 1

[Function]
This signal gives information on the selected spindle (G43.1/G44.1 mode, spindle number) of each part system.
(1) The given information is the spindle number, not spindle name.
(2) Bit8 and bit0 to bit7 become "0" when G47.1 (all spindle selection) mode is entered.
[Operation]
The information on selected spindle is output at the following timing.
<At power ON/NC reset>
The information on the currently selected spindle is output based on the parameter settings.
(Example)
$1: Initial G43.1 mode ("#1199 Sselect" is "0", "#12090 SnG43.1" is "1", "#1534 SnG44.1" is "2")
$2: Initial G44.1 mode ("#1199 Sselect" is "1", "#12090 SnG43.1" is "1", "#1534 SnG44.1" is "2")
$3: Initial G47.1 mode ("#1199 Sselect" is "2")
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Multiple-spindle control I: Selected spin dle No. SLSPNO R2614 R2814 R3014 R3214 R3414 R3614 R3814 R4014
Note
F 8 7 0
BIT0-BIT7 : Selected spindle No. = 1 to 8
In G47.1 mode = 0
Selected spindle No.
BIT8=0 : In G43.1 mode, In G47.1 mode BIT8=1 : In G44.1 mode
R2614 BIT8 = 0 1
R register for part systems ($1)
R2814 BIT8 = 1 2
R register for part systems ($2)
R3014 BIT8 = 0 0
R register for part systems ($3)

<When G43.1/G44.1/G47.1 is commanded>
When G43.1/G44.1/G47.1 command is executed, the information on selected spindle after command execution is output.
(Example) 1st spindle Spindle name: 1 ("#3077 Sname" is "1")
"#12090 SnG43.1" is "1"
2nd spindle Spindle name: 2 ("#3077 Sname" is "2")
"#1534 SnG44.1" is "2"
<When G44.1D is commanded>
When G44.1D command is executed, the information on selected spindle after command execution is output.
(Example) 1st spindle Spindle name: 1 ("#3077 Sname" is "1")
2nd spindle Spindle name: 2 ("#3077 Sname" is "2")
3rd spindle Spindle name: 5 ("#3077 Sname" is "5")
4th spindle Spindle name: 8 ("#3077 Sname" is "8")
"#1534 SnG44.1" is "2"
R3014 BIT8 = 0 0

R3014 BIT8 = 0 1
R2814 BIT8 = 1 2
R2814 BIT8 = 0 1
R2614 BIT8 = 0 1
R2614 BIT8 = 1 2
$1
$2
$3
:
G43.1
M3 S1000
:
G44.1
:
:
G44.1
M23 S1000
:
G43.1
:
:
G47.1
M3 S1000
:
G43.1
:
R register for part systems ($3)
R register for part systems ($2)
R register for part systems ($1)
R2814 BIT8 = 1 2
R2814 BIT8 = 1 4
R2614 BIT8 = 1 3
R2614 BIT8 = 0 1
$1
$2
:
G44.1 D5
M80 S1000
:
G43.1
:
:
G44.1
M23 S1000
:
G44.1 D8
:
R register for part systems ($2)
R register for part systems ($1)

[Function]
This switches the rotary axis configuration parameters.
[Operation]
<Low-order 8 bits: Configuration No. of rotary axis configuration parameter>
This specifies the configuration No. of rotary axis configuration parameter.
Setting range: 1 to the number of effective part systems (*1)
(*1) The setting range is 1 to 8 when the tool head hot swapping specification is valid.
<High-order 8 bits: Switching command of rotary axis configuration parameter>
When "Rotary axis configuration parameter switch request" signal (bit8) turns ON, the configuration set to the "Configuration No. of rotary axis configuration parameter" will be valid.
This register is cleared when the power is turned ON.
Turn ON the "Rotary axis configuration parameter switch request" signal before using the following functions.
If the "Rotary axis configuration parameter switch request" signal is turned ON while any of the following functions is performed, the operation error (M01 0187) occurs.
- Tool center point control
- Inclined surface machining
- Workpiece installation error compensation
- Tool length compensation along the tool axis
- Simple inclined surface machining
- 3-dimensional tool radius compensation (Tool's vertical-direction compensation)
- 3-dimensional manual feed
- Tool handle feed & interruption
- R-Navi
This signal is valid only when "#1450 5axis_Spec/bit0" (Axis name setting method of rotary axis configuration parame ter) is set to "1" and "#1450 5axis_Spec/bit2" (Application of rotary axis configuration parameters) is set to "1".
[Timing chart]
[Related signals]
(1) Rotary axis configuration parameter output (R656: RPAROUT)
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Rotary axis configuration parameter
switch
RPARCH
G R2615 R2815 R3015 R3215 R3415 R3615 R3815 R4015
File register (R) F EDCB A 9 8
< High-order 8 bits > < Low-order 8 bits >
Not in use Configuration No. of rotary axis configuration parameter

Rotary axis configuration parameter switch request signal
bit
2
2
Machining program N01 G28 X0. Z0.; N02 M**; N03 G0 Z100.;
Configuration No. of rotary axis
configuration parameter (R2615/low-order 8 bits)
Rotary axis configuration parameter
switch request signal (R2615/bit8)
Rotary axis configuration parameter
switch completion signal (R656/bit8)
M function finish 1 (FIN1n)
Applying rotary axis configuration parameter

[Function]
Set the compensation No. of the tool data for setting the measurement result during manual tool length measurement II.
This is set in BCD code.
[Operation]
When the sensor is touched by the tool, compensation amount will be written into the tool data of the compensation No.
automatically specified.
This tool No. is interpreted as the tool compensation No. by the CNC.
[Related signals]
(1) Wear compensation No. (R2594)
(2) Tool length measurement 2 (TLMS: YC21)
[Function]
This signal commands constant torque control or proportional torque stopper control. By turning the axis bit of a part
system ON, constant torque control or proportional torque stopper control is performed for the corresponding axis.
(1) The axis bit configuration for part systems are the same as the basic axis configuration.
[Operation]
<High-order 8 bits: The Proportional torque stopper control request axis bit>
When the bit of the specified axis turns ON, the servomotor for the axis generates a constant torque in the stopper
direction according to the value that is set in "#2296 SV096 TQC" (Stopper torque for constant torque control). When a
position droop occurs, the stopper position is maintained with a torque generated in proportion of the position droop.
<Low-order 8 bits: The Constant torque control request axis bit>
When the bit of the specified axis turns ON, the servomotor for the axis outputs a constant torque in a constant direction
according to the value that is set in "#2296 SV096 TQC" (Stopper torque for constant torque control).
[Related signals]
(1) Constant torque control: Axis under constant torque/proportional torque stopper control (R624)
[Function]
This signal commands constant torque droop cancellation. By turning the axis bit of a part system ON, constant torque
droop cancellation is performed for the corresponding axis.
(1) The axis bit configuration for part systems are the same as the basic axis configuration.
[Operation]
Position droop cancellation and command position update are performed when the axis bit is turned ON for an axis for
which you want to clear the position droop generated during constant torque control.
[Related signals]
(1) Constant torque control: Constant torque droop cancel axis status (R625)
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Tool length measurement 2 Tool No. R2618 R2818 R3018 R3218 R3418 R3618 R3818 R4018
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A
Constant torque control: Constant
torque/proportional torque stopper con trol request axis
R2620 R2820 R3020 R3220 R3420 R3620 R3820 R4020
BIT F E D C B A 9 8 7 6 5 4 3 2 1 0
Axis 8 7 6 5 4 3 2 1 8 7 6 5 4 3 2 1
Proportional torque stopper control request axis Constant torque control request axis
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Constant torque control: Constant
torque droop cancel request axis R2621 R2821 R3021 R3221 R3421 R3621 R3821 R4021
BIT F E D C B A 9 8 7 6 5 4 3 2 1 0
Axis 8 7 6 5 4 3 2 1 8 7 6 5 4 3 2 1
Not used. Constant torque droop cancel request axis
Note
Note

[Function]
The "Servo ready completion" signal (SA) indicates that the servo system is ready for normal operation. The signal can be
output to a Y device of remote I/O, which is designated by this register.
The direct transfer of the signal from CNC to remote I/O allows the output of the signal during PLC is stopped.
[Operation]
The first setting data since the power ON is valid. Only the first setting is valid. The value changed later is invalid.
The setting range is 1 to 5FF (HEX). 2C0 to 2FF is excluded from the range.
If the first setting of Y device No. is out of range, the signal is not output to the Y device. To output the signal, turn the
power ON again and then set the Y device No. again within the range.
[Caution]
(1) Setting "0" does not mean the output to Y0. This setting is invalid.
(2) If the "Servo ready completion" signal is OFF on either of the R registers (among R2625/R2825/R3025/R3225) with
the overlapped setting value, the signals to be output to Y device turn OFF.
(3) Y2C0 to 2FF, which are used by the system, cannot be set as servo ready completion output designation.
(4) This register, if designated after the "Servo ready completion" signal is ON without initial ladders, turns valid from the
time of the setting and the signal is output to Y device.

(5) The devices Y300 to Y5FF are available when the external PLC link such as PROFIBUS-DP and CC-Link is con nected.
(6) Do not control the designated Y devices with user PLC. When the device is controlled with user PLC, the "Servo ready completion" signal is overwritten and turns invalid.
(7) If the servo ready completion output designation, which has not been set with this register, is written twice in 1 scan of user PLC, the latter setting is valid.
[Related signals]
(1) Servo ready completion (SA: XC11)
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Servo ready completion output desig nation R2625 R2825 R3025 R3225 R3425 R3625 R3825 R4025

[Function]
This signal commands memorization or deletion of the position data that is used by the thread recutting function.
This signal needs to be set from the ladder when the thread recutting operation from the ladder ("#1258 set30/bit4" is set to "1") is selected.
When the thread recutting operation on the CNC screen ("#1258 set30/bit4" is set to "0") is selected, thread recutting operation is disabled even if this signal is set.
[Operation]
[Related signals]
(1) Thread recutting status (R648)
(2) Thread recutting lead axis No. (R651)
[Function]
This signal commands various operations related to thread recutting.
This signal needs to be set from the ladder when the thread recutting operation from the ladder ("#1258 set30/bit4" is set to "1") is selected.
When the thread recutting operation on the CNC screen ("#1258 set30/bit4" is set to "0") is selected, thread recutting operation is disabled even if this signal is set.
[Operation]
[Related signals]
(1) Thread recutting execution status (R649)
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Thread recutting command R2626 R2826 R3026 R3226 R3426 R3626 R3826 R4026
Bit of R2626 Meaning Details
0
Memory If this bit is ON when the command is executed, the CNC stores "spindle number", "spindle position", "lead axis number" and "lead axis machine coordinate" in the CNC memory.
1
Erase If this bit is ON when the command is executed, the CNC erases "spindle number", "spindle angle", "lead axis number" and "lead axis machine coordinate" from the CNC memory.
7
Command execution The CNC performs "Memory" (bit0) or "Erase" (bit1) operation at the rising edge of this bit.
An error occurs if both "Memory" and "Erase" bits are ON or OFF.
8 to F
Lead axis number The lead axis number of the axis that performs thread recutting is set in binary using these bits.
The range of numbers that can be set is 0x00 to 0xFF. Set the 1st axis to "1" in the command.
The number in the command is memorized as the lead axis number.
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Thread recutting execution operation R2627 R2827 R3027 R3227 R3427 R3627 R3827 R4027
Bit of R2627 Meaning Details
F
Thread recutting function enabled
Turn this bit ON to perform thread recutting.
When thread recutting can be performed, bitF of the "Thread recutting execution sta tus" signal (R649) turns ON.
To perform normal thread cutting, turn this bit OFF.
0123456789ABCDEF BIT
Memory
Erase
Lead axis number
Command execution
DEF C 0123456789AB BIT
Thread recutting function enabled

[Function]
This signal sets rotary axis angle of the mechanical axis specifications.
The setting range is 0 to 720000 (1 degree/1000).
[Operation]
When the handle is fed in the tool axis direction/tool radius direction in the mechanical axis specifications, the angle of the rotation axis, which is the direction of the tool, can be input by writing the angle in the R register with the user PLC.
(Example) Writing 90 degrees on A axis and 180 degrees on C axis with A-C axes configuration is shown below.
[Caution]
(1) The tool center point rotation mode cannot be used while the mechanical axis is in use.
(2) Do not change the rotary axis angle of the mechanical axis during tool handle feed & interruption.
(3) When the angle of the mechanical axis is written to the R register, only the tool center point value counter on the posi tion display screen is updated. Other counters are not updated.
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Mechanical axis specifications 1st rota ry axis angle R2628, 9 R2828, 9 R3028, 9 R3228, 9 R3428, 9 R3628, 9 R3828, 9 R4028, 9
A Mechanical axis specifications 2nd rota ry axis angle R2630, 1 R2830, 1 R3030, 1 R3230, 1 R3430, 1 R3630, 1 R3830, 1 R4030, 1
R register Details Input range

R2628
R2629
Mechanical axis specifications 1st rotary axis an gle
R2628 (low order)/R2629 (high order)
0 to 720000
(1 degree/1000)
R2630
R2631
Mechanical axis specifications 2nd rotary axis an gle
R2630 (low order)/R2631 (high order)
0 to 720000
(1 degree/1000)
CNC servo axis
C N C
Rotary axis
motor
C N C
[Mechanical position]
Counter
A,B,C axes
Mechanical axis
specifications
User PLC
Mechanical
axis
User PLC
R register
R2628:Rotary axis
1st axis
R2630: Rotary axis
2nd axis
Mechanical specifications
[Rotary angle]
Switching
Rotary axis
configuration
ROTAXT1or2
Tool handle feed distributing process
CNC
Display
processing
CRT
Manual
pulse
generator
X axis
Y axis
Z axis
A axis
B axis
C axis
A axis: 90 1000 = 90000
 angle 1/1000degree System unit
[DMOV K90000 R2628]

C axis: 180 1000 = 180000
 angle 1/1000degree System unit
[DMOV K180000 R2630]
M800V/M80V Series PLC Interface Manual
4 Explanation of Interface Signals
4.4 PLC Output Signals (Data Type: R***)
IB-1501616-F 600
[Function]
This signal is to compensate the reference position of rotation angle for the rotary axis of tool side during the modal of simple tool center point control (G174) or when tool axis direction control (G53.1) is commanded.
R register of the part system where the rotary axis exists is applied by the reset condition.
[Operation]
The angle of tool side rotary axis is based on the angle set in the tool axis rotation angle compensation amount.
The tool axis rotation angle compensation amount validates the data at the time of G174/G53.1 command. However, when the data is changed during G174 mode, it will not be valid.
Setting range: -359999 to 359999 (Increment 0.001[])
Regardless of the input unit, a value is incremented by 0.001[] .
(1) The tool axis rotation angle compensation amount is cleared at the power ON. Set this signal before commanding G174/G53.1.
(2) To use a tool with turret, set the offset angle information of the tool for the reference position rotation angle to this compensation amount. It is possible to perform machining using an arbitrary tool on the turret by setting the angle information before commanding G174/G53.1.
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A
Simple inclined surface machining com mand:
Tool axis rotation angle compensation
amount
TAN GOFS R2634, 5 R2834, 5 R3034, 5 R3234, 5 R3434, 5 R3634, 5 R3834, 5 R4034, 5
Note
M800V/M80V Series PLC Interface Manual
4 Explanation of Interface Signals
4.4 PLC Output Signals (Data Type: R***)
601 IB-1501616-F

[Function]
The operation mode for the circular feed in manual mode is designated.
[Operation]
Operation mode: Designate the coordinate setting.
The setting value other than above is invalid.
Vertical axis (V) mirror image: Reverse the "+" direction of the vertical axis (V).
Vertical axis (V) is determined by the plane selection mode.
Plane selection mode: Specifies a virtual coordinate system plane on the machine coordinate system.
[Caution]
(1) This data is enabled at the rising edge of the "Circular feed in manual mode valid" signal.
(2) The data is not enabled even if it is changed while the "Circular feed in manual mode valid" signal is ON.
[Related signals]
(1) Circular feed in manual mode valid (YC7E)
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Circular feed in manual mode Operation
mode data R2636, 7 R2836, 7 R3036, 7 R3236, 7 R3436, 7 R3636, 7 R3836, 7 R4036, 7
Setting value Description
1 Linear-linear coordinate is selected.
2 Circular-linear coordinate is selected. ("+" indicates the CW direction of the horizontal
axis (H).)
3 Circular-linear coordinate is selected. ("+" indicates the CCW direction of the horizontal
axis (H).)
Setting value Description
0 Vertical axis (V) mirror image is not valid
1 Vertical axis (V) mirror image is valid
Plane selection mode
Plane Horizontal axis (H) Vertical axis (V) bitF bitE
0 0 Not specified 1st axis of NC axis 2nd axis of NC axis
0 1 XY #1026 Base axis I #1027 Base axis J
1 0 ZX #1028 Base axis K #1026 Base axis I
1 1 YZ #1027 Base axis J #1028 Base axis K
F E D C B A 9 8 7 6 5 4 3 2 1 0
Operation mode
R2636
R2836
R3036
R3236
Mirror image on vertical axis (V)
Plane selection mode
Bit
F E D C B A 9 8 7 6 5 4 3 2 1 0
R2637
R2837
R3037
R3237
M800V/M80V Series PLC Interface Manual
4 Explanation of Interface Signals
4.4 PLC Output Signals (Data Type: R***)
IB-1501616-F 602
[Function]
Designate a reference point on the hypothetical coordinate.
[Operation]
Designate a reference point on the hypothetical coordinate using the machine coordinate system.
The setting range differs in each PLC setting unit.
[Caution]
(1) This data is enabled at the rising edge of the "Circular feed in manual mode valid" signal.
(2) The data is not enabled even if it is changed while the "Circular feed in manual mode valid" signal is ON.
(3) The reference point coordinate is designated with "0.5PLC setting unit".
(4) When the parameter "#1040 M_inch" is set to "1", the data is set in inches.
[Related signals]
(1) Circular feed in manual mode valid (YC7E)
[Function]
Designate the travel range on the hypothetical coordinate.
[Operation]
Designate the travel ranges with the value in the "+" or "-" direction on the hypothetical coordinate. Set the hypothetical
coordinate value in the following state.
In the "circular-linear" mode, set the travel range of H' on the hypothetical coordinate by an angle with the basic point
defined as 0 degree.
The setting range differs in each PLC setting unit.
[Caution]
(1) The data is enabled as soon as it is changed while the "Circular feed in manual mode valid" signal is ON.
(2) The reference point is treated as zero point on the hypothetical coordinate.
(3) The moving range is designated with "0.5PLC setting unit".
(4) When the parameter "#1040 M_inch" is set to "1", the data is set in inches.
[Related signals]
(1) Circular feed in manual mode valid (YC7E)
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Circular feed in manual mode Refer ence point H data R2644, 5 R2844, 5 R3044, 5 R3244, 5 R3444, 5 R3644, 5 R3844, 5 R4044, 5
A Circular feed in manual mode Refer ence point V data R2648, 9 R2848, 9 R3048, 9 R3248, 9 R3448, 9 R3648, 9 R3848, 9 R4048, 9
PLC setting unit
mm inch
(B) 99999.999 mm 3937.0078 inch
(C) 9999.9999 mm 393.70078 inch
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Circular feed in manual mode travel
range H (+) data R2652, 3 R2852, 3 R3052, 3 R3252, 3 R3452, 3 R3652, 3 R3852, 3 R4052, 3
A Circular feed in manual mode travel
range H (-) data R2656, 7 R2856, 7 R3056, 7 R3256, 7 R3456, 7 R3656, 7 R3856, 7 R4056, 7

A Circular feed in manual mode travel
range V (+) data R2660, 1 R2860, 1 R3060, 1 R3260, 1 R3460, 1 R3660, 1 R3860, 1 R4060, 1
A Circular feed in manual mode travel
range V (-) data R2664, 5 R2864, 5 R3064, 5 R3264, 5 R3464, 5 R3664, 5 R3864, 5 R4064, 5
Linear-linear hypothetical coor dinate V' axis: mirror image is not valid
Circular-linear hypothetical coor dinate
H' axis: "+" indicates the inverse (CW) direction
V' axis: mirror image is not valid
PLC setting unit
mm inch angle
(B) 99999.999 mm 3937.0078 inch 360.000
(C) 9999.9999 mm 393.70078 inch 360.0000

[Function]
Designate the gradient on the "linear-linear" hypothetical coordinate, or the arc center on the "circular-linear" hypothetical coordinate.
[Operation]
How to designate differs in each operation mode.
(*1) Refer to the section on "Circular feed in manual mode operation mode data" (R2636) for the operation mode.
[Caution]
(1) This data is enabled at the rising edge of the "Circular feed in manual mode valid" signal.
(2) The data is not enabled even if it is changed while the "Circular feed in manual mode valid" signal is ON.
(3) The arc center coordinate and gradient are designated with "0.5PLC setting unit".
(4) When the parameter "#1040 M_inch" is set to "1", set the data in inches.
[Related signals]
(1) Circular feed in manual mode valid (YC7E)
[Function]
This signal is used to update the shape group of the 3D machine interference check or real-time 3D machine interference check. Set the No. of shape group which is currently specified as the interference check target. This signal is enabled while the machine interference check is being performed.
If a shape group is selected on the [3D Monitor] screen, the group No. is set in the "3D machine interference check: Requested shape group No." signal (R2400). Then set this value in the "Enabled shape group No." signal.
[Operation]
When the "Enabled shape group No." changes, the jig or workpiece model is updated. The machine interference check is implemented using the updated model.
If the setting is changed during axis movement, the axis will decelerate to a stop while the model is being updated.
(1) This signal is inoperative during automatic operation.
(2) Shapes defined in Group 1 are within the scope of the interference check. Interference check is not executed for the shape defined in Groups 2 to 4.
[Related signals]
(1) 3D Machine Interference Check : Requested shape group No. (R2400)
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Circular feed in manual mode gradient/
arc center H data R2668, 9 R2868, 9 R3068, 9 R3268, 9 R3468, 9 R3668, 9 R3868, 9 R4068, 9
A Circular feed in manual mode gradient/
arc center V data R2672, 3 R2872, 3 R3072, 3 R3272, 3 R3472, 3 R3672, 3 R3872, 3 R4072, 3
Operation mode is "Linear-linear"(*1)
Use the ratio of H/V to designate the gradients of H axis on the machine coordinate
and H' axis on the hypothetical coordinate. Signs are available. "+" indicates the
CCW direction from the H axis.
If the gradient is 45, H and V should have the same value.
The designation unit follows the PLC setting unit.
PLC setting unit (B) : 99999.999
PLC setting unit (C) : 9999.9999
Operation mode is "Arc-linear"(*1)
Designate an arc center on the hypothetical coordinate using the machine coordi nate system.
The designation unit follows the PLC setting unit.
[Millimeter]
PLC setting unit (B) : 99999.999 [mm]
PLC setting unit (C) : 9999.9999 [mm]
[Inch]
PLC setting unit (B) : 3937.0078 [inch]
PLC setting unit (C) : 393.70078 [inch]
Cont. Signal name Abbrev. Common ($)
A 3D machine interference check: Enabled shape group No. 1
to 4 R4400 to 3
Note

[Function]
This data compensates the basic machine coordinate system. The axis moves the amount equivalent to the set data (machine error compensation unit). The entire coordinate system value, including the basic machine coordinate system, will not change.
[Operation]
When the "Ext. machine coordinate system offset data" (R5700 to 15) is set, the axis will move the amount equivalent to that set value.
The entire coordinate system value, including the basic machine coordinate system, will not change.
If the changed amount of the set value exceeds the rapid traverse feedrate, the set value turns invalid: the compensation is executed with the set value unchanged.
<Data range>
80000000 (HEX) to 7FFFFFFF (HEX) (Absolute compensation amount -2147483648 to 2147483647)
Unit: Machine error compensation unit
[Related signals]

(1) Ext. machine coordinate system offset data illegal n-th axis (XA40 to XA47)
[Function]
When the "Each axis manual feedrate B valid" signal is valid, designate the manual feedrate for the axis selected with the "Manual feedrate B valid" signal.
[Operation]
When the "Each axis manual feedrate B valid" signal is valid, the each axis speed designated with this register is valid for the manual feedrate of an axis for which the "Manual feedrate B valid" signal is valid.
Cutting override and manual override are invalid for this register's speed.
This register is not related to the dry run speed.
A binary value is directly set for this register. The setting unit is 0.01mm/min (/min).
This signal is a register independent for each axis.
[Related signals]
(1) Manual feedrate B valid (FBEn: Y940 to Y947)
(2) Each axis manual feedrate B valid (YC7C)
Cont. Signal name Abbrev. $1 $2 $3 $4
A Ext. machine coordinate system offset data n-th axis R5700 to 15 R5716 to 31 R5732 to 47 R5748 to 63
Cont. Signal name Abbrev. $1 $2 $3 $4
A Each axis manual feedrate B n-th axis R5764 to
5779
R5780 to
5795
R5796 to
5811
R5812 to
5827

[Function]
This provides interface function used to coordinate user PLC to user macro.
(1) The other signals from R0 to R99 are PLC inputs, but this signal is output to the NC from PLC.
[Operation]
The data set in file registers Rn and Rn+1 with the user PLCs, can be referred to on the user macro side with the user macro system variables #1000 to #1031 or #1032.
The relationship between system variable and file register is as follows:
This correspondence table shows the example for file registers R6436 and R6437.
File registers R6436 and R6437 correspond to system variables #1000 to #1031, and #1032 (32-bit data).
To use the R register of the 2nd and subsequent part system, set "#1230 set02/bit7" to "1".
[Related signals]
(1) User macro input #1033, #1034, #1035 (R6436/6437,R6438/6439,R6440/6441,R6442/6443)
(2) User macro output #1132, #1133, #1134, #1135 (R6372/6373,R6374/6375,R6376/6377,R6378/6379)
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A User macro input #1032 (PLC -> NC) R6436, 7 R6444, 5 R6452, 3 R6460, 1 R6468, 9 R6476, 7 R6484, 5 R6492, 3
System variable Points Interface input signal System variable Points Interface input signal
#1000 1 Register R6436 bit0 #1016 1 Register R6437 bit0
#1001 1 Register R6436 bit1 #1017 1 Register R6437 bit1
#1002 1 Register R6436 bit2 #1018 1 Register R6437 bit2
#1003 1 Register R6436 bit3 #1019 1 Register R6437 bit3
#1004 1 Register R6436 bit4 #1020 1 Register R6437 bit4
#1005 1 Register R6436 bit5 #1021 1 Register R6437 bit5
#1006 1 Register R6436 bit6 #1022 1 Register R6437 bit6
#1007 1 Register R6436 bit7 #1023 1 Register R6437 bit7
#1008 1 Register R6436 bit8 #1024 1 Register R6437 bit8
#1009 1 Register R6436 bit9 #1025 1 Register R6437 bit9
#1010 1 Register R6436 bit10 #1026 1 Register R6437 bit10
#1011 1 Register R6436 bit11 #1027 1 Register R6437 bit11
#1012 1 Register R6436 bit12 #1028 1 Register R6437 bit12
#1013 1 Register R6436 bit13 #1029 1 Register R6437 bit13
#1014 1 Register R6436 bit14 #1030 1 Register R6437 bit14
#1015 1 Register R6436 bit15 #1031 1 Register R6437 bit15
System variable Points Interface input signal
#1032 32 Register R6436, R6437
#1033 32 Register R6438, R6439
#1034 32 Register R6440, R6441
#1035 32 Register R6442, R6443
Note

[Function]
This provides interface function used to coordinate user PLC to user macro.
[Operation]
The data set in file registers Rn and Rn+1 with the user PLCs, can be referred to on the user macro side with the user macro system variables #1033.
[Related signals]
(1) User macro input #1032, #1034, #1035 (R6436/6437,R6440/6441,R6442/6443)
(2) User macro output #1132, #1133, #1134, #1135 (R6372/6373,R6374/6375,R6376/6377,R6378/6379)
[Function] [Operation]
The function, operation, etc. are the same as those of "User macro input #1033".
[Function] [Operation]
The function, operation, etc. are the same as those of "User macro input #1033".
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A User macro input #1033 (PLC -> NC) R6438, 9 R6446, 7 R6454, 5 R6462, 3 R6470, 1 R6478, 9 R6486, 7 R6494, 5
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A User macro input #1034 (PLC -> NC) R6440, 1 R6448, 9 R6456, 7 R6464, 5 R6472, 3 R6480, 1 R6488, 9 R6496, 7
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8

A User macro input #1035 (PLC -> NC) R6442, 3 R6450, 1 R6458, 9 R6466, 7 R6474, 5 R6482, 3 R6490, 1 R6498, 9
DMOV K1000 R6438
ACT
ACT
WOR R6436 K1 R6436
Set 1 in #1000.
IF [#1000 EQ 0] GOTO 100
#100 = #1033
N100
The #1033(R6438, R6439) data is read into #100
Other than when #1000 is set to 0.
(Example)
Sequence program User macro program

[Function]
By setting data of desired spindle speed to this signal, the spindle can be rotated at that speed.
[Operation]
When this signal is used, operation is same as the case where usual spindle command rotation speed input signal (R6500, 1) is given. Difference is that when data is set by user PLC, priority is given to that data over spindle (S) command data specified in automatic operation, or by manual command setting.
User PLC main (medium-speed) operation pattern
(1) Spindle command rotation speed output data is rewritten by user PLC for each scan (constant).
(2) Spindle speed override, "Spindle gear selection code 1,2" (GI1, GI2), "Spindle stop" (SSTP), "Spindle gear shift" (SSFT) and "Spindle orientation" (SORC) conditions are added to Spindle command rotation speed output data and sent to the spindle controller.
(3) For flow of spindle (S) function command data, data update timing, etc., refer to the section for normal "Spindle com mand rotation speed input" signal (R6500, 1).
[Related signals]
(1) Spindle command rotation speed input (R6500, R6501)
(2) Spindle command final data (R6502, R6503)
Cont. Signal name Abbrev. 1stSP 2ndSP 3rdSP 4thSP 5thSP 6thSP 7thSP 8thSP
A Spindle command rotation speed out put R7000, 1 R7050, 1 R7100, 1 R7150, 1 R7200, 1 R7250, 1 R7300, 1 R7350, 1

(2) "Spindle command rotation speed output data" can be rewritten by user PLC within this interval if necessary (PLC process).
(1) "Spindle command rotation speed input data" is set to the "output data" at the head of user PLC main program (controller process).
(3) "Spindle command rotation speed output data" is processed at the end of user PLC and signal is given to spindle controller (controller process).
Note

[Function]
This signal sets from which system the S command is received when the multiple-spindle control II is valid.
0: 1st part system
1: 2nd part system
2: 3rd part system
3: 4th part system
(1) If a setting value exceeds the maximum number of part systems determined by specifications, it will be interpreted that a selection has not been made.
[Operation]
If an S command is given while the "Spindle selection" (SWS) and the "Spindle command selection" (SLSP) have already been input through different blocks, this S command is handled as a rotation speed command of the selected spindle. The selected spindle rotates at the rotation speed which was output. The spindle deselected by turning OFF the "Spindle selection" signal (SWS) continues to rotate at the same rotation speed as the rotation speed immediately before the deselection. This allows each spindle to be rotated simultaneously at a different rotation speed. The "Spindle command selection" signal is used to select which of the spindles is to receive the S command from which part system.
[Caution]
Even though the "Spindle selection" (SWS) or the "Spindle command selection" (SLSP) is performed with the M command in the same block as the S command, the spindle selection command (spindle rotation speed) is not updated.
[Related signals]
(1) Spindle selection (SWS: Y18A8)
(2) Spindle stop (SSTP: Y1894)
(3) Spindle enable (ENB: X18A0)
(4) Encoder selection (R2567)
(5) Spindle forward run start (SRN: Y1898)
(6) Spindle reverse run start (SRI: Y1899)
Cont. Signal name Abbrev. 1stSP 2ndSP 3rdSP 4thSP 5thSP 6thSP 7thSP 8thSP
A Spindle command selection SLSP R7002 R7052 R7102 R7152 R7202 R7252 R7302 R7352
Note

[Function]
When "Spindle override method selection" signal is set to "file register method", override can be exerted on the spindle rotation speed besides the code method override (SP1 to SP4).
Override can be exerted within range of 0% to 200% (1% increment).
Desired value is set to file register (R) in binary code.
[Operation]
When this function is used, the true spindle speed is obtained by multiplying the originally set spindle speed by override

ratio set with this signal.
Clamp spindle speed is the maximum or minimum speed set with parameters, which depends on the "Spindle gear selection code 1,2" signal (GI1, GI2). (Both are set to parameters.)
Even when spindle speed exceeds the maximum or minimum speed at the currently selected gear stage, due to change of override setting, the "Spindle gear shift" signal (GR1, GR2) does not automatically change.
(1) Override is not valid (100%) under the following conditions:
The "Spindle stop" signal (SSTP) is ON.
During tapping mode
During thread cutting
[Related signals]
(1) Spindle speed override code m (SPn: Y1888)
(2) Spindle override method selection (SPS: Y188F)
(3) Spindle gear selection code 1,2 (GI1, GI2: Y1890, Y1891)
(4) Spindle stop (SSTP: Y1894)
(5) Spindle gear shift (SSFT: Y1895)
(6) Spindle orientation (SORC: Y1896)
Cont. Signal name Abbrev. 1stSP 2ndSP 3rdSP 4thSP 5thSP 6thSP 7thSP 8thSP
A S command override R7008 R7058 R7108 R7158 R7208 R7258 R7308 R7358
0 Smini Smax1 Smax2 Smax3
G10
G20
G30
Applicable override range at gear stage 3
GR10 : Applicable override range at gear stage
GR20 : Applicable override range at gear stage
GR30 : Applicable override range at gear stage
Smini : Minimum spindle speed (parameter)
Smax1: Maximum spindle speed at gear stage 1
(parameter)
Smax2: Maximum spindle speed at gear stage 2
(parameter)
Smax3: Maximum spindle speed at gear stage 3
(parameter)
Note

[Function]
This signal has the following two functions:
Notification of orientation position to control unit (spindle controller) at orientation command.
Position data where the "Spindle orientation command" (ORC) is turned ON.
During multi-point indexing, notification of indexing position during forward run indexing or reverse run indexing to con trol unit (spindle controller).
Position data where the "Spindle forward run index" (WRN), the "Spindle reverse run index" (WR1) is turned ON.
[Operation]
<Orientation command>
The orientation position, at which the "Spindle orientation command" (ORC) turns ON, is input.
The values designated with the spindle specification parameter (position shift amount for orientation) and with the "Multi point orientation position data" signal are totaled to determine the orientation position.
<Multi-point indexing>
Each time the "Spindle forward run index" (WRN) and "Spindle reverse run index" (WRI) turn ON, the axis rotates by the amount designated with the multi-point orientation position data.
Command value is handled as 16-bit binary data and its increment is as follows.
Command increment = 360/36000 (0.01)
<Turret indexing>
The turret angle is designated when the turret indexing is valid (when "#3121 tret" is set to "1").
The spindle rotation angle will be the multi-point orientation position data which is multiplied by the turret side gear ratio (in "#3122 GRC").
This signal must be validated before the "Spindle orientation command" signal turns ON (at least 100 ms before).
[Related signals]
(1) Spindle orientation command (ORC: Y189E)
(2) Spindle forward run index (WRN: Y189C)
(3) Spindle reverse run index (WRI: Y189D)
[Function] [Operation]
When the parameter "#3024 sout" (spindle connection) is set to "2" to "5", the value set in this signal appears as an absolute value in the "Load" (%) on the load meter display screen. The graphical display for load meter varies depending on the value set in this signal.
Set the load in the range of "-999" to "999".
When the set value exceeds the setting range, a value clamped with the upper or lower limit is displayed.
(1) The unit is percentage (%).
(2) The data format is signed binary.
Cont. Signal name Abbrev. 1stSP 2ndSP 3rdSP 4thSP 5thSP 6thSP 7thSP 8thSP
A Multi-point orientation position data R7009 R7059 R7109 R7159 R7209 R7259 R7309 R7359
Cont. Signal name Abbrev. 1stSP 2ndSP 3rdSP 4thSP 5thSP 6thSP 7thSP 8thSP
A Interface of load meter for analog I/F
spindle ANSLD R7012 R7062 R7112 R7162 R7212 R7262 R7312 R7362
Turn the signal ON at the same time as the
position data set or after the data set.
Multi-point orientation
position data (R7009)
Spindle orientation command (ORC)
Spindle forward run index (WRN)
/Spindle reverse run index (WRI)
Note

[Function]

Select the reference spindle to be used for synchronous control from the PLC.
[Operation]
Select the spindle to be controlled as the reference spindle from the serially connected spindles.
(0: 1st spindle), 1: 1st spindle, 2: 2nd spindle, 3: 3rd spindle, 4: 4th spindle, 5: 5th spindle, 6: 6th spindle, 7: 7th spindle, 8: 8th spindle
(1) When a spindle that is not serially connected is selected, spindle synchronous control will not be executed.
(2) When "0" is designated, the 1st spindle will be controlled as the reference spindle.
[Function]
Select the synchronized spindle to be used for synchronous control from the PLC.
[Operation]
Select the spindle to be controlled as the synchronized spindle from the serially connected spindles.
(0: 2nd spindle), 1: 1st spindle, 2: 2nd spindle, 3: 3rd spindle, 4: 4th spindle, 5: 5th spindle, 6: 6th spindle, 7: 7th spindle, 8: 8th spindle
(1) If a spindle that is not serially connected is selected or if the same spindle as the reference spindle is selected, spindle synchronous control will not be executed.
(2) If "0" is designated, the 2nd spindle will be controlled as the synchronized spindle.
[Function]
The phase shift amount for the synchronized spindle can be designated from the PLC.
[Operation]
Designate the phase shift amount for the synchronized spindle.
Unit: 360/4096
[Related signals]
(1) In spindle synchronization (SPSYN1: X18A8)
(2) Spindle rotation speed synchronization completion (FSPRV: X18A9)
(3) Spindle phase synchronization completion (FSPPH: X18AA)
(4) Spindle synchronization (SPSY: Y18B0)
(5) Spindle phase synchronization (SPPHS: Y18B1)
(6) Spindle synchronous rotation direction (Y18B2)
Cont. Signal name Abbrev. 1stSP 2ndSP 3rdSP 4thSP 5thSP 6thSP 7thSP 8thSP
A Spindle synchronization: Reference
spindle selection R7016 R7066 R7116 R7166 R7216 R7266 R7316 R7366
Cont. Signal name Abbrev. 1stSP 2ndSP 3rdSP 4thSP 5thSP 6thSP 7thSP 8thSP
A Spindle synchronization: Synchro nized spindle selection R7017 R7067 R7117 R7167 R7217 R7267 R7317 R7367
Cont. Signal name Abbrev. 1stSP 2ndSP 3rdSP 4thSP 5thSP 6thSP 7thSP 8thSP
A Spindle synchronization: Phase shift
amount R7018 R7068 R7118 R7168 R7218 R7268 R7318 R7368
Note
Note
M800V/M80V Series PLC Interface Manual
4 Explanation of Interface Signals
4.4 PLC Output Signals (Data Type: R***)
IB-1501616-F 612
[Function]
This signal specifies the tolerable range of the actual position delay (or advance) of the reference and synchronized spindles with respect to the position command, which is applied after the phase alignment under the absolute position spindle synchronization. The tolerance is specified by the angle.
[Operation]
Delay or advance angle of the actual position with respect to the commanded position
<Data range>
F001 (HEX) to 0FFF (HEX) (-359.9 to 359.9)
Unit: 360/4096
(1) Output the 1st spindle's signal while "#1440 multi_sp_syn" (Multiple spindle synchronization valid) is "0".
(2) Output the synchronized spindle's signal while "#1440 multi_sp_syn" (Multiple spindle synchronization valid) is "1".
[Related signals]
(1) In spindle synchronization (SPSYN1: X18A8)
(2) Spindle rotation speed synchronization completion (FSPRV: X18A9)
(3) Spindle phase synchronization completion (FSPPH: X18AA)
(4) Spindle synchronization/superimposition cancel (SPSYC: Y18B8)
(5) Spindle synchronization: Phase error over (SPPHOV: X18B0)
(6) Spindle synchronization: Phase error/Hob axis delay angle (R6516)
(7) Spindle synchronization: Maximum phase error/Maximum hob axis delay angle (R6517)
[Function]
This signal is used to set the amplitude of the spindle oscillation.
The effective setting range: 1 to 32767 [0.01]
[Related signals]
(1) Spindle oscillation command (Y18C8)
(2) Spindle oscillation frequency (R7021)
[Function]
This signal is used to set the frequency of the spindle oscillation.
The effective setting range: 1 to 140 [Hz]
[Related signals]
(1) Spindle oscillation command (Y18C8)
(2) Spindle oscillation amplitude (R7020)
Cont. Signal name Abbrev. 1stSP 2ndSP 3rdSP 4thSP 5thSP 6thSP 7thSP 8thSP
A Spindle synchronization: Phase error
tolerance R7019 R7069 R7119 R7169 R7219 R7269 R7319 R7369
Cont. Signal name Abbrev. 1stSP 2ndSP 3rdSP 4thSP 5thSP 6thSP 7thSP 8thSP
A Spindle oscillation amplitude R7020 R7070 R7120 R7170 R7220 R7270 R7320 R7370
Cont. Signal name Abbrev. 1stSP 2ndSP 3rdSP 4thSP 5thSP 6thSP 7thSP 8thSP
A Spindle oscillation frequency R7021 R7071 R7121 R7171 R7221 R7271 R7321 R7371
Note
M800V/M80V Series PLC Interface Manual
4 Explanation of Interface Signals
4.4 PLC Output Signals (Data Type: R***)
613 IB-1501616-F
[Function]
The setting for installing another spindle motor on the detached spindle can be transferred to the drive unit.
[Operation]

<Low-order 8 bits: Spindle switch setting number>
Set the parameter number used in spindle switch. When "0" is set, the switch is performed by using the setting value of the original spindle parameters (#13001 or later).
Setting range: 0 to 8
<High-order 8 bits: Spindle switch command>
When the "Spindle switch request" signal (bit8) turns ON, the spindle switch parameter of the set for the number will be valid.
Cont. Signal name Abbrev. 1stSP 2ndSP 3rdSP 4thSP 5thSP 6thSP 7thSP 8thSP
A Tool head hot swapping: Spindle
switch
SPCHG CMD R7026 R7076 R7126 R7176 R7226 R7276 R7326 R7376
R7026 F EDCB A 9 8
Spindle switch request
<High-order 8 bits>
Not in use Spindle switch setting number
<Low-order 8 bits>

[Timing chart]
In the following example, the spindle switch is performed for the first spindle by using the second set of the spindle switch parameters.
(1) When the "Exclude spindle" signal (Y18BF) turns ON, the spindle is detached from CNC, and the "In spindle off" sig nal (X18B6) turns ON.
(2) When the spindle switch is requested while the spindle is detached from CNC, the target spindle turns to the state of spindle switch in progress, and the setting data of spindle switch parameter is transferred to the drive unit according to the value of "Spindle switch setting number" (R7026/low-order 8 bits).
(3) When the transfer is completed, the "Spindle switch in progress" signal (R6547/bit8) turns OFF, and a value is set to the "In-use spindle switch setting number" (R6547/low-order 8 bits).
(4) Change the tool head while the spindle is detached. (This operation is available even while the spindle switch is in progress and can be started at the same time as the (2) operation.)
(5) When (2), (3) and (4) are completed, the spindle switch is completed. When the "Exclude spindle" signal (Y18BF) and the "Spindle switch request" signal (R7026/bit8) turn OFF, the spindle control is enabled again and operation is possi ble using the setting after the switch.
[Related signals]
(1) Tool head hot swapping: Spindle switch status (R6547: SPCHGSTS)
(2) Exclude spindle (Y18BF: SPOFF)
(3) In spindle off (X18B6: SPOFFA)
[Function] [Operation]
This signal designates the override value added to the selected feedrate. Set a binary value for the override. Values over 100% are regarded as 100%.
Effective feedrate = (Selected speed Speed override) / 100
Signal name Abbrev. 1st axis 2nd axis 3rd axis 4th axis 5th axis 6th axis 7th axis 8th axis
PLC axis indexing control command 4 AUXCM4 R8050 R8056 R8062 R8068 R8074 R8080 R8086 R8092
Cont. Signal name Abbrev. bit
A Speed override 1 to 64 OV1 to
OV64 AUXCM4/bit0 to 6
PLC
NC
(1)
(2)
(3)
(4)
(5)
0
0
2
2
0
Machine
Exclude spindle (Y18BF)
Spindle switch request (R7026/bit8)
Spindle switch setting number
(R7026/low-order 8 bits)
In spindle off (X18B6)
In-use spindle switch setting number
(R6547/low-order 8 bits)
Spindle switch completion (R6547/bit9)
Tool head hot swapping
Spindle switch in progress (R6547/bit8)

[Function] [Operation]
This is a signal to validate the speed override. When this signal is turned OFF, the set feedrate becomes the operation speed without calculating the override.
[Function]
This signal designates an index station No. in the automatic operation mode.
[Operation]
Set an index station No. before inputting the "Operation start" (ST) in the automatic operation mode.
Input a 9-digit binary number. An input "000000001" corresponds to station No.1.
This signal is read in at the rising edge of the "Operation start" (ST). The signal changes are ignored after the startup.
When this signal is set to "000000000" and the automatic operation is started, a one-station rotation special command is issued. (Note that this cannot be used when the station positions are determined in non-uniform assignments.)
Cont. Signal name Abbrev. bit
A Speed override valid OVR AUXCM4/bit7
Signal name Abbrev. 1st axis 2nd axis 3rd axis 4th axis 5th axis 6th axis 7th axis 8th axis
PLC axis indexing control command 3 AUXCM3 R8051 R8057 R8063 R8069 R8075 R8081 R8087 R8093

Cont. Signal name Abbrev. bit
A Station selection 1 to 256 ST1 to
ST256 AUXCM3/bit0 to 8
Signal name Abbrev. 1st axis 2nd axis 3rd axis 4th axis 5th axis 6th axis 7th axis 8th axis
PLC axis indexing control command 2 AUXCM2 R8052 R8058 R8064 R8070 R8076 R8082 R8088 R8094

[Function] [Operation]
When this signal is turned ON in the operation mode, the operation starts. Since the "Operation start" signal is handled as a status, the ON status must be maintained until the end of operation.
Operation movement in each operation mode
<Automatic operation mode>
The "Station selection" (ST1 to ST256) and the "Operation parameter selection 1, 2" (PR1, PR2) are established before the "Operation start" signal is input. Since these two signals are read at the rising edge of the "Operation start" signal, they are held even though they are changed after the startup.
When the "Operation start" signal is input, the output signals related to the set position all turn OFF. Station position will be output as "0". When the positioning is completed, the "Automatic set position reached" (JSTA) and the "Set position reached" (JST) are output. Then turn OFF the "Operation start" signal.
When the "Operation start" signal is turned OFF during axis movement, the axis will stop at the nearest station. Note that, for a linear axis, if there is no nearest point in the movement direction, the commanded station becomes the nearest point.
(1) When the shortcut function is OFF for the rotary axis, the positioning direction can be designated with the "Rotation direction" (DIR).
<Manual operation mode>
The "Rotation direction" (DIR) and the "Operation parameter selection 1, 2" (PR1, PR2) are established before the Operation start signal is input. Since these two signals are read in at the rising edge of the "Operation start" signal, they are held even if they are changed after the startup.
When the "Operation start" signal is input, the output signals related to the set position all turn OFF. Station position will be output as "0".
While the "Operation start" signal is ON, the rotation continues in the designated direction. When the "Operation start" signal is turned OFF, a positioning is carried out to the nearest station where the axis can stop in the rotation direction. Note that, for a linear axis, if there is no nearest point in the movement direction, the axis will immediately decelerate to a stop.
When the positioning is completed, the "Set position reached" (JST) is output.
(1) The "Automatic set position reached" (JSTA) will not be output.
Cont. Signal name Abbrev. bit
A Operation start ST AUXCM2/bit0
Station selection
Operation start
Automatic set position
reached
Set position reached
Near set position
Station position
Axis movement
Output 0 (zero)
Note
Rotation direction
Operation start
Automatic set position reached
Set position reached
Near set position
Station position
Axis movement
Output 0 (zero)
Note

<JOG operation mode>
The "Rotation direction" (DIR) and the "Operation parameter selection 1, 2" (PR1, PR2) are established before the Operation start signal is input. Since these two signals are read in at the rising edge of the "Operation start" signal, they are held even if they are changed after the startup.
When the "Operation start" signal is input, the output signals related to the set position all turn OFF. Station position will be output as "0". While the "Operation start" signal is ON, the rotation continues in the designated direction. When the "Operation start" signal is turned OFF, the axis decelerates to stop. The "Set position reached" (JST) and the "Near set position" (NEAR) are output if the axis is stopped within each tolerable width from the station position.
[Function]
This signal designates the rotation direction of the operation in each operation mode.
[Operation]
Turn this signal ON to designate the rotation direction before the "Operation start" signal (ST) is input.
This signal is invalid in the automatic operation mode when the shortcut control is set and selected by the parameter. When the shortcut control is not selected, a positioning is carried out in the direction designated by this signal.
This signal is read in at the rising edge of the "Operation start" (ST). Therefore, the signal changes are ignored after the startup.
The actual motor rotation direction is reversed by changing the setting of the parameter "#1018 ccw".
[Related signals]
(1) Operation start (ST: AUXCM2/bit0)
[Function] [Operation]
This signal selects the mode that executes the positioning, with the command unit specified by the parameter "#1005 plcunit", to the arbitrary position (coordinate) transferred from the NC. To execute the arbitrary point feed command, the "Automatic operation mode" (AUT) must be turned ON at the same time.
[Related signals]
(1) Automatic operation mode (AUT: AUXCM1/bit8)
Cont. Signal name Abbrev. bit
A Rotation direction DIR AUXCM2/bit1

DIR Axis rotation direc tion Station movement direction
0 Forward run Direction of increasing station No.
1 Reverse run Direction of decreasing station No.
Cont. Signal name Abbrev. bit
A Arbitrary point feed command valid STS AUXCM2/bit2
Output 0 (zero)
Station selection
Operation start
Automatic set position reached
Set position reached
Near set position
Station position
Axis movement

[Function] [Operation]
This signal selects the incremental feed amount and the handle feed magnification. In the handle feed, the movement amount per handle pulse is selected.
[Function] [Operation]
This signal selects one parameter group to be actually used from four parameter groups that designate the axis feed operation. The parameter group cannot be changed while the "Operation start" (ST) is ON. (The group is held in NC.)
If Smoothing zero is confirmed for the target axis, the operation parameter group can be changed with the Operation start.
Changing the parameter setting values of the time constant, torque limit value and excessive error detection width, however, is not possible unless Smoothing zero is confirmed for all the NC axes. The parameter values, if changed during the NC axis movement, are valid after the smoothing zero is confirmed.
Cont. Signal name Abbrev. bit
A Incremental feed magnification 1, 2 MP1, MP2 AUXCM2/bit4,5
MP2 MP1 Feed amount
0 0 0.001
0 1 0.01
1 0 0.1
111
Cont. Signal name Abbrev. bit
A Operation parameter selection 1, 2 PR1, PR2 AUXCM2/bit6,7
PR2 PR1 Selected operation parameter group
0 0 1
0 1 2
1 0 3
1 1 4
Operation parameter group 4
Operation parameter group 3
Operation parameter group 2
Operation parameter group 1
Automatic feedrate
Manual feedrate
Acceleration/deceleration time constant 1
Acceleration/deceleration time constant 2
Torque limit value
Excessive error detection width
Set position detection width
Near set position detection width
Select
Operation parameter
Automatic feedrate
Manual feedrate
Acceleration/deceleration time constant 1
Acceleration/deceleration time constant 2
Torque limit value
Excessive error detection width
Set position detection width
Near set position detection width

[Function] [Operation]
When the Servo OFF signal is set to "0" (B contact), the control axis enters the servo OFF status. No matter which operation mode the servo is in and turned OFF, the axis movement will stop, and the servo will turn OFF. The axis movement restarts when the servo is turned ON again.
If the axis moves for any reason while the servo is OFF, it can be selected whether to compensate that movement amount when the servo turns ON the next time. Select with parameter "#1064 svof".
<When carrying out movement amount compensation (#1064 svof = 1)>
When the servo is OFF, the coordinates are always updated by the amount the axis has moved. When the servo is OFF, the coordinates show the machine position.
<When not carrying out movement amount compensation (#1064 svof = 0)>
When the servo is OFF, the coordinates are not updated even when the axis moves. When the servo is OFF, the coor dinates show the machine position when the servo is OFF.
When the servo is turned ON, the axis is moved to the position where the servo was turned OFF.
When the servo is OFF and the axis movement exceeds the excessive error width (designated with parameter "#2226 SV026"), a servo alarm occurs.
[Caution]
(1) The actual servo OFF operation is validated after In-position (INP) is completed. When using a mechanical clamp, carry out the clamp operation after confirming the in-position status.
(2) When the power is turned ON, the Servo OFF signal turns OFF ("0") and the servo OFF function becomes valid. It is necessary before operation to turn the Servo OFF signal ON ("1") in the PLC program to release the servo OFF.
[Function]
This signal resets the PLC indexing axis.

[Operation]
When this signal is ON, the following reset operations are carried out.
The axis movement decelerates to a stop.
Alarms that can be released by the reset are released.
The "In reset" signal (RST) is output.
The operation alarm is released while resetting.
[Related signals]
(1) In reset (RST: AUXST1/bit9)
[Function] [Operation]
When the control axis is moving in the (+) direction, this signal decelerates and stops the axis movement immediately. When this signal is OFF from before movement, the motion is stopped in the same manner as without starting. In any case the movement is started or restarted by turning this signal ON.
[Function] [Operation]
This is the same as the "Interlock +" signal (IT+), the only difference being the direction.
Signal name Abbrev. 1st axis 2nd axis 3rd axis 4th axis 5th axis 6th axis 7th axis 8th axis
PLC axis indexing control command 1 AUXCM1 R8053 R8059 R8065 R8071 R8077 R8083 R8089 R8095
Cont. Signal name Abbrev. bit
B Servo OFF *SVF AUXCM1/bit0
Cont. Signal name Abbrev. bit
A Master reset MRST AUXCM1/bit3
Cont. Signal name Abbrev. bit
A Interlock+ *IT+ AUXCM1/bit4
Cont. Signal name Abbrev. bit
A Interlock- *IT- AUXCM1/bit5

[Function]
This is a signal to turn OFF the READY status.
[Operation]
When put into a READY OFF status, the power supply to the servomotor is shut off, and the contactor control output is simultaneously turned OFF. If the motor is in operation, it will stop by a dynamic brake stop or a deceleration control stop. The "Servo ready completion" (SA) and the "Servo ready" (RDY) are also turned OFF, but an alarm does not occur. When this signal is turned OFF, the machine immediately returns to the original state.
[Related signals]
(1) Servo ready completion (SA: AUXST1/bitC)
(2) Servo ready (RDY: AUXST1/bit0)
[Function]
This signal selects the handle feed operation mode.
[Operation]
The axis will move for the amount determined by input pulse multiplied by feed magnification after this signal is turned ON, each signal [Operation parameter selection (PR1, PR2) and Incremental feed magnification (MP1, MP2)] is determined, and the handle pulse is input.
[Caution]
(1) Turning this signal ON when other operation modes are ON will result in the operation error (M01 0101).
(2) The handle mode acceleration/deceleration time is the acceleration/deceleration time constant 2 linear acceleration/deceleration of the selected operation parameter group.
[Related signals]
(1) Operation parameter selection 1, 2 (PR1, PR2: AUXCM2/bit6,7)
(2) Incremental feed magnification 1, 2 (MP1, MP2: AUXCM2/bit4,5)
[Function]
This signal selects the automatic operation mode.
[Operation]
Turn this signal ON, set the "Station selection 1 to 256" (ST1 to ST256) and then turn ON the "Operation start" (ST) to move the axis to the designated station. The shortcut control or the rotation direction can be selected with parameters.
[Caution]
Turning this signal ON when other operation modes are ON will result in the operation error (M01 0101).
[Related signals]
(1) Rotation direction (DIR: AUXCM2/bit1)
(2) Operation parameter selection 1, 2 (PR1, PR2: AUXCM2/bit6,7)
(3) Station selection 1 to 256 (ST1 to ST256: AUXCM3/bit0 to 8)
[Function]
This signal selects the manual operation mode.
[Operation]
When the rotation direction is designated and Operation start (ST) is turned ON, the axis will begin moving, and the rotation will continue in the designated direction until Operation start is turned OFF. When Operation start turns OFF, the axis will be positioned to the nearest station.
[Caution]
Turning this signal ON when other operation modes are ON will result in the operation error (M01 0101).
[Related signals]
(1) Rotation direction (DIR: AUXCM2/bit1)
(2) Operation parameter selection 1, 2 (PR1, PR2: AUXCM2/bit6,7)
Cont. Signal name Abbrev. bit
A Ready OFF RDF AUXCM1/bit6
Cont. Signal name Abbrev. bit
A Handle feed operation mode H AUXCM1/bit7
Cont. Signal name Abbrev. bit
A Automatic operation mode AUT AUXCM1/bit8
Cont. Signal name Abbrev. bit
A Manual operation mode MAN AUXCM1/bit9

[Function]
This signal selects the JOG operation mode.
[Operation]

When the rotation direction is designated and the "Operation start" (ST) is turned ON, the axis will begin moving, and the rotation will continue in the designated direction until the "Operation start" is turned OFF. Unlike the manual operation mode, when the "Operation start" is turned OFF, the axis immediately decelerate to a stop.

[Caution]

Turning this signal ON when other operation modes are ON will result in the operation error (M01 0101).

[Related signals]

(1) Rotation direction (DIR: AUXCM2/bit1)

(2) Operation parameter selection 1, 2 (PR1, PR2: AUXCM2/bit6,7)

[Function]

This signal selects the reference position return mode.

[Operation]

When this signal (ZRN) is turned ON, the reference position return mode is designated. To start the reference position return, turn this signal ON, select the operation parameter group, then turn ON the "Operation start" signal (ST).

When the absolute position coordinate system has been established in the absolute position specifications, the high speed return will be applied in every operation.

[Related signals]

(1) Operation parameter selection 1, 2 (PR1, PR2: AUXCM2/bit6,7)

[Function]

This signal selects the mode that initializes the basic point for the absolute position detection system.

[Operation]

When this signal is turned ON, the basic point initialization setting mode is held until the NC power is turned OFF. (Cannot be canceled)

When the stopper method is selected by setting "1" to "#2049 type", the torque limit value and the excessive error detection width in the operation parameter group 4 are automatically selected.

[Function]

This signal turns ON when designating the basic point with the basic point initialization in the absolute position detection system.

[Operation]

When this signal is turned ON in the basic point initialization setting mode, the designated position is set as the absolute position basic point.

Cont. Signal name Abbrev. bit

A JOG operation mode J AUXCM1/bitA

Cont. Signal name Abbrev. bit

A Reference position return mode ZRN AUXCM1/bitB

Cont. Signal name Abbrev. bit

A Basic point initialization setting mode AZS AUXCM1/bitD

Cont. Signal name Abbrev. bit

A Basic point setting ZST AUXCM1/bitE

[Function]

This signal selects the incremental mode.

[Operation]

After turning ON this signal, designate the operation parameter group (with PR1 and PR2), the incremental feed magnification (with MP1 and MP2) and the rotation direction (with DIR). Then turn ON the "Operation start" signal (ST) to move the axis.

[Caution]

(1) Turning this signal ON when other operation modes are ON will result in the operation error (M01 0101).

(2) In the incremental mode, the axis travel will be maintained at a constant amount, even if the "Operation start" signal is OFF.

[Related signals]

(1) Operation parameter selection 1, 2 (PR1, PR2: AUXCM2/bit6,7)

[Function]

Combination of the number of digits for tool No. to be displayed, magazine No. start value, and spindle and standby tool to be displayed are designated.

Refer to "PLC Programming Manual" for details.

[Operation]

Control parameter details

Cont. Signal name Abbrev. bit

A Incremental mode S AUXCM1/bitF

Cont. Signal name Abbrev. Common ($)

A ATC control parameter R10600

S

MP1,MP2

PR1,PR2

DIR

ST

RST

Axis movement

F E D C B A 9 8 7 6 5 4 3 2 1 0

R10600

Magazine No. start value

0: 1-start magazine

(Magazine No. or Pot No. starts with "1".)

1: 0-start magazine

(Magazine No. or Pot No. starts with "0".)

Pot No. expansion

0: No arbitrary setting

1: Arbitrary setting

Number of tools per magazine

0: No arbitrary setting

1: Arbitrary setting

Designation of number of digits for tool No. to be displayed

0: T4-digit

Display only the last 4 digits of the tool No.

1: T8-digit

Arrange the first and last 4 digits of the tool No.
to display in 8 digits. Designation of the number of spindles and
standby tools to be displayed
00000000: Spindle
00000001: Spindle, standby 1
00000010: Spindle, standby 1 to standby 2
00000011: Spindle, standby 1 to standby 3
00000100: Spindle, standby 1 to standby 4
Others: No display

Pot No. expansion (R10600/bit2)
This function allows pot head No. for each magazine to be set arbitrarily.
[When the pot head No. is set to "No arbitrary setting"]
The pot head No. for each magazine is "1" or "0", depending on the setting of the "magazine No. start value" of the ATC control parameter (R10600/bit1).
(Example 1) When the magazine No. starts with "1" ("R10600/bit1" is set to "0")
(Example 2) When the magazine No. starts with "0" ("R10600/bit1" is set to "1")
Set the following R registers.
R10600 : 0x0000
Number of digits for tool No. to be displayed : T4-digit
Magazine No. start value : 1-start magazine
Pot No. expansion : No arbitrary setting
Number of tools per magazine : No arbitrary setting
R10610 : 0x000C
Number of tools for magazine 1 : 12
Set the following R registers.
R10600 : 0x0002
Number of digits for tool No. to be displayed : T4-digit
Magazine No. start value : 0-start magazine
Pot No. expansion : No arbitrary setting
Number of tools per magazine : No arbitrary setting
R10610 : 0x000C
Number of tools for magazine 1 : 12

[When the pot head No. is set to "Arbitrary setting"]
Set pot head No. for each magazine in the following registers.
1st magazine pot head No. (R10695)
2nd magazine pot head No. (R10696)
3rd magazine pot head No. (R10697)
4th magazine pot head No. (R10698)
5th magazine pot head No. (R10699)
(1) The pot head No. for each magazine is the value set in the register for "Pot head No. for each magazine" (R10695 to R10699) regardless of "magazine No. start value" (R10600/bit1) of the ATC control parameter.
(2) Numerical value "0" to "8999" can be set in the register for "Pot head No. for each magazine" (R10695 to R10699).
When a value out of the range is set, pot No. is displayed from "1" or "0", depending on the setting of "magazine No. start value" (R10600/bit1).
(Example 1) Pot head No. for each magazine: 10; number of tools for magazine: 12
If the pot head No. for each magazine is outside the range of "0" to "8999", follow the setting for "magazine No. start value".
(Example 2) Pot head No. for each magazine: 9000; number of tools for magazine: 12
Note
Set the following R registers.
R10600 : 0x0004
Number of digits for tool No. to be displayed: T4-digit
Magazine No. start value : 1-start magazine
Pot No. expansion : Arbitrary setting
Number of tools per magazine : No arbitrary setting
R10610 : 0x000C
Number of tools for magazine 1 : 12
R10695 : 0x000A
Pot head No. for magazine 1: 10
Set the following R registers.
R10600 : 0x0006
Number of digits for tool No. to be displayed : T4-digit
Magazine No. start value : 0-start magazine
Pot No. expansion : Arbitrary setting
Number of tools per magazine : No arbitrary setting
R10610 : 0x000C
Number of tools for magazine 1 : 12
R10695 : 0x2328
Pot head No. for magazine 1: 9000

Arbitrary setting of the number of tools per magazine (R10600/bit3)
The device assignment method of the magazine tool data is selected.
[When the number of tools per magazine is set to "No arbitrary setting" (R10600/bit3 = 0)]
There is a maximum of three rows of magazine, and the maximum number of tools that can be registered per magazine is 200.
The device assignment of the magazine tool data is fixed.
Refer to "[Example of tool data assignment when not setting arbitrarily]" for details.

[When the number of tools per magazine is set to "Arbitrary setting" (R10600/bit3 = 1)]
There is a maximum of five rows of magazine, and the total number of tools that can be registered for all the magazines is 600.
The device of the magazine tool data is assigned for the set tools in order from No. 1 magazine based on the set number of tools.
Refer to "[Example of tool data assignment when setting arbitrarily]" for details.
Number of tools per magazine
Regardless of arbitrary setting, set the number of tools to be registered for the magazine, in the following R registers of each magazine.
If there are any magazines not being used, set the designation register to "0".
To set the magazine tool arbitrarily (R10600/bit3 = 1), make sure that the number of tools is an even number.
No.1 magazine R10610
No.2 magazine R10611
No.3 magazine R10612
No.4 magazine R10613
No.5 magazine R10614

ATC file register
The file registers used with ATC are as shown below.
Corresponding file register (R)
Data type Magazine No.1 magazine No.2 magazine No.3 magazine No.4 magazine No.5 magazine
T4-digit/T8-digit
specifications T4-digit T8-digit T4-digit T8-digit T4-digit T8-digit T4-digit T8-digit T4-digit T8-digit
ATC control parame ter
R10600 <- <- <- <- <- <- <- <- <-
Number of maga zines designation
R10610 <- R10611 <- R10612 <- R10613 <- R10614 <- BIN
Pointer designation R10615 <- R10616 <- R10617 <- R10618 <- R10619 <- BIN
Spindle tool R10620 R10620
R10621
R10630 R10630
R10631
R10640 R10640
R10641
R10650 R10650
R10651
R10660 R10660
R10661
BCD
Standby 1 tool R10621 R10622
R10623
R10631 R10632
R10633
R10641 R10642
R10643
R10651 R10652
R10653
R10661 R10662
R10663
BCD
Standby 2 tool R10622 R10624
R10625
R10632 R10634
R10635
R10642 R10644
R10645
R10652 R10654
R10655
R10662 R10664
R10665
BCD
Standby 3 tool R10623 R10626
R10627
R10633 R10636
R10637
R10643 R10646
R10647
R10653 R10656
R10657
R10663 R10666
R10667
BCD
Standby 4 tool R10624 R10628
R10629
R10634 R10638
R10639
R10644 R10648
R10649
R10654 R10658
R10659
R10664 R10668
R10669
BCD
Spindle tool D R10670 <- R10675 <- R10680 <- R10685 <- R10690 <- BIN
Standby 1 tool D R10671 <- R10676 <- R10681 <- R10686 <- R10691 <- BIN

Standby 2 tool D R10672 <- R10677 <- R10682 <- R10687 <- R10692 <- BIN
Standby 3 tool D R10673 <- R10678 <- R10683 <- R10688 <- R10693 <- BIN
Standby 4 tool D R10674 <- R10679 <- R10684 <- R10689 <- R10694 <- BIN
AUX data R10604 <- <- <- <- <- <- <- <- <- BIN
Pot head No. for each
magazine
R10695 <- R10696 <- R10697 <- R10698 <- R10699 <- BIN
Magazine
tool data
Pot 1
(MG1):
When not setting arbitrarily
Magazine tool data assignment is fixed.
Refer to "Arbitrary setting of the number of tools per magazine (R10600/bit3)" and "[Example of tool data assign ment when not setting arbitrarily]" for details.
When setting arbitrarily
Magazine tool data assignment varies.
Refer to "Arbitrary setting of the number of tools per magazine (R10600/bit3)" and "[Example of tool data assign ment when setting arbitrarily]" for details.
Magazine
tool data
(Aux. D)
Pot 1:

[Example of tool data assignment when not setting arbitrarily]
[Magazine tool data]
[Magazine tool data (Aux. D)]
(*1) "n" and "m" indicate the Pot No. (n: 1 to 120, m: 121 to 200)
Pot No.1 magazine No.2 magazine No.3 magazine No.4 magazine No.5 magazine Data
T4-digit T8-digit T4-digit T8-digit T4-digit T8-digit T4-digit T8-digit T4-digit T8-digit type
Pot 1
(MG1)
R10700 R10700
R10701
R11060 R11060
R11061
R11420 R11420
R11421
- - - - BCD
Pot 2
(MG2)
R10701 R10702
R10703
R11061 R11062
R11063
R11421 R11422
R11423
- - - - BCD
Pot 3
(MG3)
R10702 R10704
R10705
R11062 R11064
R11065
R11422 R11424
R11425
- - - - BCD
:
Pot n (*1)
(MGn)
R10700+
(n-1)
R10700+
2(n-1)
R10701+
2(n-1)
R11060+
(n-1)
R11060+
2(n-1)
R11061+
2(n-1)
R11420+
(n-1)
R11420+
2(n-1)
R11421+
2(n-1)
- - - - BCD
:
Pot 119
(MG119)
R10818 R10936
R10937
R11178 R11296
R11297
R11538 R11656

R11657
- - - - BCD
Pot 120
(MG120)
R10819 R10938
R10939
R11179 R11298
R11299
R11539 R11658
R11659
- - - - BCD
Pot 121
(MG121)
ZR4000 ZR4000
ZR4001
ZR4240 ZR4240
ZR4241
ZR4480 ZR4480
ZR4481
- - - - BCD
Pot 122
(MG122)
ZR4001 ZR4002
ZR4003
ZR4241 ZR4242
ZR4243
ZR4481 ZR4482
ZR4483
- - - - BCD
:
Pot m (*1)
(MGm)
ZR4000+
(m-121)
ZR4000+
2(m-121)
ZR4001+
2(m-121)
ZR4240+
(m-121)
ZR4240+
2(m-121)
ZR4241+
2(m-121)
ZR4480+
(m-121)
ZR4480+
2(m-121)
ZR4481+
2(m-121)
- - - - BCD
:
Pot 200
(MG200)
ZR4079 ZR4158
ZR4159
ZR4319 ZR4398
ZR4399
ZR4559 ZR4638
ZR4639
- - - - BCD
Pot No.1 magazine No.2 magazine No.3 magazine No.4 magazine No.5 magazine Data
T4-digit T8-digit T4-digit T8-digit T4-digit T8-digit T4-digit T8-digit T4-digit T8-digit type
Pot 1 R10940 <- R11300 <- R11660 <- - - - - BIN
Pot 2 R10941 <- R11301 <- R11661 <- - - - - BIN
Pot 3 R10942 <- R11302 <- R11662 <- - - - - BIN
:
Pot n (*1) R10940+
(n-1)
<- R11300+
(n-1)
<- R11660+
(n-1)
<- - - - - BIN
:
Pot 119 R11058 <- R11418 <- R11778 <- - - - - BIN
Pot 120 R11059 <- R11419 <- R11779 <- - - - - BIN
Pot 121 ZR4160 <- ZR4400 <- ZR4640 <- - - - - BIN
Pot 122 ZR4161 <- ZR4401 <- ZR4641 <- - - - - BIN
:
Pot m (*1) ZR4160+
(m-121)
<- ZR4400+
(m-121)
<- ZR4640+
(m-121)
<- - - - - BIN
:

Pot 200 ZR4239 <- ZR4479 <- ZR4719 <- - - - - BIN

[Example of tool data assignment when setting arbitrarily]
The magazine tool data is assigned for the number of tools set in order from No. 1 magazine based on the set number of tools.
(Example) Number of magazines: 5 magazines; Number of tools: 180 tools in each of No.1 magazine and No.2 magazine, 50 tools in each of No.3 to No.5 magazines
[Magazine tool data]
[Magazine tool data (Aux. D)]
(*1) "n" indicates the Pot No.
[Related signals]
(1) Display tool selection parameter (R10603)
Pot No.1 magazine No.2 magazine No.3 magazine No.4 magazine No.5 magazine Data
T4-digit T8-digit T4-digit T8-digit T4-digit T8-digit T4-digit T8-digit T4-digit T8-digit type
Pot 1
(MG1)
R10700 R10700
R10701
R11240 R11240
R11241
ZR4000 ZR4000
ZR4001
ZR4150 ZR4150
ZR4151
ZR4300 ZR4300
ZR4301
BCD
Pot 2
(MG2)
R10701 R10702
R10703
R11241 R11242
R11243
ZR4001 ZR4002
ZR4003
ZR4151 ZR4152
ZR4153
ZR4301 ZR4302
ZR4303
BCD
Pot 3
(MG3)
R10702 R10704
R10705
R11242 R11244
R11245
ZR4002 ZR4004
ZR4005
ZR4152 ZR4154
ZR4155
ZR4302 ZR4304
ZR4305
BCD
:
Pot n (*1)
(MGn)
R10700+
(n-1)
R10700+
2(n-1)
R10701+
2(n-1)
R11240+
(n-1)
R11240+
2(n-1)
R11241+
2(n-1)
ZR4000+
(n-1)
ZR4000+
2(n-1)
ZR4001+
2(n-1)
ZR4150+
(n-1)
ZR4150+
2(n-1)
ZR4151+
2(n-1)
ZR4300+
(n-1)
ZR4300+
2(n-1)
ZR4301+

2(n-1)
BCD
:
Pot 49
(MG119)
R10748 R10796
R10797
R11288 R11336
R11337
ZR4048 ZR4096
ZR4097
ZR4198 ZR4246
ZR4247
ZR4348 ZR4396
ZR4397
BCD
Pot 50
(MG120)
R10749 R10798
R10799
R11289 R11338
R11339
ZR4049 ZR4098
ZR4099
ZR4199 ZR4248
ZR4249
ZR4349 ZR4398
ZR4399
BCD
Pot 51
(MG121)
R10750 R10800
R10801
R11290 R11340
R11341
- - - - - - BCD
:
Pot 179
(MG179)
R10878 R11056
R11057
R11418 R11596
R11597
- - - - - - BCD
Pot 180
(MG180)
R10879 R11058
R11059
R11419 R11598
R11599
- - - - - - BCD
Pot No.1 magazine No.2 magazine No.3 magazine No.4 magazine No.5 magazine Data
T4-digit T8-digit T4-digit T8-digit T4-digit T8-digit T4-digit T8-digit T4-digit T8-digit T4-digit type
Pot 1 R11060 <- R11600 <- ZR4100 <- ZR4250 <- ZR4400 <- BIN
Pot 2 R11061 <- R11601 <- ZR4101 <- ZR4251 <- ZR4401 <- BIN
Pot 3 R11062 <- R11602 <- ZR4102 <- ZR4252 <- ZR4402 <- BIN
:
Pot n (*1) R11060+
(n-1)
<- R11600+
(n-1)
<- ZR4100+
(n-1)
<- ZR4250+
(n-1)
<- ZR4400+
(n-1)
<- BIN
:
Pot 49 R11108 <- R11648 <- ZR4148 <- ZR4298 <- ZR4448 <- BIN
Pot 50 R11109 <- R11649 <- ZR4149 <- ZR4299 <- ZR4449 <- BIN
Pot 51 R11110 <- R11650 <- - - - - - - BIN
:
Pot 179 R11238 <- R11778 <- - - - - - - BIN
Pot 180 R11239 <- R11779 <- - - - - - - BIN

[Function]
This is used to specify whether or not the spindle/standby tools names are displayed on the comment display area of the tool registration screen.
[Operation]
[Related signals]
(1) ATC control parameter (R10600)
[Function] [Operation]
This signal indicates spindle No. in use.
[Function] [Operation]

This signal indicates standby tool No.
[Function]
The time at which the machining starts is stored in the total (seconds) from January 1, 1970.
[Operation]
When the machining is completed, this sets the time of cycle start automatically.
The time is not set in the case of restarting after automatic operation pause (halt) or block stop.
In the case of repeating with M99, the time at which the machining is completed is set as the start time of the next cycle.
When MES interface library function is invalid, this signal is set to "0".
[Function]
The time at which the machining is complete is stored in the total (seconds) from January 1, 1970.
[Operation]
When the M code registered in "#8001 WRK COUNT M" is executed, the time of execution is set automatically.
When "0" is set in "#8001 WORK COUNT M" and when M02 or M30 is executed, the time of execution is set automatically.
When MES interface library function is invalid, this signal is set to "0".
Cont. Signal name Abbrev. Common ($)
A Display tool selection parameter R10603
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Spindle tool No. R12200,
1
R12210,
1
R12220,
1
R12230,
1
R12240,
1
R12250,
1
R12260,
1
R12270,
1
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Standby tool No. R12202,
3
R12212,
3
R12222,
3
R12232,
3
R12242,
3
R12252,
3
R12262,
3
R12272,
3
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A MES interface library:
Machining start time
R14700,
1
R14950,
1
R15200,
1
R15450,
1
R15700,
1
R15950,
1
R16200,
1
R16450,
1
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A MES interface library:
Machining end time
R14702,
3
R14952,
3
R15202,
3
R15452,
3
R15702,
3
R15952,
3
R16202,
3
R16452,

3
Selection of display
Spare Spare
1: Displays the spindle/standby tools names
0: Does not display the spindle/standby tools names
R10603 FEDCBA9 8 7 6 5 4 3 2 1 0

[Function]
The cycle time is stored here. The unit is [ms].
[Operation]
This signal specifies the time (ms) from cycle start until the M code registered in "#8001 WRK COUNT M" is performed.
When "0" is set in "#8001 WRK COUNT M", this signal specifies the time (ms) from cycle start until M02 or M30 is performed.
When the cycle time exceeds "499:59:59.999", "1799999999" is set.
When MES interface library function is invalid, this signal is set to "0".
[Function]
The program number at the time of the machining start is stored here.
[Operation]
When the machining is completed, this sets the ASCII code (hexadecimal number) corresponding to the program number of that machining start automatically.
When MES interface library function is invalid, this signal is set to "0".
[Function]
The N number at the time of the machining start is stored here.
[Operation]
When the machining is completed, this sets the N number of that machining start automatically.
When MES interface library function is invalid, this signal is set to "0".
[Function]
The B number at the time of the machining start is stored here.
[Operation]
When the machining is completed, this sets the B number of that machining start automatically.
When MES interface library function is invalid, this signal is set to "0".
[Function]
The maximum current of the 1st spindle at the time of the machining completion is stored here.
[Operation]
When the machining is completed, the maximum current of the 1st spindle since the machining start is automatically set.
The maximum current is set by 1% increments regardless of the value of "#1256 set28/bit2" (Change current FB (load) output unit).
When MES interface library function is invalid, this signal is set to "0".
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A MES interface library:
Cycle time
R14704,
5
R14954,
5
R15204,
5
R15454,
5
R15704,
5
R15954,
5
R16204,
5
R16454,
5
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A MES interface library:
Program number at machining start
R14706
to
R14721
R14956
to
R14971
R15206
to
R15221
R15456
to
R15471
R15706
to
R15721
R15956
to
R15971
R16206
to
R16221
R16456
to
R16471
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8

A MES interface library:
N number at machining start
R14722,
3
R14972,
3
R15222,
3
R15472,
3
R15722,
3
R15972,
3
R16222,
3
R16472,
3
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A MES interface library:
B number at machining start
R14724,
5
R14974,
5
R15224,
5
R15474,
5
R15724,
5
R15974,
5
R16224,
5
R16474,
5
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A MES interface library:
Spindle 1 maximum load R14726 R14976 R15226 R15476 R15726 R15976 R16226 R16476

[Function]
The maximum current of the 2nd spindle at the time of the machining completion is stored here.
[Operation]
When the machining is completed, the maximum current of the 2nd spindle since the machining start is automatically set.
The maximum current is set by 1% increments regardless of the value of "#1256 set28/bit2" (Change current FB (load) output unit).
When MES interface library function is invalid, this signal is set to "0".
[Function]
The power consumption amount at the time of the machining completion is stored here.
[Operation]
When the machining is completed, the power consumption amount (Wh) obtained by EcoMonitorLight station #1 is automatically set.
When the MES interface library function is invalid or the device is not connected with EcoMonitorLight, this signal is set to "0".
[Related signals]
(1) EcoMonitorLight connection: Station #1 consumed power (R14000,1)
[Function]
The power regeneration amount at the time of machining completion is stored here.
[Operation]
When the machining is completed, the power regeneration amount (Wh) obtained by EcoMonitorLight station #1 is automatically set.
When the MES interface library function is invalid or the device is not connected with EcoMonitorLight, this signal is set to "0".
[Related signals]
(1) EcoMonitorLight connection: Station #1 regenerated power (R14002,3)
[Function]
This signal displays the tool number.
[Operation]
The tool number displayed on the R register "T code data 1" commanded by the T command is automatically stored when machining is completed.
Up to five tool number histories from the latest are stored in the R registers "Tool number 1" to "Tool number 5".
The latest is set in the R register "Tool number 1".
When MES interface library function is invalid, this signal is set to "0".
[Related signals]
(1) T code data (R536,7)
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A MES interface library:
Spindle 2 maximum load R14727 R14977 R15227 R15477 R15727 R15977 R16227 R16477
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A MES interface library:
Power consumption amount
R14728,
9
R14978,

9
R15228,
9
R15478,
9
R15728,
9
R15978,
9
R16228,
9
R16478,
9
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A MES interface library:
Power regeneration amount
R14730,
1
R14980,
1
R15230,
1
R15480,
1
R15730,
1
R15980,
1
R16230,
1
R16480,
1
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A MES interface library:
Tool number 1 to 5
R14732,
3 to
R14740,
1
R14982,
3 to
R14990,
1
R15232,
3 to
R15240,
1
R15482,
3 to
R15490,
1
R15732,
3 to
R15740,
1
R15982,
3 to
R15990,
1
R16232,
3 to
R16240,
1
R16482,
3 to
R16490,
1

[Function]
The tool offset number is stored here.
[Operation]
The tool offset number commanded by the T command is automatically set when machining is completed.
Up to five tool offset number histories from the latest are set in the R registers "Tool offset number 1" to "Tool offset number 5".
The latest is set in the R register "Tool offset number 1".
Compensation number is set for the machining center system, or tool length offset number is set for the lathe system.
When MES interface library function is invalid, this signal is set to "0".
[Function]
The tool length offset amount (M system) or the X axis tool length offset amount (L system) is stored here.
[Operation]
The tool length offset amount commanded by the T command is automatically set when machining is completed.
Up to five tool length offset histories from the latest are set in the R registers "Tool length offset 1" to "Tool length offset 5".
The latest is set in the R register "Tool length offset 1".
For M system, offset amount (for offset type I), length dimension (for offset type II), or Z axis tool length offset amount (for offset type III) is displayed. For L system, X axis tool length offset amount is displayed.

"0" is set when the tool length offset amount cannot be set, such as when the tool number is not designated.
The unit is [m].
When MES interface library function is invalid, this signal is set to "0".
[Function]
The tool radius compensation amount (M system) or the tool nose radius compensation amount (L system) is stored here.
[Operation]
The tool radius compensation amount when T command was issued is automatically set when machining is completed.
Up to five tool radius offset histories from the latest are set in the R registers "Tool radius offset 1" to "Tool radius offset 5".
The latest is set in the R register "Tool radius offset 1".
For M system, offset amount (for offset type I), radius dimension (for offset type II), or tool nose radius offset (for offset type III) is displayed. For L system, tool nose radius offset is displayed.
"0" is set when the tool radius compensation amount cannot be set, such as when the tool number is not designated.
The unit is [m].
When MES interface library function is invalid, this signal is set to "0".
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A MES interface library:
Tool offset number 1 to 5
R14742
to
R14746
R14992
to
R14996
R15242
to
R15246
R15492
to
R15496
R15742
to
R15746
R15992
to
R15996
R16242
to
R16246
R16492
to
R16496
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A MES interface library:
Tool length offset 1 to 5
R14748,
9 to
R14756,
7
R14998,
9 to
R15006,
7
R15248,
9 to
R15256,
7
R15498,
9 to
R15506,
7
R15748,
9 to
R15756,
7
R15998,
9 to
R16006,
7
R16248,
9 to
R16256,
7
R16498,
9 to
R16506,
7
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A MES interface library:
Tool radius offset 1 to 5
R14758,
9 to
R14766,
7
R15008,
9 to
R15016,
7
R15258,

9 to
R15266,
7
R15508,
9 to
R15516,
7
R15758,
9 to
R15766,
7
R16008,
9 to
R16016,
7
R16258,
9 to
R16266,
7
R16508,
9 to
R16516,
7

[Function]
The tool length wear amount (M system) or the X axis tool wear amount (L system) is stored here.
[Operation]
The tool length wear amount is automatically set when a T command is commanded. Up to five tool length wear amount histories from the latest tool length wear amount are set in the R register "Tool length wear amount 1" to "Tool length wear amount 5". The latest is set in the R register "Tool length wear amount 1".
For M system, compensation amount (for compensation type I), length wear (for compensation type II), or Z axis tool wear (for compensation type III) is displayed. For L system, X axis tool wear is displayed.
"0" is set when the tool length wear amount cannot be set, such as when the tool number is unspecified. The unit is [m].
When MES interface library function is invalid, this signal is set to "0".
[Function]
The tool radius wear amount (M system) or the X axis tool radius wear amount (L system) is stored here.
[Operation]
The tool radius wear amount when T command is issued is automatically set. Up to five tool radius wear amount histories from the latest tool radius wear amount are set in the R register "Tool radius wear amount 1" to "Tool radius wear amount 5". The latest is set in the R register "Tool radius wear amount1".
For M system, compensation amount (for compensation type I), radius wear (for compensation type II), or tool nose radius wear (for compensation type III) is displayed. For L system, tool nose radius wear is displayed.
"0" is set when the tool radius wear amount cannot be set, such as when the tool number is unspecified. The unit is [m].
When MES interface library function is invalid, this signal is set to "0".
[Function]
The tool lives data at the time of machining completion are stored here.
[Operation]
The tool lives (cumulative cutting hours or cumulative number of cuttings) for the tools set in the R register "Tool number 1" to "Tool number 5" (R14732 to R14741) are automatically set at the time of the machining completion.
Five tool life histories from the latest tool life are set in the R register "Tool life 1" to R register "Tool life 5". The latest is set in the R register "Tool life 1".
The tool life is set only when the tool life management I is valid for both M and L systems.
"0" is set when tool life management II or III is valid or tool life management function is invalid.
Data type depends on the setting of management method for M system. Specify the data type in minutes in the case of usage time and specify it by the number of times in the case of usage count. Specify usage time in minutes for L system.
"0" is set when tool lives are unsettable, such as when the tool numbers are unspecified.
When MES interface library function is invalid, this signal is set to "0".
[Function]
The time at which an alarm occurs is stored in the total (seconds) from January 1, 1970.
[Operation]
When an alarm occurs, the time of alarm occurrence is automatically set.
When MES interface library function is invalid, this signal is set to "0".
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A MES interface library:
Tool length wear amount 1 to 5
R14768,
9 to
R14776,
7
R15018,
9 to
R15026,
7
R15268,
9 to
R15276,
7
R15518,
9 to
R15526,
7
R15768,
9 to
R15776,
7

R16018,
9 to
R16026,
7
R16268,
9 to
R16276,
7
R16518,
9 to
R16526,
7
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A MES interface library:
Tool radius wear amount 1 to 5
R14778,
9 to
R14786,
7
R15028,
9 to
R15036,
7
R15278,
9 to
R15286,
7
R15528,
9 to
R15536,
7
R15778,
9 to
R15786,
7
R16028,
9 to
R16036,
7
R16278,
9 to
R16286,
7
R16528,
9 to
R16536,
7
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A MES interface library:
Tool life 1 to 5
R14788,
9 to
R14796,
7
R15038,
9 to
R15046,
7
R15288,
9 to
R15296,
7
R15538,
9 to
R15546,
7
R15788,
9 to
R15796,
7
R16038,
9 to
R16046,
7
R16288,
9 to
R16296,
7
R16538,
9 to
R16546,
7
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A MES interface library:
Time of alarm occurrence
R14798,
9
R15048,

9
R15298,
9
R15548,
9
R15798,
9
R16048,
9
R16298,
9
R16548,
9

[Function]
The alarm numbers at the alarm occurrence are stored here.
[Operation]
When an alarm occurs, the latest alarm number is automatically set.
Up to four alarm number histories from the latest are set in the R registers "Alarm number 1" to "Alarm number 4".
The latest is set in the R register "Alarm number 1".
When MES interface library function is invalid, this signal is set to "0".
[Function]
The power ON time at an alarm occurrence is stored. The unit is [s].
[Operation]
When an alarm occurs, the power ON time at that time is automatically set.
The power ON time is the total integrated time of the time from NC power ON to OFF.
When the power ON time exceeds "59999:59:59", "215999999" is set.
When MES interface library function is invalid, this signal is set to "0".
[Function]
The program number at the alarm occurrence is stored here.
[Operation]
When an alarm occurs, this automatically sets the ASCII code (hexadecimal number) corresponding to the program number at that time.
When MES interface library function is invalid, this signal is set to "0".
[Function]
The subprogram number at the alarm occurrence is stored here.
[Operation]
When an alarm occurs, the ASCII code (hexadecimal number) corresponding to the subprogram at that time is specified automatically.
"0" is specified while subprogram is not in execution.
When MES interface library function is invalid, this signal is set to "0".
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A MES interface library:
Alarm number 1
R14800
to
R14815
R15050
to
R15065
R15300
to
R15315
R15550
to
R15565
R15800
to
R15815
R16050
to
R16065
R16300
to
R16315
R16550
to
R16565
A MES interface library:
Alarm number 2
R14816
to
R14831
R15066
to
R15081
R15316
to
R15331
R15566
to
R15581
R15816
to
R15831

R16066
to
R16081
R16316
to
R16331
R16566
to
R16581
A MES interface library:
Alarm number 3
R14832
to
R14847
R15082
to
R15097
R15332
to
R15347
R15582
to
R15597
R15832
to
R15847
R16082
to
R16097
R16332
to
R16347
R16582
to
R16597
A MES interface library:
Alarm number 4
R14848
to
R14863
R15098
to
R15113
R15348
to
R15363
R15598
to
R15613
R15848
to
R15863
R16098
to
R16113
R16348
to
R16363
R16598
to
R16613
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A MES interface library:
Power ON time
R14864,
5
R15114,
5
R15364,
5
R15614,
5
R15864,
5
R16114,
5
R16364,
5
R16614,
5
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A MES interface library:
Program number at alarm
R14866
to
R14881
R15116
to

R15131
R15366
to
R15381
R15616
to
R15631
R15866
to
R15881
R16116
to
R16131
R16366
to
R16381
R16616
to
R16631
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A MES interface library:
Subprogram number at alarm
R14882
to
R14897
R15132
to
R15147
R15382
to
R15397
R15632
to
R15647
R15882
to
R15897
R16132
to
R16147
R16382
to
R16397
R16632
to
R16647

[Function]
The sequence number at the alarm occurrence is stored here.
[Operation]
When an alarm occurs, the sequence number at that time is automatically set.
When MES interface library function is invalid, this signal is set to "0".
[Function]
The block number at the alarm occurrence is stored here.
[Operation]
When an alarm occurs, the block number at that time is automatically set.
When MES interface library function is invalid, this signal is set to "0".
[Function]
The G code at the alarm occurrence is stored here.
[Operation]
When an alarm occurs, the G code corresponding to the G code modal is set in ASCII code.
The modal status of G code is set according to R register "G code modal registration selection" (R14604,5).
When MES interface library function is invalid, this signal is set to "0".
[Related signals]
(1) MES interface library: G code modal registration selection (R14604,5)
[Function]
The current of the 1st spindle at the alarm occurrence is stored here.
[Operation]
When an alarm occurs, the current of the 1st spindle is automatically set.
The maximum current is set by 1% increments regardless of the value of "#1256 set28/bit2" (Change current FB (load) output unit).
When MES interface library function is invalid, this signal is set to "0".
[Function]
The current of the 2nd spindle at the alarm occurrence is stored here.
[Operation]
When an alarm occurs, the current of the 2nd spindle is automatically set.
The maximum current is set by 1% increments regardless of the value of "#1256 set28/bit2" (Change current FB (load) output unit).
When MES interface library function is invalid, this signal is set to "0".
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A MES interface library:
N number at alarm
R14898,
9
R15148,

9
R15398,
9
R15648,
9
R15898,
9
R16148,
9
R16398,
9
R16648,
9
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A MES interface library:
B number at alarm
R14900,
1
R15150,
1
R15400,
1
R15650,
1
R15900,
1
R16150,
1
R16400,
1
R16650,
1
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A MES interface library:
G code modal status
R14902
to
R14933
R15152
to
R15183
R15402
to
R15433
R15652
to
R15683
R15902
to
R15933
R16152
to
R16183
R16402
to
R16433
R16652
to
R16683
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A MES interface library:
Spindle 1 load R14934 R15184 R15434 R15684 R15934 R16184 R16434 R16684
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A MES interface library:
Spindle 2 load value R14935 R15185 R15435 R15685 R15935 R16185 R16435 R16685

[Function]
The tool number at the alarm occurrence is stored here.
[Operation]
When an alarm occurs, this automatically sets the tool number displayed on the R register "T code data 1" at that time.
When MES interface library function is invalid, this signal is set to "0".
[Related signals]
(1) T code data (R536,7)
[Function]
The tool offset number at the alarm occurrence is stored here.
[Operation]
When an alarm occurs, the tool offset number of that time is automatically set.
Compensation number is set for the machining center system, and tool length offset number is set for the lathe system.
[Function]
The tool length offset amount (M system) or the X axis tool length offset amount (L system) at the alarm occurrence is stored here.
[Operation]
When an alarm occurs, the tool length offset of that time is automatically set.
For M system, offset amount (for offset type I), length dimension (for offset type II), or Z axis tool length offset amount (for offset type III) is displayed. For L system, the X axis tool length offset amount is displayed.

"0" is set when the tool length offset amount cannot be set, such as when the tool number is not designated.
The unit is [m].
When MES interface library function is invalid, this signal is set to "0".
[Function]
The tool radius compensation amount (M system) or the tool nose radius compensation amount (L system) is stored here.
[Operation]
When an alarm occurs, this automatically sets the tool radius compensation amount of that time.
For M system, offset amount (for offset type I), radius dimension (offset type II), or tool nose radius (offset type III) is displayed. For L system, the tool nose radius offset is displayed.
"0" is set when the tool radius compensation amount cannot be set, such as when the tool number is not designated.
The unit is [m].
When MES interface library function is invalid, this signal is set to "0".
[Function]
The tool length wear amount (M system) or the X axis tool wear amount (L system) when an alarm occurs is stored here.
[Operation]
The tool length wear amount at the time of alarm occurrence is automatically set.
For M system, compensation amount (for compensation type I), length wear (for compensation type II), or Z axis tool wear (for compensation type III) is displayed. For L system, X axis tool wear is displayed.
"0" is set when the tool length wear amount cannot be set, such as when the tool number is unspecified. The unit is [m].
When MES interface library function is invalid, this signal is set to "0".
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A MES interface library:
Tool number
R14936,
7
R15186,
7
R15436,
7
R15686,
7
R15936,
7
R16186,
7
R16436,
7
R16686,
7
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A MES interface library:
Tool offset number R14938 R15188 R15438 R15688 R15938 R16188 R16438 R16688
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A MES interface library:
Tool length offset
R14940,
1
R15190,
1
R15440,
1
R15690,
1
R15940,
1
R16190,
1
R16440,
1
R16690,
1
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A MES interface library:
Tool radius offset
R14942,
3
R15192,
3
R15442,
3
R15692,
3
R15942,
3
R16192,
3
R16442,
3
R16692,
3
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A MES interface library:
Tool length wear amount
R14944,
5
R15194,
5
R15444,

5
R15694,
5
R15944,
5
R16194,
5
R16444,
5
R16694,
5

[Function]
The tool radius wear amount (M system) or the tool nose radius wear amount (L system) is stored here.
[Operation]
The tool radius wear amount at the time of alarm occurrence is automatically set.
For M system, compensation amount (for compensation type I), length wear (for compensation type II), or Z axis tool wear (for compensation type III) is displayed. For L system, X axis tool wear is displayed.
"0" is set when the tool radius wear amount cannot be set, such as when the tool number is unspecified. The unit is [m].
When MES interface library function is invalid, this signal is set to "0".
[Function]
The tool life data when an alarm occurs is stored.
[Operation]
The tool life (cumulative cutting hours and cumulative number of cuttings) for the tool being used at the time of alarm occurrence is automatically set.
The tool life data is set only when the tool life management I is valid for both M and L systems.
"0" is set when tool life management II or III is valid or tool life management function is invalid.
Data type depends on the setting of management method for M system. Specify the data type in minutes in the case of usage time and specify it by the number of times in the case of usage count. Specify usage time in minutes for L system.
"0" is set when tool lives are unsettable such as tool numbers are unspecified.
When MES interface library function is invalid, this signal is set to "0".
[Function]
This start bit executes the power value collection.
[Operation]
When "1" is written to Bit0, the power value collecting function is executed based on the setting values written in R20289 to R20291.
The bit is cleared to zero in the next cycle.
Bit0
1: Start
0: Stop
This register holds the value even after the power is turned OFF.
[Related signals]
(1) EcoMonitorLight connection: Completion bit (R14400)
(2) EcoMonitorLight connection: Completion status (R14401)
(3) EcoMonitorLight connection: Acquired data (R14402 to R14405)
(4) EcoMonitorLight connection: Station No. (R20289)
(5) EcoMonitorLight connection: Register address (R20290)
(6) EcoMonitorLight connection: Size of data to read (R20291)
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A MES interface library:
Tool radius wear amount
R14946,
7
R15196,
7
R15446,
7
R15696,
7
R15946,
7
R16196,
7
R16446,
7
R16696,
7
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A MES interface library:
Tool life
R14948,
9
R15198,
9
R15448,
9
R15698,
9
R15948,
9
R16198,
9
R16448,
9
R16698,

[Function]
This register sets the information required for the power value collection.
[Operation]
The required information is set with user's ladder program.
These data is read into CNC by writing "1" to R20288.
This register holds the value even after the power is turned OFF.
[Related signals]
(1) EcoMonitorLight connection: Read start bit (R20288)
(2) EcoMonitorLight connection: Completion bit (R14400)
(3) EcoMonitorLight connection: Completion status (R14401)
(4) EcoMonitorLight connection: Acquired data (R14402 to R14405)
[Function] [Operation]
An interfering object to be used in the interference check III is selected.
Cont. Signal name Abbrev. Common ($)
A EcoMonitorLight connection: Station No. R20289
A EcoMonitorLight connection: Register address R20290
A EcoMonitorLight connection: Size of data to read R20291
Cont. Signal name Abbrev. Common ($)
A Interference check III: Interfering object selection ITF3DFTH R20304 to
R20449

System vari able R register Item Details
Setting range (unit)
Upper: System variable
Lower: R register
#40000 R20304 Interfering object enable/dis able designation
Set enable/disable for each in terfering object.
Bit designation (0: enable 1: dis able)
bit0: Disable 1st interfering ob ject
:
bitF: Disable 16th interfering
object
0 to 65535 (decimal)
0x0000 to 0xFFFF (hexadeci mal)
#40001 R20305 Spare 0
0
40002 R20306 1st interfering object selection Select interfering object defini tion No. to use.
0 to 128 (0: not selected)
0 to 128 (0: not selected)
#40003 R20307 1st interfering object specifica tion
In the configured solid specifi cation of the interfering object
definition, specify alarm area/
warning area/solid setting inval id of the solid in which switching
method is selected.
0, 1: Alarm area
2: Warning area
3: Solid setting invalid
0 to 3
0 to 3
#40004 R20308 (L) 1st interfering model coordinate
system
I axis offset 1
Set the interfering model coor dinate system offset with a radi us value. (I axis direction) (*1)
-99999.999 to 99999.999 (mm)
(radius value) R20309 (H)
#40005 R20310 (L) 1st interfering model coordinate
system
J axis offset 1
Set the interfering model coor dinate system offset with a radi us value. (J axis direction) (*1) R20309 (H) -99999999 to 99999999 (mm)
(radius value)
#40006 R20312 (L) 1st interfering model coordinate
system
K axis offset 1
Set the interfering model coor dinate system offset with a radi us value. (K axis direction) (*1) R20313 (H)
: :
#40077 R20426 16th interfering object selection Same as above Same as above
#40078 R20427 16th interfering object specifica tion selection
Same as above Same as above
#40079 R20428 (L) 16th interfering model coordi nate system
I axis offset 1
Same as above Same as above
R20429 (H)
#40080 R20430 (L) 16th interfering model coordi nate system
J axis offset 1
Same as above Same as above
R20431 (H)
#40081 R20432 (L) 16th interfering model coordi nate system
K axis offset 1

Same as above Same as above
R20433 (H)
#40082 R20434 1st interfering object Interfer ence check III: Specifying dis abled interference object
Select an interfering object that
you do not check the interfer ence with the 1st interfering ob ject.
bit0: Disable 1st interfering ob ject (inaction data)
bit1: Disable 2nd interfering ob ject
:
bitF: Disable 16th interfering
object
0 to 65535 (decimal)
0x0000 to 0xFFFF (hexadeci mal)

(*1) The interfering model coordinate system offset is the sum of interfering model coordinate system offsets 1 and 2.
[Function]
This signal is used to select the PLC axis for insulation resistance measurement.
[Operation]
When the control starts measuring the motor insulation resistance, the measurement starts on the axis for which the signal is ON.
[Related signals]
(1) Diagnosis data output: Motor insulation degradation detection request (IDDD: R20481)
#40083 R204325 2nd interfering object: Specify ing disabled object with interfer ence check III
Select an interfering object that
you do not check the interfer ence with the 2nd interfering ob ject.
bit0: Disable 1st interfering ob ject
bit1: Disable 2nd interfering ob ject (inaction data)
:
bitF: Disable 16th interfering
object
0 to 65535 (decimal)
0x0000 to 0xFFFF (hexadeci mal)
: :
#40097 R20449 16th interfering object: Specify ing disabled object with interfer ence check III
Select an interfering object that
you do not check the interfer ence with the 16th interfering
object.
bit0: Disable 1st interfering ob ject
bit1: Disable 2nd interfering ob ject
:
bitF: Disable 16th interfering
object (inaction data)
0 to 65535 (decimal)
0x0000 to 0xFFFF (hexadeci mal)
Cont. Signal name Abbrev. Common ($)
A Diagnosis data output: Select axis for servomotor insulation
degradation detection (PLC axis) SVIDDDAX R20450
System vari able R register Item Details
Setting range (unit)
Upper: System variable
Lower: R register
F E D C B A 9 8 7 6 5 4 3 2 1 0
:
Degradation detection axis selection 1st axis
Degradation detection axis selection 2nd axis
Degradation detection axis selection 16th axis

[Function]
This signal is used to select the spindle for insulation resistance measurement.
[Operation]
When the control starts measuring the motor insulation resistance, the measurement starts on the spindle for which the signal is ON.
[Related signals]
(1) Diagnosis data output: Motor insulation degradation detection request (IDDD: R20481)
[Function]
This signal is used to set the override value of the laser output (W).
[Operation]
This register can be set within the range of 0% to 100% in 1% increment.
When a value larger than 100% is set, the value is regarded as 100%.
[Related signals]
(1) Laser: Laser beam irradiation ON (Y1CA7)
[Function]
Touchscreen operation can be temporarily disabled by using this signal (TP_INVALD).
[Operation]
When you turn ON (disable) R20480 bit0, the touchscreen operation is disabled.
When you change R20480 bit0 from OFF (enable) to ON (disable) with the touchscreen pressed, the touch is interpreted to be released at the time of ON.
When you change R20480 bit0 from ON (disable) to OFF (enable) with the touchscreen pressed, the touch is interpreted to be made at the time of OFF.
Cont. Signal name Abbrev. Common ($)
A Diagnosis data output: Select spindle for motor insulation
degradation detection SPIDDDAX R20451
Cont. Signal name Abbrev. Common ($)

A Laser: Laser output override R20453
Cont. Signal name Abbrev. Common ($)
A Touchscreen operation disabled TP_INVALID R20480
F E D C B A 9 8 7 6 5 4 3 2 1 0
:
Degradation detection axis selection 1st spindle
Degradation detection axis selection 2nd spindle
Degradation detection axis selection 16th spindle

[Function]
This signal enables the measurement of motor insulation resistance.
[Operation]
The insulation resistance measurement starts when emergency stop is canceled while "R20481/bit0" is ON.
The measurement is performed for the axis selected by "Select axis for servomotor insulation degradation detection" or for the spindle selected by "Select spindle for motor insulation degradation detection".
The servo ready sequence is held until the measurement of insulation resistance is completed.
Irrespective of this signal, if the emergency stop is canceled for the first time after turning ON the NC power with "#6456/bit4" (Motor insulation deterioration detection ON) set to "1", the insulation resistance measurement takes place.
[Operation sequence]
[Related signals]
(1) Diagnosis data output: Servomotor insulation degradation detection in progress (SVIDDD: R20522)
(2) Diagnosis data output: Spindle motor insulation degradation detection in progress (SPIDDD: R20048)
(3) Diagnosis data output: Select axis for servomotor insulation degradation detection (SVIDDDAX: R22501)
(4) Diagnosis data output: Select spindle for motor insulation degradation detection (SPIDDDAX: R20451)
Cont. Signal name Abbrev. Common ($)
A Diagnosis data output: Motor insulation degradation detec tion request IDDD R20481
F E D C B A 9 8 7 6 5 4 3 2 1 0
Degradation detection request
Emergency stop (QEMG)
Motor insulation degradation
detection request (IDDD)
Select axis for servomotor insulation
degradation detection (SVIDDDAX)
Servomotor insulation degradation
detection in progress (SVIDDD)
Servo ready (RDYn)

[Function]
This signal disables the program restart function from checking whether the axis has returned to the restart position after restart search.
[Operation]
When restarting a machining program after restart search while this signal is ON, NC will not check if the axis selected by the bit of this signal has returned to the restart position, regardless of whether the command is programmed or not.
The program operation restarts at cycle start even when the said axis has not returned to the restart position.
Finish the restart search, then turn on this signal before restart the cycle. Keep this signal ON until the "In automatic operation "run"" signal (OP: XC12) turns ON.
[Caution]
(1) While this signal is ON, restart position return operation is not performed on an axis for which the parameter "#1302 AutoRP" is "1" (Automatic return to restart position) and the parameter "#2082 a_rstax" is other than "0".
(2) If an axis selected by the bit of this signal is programmed while this signal is ON, the program is able to restart even when the axis is not in the restart position. This may change the tool path after the program restart. Thus before exe cuting a cycle start, make sure that the said axis is in a position where the program is possible to restart.
[Function]
This signal is used to select the servo axis for insulation resistance measurement.
[Operation]
When the control starts measuring the motor insulation resistance, the measurement starts on the axis for which the signal is ON.
[Related signals]
(1) Diagnosis data output: Motor insulation degradation detection request (IDDD: R20481)
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A Program restart:
Restart position return check invalid R22500 R22700 R22900 R23100 R23300 R23500 R23700 R23900
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A
Diagnosis data output:
Select axis for servomotor insulation
degradation detection
SVIDDD
AX R22501 R22701 R22901 R23101 R23301 R23501 R23701 R23901
File register (R) 76543210 Bit
1st axis Program restart: Restart position return check invalid
:
:
8th axis Program restart: Restart position return check invalid
F E D C B A 9 8 7 6 5 4 3 2 1 0
:
Degradation detection axis selection 1st axis
Degradation detection axis selection 2nd axis
Degradation detection axis selection 16th axis

[Function]
This signal is used to temporarily disable the vibration cutting control. (This can be set for each axis.)
(1) Switching an axis does not change a bit position.
[Operation]
Turning this signal ON can temporarily disable the vibration cutting control of the control axis corresponding to the bits.
When this signal is ON for the axis to be vibrated at the time of cutting command in the vibration cutting mode, the operation error (M01 1302) occurs. Machining continues without the vibration cutting control.
[Caution]
After all axes in the part system are stopped, the setting of this signal becomes valid from the subsequent program blocks.
When the axes are moving, the previous status of the signal is retained. However, when the axis is stopped during the fixed cycle execution, the signal retains its status at the start of fixed cycle.
[Related signals]
(1) VCC: Mode in execution (VCC: X1810)
(2) VCC: Numbers of vibrations (VCC_VIB: R20556)
(3) VCC: Frequency (VCC_FRQ: R20557)
(4) VCC: Spindle rotation speed (VCC_SPREV: R7024,R7025)
(5) VCC: Vibrating axis (VCC_VIBAX: R20558)
(6) VCC: Temporary cancel of axis vibration (VCC_INVAX: R22532)
(7) VCC: Cause of non-vibration (VCC_FACT: R20559)
[Function]
The cutting load of spindle to be used during the cutting load control is specified in binary.
(1) When the set value is larger than the maximum number of connected spindles, the cutting load control will be dis abled.
[Operation]
During the cutting load control, the cutting load is controlled using the load value of the spindle selected by this signal.
Set the spindle to be used in the part system.
[Related signals]
(1) CLC: Maximum load (R20564)
(2) CLC: Minimum load (R20565)
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A VCC: Temporary cancel of axis vibration VCC_IN VAX R22532 R22732 R22932 R23132 R23332 R23532 R23732 R23932
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A CLC: Spindle selection R22540 R22740 R22940 R23140 R23340 R23540 R23740 R23940
Setting value Spindle Setting value Spindle
0 1st spindle 4 5th spindle
1 2nd spindle 5 6th spindle
2 3rd spindle 6 7th spindle
3 4th spindle 7 8th spindle
0123456789ABCDEF
1st axis
bit
File register
(R)
2nd axis
12th axis

Note
Note
M800V/M80V Series PLC Interface Manual
4 Explanation of Interface Signals
4.4 PLC Output Signals (Data Type: R***)
645 IB-1501616-F
[Function]
This is used to specify the machining application and machining condition in the machining condition selection I function.
"Selection of machining application" (R22564): Specify the machining application.
"Selection of machining condition" (R22565): Specify the machining condition.
[Operation]
When a value is set in the "Machining condition selection I: Selection of machining application" signal (R22564) and the "Machining condition selection I: Selection of machining condition" signal (R22565), and then the "Machining condition selection I: Machining condition parameter group switch request" signal (YC6D) is turned ON, the operation is as follows.
[When a value from 0 to 3 is set]
CNC switches the machining application and machining condition to the set ones.
When both "Selection of machining application" and "Selection of machining condition" are set to "0", the parameter is switched to the reference parameter.
[When a value other than 0 to 3 is set]
An error occurs and the bit corresponding to "Machining condition selection I: Machining condition parameter group switch error status" (R20583) is turned ON.
When the value of "Selection of machining application" (R22564) has an error, bit1 is turned ON. When the value of "Selection of machining condition" (R22565) has an error, bit2 is turned ON.
The parameter group is not switched.
[Caution]
When "0" is set in the machining application, an error occurs if any of 1 to 3 is set in the machining condition and then "Machining condition parameter group switch request" is turned ON.
When any of 1 to 3 is set in the machining application, an error occurs if "0" is set in the machining condition and then "Machining condition parameter group switch request" is turned ON.
[Related signals]
(1) Machining condition selection I: Machining condition parameter group switch request (YC6D: MCSLR)
(2) Machining condition selection I: Machining condition parameter group switch completed (XCBD: MCSLF)
(3) Machining condition selection I: Machining condition parameter group switch error status (R20583: MCSLERR)
[Function]
The setting for installing another servo motor on the detached NC axis can be transferred to the drive unit.
[Operation]
<Low-order 8 bits: NC axis switch setting number>
Set the parameter number used in NC axis switch. When "0" is set, the switch is performed by using the setting value of the original servo parameters (#2201 or later).
Setting range: 0 to 16
<High-order 8 bits: NC axis switch command>
When the "NC axis switch request" signal (bit8) turns ON, the NC axis switch parameters of the set number will be valid.
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8

A Machining condition selection I: Selection
of machining application MCSLSA R22564 R22764 R22964 R23164 R23364 R23564 R23764 R23964
A Machining condition selection I: Selection
of machining condition MCSLSC R22565 R22765 R22965 R23165 R23365 R23565 R23765 R23965
Cont. Signal name Abbrev. $1 $2 $3 $4
A Tool head hot swapping: NC axis switch n-th axis AXCHGC MD1 to 8
R25684 to
91
R25692 to
99
R25700 to
07
R25708 to
15
R25684 F EDCB A 9 8
NC axis switch request
<High-order 8 bits>
Not in use NC axis switch setting number
<Low-order 8 bits>

[Timing chart]
In the following example, the NC axis switch is performed for the first axis by using the first set of the NC axis switch
parameters.
(1) When the "Control axis detachment" signal (Y780) turns ON, the axis is detached from CNC.
(2) When the NC axis switch is requested while the axis is detached from CNC, the target axis turns to the state of NC
axis switch in progress, and the setting data of NC axis switch parameter is transferred to the drive unit according to
the value of "NC axis switch setting number" (R25684/low-order 8 bits).
(3) When the transfer is completed, the "NC axis switch in progress" signal (R25012/bit8) turns OFF, and a value is set to
the "In-use NC axis switch setting number" signal (R25012/low-order 8 bits).
(4) Change the tool head while the axis is detached. (This operation is available even while the NC axis switch is in prog ress and can be started at the same time as the (2) operation.)
(5) When (2), (3) and (4) are completed, the NC axis switch is completed. When the "Control axis detachment" signal
(Y780) turns OFF, NC axis control is enabled again and operation is possible using the setting after the switch.
[Related signals]
(1) Control axis detachment n-th axis (Y780: DTCHn)
(2) Tool head hot swapping: NC axis switch status n-th axis (R25012: AXCHGSTSn)
PLC
(1)
(2)
(3)
(4)
(5)
0 0
0
1
1
NC
Control axis detachment (Y780)
NC axis switch request (R25684/bit8)
NC axis switch setting number
(R25684/low-order 8 bits)
NC axis switch in progress (R25012/bit8)
In-use NC axis switch setting number
(R25012/low-order 8 bits)
NC axis switch completion (R25012/bit9)
Tool head hot swapping
Machine

[Function] [Operation]
If the alarm is displayed when an overheat alarm is detected in the control unit or communication terminal, the overheat
signal will be output simultaneously. If the machine is in automatic operation, the operation will be continued, but restarting
will not be possible after resetting or stopping with M02/M30. (Starting will be possible after block stop or feed hold.)
For details on the operation, etc., refer to "Temperature warning cause".
[Related signals]
(1) Temperature warning cause (R57)
(2) Control unit temperature (R60)
[Function] [Operation]
The data link status can be confirmed using this device.
SM1800 can be referred to from all the PLC projects.
Cont. Signal name Abbrev. Common ($)
A Temperature rise SM16
CAUTION
If the temperature rise detection function is invalidated with the parameters, the control could be disabled when the
temperature is excessive. This could result in machine damage or personal injuries due to runaway axis, and could
damage the device. Enable the detection function for normal use.
Cont. Signal name Abbrev. Device No.
A CC-Link IE TSN remote data link status SM1800
ON/OFF Data link status
ON Communication with the master station is in progress normally by cyclic transmission.
OFF Normal cyclic transmission is not possible because there is an abnormality in the master station, commu nication path, or CNC.

4.6 Explanation of ZR Device
4.6.1 Smart Safety Observation
4.6.1.1 PLC -> CNC
[Function]
This signal is used to start execution of the SLS observation function on the control axis.
This signal is available when the parameter "#51002 SLS_Enable" (Enable SLS observation) is set to "1" (Enable).
(This signal is ignored when the parameter "#51002 SLS_Enable" (Enable SLS observation) is set to "0" (Disable).)
[Operation]
When the "SLS observation request" signal is turned OFF (when SLS is requested), the NC carries out the following operations:
(1) Checks the SLS parameters to be used.
(2) Executes the NC's SLS observation function, and turns ON the "SLS observation is active" (SLSEm).
(3) Turns ON the "Under SLS limit" signal (SLSSm) when the axis is confirmed to have decelerated to the safely-limited speed or below.
[Related signals]
(1) SLS speed change input (SLSMImn)
(2) SLS speed change output (SLSMOmn)
(3) SLS speed override input (SLSOVRImn)
(4) SLS speed override output (SLSOVROmn)
(5) SLS observation is active (SLSEm)
(6) Under SLS limit (SLSSm)
Cont. Signal name Abbrev. 1st axis 2nd axis 3rd axis 4th axis 5th axis 6th axis 7th axis 8th axis
B SLS observation request
(control axis) *SLSRm
ZR256
bit0
ZR256
bit1
ZR256
bit2
ZR256
bit3
ZR256
bit4
ZR256
bit5
ZR256
bit6
ZR256
bit7
9th axis 10th axis 11th axis 12th axis 13th axis 14th axis 15th axis 16th axis
ZR256
bit8
ZR256
bit9
ZR256
bit10
ZR256
bit11
ZR256
bit12
ZR256
bit13
ZR256
bit14
ZR256
bit15
17th axis 18th axis 19th axis 20th axis 21th axis 22th axis 23th axis 24th axis
ZR257
bit0
ZR257
bit1
ZR257
bit2
ZR257
bit3
ZR257
bit4
ZR257
bit5
ZR257
bit6
ZR257
bit7
25th axis 26th axis 27th axis 28th axis 29th axis 30th axis 31th axis 32th axis
ZR257
bit8
ZR257
bit9
ZR257
bit10
ZR257
bit11
ZR257
bit12
ZR257

bit13
ZR257
bit14
ZR257
bit15

[Function]
This signal is used to start execution of the SLP observation function on the control axis.
This signal is available when the parameter "#51003 SLP_Enable" (Enable SLP observation) is set to "1" (Enable).
(This signal is ignored when the parameter "#51003 SLP_Enable" (Enable SLP observation) is set to "0" (Disable).)
[Operation]
When the "SLP observation request" signal is turned OFF (when SLP is requested), the NC carries out the following operations:
(1) Checks the SLP parameters to be used.
(2) Executes the NC's SLP observation function, and turns ON the "SLP observation is active" (SLPEm).
(3) Turns ON the "In SLP range" signal (SLPSm) when the axis is confirmed to be in the SLP position tolerance range.
[Related signals]
(1) SLP position change input (SLPMImn)
(2) SLP position change output (SLPMOmn)
(3) SLP observation is active (SLPEm)
(4) In SLP range (SLPSm)
[Function]
This signal is used to start execution of SSM on the control axis.
This signal is available when the parameter "#51004 SSM_Enable" (Enable Safe speed monitor) is set to "1" (Enable).
(This signal is ignored when the parameter "#51004 SSM_Enable" (Enable Safe speed monitor) is set to "0" (Disable).)
[Operation]
When the "SSM request" signal is turned OFF (when SSM is requested), the NC carries out the following operations:
(1) Checks the SSM parameters to be used.
(2) Executes the NC's Safe speed monitor function, and turns ON the "SSM is active" signal (SSMEm).
(3) Turns ON 1 to 4 of the "Under SSM safe speed" signal (SSMSmn) when the axis is confirmed to be at the safe speed or below.
[Related signals]
(1) SSM is active (SSMEm)
(2) Under SSM safe speed (SSMSmn)
Cont. Signal name Abbrev. 1st axis 2nd axis 3rd axis 4th axis 5th axis 6th axis 7th axis 8th axis
B SLP observation request
(control axis) *SLPRm
ZR258
bit0
ZR258
bit1
ZR258
bit2
ZR258
bit3
ZR258
bit4
ZR258
bit5
ZR258
bit6
ZR258
bit7
9th axis 10th axis 11th axis 12th axis 13th axis 14th axis 15th axis 16th axis
ZR258
bit8
ZR258
bit9
ZR258
bit10
ZR258
bit11
ZR258
bit12
ZR258
bit13
ZR258
bit14
ZR258
bit15
17th axis 18th axis 19th axis 20th axis 21th axis 22th axis 23th axis 24th axis
ZR259
bit0
ZR259
bit1
ZR259
bit2
ZR259
bit3
ZR259
bit4
ZR259
bit5
ZR259
bit6

ZR259
bit7
25th axis 26th axis 27th axis 28th axis 29th axis 30th axis 31th axis 32th axis
ZR259
bit8
ZR259
bit9
ZR259
bit10
ZR259
bit11
ZR259
bit12
ZR259
bit13
ZR259
bit14
ZR259
bit15
Cont. Signal name Abbrev. 1st axis 2nd axis 3rd axis 4th axis 5th axis 6th axis 7th axis 8th axis
B SSM request
(control axis) *SSMRm
ZR260
bit0
ZR260
bit1
ZR260
bit2
ZR260
bit3
ZR260
bit4
ZR260
bit5
ZR260
bit6
ZR260
bit7
9th axis 10th axis 11th axis 12th axis 13th axis 14th axis 15th axis 16th axis
ZR260
bit8
ZR260
bit9
ZR260
bit10
ZR260
bit11
ZR260
bit12
ZR260
bit13
ZR260
bit14
ZR260
bit15
17th axis 18th axis 19th axis 20th axis 21th axis 22th axis 23th axis 24th axis
ZR261
bit0
ZR261
bit1
ZR261
bit2
ZR261
bit3
ZR261
bit4
ZR261
bit5
ZR261
bit6
ZR261
bit7
25th axis 26th axis 27th axis 28th axis 29th axis 30th axis 31th axis 32th axis
ZR261
bit8
ZR261
bit9
ZR261
bit10
ZR261
bit11
ZR261
bit12
ZR261
bit13
ZR261
bit14
ZR261

bit15

[Function]
This signal is used to start execution of the Safe cam function on the control axis.
This signal is available when the parameter "#51005 SCA_Enable" (Enable safe cam) is set to "1" (Enable).
(This signal is ignored when the parameter "#51005 SCA_Enable" (Enable safe cam) is set to "0" (Disable).)
[Operation]
When the "Safe cam request" signal is turned OFF (when SCA is requested), the NC carries out the following operations:
(1) Checks the SCA parameters to be used.
(2) Executes the NC's Safe cam function and turns ON the "Safe cam is active" signal (SCAEm).
(3) Outputs the safe cam position status to the "Safe cam position" signal (SCASm).
[Related signals]
(1) Safe cam is active (SCAEm)
(2) Safe cam position (SCASmn)
[Function]
This signal is used to start execution of the SOS observation function on the control axis.
This signal is available when the parameter "#51006 SOS_Enable" (Enable Safe operating stop) is set to "1" (Enable).
(This signal is ignored when the parameter "#51006 SOS_Enable" (Enable Safe operating stop) is set to "0" (Disable).)
[Operation]
When the "SOS observation request" is turned OFF (when SOS is requested), the NC carries out the following operations:
(1) Checks the SOS parameters to be used.
(2) Executes the NC's Safe operating stop function, and turns ON the "SOS is active" signal (SOSEm).
(3) Turns ON the "In SOS stop" signal (SOSSm) when the safe standstill state of the axis is confirmed.
[Related signals]
(1) SOS is active (SOSEm)
(2) In SOS stop (SOSSm)
Cont. Signal name Abbrev. 1st axis 2nd axis 3rd axis 4th axis 5th axis 6th axis 7th axis 8th axis
B Safe cam request
(control axis) *SCARm
ZR262
bit0
ZR262
bit1
ZR262
bit2
ZR262
bit3
ZR262
bit4
ZR262
bit5
ZR262
bit6
ZR262
bit7
9th axis 10th axis 11th axis 12th axis 13th axis 14th axis 15th axis 16th axis
ZR262
bit8
ZR262
bit9
ZR262
bit10
ZR262
bit11
ZR262
bit12
ZR262
bit13
ZR262
bit14
ZR262
bit15
17th axis 18th axis 19th axis 20th axis 21th axis 22th axis 23th axis 24th axis
ZR263
bit0
ZR263
bit1
ZR263
bit2
ZR263
bit3
ZR263
bit4
ZR263
bit5
ZR263
bit6
ZR263
bit7
25th axis 26th axis 27th axis 28th axis 29th axis 30th axis 31th axis 32th axis
ZR263
bit8
ZR263
bit9
ZR263

bit10
ZR263
bit11
ZR263
bit12
ZR263
bit13
ZR263
bit14
ZR263
bit15
Cont. Signal name Abbrev. 1st axis 2nd axis 3rd axis 4th axis 5th axis 6th axis 7th axis 8th axis
B SOS observation request
(control axis) *SOSRm
ZR264
bit0
ZR264
bit1
ZR264
bit2
ZR264
bit3
ZR264
bit4
ZR264
bit5
ZR264
bit6
ZR264
bit7
9th axis 10th axis 11th axis 12th axis 13th axis 14th axis 15th axis 16th axis
ZR264
bit8
ZR264
bit9
ZR264
bit10
ZR264
bit11
ZR264
bit12
ZR264
bit13
ZR264
bit14
ZR264
bit15
17th axis 18th axis 19th axis 20th axis 21th axis 22th axis 23th axis 24th axis
ZR265
bit0
ZR265
bit1
ZR265
bit2
ZR265
bit3
ZR265
bit4
ZR265
bit5
ZR265
bit6
ZR265
bit7
25th axis 26th axis 27th axis 28th axis 29th axis 30th axis 31th axis 32th axis
ZR265
bit8
ZR265
bit9
ZR265
bit10
ZR265
bit11
ZR265
bit12
ZR265
bit13
ZR265
bit14
ZR265
bit15

[Function]
This signal is used to start execution of Safe stop 1 on the control axis.
This signal is available when the parameter "#51007 SS1_Enable" (Enable Safe stop 1) is set to "1" (Enable).

(This signal is ignored when the parameter "#51007 SS1_Enable" (Enable Safe stop 1) is set to "0" (Disable).)
[Operation]
When the "Safe stop 1 request" signal is turned OFF (when SS1 is requested), the NC carries out the following operations:
(1) Checks the SS1 parameters to be used.
(2) Executes the NC's Safe stop 1 function, and turns ON the "SS1 is active" signal (SS1Em).
(3) Turns ON the "In Safe stop 1" signal (SS1Sm) when the axis deceleration is confirmed.
[Related signals]
(1) SS1 is active (SS1Em)
(2) In safe stop 1(SS1Sm)
[Function]
This signal is used to start execution of the Safe stop 2 function on the control axis.
This signal is available when the parameter "#51008 SS2_Enable" (Enable Safe stop 2) is set to "1" (Enable).
(This signal is ignored when the parameter "#51008 SS2_Enable" (Enable Safe stop 2) is set to "0" (Disable).)
[Operation]
When the "Safe stop 2 request" signal is turned OFF (when SS1 is requested), the NC carries out the following operations:
(1) Checks the SS2 parameters to be used.
(2) Executes the NC's Safe stop 2 function, and turns ON the "SS1 is active" signal (SS2Em).
(3) Executes Safe operating stop (SOS) when the axis deceleration is confirmed.
[Related signals]
(1) SS2 is active (SS2Em)
Cont. Signal name Abbrev. 1st axis 2nd axis 3rd axis 4th axis 5th axis 6th axis 7th axis 8th axis
B Safe stop 1 request
(control axis) *SS1Rm
ZR266
bit0
ZR266
bit1
ZR266
bit2
ZR266
bit3
ZR266
bit4
ZR266
bit5
ZR266
bit6
ZR266
bit7
9th axis 10th axis 11th axis 12th axis 13th axis 14th axis 15th axis 16th axis
ZR266
bit8
ZR266
bit9
ZR266
bit10
ZR266
bit11
ZR266
bit12
ZR266
bit13
ZR266
bit14
ZR266
bit15
17th axis 18th axis 19th axis 20th axis 21th axis 22th axis 23th axis 24th axis
ZR267
bit0
ZR267
bit1
ZR267
bit2
ZR267
bit3
ZR267
bit4
ZR267
bit5
ZR267
bit6
ZR267
bit7
25th axis 26th axis 27th axis 28th axis 29th axis 30th axis 31th axis 32th axis
ZR267
bit8
ZR267
bit9
ZR267
bit10
ZR267
bit11
ZR267
bit12
ZR267
bit13
ZR267
bit14

ZR267
bit15
Cont. Signal name Abbrev. 1st axis 2nd axis 3rd axis 4th axis 5th axis 6th axis 7th axis 8th axis
B Safe stop 2 request
(control axis) *SS2Rm
ZR268
bit0
ZR268
bit1
ZR268
bit2
ZR268
bit3
ZR268
bit4
ZR268
bit5
ZR268
bit6
ZR268
bit7
9th axis 10th axis 11th axis 12th axis 13th axis 14th axis 15th axis 16th axis
ZR268
bit8
ZR268
bit9
ZR268
bit10
ZR268
bit11
ZR268
bit12
ZR268
bit13
ZR268
bit14
ZR268
bit15
17th axis 18th axis 19th axis 20th axis 21th axis 22th axis 23th axis 24th axis
ZR269
bit0
ZR269
bit1
ZR269
bit2
ZR269
bit3
ZR269
bit4
ZR269
bit5
ZR269
bit6
ZR269
bit7
25th axis 26th axis 27th axis 28th axis 29th axis 30th axis 31th axis 32th axis
ZR269
bit8
ZR269
bit9
ZR269
bit10
ZR269
bit11
ZR269
bit12
ZR269
bit13
ZR269
bit14
ZR269
bit15

[Function]
This signal is used to start execution of the Safe torque off function on the control axis.
This signal is available when the parameter "#51009 STO_Enable" (Enable Safe torque off) is set to "1" (Enable).
(This signal is ignored when the parameter "#51009 STO_Enable" (Enable Safe torque off) is set to "0" (Disable).)
[Operation]
When the "Safe torque off request" signal is turned OFF (when STO is requested), the NC carries out the following operations:
(1) Checks the STO parameters to be used.
(2) Executes the NC's Safe torque off function, and turns ON the "STO is active" signal (STOEm).
(3) Turns ON the "In Safe torque off" signal (STOSm) when the main power supply for driving the axis is shut OFF.
[Related signals]
(1) STO is active (STOEm)

(2) In Safe torque off (STOSm)

[Function]

This signal is for starting the motor brake by safety brake control.

This signal is available when the parameter "#51010 SBC_Enable" (Safe brake control enabled) is set to "1" (Enable).

(This signal is ignored when the parameter "#51010 SBC_Enable" (Safe brake control enabled) is set to "0" (Disable).)

[Operation]

By turning OFF this signal (when SBC is requested), the NC outputs the motor brake starting request to the drive unit.

When the motor brake starts, the "In SBC motor brake start" signal (SBCSm) turns ON.

When the power is shut OFF (at Safety related error, at the *STORm signal OFF, and the *SS1Rm signal OFF), the motor brake start is performed automatically. To start the motor brake independently, turn this signal OFF.

[Caution]

Even though this signal is turned OFF for the axis where the parameter "#51200 SFSPEC1/bit3" is set to "1", it is ignored.

[Related signals]

(1) Safe torque off request (*STORm)

(2) Safe stop 1 request (*SS1Rm)

(3) In SBC motor brake enabled (*SBCEm)

(4) In SBC motor brake start (SBCSm)

Cont. Signal name Abbrev. 1st axis 2nd axis 3rd axis 4th axis 5th axis 6th axis 7th axis 8th axis

B Safe torque OFF request

(control axis) *STORm

ZR270

bit0

ZR270

bit1

ZR270

bit2

ZR270

bit3

ZR270

bit4

ZR270

bit5

ZR270

bit6

ZR270

bit7

9th axis 10th axis 11th axis 12th axis 13th axis 14th axis 15th axis 16th axis

ZR270

bit8

ZR270

bit9

ZR270

bit10

ZR270

bit11

ZR270

bit12

ZR270

bit13

ZR270

bit14

ZR270

bit15

17th axis 18th axis 19th axis 20th axis 21th axis 22th axis 23th axis 24th axis

ZR271

bit0

ZR271

bit1

ZR271

bit2

ZR271

bit3

ZR271

bit4

ZR271

bit5

ZR271

bit6

ZR271

bit7

25th axis 26th axis 27th axis 28th axis 29th axis 30th axis 31th axis 32th axis

ZR271

bit8

ZR271

bit9

ZR271

bit10

ZR271

bit11

ZR271

bit12

ZR271

bit13

ZR271

bit14

ZR271

bit15

Cont. Signal name Abbrev. 1st axis 2nd axis 3rd axis 4th axis 5th axis 6th axis 7th axis 8th axis

B
SBC motor brake starting re quest
(control axis)
*SBCRm
ZR272
bit0
ZR272
bit1
ZR272
bit2
ZR272
bit3
ZR272
bit4
ZR272
bit5
ZR272
bit6
ZR272
bit7
9th axis 10th axis 11th axis 12th axis 13th axis 14th axis 15th axis 16th axis
ZR272
bit8
ZR272
bit9
ZR272
bit10
ZR272
bit11
ZR272
bit12
ZR272
bit13
ZR272
bit14
ZR272
bit15
17th axis 18th axis 19th axis 20th axis 21th axis 22th axis 23th axis 24th axis
ZR273
bit0
ZR273
bit1
ZR273
bit2
ZR273
bit3
ZR273
bit4
ZR273
bit5
ZR273
bit6
ZR273
bit7
25th axis 26th axis 27th axis 28th axis 29th axis 30th axis 31th axis 32th axis
ZR273
bit8
ZR273
bit9
ZR273
bit10
ZR273
bit11
ZR273
bit12
ZR273
bit13
ZR273
bit14
ZR273
bit15

[Function]
This signal is for testing external brakes with Safety Brake Control.
This signal is available only when the parameter "#51010 SBC_Enable" (Safe brake control enabled) is set to "1" (Enable) and "#51186 SBTEX_Enable" (External brake SBT enabled) is set to "1" (Enable).
(This signal is ignored when the parameter "#51010 SBC_Enable" (Safe brake control enabled) is set to "0" (Disable), or #51186 SBTEX_Enable" (External brake SBT enabled) is set to "0" (Disable).)
[Operation]
When the NC is turned ON, and after a certain period of time has elapsed since the last brake test (parameter "#51011 SBT_INT"), the "External brake SBT incomplete" signal (SBTNFEXm) turns ON as a warning.
Turn ON the SBTSTEXm and perform the brake test. When the test completes successfully, the SBTNFEXm turns OFF.
The test can be temporarily stopped by turning OFF the SBTSTEXm during the test.
After the temporary stop, the test can be resumed by turning ON the SBTSTEXm.
Cont. Signal name Abbrev. 1st axis 2nd axis 3rd axis 4th axis 5th axis 6th axis 7th axis 8th axis

A External brake SBT start
(control axis)
SBT STEXm
ZR274
bit0
ZR274
bit1
ZR274
bit2
ZR274
bit3
ZR274
bit4
ZR274
bit5
ZR274
bit6
ZR274
bit7
9th axis 10th axis 11th axis 12th axis 13th axis 14th axis 15th axis 16th axis
ZR274
bit8
ZR274
bit9
ZR274
bit10
ZR274
bit11
ZR274
bit12
ZR274
bit13
ZR274
bit14
ZR274
bit15
17th axis 18th axis 19th axis 20th axis 21th axis 22th axis 23th axis 24th axis
ZR275
bit0
ZR275
bit1
ZR275
bit2
ZR275
bit3
ZR275
bit4
ZR275
bit5
ZR275
bit6
ZR275
bit7
25th axis 26th axis 27th axis 28th axis 29th axis 30th axis 31th axis 32th axis
ZR275
bit8
ZR275
bit9
ZR275
bit10
ZR275
bit11
ZR275
bit12
ZR275
bit13
ZR275
bit14
ZR275
bit15
NCPLC
NCPLC
NCPLC
PLCNC
External brake SBT
incomplete (SBTNFEXm)
External brake SBT
start (SBTSTEXm)
In SBT External brake test
(SBTEXBRm) 1CH
In SBT External brake test
(SBTEXBRm) 2CH
External brake starting
signal 1CH
External brake starting
signal 2CH
Test Pattern Test
Pattern 1

[Caution]
When SBTSTEXm is turned ON without meeting the following conditions, the brake test does not start. When this signal is turned ON without satisfying (1) to (12) of (Condition), the smart safety observation alarm (V51 0001) occurs.
(Condition)
(1) All part systems are not in automatic operation.
(2) The target axis to be tested is in in-position.
(3) The target axis to be tested is in servo ON state.
(4) The target axis to be tested is not in current limit.
(5) The target axis to be tested is not the slave axis in the synchronous control.
(6) The target axis to be tested is not in superimposition control.
(7) There is no axis which is in arbitrary axis exchange control in the part system to which the target axis to be tested belongs.
(8) There is no axis which is in mixed control in the part system to which the target axis to be tested belongs.
(9) The parameter "#51191 SBT_ILIM" (SBT current limit value) of target axis to be tested is not "0".
(10)The parameter "#51193 SBT_FD" (SBT movement command amount) of target axis to be tested is not "0".
(11)The parameter "#51194 SBT_FDRATE" (SBT command speed) of target axis to be tested is not "0".
(12)The "Reference position establishment" signal of the target axis to be tested is ON.
(13)The target axis is not in PLC axis mode of NC axis/PLC axis switchover function.
[Related signals]
(1) External brake SBT Incomplete (SBTNFEXm)
(2) In SBT External brake test (SBTEXBRm)

[Function]
This signal is for testing motor brakes with Safety Brake Control.
This signal can be used only when the parameter "#51010 SBC_Enable" (Safe brake control enabled) is set to "1" (Enable) and "#51187 SBTMO_Enable" (Motor brake SBT enabled) is set to "1" (Enable).
(This signal is ignored when the parameter "#51010 SBC_Enable" (Safe brake control enabled) is set to "0" (Disable), or "#51187 SBTMO _Enable" (Motor brake SBT enabled) is set to "0" (Disable).)
[Operation]
When the NC is turned ON, and after a certain period of time has elapsed since the last brake test (parameter "#51011 SBT_INT" (SBT interval)), the "Motor brake SBT incomplete" signal (SBTNFMOm) turns ON as a warning.
Turn ON the SBTSTMOm and perform the brake test. When the test completes successfully, the SBTNFMOm turns OFF.
The test can be temporarily stopped by turning OFF the SBTSTMOm during the test.
After the temporary stop, the test can be resumed from the test pattern1 by turning ON the SBTSTMOm.
Cont. Signal name Abbrev. 1st axis 2nd axis 3rd axis 4th axis 5th axis 6th axis 7th axis 8th axis
A Motor brake SBT start
(control axis) SBTSTMOm
ZR276
bit0
ZR276
bit1
ZR276
bit2
ZR276
bit3
ZR276
bit4
ZR276
bit5
ZR276
bit6
ZR276
bit7
9th axis 10th axis 11th axis 12th axis 13th axis 14th axis 15th axis 16th axis
ZR276
bit8
ZR276
bit9
ZR276
bit10
ZR276
bit11
ZR276
bit12
ZR276
bit13
ZR276
bit14
ZR276
bit15
17th axis 18th axis 19th axis 20th axis 21th axis 22th axis 23th axis 24th axis
ZR277
bit0
ZR277
bit1
ZR277
bit2
ZR277
bit3

ZR277
bit4
ZR277
bit5
ZR277
bit6
ZR277
bit7
25th axis 26th axis 27th axis 28th axis 29th axis 30th axis 31th axis 32th axis
ZR277
bit8
ZR277
bit9
ZR277
bit10
ZR277
bit11
ZR277
bit12
ZR277
bit13
ZR277
bit14
ZR277
bit15
NCPLC
PLCNC
Motor brake SBT start
(SBTNFMOm)
Motor brake SBT start
(SBTSTMOm)
Motor brake starting request
1CH
Motor brake starting request
2CH
Test pattern Test Pattern 1 Test Pattern 2 Test Pattern 3
NCDrive
NCDrive

[Caution]
When SBTSTMOm is turned ON without meeting the following conditions, the brake test does not start. When this signal is turned ON without satisfying (1) to (12) of (Condition), the smart safety observation alarm (V51 0001) occurs.
(Condition)
(1) All part systems are not in automatic operation.
(2) The target axis to be tested is in in-position.
(3) The target axis to be tested is in servo ON state.
(4) The target axis to be tested is not in current limit.
(5) The target axis to be tested is not the slave axis in the synchronous control.
(6) The target axis to be tested is not in superimposition control.
(7) There is no axis which is in arbitrary axis exchange control within the part system to which target axis to be tested belongs.
(8) There is no axis which is in mixed control within the part system to which target axis to be tested belongs.
(9) The parameter "#51191 SBT_ILIM" (SBT current limit value) of target axis to be tested is not "0".
(10)The parameter "#51193 SBT_FD" (SBT movement command amount) of target axis to be tested is not "0".
(11)The parameter "#51194 SBT_FDRATE" (SBT command speed) of target axis to be tested is not "0".
(12)The reference position establishment signal of target axis to be tested is ON.
(13)The target axis is not in PLC axis mode of NC axis/PLC axis switchover function.
[Related signals]
(1) Motor brake SBT incomplete (SBTNFMOm)
[Function]
This signal is used to cancel the alarm "Safe absol. posn unestablished" and establish the safety absolute position in SLP/SCA encoder diagnosis during power OFF.
[Operation]
When the "Safe absol. posn unestablished" alarm is occurring, turning ON this signal will cancel the alarm and bring it to the safety absolute position established state (the "In safety position establishing" signal is ON.). By establishing the safety absolute position, the observation with SLP and the signal output with SCA is possible. (SLP/SCA will not operate while the "Safe absol. posn unestablished" alarm is occurring.)
[Caution]
This alarm is to show that users have checked the correctness of the absolute position. Before turning ON this signal, manually move the axis to a position where the coordinate values are clear (marked position, reference position, etc.) (in the case of a relative position detection system, operate the reference position return), then compare the actual position and the displayed position to confirm the both positions are corresponding.
[Related signals]
(1) In safety absolute position establishing (Control axis) (SFABSPESTm)
Cont. Signal name Abbrev. 1st axis 2nd axis 3rd axis 4th axis 5th axis 6th axis 7th axis 8th axis
A
Safety absolute position
confirm
(control axis)
SFABSPFXm
ZR278
bit0
ZR278
bit1
ZR278

bit2
ZR278
bit3
ZR278
bit4
ZR278
bit5
ZR278
bit6
ZR278
bit7
9th axis 10th axis 11th axis 12th axis 13th axis 14th axis 15th axis 16th axis
ZR278
bit8
ZR278
bit9
ZR278
bit10
ZR278
bit11
ZR278
bit12
ZR278
bit13
ZR278
bit14
ZR278
bit15
17th axis 18th axis 19th axis 20th axis 21th axis 22th axis 23th axis 24th axis
ZR279
bit0
ZR279
bit1
ZR279
bit2
ZR279
bit3
ZR279
bit4
ZR279
bit5
ZR279
bit6
ZR279
bit7
25th axis 26th axis 27th axis 28th axis 29th axis 30th axis 31th axis 32th axis
ZR279
bit8
ZR279
bit9
ZR279
bit10
ZR279
bit11
ZR279
bit12
ZR279
bit13
ZR279
bit14
ZR279
bit15

[Function]
This signal is used to reset the alarm for the control axis's safety function. When the alarm for the safety function has not being occurred, this signal is ignored.
[Operation]
By turning ON this signal, the NC carries out the following operations:
(1) Check whether the occurring alarm for safety function is in the state that is possible to cancel(*1).
(*1) The alarm is possible to cancel in any of the following status.
When the function corresponding to the occurring alarm (SLS/SLP/SOS/SS1/SS2) is enabled, the enabled function is determined to be in safety status. ("In Safely-limited speed"/"In Safely-limited position"/"In Safe operating stop"/"In Safe stop 1" are ON. (The safety status of SS2 is determined by the "In Safe operating stop".))
The function corresponding to the occurring alarm (SLS/SLP/SOS/SS1/SS2) is disabled. (The request signal is OFF.)
(2) Cancel the alarm after the check proves the alarm status is possible to cancel.
(3) Turn back the drive power ON.
[Caution]
When the safety functions alarm, including the parameter error, are not in state that to be canceled, ("In Safely-limited speed"/"In Safely-limited position"/"In Safe operating stop"/"In Safe stop 1" are OFF in enabled SLS, SLP, SOS, SS1, and SS2), the alarm will not be canceled even when this signal is turned ON. (This signal will be ignored.)
Cont. Signal name Abbrev. 1st axis 2nd axis 3rd axis 4th axis 5th axis 6th axis 7th axis 8th axis
A Safety reset
(control axis) SRSTm
ZR280

bit0
ZR280
bit1
ZR280
bit2
ZR280
bit3
ZR280
bit4
ZR280
bit5
ZR280
bit6
ZR280
bit7
9th axis 10th axis 11th axis 12th axis 13th axis 14th axis 15th axis 16th axis
ZR280
bit8
ZR280
bit9
ZR280
bit10
ZR280
bit11
ZR280
bit12
ZR280
bit13
ZR280
bit14
ZR280
bit15
17th axis 18th axis 19th axis 20th axis 21th axis 22th axis 23th axis 24th axis
ZR281
bit0
ZR281
bit1
ZR281
bit2
ZR281
bit3
ZR281
bit4
ZR281
bit5
ZR281
bit6
ZR281
bit7
25th axis 26th axis 27th axis 28th axis 29th axis 30th axis 31th axis 32th axis
ZR281
bit8
ZR281
bit9
ZR281
bit10
ZR281
bit11
ZR281
bit12
ZR281
bit13
ZR281
bit14
ZR281
bit15

[Function]
This signal specifies the SLS speed tolerance to be used for the SLS observation function.
This signal is available when the parameter "#51002 SLS_Enable" (Enable SLS observation) is set to "1" (Enable).
(This signal is ignored when the parameter "#51002 SLS_Enable" (Enable SLS observation) is set to "0" (Disable).)
<SLS speed input selection method>
[Operation]
When this signal is changed, the "SLS speed change output" (SLSMOmn) is also changed.
(SLSMOmn is changed even though the "SLS observation request" (*SLSRm) is ON (when SLS is not requested).)
[Related signals]
(1) SLS speed change output (SLSMOmn)
(2) SLS speed override input (SLSOVRImn)
(3) SLS speed override output (SLSOVROmn)
(4) SLS observation request (*SLSRm)
(5) SLS observation is active (SLSEm)
(6) Under SLS limit (SLSSm)
Cont. Signal name Abbrev. 1st axis 2nd axis 3rd axis 4th axis 5th axis 6th axis 7th axis 8th axis
A SLS speed change input
(control axis)

ZR312 ZR313 ZR314 ZR315 ZR316 ZR317 ZR318 ZR319
9th axis 10th axis 11th axis 12th axis 13th axis 14th axis 15th axis 16th axis
ZR320 ZR321 ZR322 ZR323 ZR324 ZR325 ZR326 ZR327
SLS MImn 17th axis 18th axis 19th axis 20th axis 21th axis 22th axis 23th axis 24th axis
ZR328 ZR329 ZR330 ZR331 ZR332 ZR333 ZR334 ZR335
25th axis 26th axis 27th axis 28th axis 29th axis 30th axis 31th axis 32th axis
ZR336 ZR337 ZR338 ZR339 ZR340 ZR341 ZR342 ZR343
SLS speed change input No. of step to be select ed
Corresponding SLS speed toler Bit1 Bit0 ance parameter
0 0 1 #51103 SLS_Speed1
0 1 2 #51104 SLS_Speed2
1 0 3 #51105 SLS_Speed3
1 1 4 #51106 SLS_Speed4

[Function]
This signal specifies the SLS speed override to be used for the SLS observation function.
This signal is available when the parameter "#51002 SLS_Enable" (Enable SLS observation) is set to "1" (Enable).
(This signal is ignored when the parameter "#51002 SLS_Enable" (Enable SLS observation) is set to "0" (Disable).)
<SLS speed override selection method>
[Operation]
When this signal is changed, the "SLS speed override output" (SLSOVROmn) is also changed.
(This signal is changed even though the "SLS observation request" (*SLSRm) is ON (when SLS is not requested).)
[Related signals]
(1) SLS speed change input (SLSMImn)
(2) SLS speed change output (SLSMOmn)
(3) SLS speed override output (SLSOVROmn)
(4) SLS observation request (*SLSRm)
(5) SLS observation is active (SLSEm)
(6) Under SLS limit (SLSSm)
Cont. Signal name Abbrev. 1st axis 2nd axis 3rd axis 4th axis 5th axis 6th axis 7th axis 8th axis
A SLS speed override input
(control axis)
ZR312 ZR313 ZR314 ZR315 ZR316 ZR317 ZR318 ZR319
9th axis 10th axis 11th axis 12th axis 13th axis 14th axis 15th axis 16th axis
ZR320 ZR321 ZR322 ZR323 ZR324 ZR325 ZR326 ZR327
SLSOVRImn 17th axis 18th axis 19th axis 20th axis 21th axis 22th axis 23th axis 24th axis
ZR328 ZR329 ZR330 ZR331 ZR332 ZR333 ZR334 ZR335
25th axis 26th axis 27th axis 28th axis 29th axis 30th axis 31th axis 32th axis
ZR336 ZR337 ZR338 ZR339 ZR340 ZR341 ZR342 ZR343
SLS speed override input No. of step to be select ed
Corresponding SLS speed over Bit7 Bit6 Bit5 Bit4 ride parameter
0 0 0 0 1 #51107 SLS_Override1
0 0 0 1 2 #51108 SLS_Override2
0 0 1 0 3 #51109 SLS_Override3
0 0 1 1 4 #51110 SLS_Override4
0 1 0 0 5 #51111 SLS_Override5
0 1 0 1 6 #51112 SLS_Override6
0 1 1 0 7 #51113 SLS_Override7
0 1 1 1 8 #51114 SLS_Override8
1 0 0 0 9 #51115 SLS_Override9
1 0 0 1 10 #51116 SLS_Override10
1 0 1 0 11 #51117 SLS_Override11
1 0 1 1 12 #51118 SLS_Override12
1 1 0 0 13 #51119 SLS_Override13
1 1 0 1 14 #51120 SLS_Override14
1 1 1 0 15 #51121 SLS_Override15
1 1 1 1 16 #51122 SLS_Override16

[Function]
This signal specifies the SLP position tolerance to be used for the SLP observation function.
This signal is available when the parameter "#51003 SLP_Enable" (Enable SLP observation) is set to "1" (Enable).
(This signal is ignored when the parameter "#51003 SLP_Enable" (Enable SLP observation) is set to "0" (Disable).)
<SLP position input selection method>
[Operation]
When this signal is changed, the "SLP position change output" (SLPMOmn) is also changed.
(This signal is changed even though the "SLP observation request" (*SLPRm) is ON (when SLP is not requested).)
[Related signals]
(1) SLP position change output (SLPMOmn)
(2) SLP observation request (*SLPRm)
(3) SLP observation is active (SLPEm)
(4) In SLP range (SLPSm)
[Function]
This signal starts execution of the SLS observation function on the spindle.
This signal is available when the parameter "#51002 SLS_Enable" (Enable SLS observation) is set to "1" (Enable).
(This signal is ignored when the parameter "#51002 SLS_Enable" (Enable SLS observation) is set to "0" (Disable).)
[Operation]
When the "SLS observation request" signal is turned OFF (when SLS is requested), the NC carries out the following operations:
(1) Checks the SLS parameters to be used.
(2) Executes the NC's SLS observation function, and turns ON the "SLS observation is active" (SLSSEm).
(3) Turns ON the "Under SLS limit" signal (SLSSSm) when the spindle is confirmed to have decelerated to the safe-lim ited speed or lower.
[Related signals]

(1) SLS speed change input (SLSSMImn)
(2) SLS speed change output (SLSSMOmn)
(3) SLS speed override input (SLSSOVRImn)
(4) SLS speed override output (SLSSOVROmn)
(5) SLS observation is active (SLSSEm)
(6) Under SLS limit (SLSSSm)
Cont. Signal name Abbrev. 1st axis 2nd axis 3rd axis 4th axis 5th axis 6th axis 7th axis 8th axis
A SLP position change input
(control axis)
ZR344 ZR345 ZR346 ZR347 ZR348 ZR349 ZR350 ZR351
9th axis 10th axis 11th axis 12th axis 13th axis 14th axis 15th axis 16th axis
ZR352 ZR353 ZR354 ZR355 ZR356 ZR357 ZR358 ZR359
SLPMImn 17th axis 18th axis 19th axis 20th axis 21th axis 22th axis 23th axis 24th axis
ZR360 ZR361 ZR362 ZR363 ZR364 ZR365 ZR366 ZR367
25th axis 26th axis 27th axis 28th axis 29th axis 30th axis 31th axis 32th axis
ZR368 ZR369 ZR370 ZR371 ZR372 ZR373 ZR374 ZR375
SLP position change input No. of step to be select ed Corresponding SLP position tolerance parameter Bit1 Bit0
0 0 1 #51126/51127 SLP_Position (P/M) 1
0 1 2 #51128/51129 SLP_Position (P/M) 2
1 0 3 #51130/51131 SLP_Position (P/M) 3
1 1 4 #51132/51133 SLP_Position (P/M) 4
Cont. Signal name Abbrev. 1st axis 2nd axis 3rd axis 4th axis 5th axis 6th axis 7th axis 8th axis
B SLS observation request
(spindle)
*SLSS Rm
ZR440
bit0
ZR440
bit1
ZR440
bit2
ZR440
bit3
ZR440
bit4
ZR440
bit5
ZR440
bit6
ZR440
bit7

[Function]
This signal is used to start execution of the Safe speed monitor function on the control axis.
This signal is available when the parameter "#51004 SSM_Enable" (Enable Safe speed monitor) is set to "1" (Enable).
(This signal is ignored when the parameter "#51004 SSM_Enable" (Enable Safe speed monitor) is set to "0" (Disable).)
[Operation]
When the "SSM request" signal is turned OFF (when SSM is requested), the NC carries out the following operations:
(1) Checks the SSM parameters to be used.
(2) Execute the NC's Safe speed monitor function, and turns ON the "SSM is active" signal (SSMSEm).
(3) Turns ON 1 to 4 of the "Under SSM safe speed" signal (SSMSmn) when the axis is confirmed to be at the safe speed or below.
[Related signals]
(1) SSM is active (SSMSEm)
(2) Under SSM safe speed (SSMSmn)
[Function]
This signal is used to start execution of the SOS observation function on the spindle.
This signal is available when the parameter "#51006 SOS_Enable" (Enable Safe operating stop) is set to "1" (Enable).
(This signal is ignored when the parameter "#51006 SOS_Enable" (Enable Safe operating stop) is set to "0" (Disable).)
[Operation]
When the "SOS observation request" signal is turned OFF (when SOS is requested), the NC carries out the following operations:
(1) Checks the SOS parameters to be used.
(2) Executes the NC's Safe operating stop function and turns ON the "SOS is active" signal (SOSSEm).
(3) Turns ON the "In SOS stop" signal (SOSSSm) when the safe standstill state of the spindle is confirmed.
[Related signals]
(1) SOS is active (SOSSEm)
(2) In SOS stop (SOSSSm)
[Function]
This signal is used to start execution of Safe stop 1 on the spindle.
This signal is available when the parameter "#51007 SS1_Enable" (Enable Safe stop 1) is set to "1" (Enable).
(This signal is ignored when the parameter "#51007 SS1_Enable" (Enable Safe stop 1) is set to "0" (Disable).)
[Operation]
When the "Safe stop 1 request" signal is turned OFF (when SS1 is requested), the NC carries out the following operations:
(1) Checks the SS1 parameters to be used.
(2) Executes the NC's Safe stop 1 function, and turns ON the "SS1 is active" signal (SS1SEm).
(3) Turns ON the "In SS1 stop" signal (SS1SSm) when the spindle deceleration is confirmed.
[Related signals]
(1) SS1 is active (SS1SEm)
(2) In SS1 stop (SS1SSm)
Cont. Signal name Abbrev. 1st axis 2nd axis 3rd axis 4th axis 5th axis 6th axis 7th axis 8th axis
B SSM request
(spindle) *SSMSRm ZR442
bit0
ZR442

bit1
ZR442
bit2
ZR442
bit3
ZR442
bit4
ZR442
bit5
ZR442
bit6
ZR442
bit7
Cont. Signal name Abbrev. 1st axis 2nd axis 3rd axis 4th axis 5th axis 6th axis 7th axis 8th axis
B SOS observation request
(spindle) *SOSSRm ZR444
bit0
ZR444
bit1
ZR444
bit2
ZR444
bit3
ZR444
bit4
ZR444
bit5
ZR444
bit6
ZR444
bit7
Cont. Signal name Abbrev. 1st axis 2nd axis 3rd axis 4th axis 5th axis 6th axis 7th axis 8th axis
B Safe stop 1 request
(spindle)
*SS1SR
m
ZR445
bit0
ZR445
bit1
ZR445
bit2
ZR445
bit3
ZR445
bit4
ZR445
bit5
ZR445
bit6
ZR445
bit7

[Function]
This signal is used to start execution of Safe stop 2 on the spindle.
This signal is available when the parameter "#51008 SS2_Enable" (Enable Safe stop 2) is set to "1" (Enable).
(This signal is ignored when the parameter "#51008 SS2_Enable" (Enable Safe stop 2) is set to "0" (Disable).)
[Operation]
When the "Safe stop 2 request" signal is turned OFF (when SS2 is requested), the NC carries out the following operations:
(1) Checks the SS2 parameters to be used.
(2) Executes the NC's Safe stop 2 function, and turns ON the "SS2 is active" signal (SS2SEm).
(3) Executes Safe operating stop (SOS) when the spindle deceleration is confirmed.
[Related signals]
(1) SS2 is active (SS2SEm)
[Function]
This signal is used to start execution of the Safe torque off function on the spindle.
This signal is available when the parameter "#51009 STO_Enable" (Enable Safe torque off) is set to "1".
(This signal is ignored when the parameter "#51009 STO_Enable" (Enable Safe torque off) is set to "0".)
[Operation]
When the "Safe torque off request" signal is turned OFF (when STO is requested), the NC carries out the following operations:
(1) Checks the STO parameters to be used.
(2) Executes the NC's Safe torque off function, and turns ON the "STO is active" signal (STOSEm).
(3) Turns ON the "In Safe torque off" signal (STOSSm) when the main drive power to the spindle has been shut OFF.
[Related signals]
(1) STO is active (STOSEm)
(2) In Safe torque off (STOSSm)
[Function]
This signal is used to reset the safety function's alarm. When the alarm for the safety function has not being occurred, this signal is ignored.
[Operation]
By turning ON this signal, the NC carries out the following operations.
(1) Check whether the occurring alarm for safety function is in the state that is possible to cancel(*1).
(*1) The alarm is possible to cancel in any of the following status.
When the function corresponding to the occurring alarm (SLS/SOS/SS1/SS2) is enabled, the enabled function is

determined to be in safety status. ("In Safely-limited speed"/"In Safe operating stop"/"In Safe stop 1" are ON. (The safety status of SS2 is determined by the "In Safe operating stop".))

The function corresponding to the occurring alarm (SLS/SOS/SS1/SS2) is disabled. (The request signal is OFF.)

(2) Cancel the alarm after the check proves the alarm status is possible to cancel.

(3) Turn back the drive power ON.

[Caution]

When the safety functions alarm, including the parameter error, are not in state that to be canceled, ("In Safely-limited speed", "In Safe operating stop", and "In Safe stop 1" are OFF in enabled SLS, SOS, SS1, and SS2), the alarm will not be canceled even when this signal is turned ON. (This signal will be ignored.)

Cont. Signal name Abbrev. 1st axis 2nd axis 3rd axis 4th axis 5th axis 6th axis 7th axis 8th axis

B Safe stop 2 request

(spindle)

*SS2SR

m

ZR446

bit0

ZR446

bit1

ZR446

bit2

ZR446

bit3

ZR446

bit4

ZR446

bit5

ZR446

bit6

ZR446

bit7

Cont. Signal name Abbrev. 1st axis 2nd axis 3rd axis 4th axis 5th axis 6th axis 7th axis 8th axis

B Safe torque OFF request

(spindle) *STOSRm ZR447

bit0

ZR447

bit1

ZR447

bit2

ZR447

bit3

ZR447

bit4

ZR447

bit5

ZR447

bit6

ZR447

bit7

Cont. Signal name Abbrev. 1st axis 2nd axis 3rd axis 4th axis 5th axis 6th axis 7th axis 8th axis

A Safety reset

(spindle) SRSTSm ZR452

bit0

ZZR452

bit1

ZR452

bit2

ZR452

bit3

ZR452

bit4

ZR452

bit5

ZR452

bit6

ZR452

bit7

[Function]

This signal specifies the SLS speed tolerance to be used for the SLS observation function.

This signal is available when the parameter "#51002 SLS_Enable" (Enable SLS observation) is set to "1" (Enable).

(This signal is ignored when the parameter "#51002 SLS_Enable" (Enable SLS observation) is set to "0" (Disable).)

<SLS speed input selection method>

[Operation]

When this signal is changed, the "SLS speed change output" (SLSSMOmn) is also changed.

(This signal is changed even though the "SLS observation request" (*SLSSRm) is ON (when SLS is not requested).)

[Related signals]

(1) SLS speed change output (SLSSMOmn)

(2) SLS speed override input (SLSSOVRImn)

(3) SLS speed override output (SLSSOVROmn)

(4) SLS observation request (*SLSSRm)

(5) SLS observation is active (SLSSEm)

(6) Under SLS limit (SLSSSm)

Cont. Signal name Abbrev. 1st axis 2nd axis 3rd axis 4th axis 5th axis 6th axis 7th axis 8th axis

A SLS speed change input

(spindle) SLSSMImn ZR468 ZR469 ZR470 ZR471 ZR472 ZR473 ZR474 ZR475

SLS speed change input No. of step to be select ed
Corresponding SLS speed toler Bit1 Bit0 ance parameter
0 0 1 #51303 SLS_SSpeed1
0 1 2 #51304 SLS_SSpeed2
1 0 3 #51305 SLS_SSpeed3
1 1 4 #51306 SLS_SSpeed4

[Function]
This signal specifies the SLS speed override to be used for the SLS observation function.
This signal is available when the parameter "#51002 SLS_Enable" (Enable SLS observation) is set to "1" (Enable).
(This signal is ignored when the parameter "#51002 SLS_Enable" (Enable SLS observation) is set to "0" (Disable).)
<SLS speed override selection method>
[Operation]
When this signal is changed, the "SLS speed override output" (SLSSOVROmn) is also changed.
(This signal is changed even though the "SLS observation request" (*SLSSRm) is ON (when SLS is not requested).)
[Related signals]
(1) SLS speed change input (SLSSMImn)
(2) SLS speed change output (SLSSMOmn)
(3) SLS speed override output (SLSSOVROmn)
(4) SLS observation request (*SLSSRm)
(5) SLS observation is active (SLSSEm)
(6) Under SLS limit (SLSSSm)
[Function]
This signal is used to turn the cancel prevention alarm into the cancel possible mode. The cancel prevention alarm occurs in the Smart safety observation diagnosis function.
[Operation]
When the cancel prevention alarm is occurring, NC can be in special safety alarm cancel mode by turning ON this signal.
With this signal turned ON, the cancel prevention alarm can be canceled by turning OFF -> ON -> OFF the "Safety reset" signal (SRSTm/SRSTSm) for the alarm cancel target axis.
[Caution]
The cancel operation of the cancel prevention alarm should be carried out after solving the cause of the alarm occurrence (encoder replacement, motor replacement, etc.).
[Related signals]
(1) Safety reset (Control axis) (SRSTm)
(2) Safety reset (Spindle) (SRSTSm)
Cont. Signal name Abbrev. 1st axis 2nd axis 3rd axis 4th axis 5th axis 6th axis 7th axis 8th axis
A SLS speed override input
(spindle) SLSSOVRImn ZR468 ZR469 ZR470 ZR471 ZR472 ZR473 ZR474 ZR475
SLS speed override input No. of step to be select ed
Corresponding SLS speed over Bit7 Bit6 Bit5 Bit4 ride parameter
0 0 0 0 1 #51307 SLS_SOverride1
0 0 0 1 2 #51308 SLS_SOverride2
0 0 1 0 3 #51309 SLS_SOverride3
0 0 1 1 4 #51310 SLS_SOverride4
0 1 0 0 5 #51311 SLS_SOverride5
0 1 0 1 6 #51312 SLS_SOverride6
0 1 1 0 7 #51313 SLS_SOverride7
0 1 1 1 8 #51314 SLS_SOverride8
1 0 0 0 9 #51315 SLS_SOverride9
1 0 0 1 10 #51316 SLS_SOverride10
1 0 1 0 11 #51317 SLS_SOverride11
1 0 1 1 12 #51318 SLS_SOverride12
1 1 0 0 13 #51319 SLS_SOverride13
1 1 0 1 14 #51320 SLS_SOverride14
1 1 1 0 15 #51321 SLS_SOverride15
1 1 1 1 16 #51322 SLS_SOverride16
Cont. Signal name Abbrev. Common
($)
A Special safety alarm cancel (system common) SARLS ZR532
bit0

[Function]
This signal enables the output OFF check function. This function can also be enabled while the "Output OFF check not complete" signal (SIOERRSTS/bit2) is OFF.
[Operation]
When the "Output OFF check request" signal is turned ON, the NC carries out the following operations:
(1) Turns OFF all the output signals of the dual signal unit.
(2) Confirms that the feedback input signals of the output signals turn OFF within a certain period of time.
(3) Returns the output statuses to the original.
Cont. Signal name Abbrev. Common
($)
A Output OFF check request SIOOFFCHK ZR1280
bit0

4.6.1.2 CNC -> PLC
[Function]
This signal indicates that SLS observation has been enabled on the target axis.
[Operation]
This signal turns ON when the "SLS observation request" (*SLSRm) is turned OFF (when SLS is requested) and the NC

starts execution of SLS. This signal turns OFF when the "SLS observation request" (*SLSRm) is turned ON (when SLS is not requested).

[Related signals]

(1) SLS observation request (*SLSRm)

(2) Under SLS limit (SLSSm)

[Function]

This signal indicates that SLS observation has been enabled on the target axis and that the axis is at the safely-limited speed or lower.

[Operation]

This signal turns ON when the "SLS observation request" (*SLSRm) is turned OFF (when SLS is requested), the NC starts execution of SLS, and then the speed of the target axis drops to the safely-limited speed or lower. This signal remains OFF if the speed of the target axis exceeds the safely-limited speed.

This signal turns OFF when the "SLS observation request" (*SLSRm) is turned ON (when SLS is not requested).

[Related signals]

(1) SLS observation request (*SLSRm)

(2) SLS observation is active (SLSEm)

Cont. Signal name Abbrev. 1st axis 2nd axis 3rd axis 4th axis 5th axis 6th axis 7th axis 8th axis

A SLS observation is active

(control axis) SLSEm

ZR544

bit0

ZR544

bit1

ZR544

bit2

ZR544

bit3

ZR544

bit4

ZR544

bit5

ZR544

bit6

ZR544

bit7

9th axis 10th axis 11th axis 12th axis 13th axis 14th axis 15th axis 16th axis

ZR544

bit8

ZR544

bit9

ZR544

bit10

ZR544

bit11

ZR544

bit12

ZR544

bit13

ZR544

bit14

ZR544

bit15

17th axis 18th axis 19th axis 20th axis 21th axis 22th axis 23th axis 24th axis

ZR545

bit0

ZR545

bit1

ZR545

bit2

ZR545

bit3

ZR545

bit4

ZR545

bit5

ZR545

bit6

ZR545

bit7

25th axis 26th axis 27th axis 28th axis 29th axis 30th axis 31th axis 32th axis

ZR545

bit8

ZR545

bit9

ZR545

bit10

ZR545

bit11

ZR545

bit12

ZR545

bit13

ZR545

bit14

ZR545

bit15

Cont. Signal name Abbrev. 1st axis 2nd axis 3rd axis 4th axis 5th axis 6th axis 7th axis 8th axis

A Under SLS limit

(control axis) SLSSm
ZR546
bit0
ZR546
bit1
ZR546
bit2
ZR546
bit3
ZR546
bit4
ZR546
bit5
ZR546
bit6
ZR546
bit7
9th axis 10th axis 11th axis 12th axis 13th axis 14th axis 15th axis 16th axis
ZR546
bit8
ZR546
bit9
ZR546
bit10
ZR546
bit11
ZR546
bit12
ZR546
bit13
ZR546
bit14
ZR546
bit15
17th axis 18th axis 19th axis 20th axis 21th axis 22th axis 23th axis 24th axis
ZR547
bit0
ZR547
bit1
ZR547
bit2
ZR547
bit3
ZR547
bit4
ZR547
bit5
ZR547
bit6
ZR547
bit7
25th axis 26th axis 27th axis 28th axis 29th axis 30th axis 31th axis 32th axis
ZR547
bit8
ZR547
bit9
ZR547
bit10
ZR547
bit11
ZR547
bit12
ZR547
bit13
ZR547
bit14
ZR547
bit15

[Function]
This signal indicates that SLP observation has been enabled on the target axis.
[Operation]
This signal turns ON when the "SLP observation request" (*SLPRm) is turned OFF (when SLP is requested) and the NC starts execution of SLP. This signal turns OFF when the "SLP observation request" (*SLPRm) is turned ON (when SLP is not requested).
[Related signals]
(1) SLP observation request (*SLPRm)
(2) In SLP range (SLPSm)
[Function]
This signal indicates that SLP observation has been enabled on the target axis and that the axis is within the SLP position tolerance range.
[Operation]
This signal turns ON when the "SLP observation request" (*SLPRm) is turned OFF (when SLP is requested), the NC starts execution of SLP, and then the position of the control axis reaches the SLP position tolerance range. This signal remains OFF if the position of the target axis is outside the SLP position tolerance range. This signal turns OFF when the "SLP

observation request" (*SLPRm) is turned ON (when SLP is not requested).
[Related signals]
(1) SLP observation request (*SLPRm)
(2) SLP observation is active (SLPEm)
Cont. Signal name Abbrev. 1st axis 2nd axis 3rd axis 4th axis 5th axis 6th axis 7th axis 8th axis
A SLP observation is active
(control axis) SLPEm
ZR548
bit0
ZR548
bit1
ZR548
bit2
ZR548
bit3
ZR548
bit4
ZR548
bit5
ZR548
bit6
ZR548
bit7
9th axis 10th axis 11th axis 12th axis 13th axis 14th axis 15th axis 16th axis
ZR548
bit8
ZR548
bit9
ZR548
bit10
ZR548
bit11
ZR548
bit12
ZR548
bit13
ZR548
bit14
ZR548
bit15
17th axis 18th axis 19th axis 20th axis 21th axis 22th axis 23th axis 24th axis
ZR549
bit0
ZR549
bit1
ZR549
bit2
ZR549
bit3
ZR549
bit4
ZR549
bit5
ZR549
bit6
ZR549
bit7
25th axis 26th axis 27th axis 28th axis 29th axis 30th axis 31th axis 32th axis
ZR549
bit8
ZR549
bit9
ZR549
bit10
ZR549
bit11
ZR549
bit12
ZR549
bit13
ZR549
bit14
ZR549
bit15
Cont. Signal name Abbrev. 1st axis 2nd axis 3rd axis 4th axis 5th axis 6th axis 7th axis 8th axis
A In SLP range
(control axis) SLPSm
ZR550
bit0
ZR550
bit1
ZR550
bit2
ZR550
bit3
ZR550
bit4
ZR550

bit5
ZR550
bit6
ZR550
bit7
9th axis 10th axis 11th axis 12th axis 13th axis 14th axis 15th axis 16th axis
ZR550
bit8
ZR550
bit9
ZR550
bit10
ZR550
bit11
ZR550
bit12
ZR550
bit13
ZR550
bit14
ZR550
bit15
17th axis 18th axis 19th axis 20th axis 21th axis 22th axis 23th axis 24th axis
ZR551
bit0
ZR551
bit1
ZR551
bit2
ZR551
bit3
ZR551
bit4
ZR551
bit5
ZR551
bit6
ZR551
bit7
25th axis 26th axis 27th axis 28th axis 29th axis 30th axis 31th axis 32th axis
ZR551
bit8
ZR551
bit9
ZR551
bit10
ZR551
bit11
ZR551
bit12
ZR551
bit13
ZR551
bit14
ZR551
bit15

[Function]
This signal indicates that the safe speed monitor has been enabled on the spindle.
[Operation]
This signal turns ON when the "SSM request" (*SSMRm) is turned OFF (when SSM is requested) and the NC starts execution of SSM. This signal turns OFF when the "SSM request" (*SSMRm) is turned ON (when SSM is not requested).
[Related signals]
(1) SSM request (*SSMRm)
(2) Under SSM safe speed (SSMSmn)
[Function]
This signal indicates that Safe cam has been enabled on the control axis.
[Operation]
This signal turns ON when the "Safe cam request" (*SCARm) is turned OFF (when SCA is requested) and the NC starts execution of SCA. This signal turns OFF when the "Safe cam request" (*SCARm) is turned ON (when SCA is not requested).
[Related signals]
(1) Safe cam request (*SCARm)
(2) Safe cam position (SCASmn)
Cont. Signal name Abbrev. 1st axis 2nd axis 3rd axis 4th axis 5th axis 6th axis 7th axis 8th axis
A SSM is active
(control axis) SSMEm
ZR552
bit0
ZR552
bit1
ZR552
bit2
ZR552
bit3

ZR552
bit4
ZR552
bit5
ZR552
bit6
ZR552
bit7
9th axis 10th axis 11th axis 12th axis 13th axis 14th axis 15th axis 16th axis
ZR552
bit8
ZR552
bit9
ZR552
bit10
ZR552
bit11
ZR552
bit12
ZR552
bit13
ZR552
bit14
ZR552
bit15
17th axis 18th axis 19th axis 20th axis 21th axis 22th axis 23th axis 24th axis
ZR553
bit0
ZR553
bit1
ZR553
bit2
ZR553
bit3
ZR553
bit4
ZR553
bit5
ZR553
bit6
ZR553
bit7
25th axis 26th axis 27th axis 28th axis 29th axis 30th axis 31th axis 32th axis
ZR553
bit8
ZR553
bit9
ZR553
bit10
ZR553
bit11
ZR553
bit12
ZR553
bit13
ZR553
bit14
ZR553
bit15
Cont. Signal name Abbrev. 1st axis 2nd axis 3rd axis 4th axis 5th axis 6th axis 7th axis 8th axis
A Safe cam is active
(control axis) SCAEm
ZR554
bit0
ZR554
bit1
ZR554
bit2
ZR554
bit3
ZR554
bit4
ZR554
bit5
ZR554
bit6
ZR554
bit7
9th axis 10th axis 11th axis 12th axis 13th axis 14th axis 15th axis 16th axis
ZR554
bit8
ZR554
bit9
ZR554
bit10
ZR554
bit11
ZR554

bit12
ZR554
bit13
ZR554
bit14
ZR554
bit15
17th axis 18th axis 19th axis 20th axis 21th axis 22th axis 23th axis 24th axis
ZR555
bit0
ZR555
bit1
ZR555
bit2
ZR555
bit3
ZR555
bit4
ZR555
bit5
ZR555
bit6
ZR555
bit7
25th axis 26th axis 27th axis 28th axis 29th axis 30th axis 31th axis 32th axis
ZR555
bit8
ZR555
bit9
ZR555
bit10
ZR555
bit11
ZR555
bit12
ZR555
bit13
ZR555
bit14
ZR555
bit15

[Function]
This signal indicates that safety operating stop has been enabled on the control axis in response to the "SOS observation request" (*SOSRm).
Note that there is no output to this signal when SOS is enabled at the request of SS2.
[Operation]
This signal turns ON when the "SOS observation request" (*SOSRm) is turned OFF (when SOS is requested) and the NC starts execution of SOS. This signal turns OFF when the "SOS observation request" (*SOSRm) is turned ON (when SOS is not requested).
[Related signals]
(1) SOS observation request (*SOSRm)
(2) In SOS stop (SOSSm)
[Function]
This signal indicates that the "SOS is active" signal (SOSEm) of the control axis is ON or there is a request from the SS2 function, and the control axis is at a standstill.
[Operation]
This signal turns ON when the NC has started execution of SOS due to turning-OFF of the "SOS observation request" (*SOSRm) (when SOS is requested) or due to a start request from SS2, and the control axis is at a standstill. This signal remains OFF while the control axis is not at a standstill. This signal turns OFF when the "SOS observation request" (*SOSRm) is turned ON (when SOS is not requested) and when there is no request from SS2.
[Related signals]
(1) SOS observation request (*SOSRm)
(2) SOS is active (SOSEm)
Cont. Signal name Abbrev. 1st axis 2nd axis 3rd axis 4th axis 5th axis 6th axis 7th axis 8th axis
A SOS is active
(control axis) SOSEm
ZR556
bit0
ZR556
bit1
ZR556
bit2
ZR556
bit3
ZR556
bit4
ZR556
bit5
ZR556
bit6
ZR556
bit7
9th axis 10th axis 11th axis 12th axis 13th axis 14th axis 15th axis 16th axis
ZR556

bit8
ZR556
bit9
ZR556
bit10
ZR556
bit11
ZR556
bit12
ZR556
bit13
ZR556
bit14
ZR556
bit15
17th axis 18th axis 19th axis 20th axis 21th axis 22th axis 23th axis 24th axis
ZR557
bit0
ZR557
bit1
ZR557
bit2
ZR557
bit3
ZR557
bit4
ZR557
bit5
ZR557
bit6
ZR557
bit7
25th axis 26th axis 27th axis 28th axis 29th axis 30th axis 31th axis 32th axis
ZR557
bit8
ZR557
bit9
ZR557
bit10
ZR557
bit11
ZR557
bit12
ZR557
bit13
ZR557
bit14
ZR557
bit15
Cont. Signal name Abbrev. 1st axis 2nd axis 3rd axis 4th axis 5th axis 6th axis 7th axis 8th axis
A In SOS stop
(control axis) SOSSm
ZR558
bit0
ZR558
bit1
ZR558
bit2
ZR558
bit3
ZR558
bit4
ZR558
bit5
ZR558
bit6
ZR558
bit7
9th axis 10th axis 11th axis 12th axis 13th axis 14th axis 15th axis 16th axis
ZR558
bit8
ZR558
bit9
ZR558
bit10
ZR558
bit11
ZR558
bit12
ZR558
bit13
ZR558
bit14
ZR558
bit15
17th axis 18th axis 19th axis 20th axis 21th axis 22th axis 23th axis 24th axis
ZR559
bit0

ZR559
bit1
ZR559
bit2
ZR559
bit3
ZR559
bit4
ZR559
bit5
ZR559
bit6
ZR559
bit7
25th axis 26th axis 27th axis 28th axis 29th axis 30th axis 31th axis 32th axis
ZR559
bit8
ZR559
bit9
ZR559
bit10
ZR559
bit11
ZR559
bit12
ZR559
bit13
ZR559
bit14
ZR559
bit15

[Function]
This signal indicates that Safe stop 1 has been enabled in response to the "Safe stop 1 request" (*SS1Rm).
Note that if SS1 is activated due to occurrence of a smart safety observation error, there is no output to this signal.
[Operation]
This signal turns ON when the "Safe stop 1 request" (*SS1Rm) is turned OFF (when STO is requested) and the NC starts execution of the Safe stop 1 function. This signal turns OFF when the "Safe stop 1 request" (*SS1Rm) is turned ON (when STO is not requested).
[Related signals]
(1) Safe stop 1 request (*SS1Rm)
(2) In safe stop 1(SS1Sm)
[Function]
This signal indicates that SS1 has been executed due to turning-ON of the "SS1 is active" signal (SS1Em) or due to occurrence of a smart safety observation error, and that the control axis is at a standstill.
[Operation]
When the "Safe stop 1 request" (*SS1Rm) is turned OFF (when SS1 is requested) or when a smart safety observation error occurs, SS1 starts to be executed. When the control axis decelerates to a stop, this signal is turned ON. This signal remains OFF while the control axis is not at a standstill. This signal turns OFF when the "Safe stop 1 request" (*SS1Rm) is turned ON (when SS1 is not requested) and when SS1 is not executed due to occurrence of a smart safety observation error.
[Related signals]
(1) Safe stop 1 request (*SS1Rm)
(2) SS1 is active (SS1Em)
Cont. Signal name Abbrev. 1st axis 2nd axis 3rd axis 4th axis 5th axis 6th axis 7th axis 8th axis
A SS1 is active
(control axis) SS1Em
ZR560
bit0
ZR560
bit1
ZR560
bit2
ZR560
bit3
ZR560
bit4
ZR560
bit5
ZR560
bit6
ZR560
bit7
9th axis 10th axis 11th axis 12th axis 13th axis 14th axis 15th axis 16th axis
ZR560
bit8
ZR560
bit9
ZR560
bit10
ZR560
bit11
ZR560
bit12
ZR560

bit13
ZR560
bit14
ZR560
bit15
17th axis 18th axis 19th axis 20th axis 21th axis 22th axis 23th axis 24th axis
ZR561
bit0
ZR561
bit1
ZR561
bit2
ZR561
bit3
ZR561
bit4
ZR561
bit5
ZR561
bit6
ZR561
bit7
25th axis 26th axis 27th axis 28th axis 29th axis 30th axis 31th axis 32th axis
ZR561
bit8
ZR561
bit9
ZR561
bit10
ZR561
bit11
ZR561
bit12
ZR561
bit13
ZR561
bit14
ZR561
bit15
Cont. Signal name Abbrev. 1st axis 2nd axis 3rd axis 4th axis 5th axis 6th axis 7th axis 8th axis
A In SS1 stop
(control axis) SS1Sm
ZR562
bit0
ZR562
bit1
ZR562
bit2
ZR562
bit3
ZR562
bit4
ZR562
bit5
ZR562
bit6
ZR562
bit7
9th axis 10th axis 11th axis 12th axis 13th axis 14th axis 15th axis 16th axis
ZR562
bit8
ZR562
bit9
ZR562
bit10
ZR562
bit11
ZR562
bit12
ZR562
bit13
ZR562
bit14
ZR562
bit15
17th axis 18th axis 19th axis 20th axis 21th axis 22th axis 23th axis 24th axis
ZR563
bit0
ZR563
bit1
ZR563
bit2
ZR563
bit3
ZR563
bit4
ZR563
bit5

ZR563
bit6
ZR563
bit7
25th axis 26th axis 27th axis 28th axis 29th axis 30th axis 31th axis 32th axis
ZR563
bit8
ZR563
bit9
ZR563
bit10
ZR563
bit11
ZR563
bit12
ZR563
bit13
ZR563
bit14
ZR563
bit15

[Function]
This signal indicates that Safe stop 2 has been enabled on the control axis.
[Operation]
This signal turns ON when the "Safe stop 2 request" (*SS2Rm) is turned OFF (when SS2 is requested) and the NC starts execution of SS2. This signal turns OFF when the "Safe stop 2 request" (*SS2Rm) is turned ON (when SS2 is not requested).
[Related signals]
(1) Safe stop 2 request (*SS2Rm)
[Function]
This signal indicates that the Safe torque off function has been enabled on the control axis in response to the "Safe torque off request" (*STORm). Note that if STO is activated due to occurrence of a smart safety observation error, there is no output to this signal.
[Operation]
This signal turns ON when the "Safe torque off request" (*STORm) is turned OFF (when STO is requested) and the NC starts execution of STO. This signal turns OFF when the "Safe torque off request" (*STORm) is turned ON (when STO is not requested).
[Related signals]
(1) Safe torque off request (*STORm)
(2) In Safe torque off (STOSm)
Cont. Signal name Abbrev. 1st axis 2nd axis 3rd axis 4th axis 5th axis 6th axis 7th axis 8th axis
A SS2 is active
(control axis) SS2Em
ZR564
bit0
ZR564
bit1
ZR564
bit2
ZR564
bit3
ZR564
bit4
ZR564
bit5
ZR564
bit6
ZR564
bit7
9th axis 10th axis 11th axis 12th axis 13th axis 14th axis 15th axis 16th axis
ZR564
bit8
ZR564
bit9
ZR564
bit10
ZR564
bit11
ZR564
bit12
ZR564
bit13
ZR564
bit14
ZR564
bit15
17th axis 18th axis 19th axis 20th axis 21th axis 22th axis 23th axis 24th axis
ZR565
bit0
ZR565
bit1
ZR565
bit2
ZR565

bit3
ZR565
bit4
ZR565
bit5
ZR565
bit6
ZR565
bit7
25th axis 26th axis 27th axis 28th axis 29th axis 30th axis 31th axis 32th axis
ZR565
bit8
ZR565
bit9
ZR565
bit10
ZR565
bit11
ZR565
bit12
ZR565
bit13
ZR565
bit14
ZR565
bit15
Cont. Signal name Abbrev. 1st axis 2nd axis 3rd axis 4th axis 5th axis 6th axis 7th axis 8th axis
A STO is active
(control axis) STOEm
ZR566
bit0
ZR566
bit1
ZR566
bit2
ZR566
bit3
ZR566
bit4
ZR566
bit5
ZR566
bit6
ZR566
bit7
9th axis 10th axis 11th axis 12th axis 13th axis 14th axis 15th axis 16th axis
ZR566
bit8
ZR566
bit9
ZR566
bit10
ZR566
bit11
ZR566
bit12
ZR566
bit13
ZR566
bit14
ZR566
bit15
17th axis 18th axis 19th axis 20th axis 21th axis 22th axis 23th axis 24th axis
ZR567
bit0
ZR567
bit1
ZR567
bit2
ZR567
bit3
ZR567
bit4
ZR567
bit5
ZR567
bit6
ZR567
bit7
25th axis 26th axis 27th axis 28th axis 29th axis 30th axis 31th axis 32th axis
ZR567
bit8
ZR567
bit9
ZR567
bit10
ZR567
bit11

ZR567
bit12
ZR567
bit13
ZR567
bit14
ZR567
bit15

[Function]
This signal indicates that STO has been executed due to turning-ON of the "STO is active" signal (STOEm) or due to occurrence of a smart safety observation error, and the main power supply for driving has been shut off.
[Operation]
This signal turns ON when the NC has started execution of STO due to turning-OFF of the "Safe torque off request" (*STORm) (when STO is requested) or due to occurrence of a smart safety observation error, and the main power supply for driving the control axis is shut off. This signal remains OFF while the main power supply for driving the control axis is not shut off. This signal turns OFF when the "Safe torque off request" (*STORm) is turned ON (when STO is not requested) and when STO is not executed due to occurrence of a smart safety observation error.
[Related signals]
(1) Safe torque off request (*STORm)
(2) STO is active (STOEm)
[Function]
This signal indicates that the SBC motor brake starting request of the axis corresponding to the signal is enabled.
[Operation]
This signal turns ON when the "SBC motor brake starting request" signal (*SBCRm) is OFF (when SBC is requested).
This signal turns OFF when the "SBC Motor brake starting request" signal (*SBCRm) is ON (when SBC is not requested).
While this signal is ON, the NC outputs the motor brake start command to the drive unit.
[Related signals]
(1) SBC motor brake starting request (*SBCRm)
(2) In SBC motor brake start signal (SBCSm)
Cont. Signal name Abbrev. 1st axis 2nd axis 3rd axis 4th axis 5th axis 6th axis 7th axis 8th axis
A In Safe torque off
(control axis) STOSm
ZR568
bit0
ZR568
bit1
ZR568
bit2
ZR568
bit3
ZR568
bit4
ZR568
bit5
ZR568
bit6
ZR568
bit7
9th axis 10th axis 11th axis 12th axis 13th axis 14th axis 15th axis 16th axis
ZR568
bit8
ZR568
bit9
ZR568
bit10
ZR568
bit11
ZR568
bit12
ZR568
bit13
ZR568
bit14
ZR568
bit15
17th axis 18th axis 19th axis 20th axis 21th axis 22th axis 23th axis 24th axis
ZR569
bit0
ZR569
bit1
ZR569
bit2
ZR569
bit3
ZR569
bit4
ZR569
bit5
ZR569
bit6
ZR569
bit7
25th axis 26th axis 27th axis 28th axis 29th axis 30th axis 31th axis 32th axis
ZR569

bit8
ZR569
bit9
ZR569
bit10
ZR569
bit11
ZR569
bit12
ZR569
bit13
ZR569
bit14
ZR569
bit15
Cont. Signal name Abbrev. 1st axis 2nd axis 3rd axis 4th axis 5th axis 6th axis 7th axis 8th axis
A
In SBC motor brake en abled
(control axis)
SBCEm
ZR570
bit0
ZR570
bit1
ZR570
bit2
ZR570
bit3
ZR570
bit4
ZR570
bit5
ZR570
bit6
ZR570
bit7
9th axis 10th axis 11th axis 12th axis 13th axis 14th axis 15th axis 16th axis
ZR570
bit8
ZR570
bit9
ZR570
bit10
ZR570
bit11
ZR570
bit12
ZR570
bit13
ZR570
bit14
ZR570
bit15
17th axis 18th axis 19th axis 20th axis 21th axis 22th axis 23th axis 24th axis
ZR571
bit0
ZR571
bit1
ZR571
bit2
ZR571
bit3
ZR571
bit4
ZR571
bit5
ZR571
bit6
ZR571
bit7
25th axis 26th axis 27th axis 28th axis 29th axis 30th axis 31th axis 32th axis
ZR571
bit8
ZR571
bit9
ZR571
bit10
ZR571
bit11
ZR571
bit12
ZR571
bit13
ZR571
bit14
ZR571
bit15
M800V/M80V Series PLC Interface Manual

[Function]
This signal indicates that the motor brake of the axis corresponding to the signal is enabled.
[Operation]
The motor brake is started when the "SBC motor brake starting request" (*SBCRm) is turned OFF (when SBC is requested) or when the power is shut OFF (at Safety related error, at *STORm signal OFF, at *SS1Rm signal OFF). After the motor brake has been started, this signal turns ON.
[Caution]
This signal does not turn ON in the case of the axis where the parameter "#51200 SFSPEC1/bit3" is set to "1".
[Related signals]
(1) SBC motor brake starting request (*SBCRm)
(2) Safe torque off request (*STORm)
(3) Safe stop 1 request (*SS1Rm)
(4) In SBC motor brake enabled (SBCEm)
[Function]
This signal indicates that a certain period of time has passed since the last safe brake test of the external brake was performed.
When this signal turns ON, perform the external brake test as soon as possible.
[Operation]
This signal turns ON when the NC is turned ON and after a certain period of time has passed since the last external brake test (parameter "#51011 SBT_INT"). To turn OFF this signal, turn ON the "External brake SBT start" signal (SBTSTEXm) and perform the brake test. The test needs to be completed successfully.
Refer to the signal description of SBTSTEXm for the operation sequence of this signal.
[Related signals]
(1) External brake SBT start (SBTSTEXm)
Cont. Signal name Abbrev. 1st axis 2nd axis 3rd axis 4th axis 5th axis 6th axis 7th axis 8th axis
A
In SBC motor brake start
signal
(control axis)
SBCSm
ZR572
bit0
ZR572
bit1
ZR572
bit2
ZR572
bit3
ZR572
bit4
ZR572
bit5
ZR572
bit6
ZR572
bit7
9th axis 10th axis 11th axis 12th axis 13th axis 14th axis 15th axis 16th axis
ZR572
bit8
ZR572
bit9
ZR572
bit10
ZR572
bit11
ZR572
bit12
ZR572
bit13
ZR572
bit14
ZR572
bit15
17th axis 18th axis 19th axis 20th axis 21th axis 22th axis 23th axis 24th axis
ZR573
bit0
ZR573
bit1
ZR573
bit2
ZR573
bit3
ZR573
bit4
ZR573
bit5
ZR573
bit6
ZR573
bit7
25th axis 26th axis 27th axis 28th axis 29th axis 30th axis 31th axis 32th axis
ZR573
bit8
ZR573
bit9

ZR573
bit10
ZR573
bit11
ZR573
bit12
ZR573
bit13
ZR573
bit14
ZR573
bit15
Cont. Signal name Abbrev. 1st axis 2nd axis 3rd axis 4th axis 5th axis 6th axis 7th axis 8th axis
A
External brake SBT incom plete
(control axis)
SBTNFEXm
ZR574
bit0
ZR574
bit1
ZR574
bit2
ZR574
bit3
ZR574
bit4
ZR574
bit5
ZR574
bit6
ZR574
bit7
9th axis 10th axis 11th axis 12th axis 13th axis 14th axis 15th axis 16th axis
ZR574
bit8
ZR574
bit9
ZR574
bit10
ZR574
bit11
ZR574
bit12
ZR574
bit13
ZR574
bit14
ZR574
bit15
17th axis 18th axis 19th axis 20th axis 21th axis 22th axis 23th axis 24th axis
ZR575
bit0
ZR575
bit1
ZR575
bit2
ZR575
bit3
ZR575
bit4
ZR575
bit5
ZR575
bit6
ZR575
bit7
25th axis 26th axis 27th axis 28th axis 29th axis 30th axis 31th axis 32th axis
ZR575
bit8
ZR575
bit9
ZR575
bit10
ZR575
bit11
ZR575
bit12
ZR575
bit13
ZR575
bit14
ZR575
bit15

[Function]
This signal indicates that the axis corresponding to the signal is under the external brake test.
[Operation]
After the "External brake SBT start" signal (SBTSTEXm) turns ON, ON/OFF of this signal switches.
Incorporate the signal processing logic at the user side to actually start the external brake when this signal is turned ON.

<Test pattern of the external brake starting method>
<Example of the signal processing logic for the external brake test>
[Related signals]
(1) External brake SBT start (SBTSTEXm)
[Function]
This signal indicates that a certain period of time has passed since the last safe brake test of the motor brake was performed.
When this signal turns ON, perform the motor brake test as soon as possible.
[Operation]
This signal turns ON when the NC is turned ON and after a certain period of time has passed since the last motor brake test (parameter "#51011 SBT_INT" (SBT interval)). To turn OFF this signal, turn ON the "Motor brake SBT start" signal (SBTSTMOm) and perform the brake test. The test needs to be completed successfully.
Refer to the signal description of SBTSTMOm for the operation sequence of this signal.
[Related signals]
(1) Motor brake SBT start (SBTSTMOm)
Cont. Signal name Abbrev. 1st axis 2nd axis 3rd axis 4th axis 5th axis 6th axis 7th axis 8th axis
A In SBT external brake test
(control axis)
SBTEX BRm
ZR576
bit0
ZR576
bit1
ZR576
bit2
ZR576
bit3
ZR576
bit4
ZR576
bit5
ZR576
bit6
ZR576
bit7
9th axis 10th axis 11th axis 12th axis 13th axis 14th axis 15th axis 16th axis
ZR576
bit8
ZR576
bit9
ZR576
bit10
ZR576
bit11
ZR576
bit12
ZR576
bit13
ZR576
bit14
ZR576
bit15
17th axis 18th axis 19th axis 20th axis 21th axis 22th axis 23th axis 24th axis
ZR577
bit0
ZR577
bit1
ZR577
bit2
ZR577
bit3
ZR577
bit4
ZR577
bit5
ZR577
bit6
ZR577
bit7
25th axis 26th axis 27th axis 28th axis 29th axis 30th axis 31th axis 32th axis
ZR577
bit8
ZR577
bit9
ZR577
bit10
ZR577
bit11
ZR577
bit12
ZR577
bit13

ZR577
bit14
ZR577
bit15
SBTEXBRm
1CH
SBTEXBRm
2CH
External brake starting
signal
1CH
External brake starting
signal
2CH
Test pattern1 ON ON OFF OFF
Cont. Signal name Abbrev. 1st axis 2nd axis 3rd axis 4th axis 5th axis 6th axis 7th axis 8th axis
A
Motor brake SBT incom plete
(control axis)
SBTNFMOm
ZR578
bit0
ZR578
bit1
ZR578
bit2
ZR578
bit3
ZR578
bit4
ZR578
bit5
ZR578
bit6
ZR578
bit7
9th axis 10th axis 11th axis 12th axis 13th axis 14th axis 15th axis 16th axis
ZR578
bit8
ZR578
bit9
ZR578
bit10
ZR578
bit11
ZR578
bit12
ZR578
bit13
ZR578
bit14
ZR578
bit15
17th axis 18th axis 19th axis 20th axis 21th axis 22th axis 23th axis 24th axis
ZR579
bit0
ZR579
bit1
ZR579
bit2
ZR579
bit3
ZR579
bit4
ZR579
bit5
ZR579
bit6
ZR579
bit7
25th axis 26th axis 27th axis 28th axis 29th axis 30th axis 31th axis 32th axis
ZR579
bit8
ZR579
bit9
ZR579
bit10
ZR579
bit11
ZR579
bit12
ZR579
bit13
ZR579
bit14
ZR579
bit15
(Y***/ ZR***)

External brake starts
In SBT External brake test
(SBTEXBRm)

[Function]
This signal indicates that the safety absolute position for executing SLP/SCA has been established.
[Operation]
When the warning "Safe absol. posn unestablished" occurs, this signal turns ON after the "Safety absolute position check" signal is turned ON and the warning is canceled. (It will be in the state of the safety absolute position established.)
Additionally, when the warning "Safe absol. posn unestablished" occurs, this signal turns OFF.
Once this signal is turned ON, the ON status is held until the warning "Safe absol. posn unestablished" occurs even when the power is turned OFF and ON again. While this signal is ON, the observation by SLP and the signal output by SCA can be carried out. (When this signal is OFF, SLP/SCA does not operate.)
[Related signals]
(1) Safety absolute position check (control axis) (SFABSPFXm)
[Function]
This signal indicates the servo axis where the smart safety observation error occurred.
[Operation]
When the smart safety observation error occurs for each axis, the BIT corresponding to the servo axis in which the error occurred is turned ON.
"0" is output when no smart safety observation error has occurred for each axis.
[Caution]
"0" is output when the smart safety observation error occurs without displaying axis name.
[Related signals]
(1) V number of smart safety observation error (SFERR_VNO)
(2) E number of smart safety observation error (SFERR_ENO)
(3) Smart safety observation error occurring spindle (SFERR_SPm)
Cont. Signal name Abbrev. 1st axis 2nd axis 3rd axis 4th axis 5th axis 6th axis 7th axis 8th axis
A
In safety absolute position
establishing
(control axis)
SFABSPE STm
ZR580
bit0
ZR580
bit1
ZR580
bit2
ZR580
bit3
ZR580
bit4
ZR580
bit5
ZR580
bit6
ZR580
bit7
9th axis 10th axis 11th axis 12th axis 13th axis 14th axis 15th axis 16th axis
ZR580
bit8
ZR580
bit9
ZR580
bit10
ZR580
bit11
ZR580
bit12
ZR580
bit13
ZR580
bit14
ZR580
bit15
17th axis 18th axis 19th axis 20th axis 21th axis 22th axis 23th axis 24th axis
ZR581
bit0
ZR581
bit1
ZR581
bit2
ZR581
bit3
ZR581
bit4
ZR581
bit5
ZR581
bit6
ZR581
bit7
25th axis 26th axis 27th axis 28th axis 29th axis 30th axis 31th axis 32th axis
ZR581

bit8
ZR581
bit9
ZR581
bit10
ZR581
bit11
ZR581
bit12
ZR581
bit13
ZR581
bit14
ZR581
bit15
Cont. Signal name Abbrev. 1st axis 2nd axis 3rd axis 4th axis 5th axis 6th axis 7th axis 8th axis
A
Smart safety observation
error
occurring servo axis (con trol axis)
SFERR_SVm
ZR582
bit0
ZR582
bit1
ZR582
bit2
ZR582
bit3
ZR582
bit4
ZR582
bit5
ZR582
bit6
ZR582
bit7
9th axis 10th axis 11th axis 12th axis 13th axis 14th axis 15th axis 16th axis
ZR582
bit8
ZR582
bit9
ZR582
bit10
ZR582
bit11
ZR582
bit12
ZR582
bit13
ZR582
bit14
ZR582
bit15
17th axis 18th axis 19th axis 20th axis 21th axis 22th axis 23th axis 24th axis
ZR583
bit0
ZR583
bit1
ZR583
bit2
ZR583
bit3
ZR583
bit4
ZR583
bit5
ZR583
bit6
ZR583
bit7
25th axis 26th axis 27th axis 28th axis 29th axis 30th axis 31th axis 32th axis
ZR583
bit8
ZR583
bit9
ZR583
bit10
ZR583
bit11
ZR583
bit12
ZR583
bit13
ZR583
bit14
ZR583
bit15

[Function]
This signal indicates the servo axis where the smart safety observation warning has occurred.
[Operation]
When the smart safety observation warning for each axis occurs, the BIT corresponding to the servo axis in which the warning occurred is turned ON.
"0" is output when the smart safety observation warning for each axis has not occurred.
[Caution]
"0" is output when the smart safety observation warning occurs without displaying axis name.
[Related signals]
(1) V number of smart safety observation warning (SFWRG_VNO)
(2) W number of smart safety observation warning (SFWRG_WNO)
(3) Smart safety observation warning occurring spindle (SFWRG_SPm)
[Function]
This signal outputs the currently selected SLS speed tolerance's step No.
This signal is available when SLS is enabled by the parameter "#51002 SLS_Enable" (Enable SLS observation).
(When SLS is disabled by "#51002 SLS_Enable" (Enable SLS observation), always zero is output to all the bits of this signal (SLS speed tolerance 1).
<SLS speed change output status>
[Operation]
When the "SLS speed change input" (SLSMImn) is changed, this signal is also changed.
(SLSMOmn is changed even though the "SLS observation request" (*SLSRm) is ON (when SLS is not requested).)
[Related signals]
(1) SLS speed change input (SLSMImn)
(2) SLS speed override input (SLSOVRImn)
(3) SLS speed override output (SLSOVROmn)
(4) SLS observation request (*SLSRm)
(5) SLS observation is active (SLSEm)
(6) Under SLS limit (SLSSm)
Cont. Signal name Abbrev. 1st axis 2nd axis 3rd axis 4th axis 5th axis 6th axis 7th axis 8th axis
A
Smart safety observation
warning occurring servo
axis (control axis)
SF WRG_SVm
ZR584
bit0
ZR584
bit1
ZR584
bit2
ZR584
bit3
ZR584
bit4
ZR584
bit5
ZR584
bit6
ZR584
bit7
9th axis 10th axis 11th axis 12th axis 13th axis 14th axis 15th axis 16th axis
ZR584
bit8
ZR584
bit9
ZR584
bit10
ZR584
bit11
ZR584
bit12
ZR584
bit13
ZR584
bit14
ZR584
bit15
17th axis 18th axis 19th axis 20th axis 21th axis 22th axis 23th axis 24th axis
ZR585
bit0
ZR585
bit1
ZR585
bit2
ZR585
bit3
ZR585
bit4
ZR585
bit5
ZR585
bit6
ZR585
bit7

25th axis 26th axis 27th axis 28th axis 29th axis 30th axis 31th axis 32th axis
ZR585
bit8
ZR585
bit9
ZR585
bit10
ZR585
bit11
ZR585
bit12
ZR585
bit13
ZR585
bit14
ZR585
bit15
Cont. Signal name Abbrev. 1st axis 2nd axis 3rd axis 4th axis 5th axis 6th axis 7th axis 8th axis
A SLS speed change output
(control axis) SLSMOmn
ZR608 ZR609 ZR610 ZR611 ZR612 ZR613 ZR614 ZR615
9th axis 10th axis 11th axis 12th axis 13th axis 14th axis 15th axis 16th axis
ZR616 ZR617 ZR618 ZR619 ZR620 ZR621 ZR622 ZR623
17th axis 18th axis 19th axis 20th axis 21th axis 22th axis 23th axis 24th axis
ZR624 ZR625 ZR626 ZR627 ZR628 ZR629 ZR630 ZR631
25th axis 26th axis 27th axis 28th axis 29th axis 30th axis 31th axis 32th axis
ZR632 ZR633 ZR634 ZR635 ZR636 ZR637 ZR638 ZR639
SLS speed change output Selected step No. Corresponding SLS speed pa Bit1 Bit0 rameter
0 0 1 #51103 SLS_Speed1
0 1 2 #51104 SLS_Speed2
1 0 3 #51105 SLS_Speed3
1 1 4 #51106 SLS_Speed4

[Function]
This signal outputs the currently selected SLS speed override.
This signal is available when SLS is enabled by the parameter "#51002 SLS_Enable" (Enable SLS observation).
(When SLS is disabled by "#51002 SLS_Enable" (Enable SLS observation), always zero is output to all the bits of this signal (SLS speed override 1).)
<SLS speed override output status>
[Operation]
When the "SLS speed override input" (SLSOVRImn) is changed, this signal is also changed.
(SLSMOmn is changed even though the "SLS observation request" (*SLSRm) is ON (when SLS is not requested).)
[Related signals]
(1) SLS speed change input (SLSMImn)
(2) SLS speed change output (SLSMOmn)
(3) SLS speed override input (SLSOVRImn)
(4) SLS observation request (*SLSRm)
(5) SLS observation is active (SLSEm)
(6) Under SLS limit (SLSSm)
Cont. Signal name Abbrev. 1st axis 2nd axis 3rd axis 4th axis 5th axis 6th axis 7th axis 8th axis
A SLS speed override output
(control axis) SLSOVROmn
ZR608 ZR609 ZR610 ZR611 ZR612 ZR613 ZR614 ZR615
9th axis 10th axis 11th axis 12th axis 13th axis 14th axis 15th axis 16th axis
ZR616 ZR617 ZR618 ZR619 ZR620 ZR621 ZR622 ZR623
17th axis 18th axis 19th axis 20th axis 21th axis 22th axis 23th axis 24th axis
ZR624 ZR625 ZR626 ZR627 ZR628 ZR629 ZR630 ZR631
25th axis 26th axis 27th axis 28th axis 29th axis 30th axis 31th axis 32th axis
ZR632 ZR633 ZR634 ZR635 ZR636 ZR637 ZR638 ZR639
SLS speed override input No. of step to be select ed
Corresponding SLS speed over Bit7 Bit6 Bit5 Bit4 ride parameter
0 0 0 0 1 #51107 SLS_Override1
0 0 0 1 2 #51108 SLS_Override2
0 0 1 0 3 #51109 SLS_Override3
0 0 1 1 4 #51110 SLS_Override4
0 1 0 0 5 #51111 SLS_Override5
0 1 0 1 6 #51112 SLS_Override6
0 1 1 0 7 #51113 SLS_Override7
0 1 1 1 8 #51114 SLS_Override8
1 0 0 0 9 #51115 SLS_Override9
1 0 0 1 10 #51116 SLS_Override10
1 0 1 0 11 #51117 SLS_Override11
1 0 1 1 12 #51118 SLS_Override12
1 1 0 0 13 #51119 SLS_Override13
1 1 0 1 14 #51120 SLS_Override14
1 1 1 0 15 #51121 SLS_Override15
1 1 1 1 16 #51122 SLS_Override16

[Function]
This signal outputs the step No. of the currently selected SLP position tolerance.
This signal is available when SLP is enabled by the parameter "#51003 SLP_Enable" (Enable SLP observation).
(When SLP is disabled by "#51003 SLP_Enable" (Enable SLP observation), always zero is output to all the bits of this

signal (SLP position tolerance 1).)
<SLP position change output status>
[Operation]
When the "SLP position change input" (SLPMImn) is changed, this signal is also changed.
(This signal is changed even though the "SLP observation request" (*SLPRm) is ON (when SLP is not requested).)
[Related signals]
(1) SLP position change input (SLPMImn)
(2) SLP observation request (*SLPRm)
(3) SLP observation is active (SLPEm)
(4) In SLP range (SLPSm)
Cont. Signal name Abbrev. 1st axis 2nd axis 3rd axis 4th axis 5th axis 6th axis 7th axis 8th axis
A SLP position change output
(control axis) SLPMOmn
ZR640 ZR641 ZR642 ZR643 ZR644 ZR645 ZR646 ZR647
9th axis 10th axis 11th axis 12th axis 13th axis 14th axis 15th axis 16th axis
ZR648 ZR649 ZR650 ZR651 ZR652 ZR653 ZR654 ZR655
17th axis 18th axis 19th axis 20th axis 21th axis 22th axis 23th axis 24th axis
ZR656 ZR657 ZR658 ZR659 ZR660 ZR661 ZR662 ZR663
25th axis 26th axis 27th axis 28th axis 29th axis 30th axis 31th axis 32th axis
ZR664 ZR665 ZR666 ZR667 ZR668 ZR669 ZR670 ZR671
SLP position change output Selected step No. Corresponding SLP position pa Bit1 Bit0 rameter
00 1 #51126/51127 SLP_Position (P/
M)1
01 2 #51128/51129 SLP_Position (P/
M)2
10 3 #51130/51131 SLP_Position (P/
M)3
11 4 #51132/51133 SLP_Position (P/
M)4

[Function]
This signal indicates that Safe speed monitor has been enabled on the target axis and that the speed of the target axis is under the safe speed.
<Correspondence between the "Under SSM safe speed" signals and parameters>
[Operation]
This signal turns ON when the "SSM request" (*SSMRm) is turned OFF (when SSM is requested), the NC starts execution of SSM, and then the speed of the target axis drops to the safe speed or lower. This signal remains OFF while the target axis speed is exceeding the safe speed. This signal turns OFF when the "SSM request" (*SSMRm) is turned ON (when SSM is not requested).
[Related signals]
(1) SSM request (*SSMRm)
(2) SSM is active (SSMEm)
Cont. Signal name Abbrev. 1st axis 2nd axis 3rd axis 4th axis 5th axis 6th axis 7th axis 8th axis
A Under SSM safe speed
(control axis) SSMSmn
ZR672 ZR673 ZR674 ZR675 ZR676 ZR677 ZR678 ZR679
9th axis 10th axis 11th axis 12th axis 13th axis 14th axis 15th axis 16th axis
ZR680 ZR681 ZR682 ZR683 ZR684 ZR685 ZR686 ZR687
17th axis 18th axis 19th axis 20th axis 21th axis 22th axis 23th axis 24th axis
ZR688 ZR689 ZR690 ZR691 ZR692 ZR693 ZR694 ZR695
25th axis 26th axis 27th axis 28th axis 29th axis 30th axis 31th axis 32th axis
ZR696 ZR697 ZR698 ZR699 ZR700 ZR701 ZR702 ZR703
Under SSM safe speed Corresponding SSM speed parameter
bit0 Under SSM safe speed
1 #51135 SSM_Speed1, #51139 SSM_Hysteresis1
bit1 Under SSM safe speed
2 #51136 SSM_Speed2, #51140 SSM_Hysteresis2
bit2 Under SSM safe speed
3 #51137 SSM_Speed3, #51141 SSM_Hysteresis3
bit3 Under SSM safe speed
4 #51138 SSM_Speed4, #51142 SSM_Hysteresis4

[Function]
This signal indicates the safe cam position status of the control axis.
<Correspondence between Safe cam position signals and parameters (for the 1st axis)>
[Operation]
When the NC has started execution of SCA in response to turning-OFF of the "Safe cam request" (*SCARm) (when SCA is requested), and the control axis has reached the safe position (+/-)(*1)or further, the corresponding bit of this signal turns ON.
(*1) Safe position (+/-) is determined based on the axis position status, which means based on SCA position ("#51143 SCA_PositionP1" (SCA position 1 (+)) to "#51174 SCA_PositionM16" (SCA position 16 (-))) and SCA hysteresis width ("#51175 SCA_Hysteresis" (SCA hysteresis width)).
When the "Safe cam position n (+/-)" is ON
"Safe position n (+/-)" = "SCA position n (+/-)" - "SCA hysteresis width" (n = 1 to 16)
When the "Safe cam position n (+/-)" is OFF
"Safe position n (+/-)" = "SCA position n (+/-)" (n = 1 to 16)
Listed below is the correspondence between the statuses of the "Safe cam position n (-)" and the "Safe cam position n (+)" and the axis position status.
(When "SCA position n (+)" > "SCA position n (-)")
When the "Safe cam request" (*SCARm) is turned ON (when SCA is not requested), this signal is all turned OFF.
[Related signals]
(1) Safe cam request (*SCARm)

(2) Safe cam is active (SCAEm)
Cont. Signal name Abbrev. 1st axis 2nd axis 3rd axis 4th axis 5th axis 6th axis 7th axis 8th axis
A SCA safe cam position
(control axis) SCASmn
ZR704
ZR705
ZR706
ZR707
ZR708
ZR709
ZR710
ZR711
ZR712
ZR713
ZR714
ZR715
ZR716
ZR717
ZR718
ZR719
9th axis 10th axis 11th axis 12th axis 13th axis 14th axis 15th axis 16th axis
ZR720
ZR721
ZR722
ZR723
ZR724
ZR725
ZR726
ZR727
ZR728
ZR729
ZR730
ZR731
ZR732
ZR733
ZR734
ZR735
17th axis 18th axis 19th axis 20th axis 21th axis 22th axis 23th axis 24th axis
ZR736
ZR737
ZR738
ZR739
ZR740
ZR741
ZR742
ZR743
ZR744
ZR745
ZR746
ZR747
ZR748
ZR749
ZR750
ZR751
25th axis 26th axis 27th axis 28th axis 29th axis 30th axis 31th axis 32th axis
ZR752
ZR753
ZR754
ZR755
ZR756
ZR757
ZR758
ZR759
ZR760
ZR761
ZR762
ZR763
ZR764
ZR765
ZR766
ZR767
SCA safe cam position Corresponding SCA position parameter
SCAS11/bit0 Safe cam position 1 (-) #51144 SCA_PositionM1
SCAS12/bit1 Safe cam position 2 (-) #51146 SCA_PositionM2
:: :
SCAS115/bit14 Safe cam position 15 (-) #51172 SCA_PositionM15
SCAS116/bit15 Safe cam position 16 (-) #51174 SCA_PositionM16
SCAS117/bit0 Safe cam position 1 (+) #51143 SCA_PositionP1
SCAS118/bit1 Safe cam position 2 (+) #51145 SCA_PositionP2
:: :
SCAS131/bit14 Safe cam position 15 (+) #51171 SCA_PositionP15
SCAS132/bit15 Safe cam position 16 (+) #51173 SCA_PositionP16
Safe cam position n (-) Safe cam position n (+) Axis position status
0 0 Smaller than "Safe position n (-)"
1 0 Between "Safe position n (-)" and "Safe position n (+)"
0 1 -
1 1 Same as or greater than "Safe position n (+)"

[Function]
This signal is used to indicate the position of the safe brake test start of the external brake test or the motor brake test.
[Operation]
This signal saves the current position on the machine coordinate at the start of the safe brake test.
This data is updated at the execution of the safe brake test. (The same value continues to be output unless the safe brake test is executed.)
The output unit differs depending on the parameter "#1040 M_inch" (Constant input (inch)).
If the target axis is an rotary axis, the output unit is 0.0001 regardless of the parameter "#1040 M_inch" (Constant input (inch)).
<For a linear axis and "M_inch" is "0" (metric system)>
The output unit is submicron (0.0001mm).
(Example) When the machine position of the 1st axis (linear axis) is 123.4567 mm
ZR768: "D687" is stored here.
ZR769: "0012" is stored here.
<For a linear axis and "M_inch" is "1" (inch system)>
The output unit is 0.00001 inch.
(Example) When the machine position of the 1st axis (linear axis) is 1.23456 inch
ZR768: "E240" is stored here.
ZR769: "0001" is stored here.
<For the linear type rotary axis or the rotation-type rotary axis>
The output unit is 0.0001.
(Example) When the machine coordinate of the 1st axis (rotary axis) is 12.3456
ZR768: "E240" is stored here.
ZR769: "0001" is stored here.
[Related signals]
(1) External brake SBT start (SBTSTEXm)
(2) Motor brake SBT start (SBTSTMOm)
[Function]
This signal indicates that SLS observation has been enabled on the spindle.
[Operation]
This signal turns ON when the "SLS observation request" (*SLSSRm) is turned OFF (when SLS is requested) and the NC starts execution of the SLS observation function. This signal turns OFF when the "SLS observation request" (*SLSSRm) is turned ON (when SLS is not requested).
[Related signals]
(1) SLS observation request (*SLSSRm)
(2) Under SLS limit (SLSSSm)
Cont. Signal name Abbrev. 1st axis 2nd axis 3rd axis 4th axis 5th axis 6th axis 7th axis 8th axis
A SBT start position
(control axis) SBTPOSm
ZR768
ZR769
ZR772
ZR773
ZR776
ZR777
ZR780
ZR781
ZR784
ZR785
ZR788
ZR789
ZR792
ZR793
ZR796
ZR797
9th axis 10th axis 11th axis 12th axis 13th axis 14th axis 15th axis 16th axis
ZR800
ZR801
ZR804
ZR805
ZR808
ZR809
ZR812
ZR813
ZR816
ZR817
ZR820
ZR821
ZR824
ZR825
ZR828
ZR829
17th axis 18th axis 19th axis 20th axis 21th axis 22th axis 23th axis 24th axis
ZR832
ZR833
ZR836
ZR837
ZR840
ZR841
ZR844
ZR845
ZR848
ZR849
ZR852
ZR853

ZR856
ZR857
ZR860
ZR861
25th axis 26th axis 27th axis 28th axis 29th axis 30th axis 31th axis 32th axis
ZR864
ZR865
ZR868
ZR869
ZR872
ZR873
ZR876
ZR877
ZR880
ZR881
ZR884
ZR885
ZR888
ZR889
ZR892
ZR893
Cont. Signal name Abbrev. 1st axis 2nd axis 3rd axis 4th axis 5th axis 6th axis 7th axis 8th axis
A SLS observation is active
(spindle) SLSSEm ZR1024
bit0
ZR1024
bit1
ZR1024
bit2
ZR1024
bit3
ZR1024
bit4
ZR1024
bit5
ZR1024
bit6
ZR1024
bit7

[Function]
This signal indicates that SLS observation has been enabled on the spindle and that the spindle is at the safe speed or lower.
[Operation]
This signal turns ON when the "SLS observation request" (*SLSSRm) is turned OFF (when SLS is requested), the NC starts execution of the SLS observation function, and then the speed of the spindle drops to the safely-limited speed or lower. This signal remains OFF if the spindle's speed is exceeding the safely-limited speed. This signal turns OFF when the "SLS observation request" (*SLSSRm) is turned ON (when SLS is not requested).
[Related signals]
(1) SLS observation request (*SLSSRm)
(2) SLS observation is active (SLSSEm)
[Function]
This signal indicates that Safe speed monitor has been enabled on the spindle.
[Operation]
This signal turns ON when the "SSM request" (*SSMSRm) is turned OFF (when SSM is requested) and the NC starts execution of SSM. This signal turns OFF when the "SSM request" (*SSMSRm) is turned ON (when SSM is not requested).
[Related signals]
(1) SSM request (*SSMSRm)
(2) Under SSM safe speed (SSMSSmn)
[Function]
This signal indicates that Safe operating stop has been enabled on the spindle in response to the "SOS observation request" (*SOSSRm).
Note that if SOS is activated by a start request from SS2, there is no output to this signal.
[Operation]
This signal turns ON when the "SOS observation request" (*SOSSRm) is turned OFF (when SOS is requested) and the NC starts execution of SOS. This signal turns OFF when the "SOS observation request" (*SOSSRm) is turned ON (when SOS is not requested).
[Related signals]
(1) SOS observation request (*SOSSRm)
(2) In SOS stop (SOSSSm)
[Function]
This signal indicates that the "SOS is active" signal (SOSSEm) of the spindle has been turned ON or there is a start request from SS2, and that the spindle is at a standstill.
[Operation]
This signal turns ON when the NC has started execution of SOS due to turning-OFF of the "SOS observation request" (*SOSSRm) (when SOS is requested) or due to a start request from SS2, and the spindle has been set to a standstill. This signal remains OFF while the spindle is not at a standstill. This signal turns OFF when the "SOS observation request" (*SOSSRm) is turned ON (when SOS is not requested) and when there is no request from SS2.
[Related signals]
(1) SOS observation request (*SOSSRm)
(2) SOS is active (SOSSEm)
Cont. Signal name Abbrev. 1st axis 2nd axis 3rd axis 4th axis 5th axis 6th axis 7th axis 8th axis
A Under SLS limit
(spindle) SLSSSm ZR1025
bit0

ZR1025
bit1
ZR1025
bit2
ZR1025
bit3
ZR1025
bit4
ZR1025
bit5
ZR1025
bit6
ZR1025
bit7
Cont. Signal name Abbrev. 1st axis 2nd axis 3rd axis 4th axis 5th axis 6th axis 7th axis 8th axis
A SSM is active
(spindle)
SSM SEm
ZR1028
bit0
ZR1028
bit1
ZR1028
bit2
ZR1028
bit3
ZR1028
bit4
ZR1028
bit5
ZR1028
bit6
ZR1028
bit7
Cont. Signal name Abbrev. 1st axis 2nd axis 3rd axis 4th axis 5th axis 6th axis 7th axis 8th axis
A SOS is active
(spindle) SOSSEm ZR1030
bit0
ZR1030
bit1
ZR1030
bit2
ZR1030
bit3
ZR1030
bit4
ZR1030
bit5
ZR1030
bit6
ZR1030
bit7
Cont. Signal name Abbrev. 1st axis 2nd axis 3rd axis 4th axis 5th axis 6th axis 7th axis 8th axis
A In SOS stop
(spindle) SOSSSm ZR1031
bit0
ZR1031
bit1
ZR1031
bit2
ZR1031
bit3
ZR1031
bit4
ZR1031
bit5
ZR1031
bit6
ZR1031
bit7

[Function]
This signal indicates that SS1 has been enabled in response to the "Safe stop 1 request" (*SS1SRm).
Note that if SS1 is activated due to occurrence of a smart safety observation error, there is no output to this signal.
[Operation]
This signal turns ON when the "Safe stop 1 request" (*SS1SRm) is turned OFF (when SS1 is requested) and the NC starts execution of the safe stop 1 function. This signal turns OFF when the "Safe stop 1 request" (*SS1SRm) is turned ON (when SS1 is not requested).
[Related signals]
(1) Safe stop 1 request (*SS1SRm)
(2) In SS1 stop (SS1SSm)
[Function]
This signal indicates that SS1 has been executed due to turning-ON of the "SS1 is active" signal (SS1SEm) of the spindle or due to occurrence of a smart safety observation error, and that the spindle is at a standstill.
[Operation]

When the "Safe stop 1 request" (*SS1SRm) is turned OFF (when SS1 is requested) or when a smart safety observation error occurs, SS1 starts to be executed. When the spindle decelerates to a stop, this signal turns ON. This signal remains OFF while the target spindle is not at a standstill. This signal turns OFF when the "Safe stop 1 request" (*SS1SRm) is turned ON (when SS1 is not requested) and when SS1 is not executed due to occurrence of a smart safety observation error.

[Related signals]

(1) Safe stop 1 request (*SS1SRm)

(2) SS1 is active (SS1SEm)

[Function]

This signal indicates that Safe stop 2 has been enabled on the spindle.

[Operation]

This signal turns ON when the "Safe stop 2 request" (*SS2SRm) is turned OFF (when SS2 is requested), and the NC starts execution of SS2. This signal turns OFF when the "Safe stop 2 request" (*SS2SRm) is turned ON (when SS2 is not requested).

[Related signals]

(1) Safe stop 2 request (*SS2SRm)

[Function]

This signal indicates that the Safe torque off function has been enabled on the spindle in response to the "Safe torque off request" (*STOSRm). Note that if STO is activated due to occurrence of a smart safety observation error, there is no output to this signal.

[Operation]

This signal turns ON when the "Safe torque off request" (*STOSRm) is turned OFF (when STO is requested) and the NC starts execution of STO. This signal turns OFF when the "Safe torque off request" (*STOSRm) is turned ON (when STO is not requested).

[Related signals]

(1) Safe torque off request (*STOSRm)

(2) In Safe torque off (STOSSm)

Cont. Signal name Abbrev. 1st axis 2nd axis 3rd axis 4th axis 5th axis 6th axis 7th axis 8th axis

A SS1 is active

(spindle) SS1SEm ZR1032

bit0

ZR1032

bit1

ZR1032

bit2

ZR1032

bit3

ZR1032

bit4

ZR1032

bit5

ZR1032

bit6

ZR1032

bit7

Cont. Signal name Abbrev. 1st axis 2nd axis 3rd axis 4th axis 5th axis 6th axis 7th axis 8th axis

A In SS1 stop

(spindle) SS1SSm ZR1033

bit0

ZR1033

bit1

ZR1033

bit2

ZR1033

bit3

ZR1033

bit4

ZR1033

bit5

ZR1033

bit6

ZR1033

bit7

Cont. Signal name Abbrev. 1st axis 2nd axis 3rd axis 4th axis 5th axis 6th axis 7th axis 8th axis

A SS2 is active

(spindle) SS2SEm ZR1034

bit0

ZR1034

bit1

ZR1034

bit2

ZR1034

bit3

ZR1034

bit4

ZR1034

bit5

ZR1034

bit6

ZR1034

bit7

Cont. Signal name Abbrev. 1st axis 2nd axis 3rd axis 4th axis 5th axis 6th axis 7th axis 8th axis

A STO is active

(spindle) STOSEm ZR1035

bit0

ZR1035

bit1

ZR1035

bit2
ZR1035
bit3
ZR1035
bit4
ZR1035
bit5
ZR1035
bit6
ZR1035
bit7

[Function]
This signal indicates that STO has been executed due to turning-ON of the "STO is active" signal (STOSEm) of the spindle or due to occurrence of a smart safety observation error, and the main power supply for driving has been shut off.
[Operation]
This signal turns ON when the NC has started execution of STO due to turning-OFF of the "Safe torque off request" (*STOSRm) (when STO is requested) or due to occurrence of a smart safety observation error, and the main power supply for driving the spindle is shut off. This signal remains OFF while the main power supply for driving the spindle has not been shut off. This signal turns OFF when the "Safe torque off request" (*STOSRm) is turned ON (when STO is not requested) and when STO is not executed due to occurrence of a smart safety observation error.
[Related signals]
(1) Safe torque off request (*STOSRm)
(2) STO is active (STOSEm)
[Function]
This signal indicates the spindle in which the smart safety observation error has occurred.
[Operation]
When the smart safety observation error occurs for each axis, the BIT corresponding to the spindle in which the error occurred is turned ON.
"0" is output when no smart safety observation error for each axis has occurred for each axis.
[Caution]
"0" is output when the smart safety observation error occurs without displaying axis name.
[Related signals]
(1) V number of smart safety observation error (SFERR_VNO)
(2) E number of smart safety observation error (SFERR_ENO)
(3) Smart safety observation error occurring servo axis (SFERR_SVm)
[Function]
This signal shows the spindle on which the smart safety observation warning has occurred.
[Operation]
When the smart safety observation warning for each axis occurs, the BIT corresponding to the spindle in which the warning occurred is turned ON.
"0" is output when the smart safety observation warning for each axis has not occurred.
[Caution]
"0" is output when the smart safety observation warning occurs without displaying axis name.
[Related signals]
(1) V number of smart safety observation warning (SFWRG_VNO)
(2) W number of smart safety observation warning (SFWRG_WNO)
(3) Smart safety observation warning occurring servo axis (SFWRG_SVm)
Cont. Signal name Abbrev. 1st axis 2nd axis 3rd axis 4th axis 5th axis 6th axis 7th axis 8th axis
A In Safe torque off
(spindle) STOSSm ZR1036
bit0
ZR1036
bit1
ZR1036
bit2
ZR1036
bit3
ZR1036
bit4
ZR1036
bit5
ZR1036
bit6
ZR1036
bit7
Cont. Signal name Abbrev. 1st axis 2nd axis 3rd axis 4th axis 5th axis 6th axis 7th axis 8th axis
A
Smart safety observation
error occurring spindle
(spindle)
SFERR_SPm ZR1043
bit0
ZR1043
bit1
ZR1043
bit2
ZR1043
bit3
ZR1043
bit4
ZR1043
bit5
ZR1043
bit6

ZR1043
bit7
Cont. Signal name Abbrev. 1st axis 2nd axis 3rd axis 4th axis 5th axis 6th axis 7th axis 8th axis
A
Smart safety observation
warning occurring spindle
(spindle)
SFWRG_SPm ZR1044
bit0
ZR1044
bit1
ZR1044
bit2
ZR1044
bit3
ZR1044
bit4
ZR1044
bit5
ZR1044
bit6
ZR1044
bit7

[Function]
This signal outputs the currently selected SLS speed tolerance's step No.
This signal is available when the parameter "#51002 SLS_Enable" (Enable SLS observation) is set to "1" (Enable).
(When the parameter "#51002 SLS_Enable" (Enable SLS observation) is set to "0" (Disable), always zero is output to all the bits of this signal (SLS speed tolerance 1).
<SLS speed change output status>
[Operation]
When the "SLS speed change input" (SLSSMImn) is changed, this signal is also changed.
(This signal is changed even though the "SLS observation request" (*SLSSRm) is ON (when SLS is not requested).)
[Related signals]
(1) SLS speed change input (SLSSMImn)
(2) SLS speed override input (SLSSOVRImn)
(3) SLS speed override output (SLSSOVROmn)
(4) SLS observation request (*SLSSRm)
(5) SLS observation is active (SLSSEm)
(6) Under SLS limit (SLSSSm)
Cont. Signal name Abbrev. 1st axis 2nd axis 3rd axis 4th axis 5th axis 6th axis 7th axis 8th axis
A SLS speed change output
(spindle)
SLSS MOmn ZR1056 ZR1057 ZR1058 ZR1059 ZR1060 ZR1061 ZR1062 ZR1063
SLS speed change output Selected step No. Corresponding SLS speed pa Bit1 Bit0 rameter
0 0 1 #51303 SLS_SSpeed1
0 1 2 #51304 SLS_SSpeed2
1 0 3 #51305 SLS_SSpeed3
1 1 4 #51306 SLS_SSpeed4

[Function]
This signal outputs the currently selected SLS speed override.
This signal is available when the parameter "#51002 SLS_Enable" (Enable SLS observation) is set to "1" (Enable).
(When the parameter "#51002 SLS_Enable" (Enable SLS observation) is set to "0" (Disable), always zero is output to all the bits of this signal (SLS speed override 1).)
<SLS speed override output status>
[Operation]
When the "SLS speed override input" (SLSSOVRImn) is changed, this signal is also changed.
(This signal is changed even though the "SLS observation request" (*SLSSRm) is ON (when SLS is not requested).)
[Related signals]
(1) SLS speed change input (SLSSMImn)
(2) SLS speed change output (SLSSMOmn)
(3) SLS speed override input (SLSSOVRImn)
(4) SLS observation request (*SLSSRm)
(5) SLS observation is active (SLSSEm)
(6) Under SLS limit (SLSSSm)
Cont. Signal name Abbrev. 1st axis 2nd axis 3rd axis 4th axis 5th axis 6th axis 7th axis 8th axis
A SLS speed override output
(spindle)
SLSSOV ROmn ZR1056 ZR1057 ZR1058 ZR1059 ZR1060 ZR1061 ZR1062 ZR1063
SLS speed override input No. of step to be select ed
Corresponding SLS speed over Bit7 Bit6 Bit5 Bit4 ride parameter
0 0 0 0 1 #51307 SLS_SOverride1
0 0 0 1 2 #51308 SLS_SOverride2
0 0 1 0 3 #51309 SLS_SOverride3
0 0 1 1 4 #51310 SLS_SOverride4
0 1 0 0 5 #51311 SLS_SOverride5
0 1 0 1 6 #51312 SLS_SOverride6
0 1 1 0 7 #51313 SLS_SOverride7
0 1 1 1 8 #51314 SLS_SOverride8
1 0 0 0 9 #51315 SLS_SOverride9
1 0 0 1 10 #51316 SLS_SOverride10

1 0 1 0 11 #51317 SLS_SOverride11
1 0 1 1 12 #51318 SLS_SOverride12
1 1 0 0 13 #51319 SLS_SOverride13
1 1 0 1 14 #51320 SLS_SOverride14
1 1 1 0 15 #51321 SLS_SOverride15
1 1 1 1 16 #51322 SLS_SOverride16

[Function]
This signal indicates that the safe speed monitor has been enabled on the target spindle and that the spindle speed is below the safe speed.
<Correspondence between the "Under SSM safe speed" signals and parameters>
[Operation]
This signal turns ON when the "SSM request" (*SSMSRm) is turned OFF (when SSM is requested), the NC starts execution of SSM, and then the speed of the spindle drops to the safe speed or lower. This signal remains OFF while the spindle speed is exceeding the safe speed. This signal turns OFF when the "SSM request" (*SSMSRm) is turned ON (when SSM is not requested).
[Related signals]
(1) SSM request (*SSMSRm)
(2) SSM is active (SSMSEm)
[Function]
This signal indicates that Safety external emergency stop is being executed.
[Operation]
This signal turns ON when the safety external emergency stop is enabled (when the emergency stop signal device No. is set in the safety I/O assignment parameter), the emergency stop signal turns OFF (open status), the axis for which the parameter "SF_Disable"/"SF_SDisable" is set to OFF enters STO status, and all the axes are set in Ready OFF status. This signal turns OFF when the emergency stop signal turns ON (close status) and both the STO status of the axis for which "SF_Disable"/"SF_SDisable" is set to OFF, and the Ready OFF status of all the axes are cancelled.
[Function]
This signal shows the category numbers of the smart safety observation error (V number).
[Operation]
When the smart safety observation error occurs, the number (V number) that shows the category of the error occurred is output.
"0" is output when the smart safety observation error is not in occurrence state.
(Example) When the smart safety observation error "V04 0003 Safe IO disabled: connect err" occurs
V number of smart safety observation error (system common) (SFERR_VNO): 0004
[Related signals]
(1) E number of smart safety observation error (SFERR_ENO)
(2) Smart safety observation error occurring servo axis (SFERR_SVm)
(3) Smart safety observation error occurring spindle (SFERR_SPm)
Cont. Signal name Abbrev. 1st axis 2nd axis 3rd axis 4th axis 5th axis 6th axis 7th axis 8th axis
A Under SSM safe speed
(spindle) SSMSSmn ZR1088 ZR1089 ZR1090 ZR1091 ZR1092 ZR1093 ZR1094 ZR1095
Under SSM safe speed Corresponding SSM speed parameter
bit0 Under SSM safe speed
1 #51326 SSM_SSpeed1, #51330 SSM_SHysteresis1
bit1 Under SSM safe speed
2 #51327 SSM_SSpeed2, #51331 SSM_SHysteresis2
bit2 Under SSM safe speed
3 #51328 SSM_SSpeed3, #51332 SSM_SHysteresis3
bit3 Under SSM safe speed
4 #51329 SSM_SSpeed4, #51333 SSM_SHysteresis4
Cont. Signal name Abbrev. Common
($)
A In safety external emergency stop (system common) SEXTEMG ZR1264
bit0
Cont. Signal name Abbrev. Common
($)
A V number of smart safety observation error (system common) SFERR_VNO ZR1268

[Function]
This signal shows the error numbers of the smart safety observation error (E number).
[Operation]
When the smart safety observation error occurs, the number (E number) that shows which error occurred in the error category (V number) is output.
"0" is output when the smart safety observation error is not in occurrence state.
(Example) When the smart safety observation error "V04 0003 Safe IO disabled: connect err" occurs
E number of smart safety observation error (system common) (SFERR_ENO): 0003
[Related signals]
(1) V number of smart safety observation error (SFERR_VNO)
(2) Smart safety observation error occurring servo axis (SFERR_SVm)
(3) Smart safety observation error occurring spindle (SFERR_SPm)
[Function]
This signal shows the category numbers of the smart safety observation warning (V number).
[Operation]
When the smart safety observation warning occurs, the number (V number) that shows the category of the warning occurred is output.
"0" is output when the smart safety observation warning is not in occurrence state.
(Example) When the smart safety observation warning "V51 0005 SBT warning 4" occurs
V number of smart safety observation warning (system common) (SFWRG_VNO): 0033 (51 in decimal)
[Related signals]
(1) W number of smart safety observation warning (SFWRG_WNO)
(2) Smart safety observation warning occurring servo axis (SFWRG_SVm)

(3) Smart safety observation warning occurring spindle (SFWRG_SPm)
[Function]
This signal shows the warning numbers of the smart safety observation warning (W number).
[Operation]
When the smart safety observation warning occurs, the number (W number) that shows which warning occurred in the warning category (V number) is output.
"0" is output when the smart safety observation warning is not in occurrence state.
(Example) When the smart safety observation warning "V51 0005 SBT warning 4" occurs
W number of smart safety observation warning (system common) (SFWRG_WNO): 0005
[Related signals]
(1) V number of smart safety observation warning (SFWRG_VNO)
(2) Smart safety observation warning occurring servo axis (SFWRG_SVm)
(3) Smart safety observation warning occurring spindle (SFWRG_SPm)
Cont. Signal name Abbrev. Common
($)
A E number of smart safety observation error (system common) SFERR_ENO ZR1269
Cont. Signal name Abbrev. Common
($)
A V number of smart safety observation warning (system com mon) SFWRG_VNO ZR1270
Cont. Signal name Abbrev. Common
($)
A W number of smart safety observation warning (system com mon)
SFWRG_W NO ZR1271

[Function]
This signal outputs the state of safety I/O-related observation function.
[Operation]
When an error occurs on a safety I/O related observation function, the corresponding error information is output.
[Related signals]
(1) Safety I/O unit observation state (SIOERRUNIT)
(2) Safety I/O unit observation error details (SIOERRUNITSTS)
[Function]
This signal outputs the state of safety I/O unit observation error for each safety I/O unit.
For the safety I/O unit, the devices are assigned with the parameters.
The following table lists the device assignment for the safety I/O unit.
[Operation]
When an error occurs in a safety I/O unit observation function, the error information is output.
[Related signals]
(1) Safety I/O observation state (SIOERRSTS)
(2) Safety I/O unit observation error details (SIOERRUNITSTS)
Cont. Signal name Abbrev. Common
($)
A Safety I/O observation state SIOERRSTS ZR1536
Bit Description Bit Description
bit0 Safety I/O unit observation error bit8 Reserved
bit1 Drive's safety signal compare error bit9 Reserved
bit2 Output OFF check not complete bit10 Reserved
bit3 Safety I/O unit I/O start bit11 Reserved
bit4 Reserved bit12 Reserved
bit5 Reserved bit13 Reserved
bit6 Reserved bit14 Reserved
bit7 Reserved bit15 Reserved
Cont. Signal name Abbrev. Common
($)
A Safety I/O unit observation state SIOERRUNIT ZR1538
Bit Description Bit Description
bit0 Safety I/O unit Unit 1 error occurring bit8 Reserved
bit1 Safety I/O unit Unit 2 error occurring bit9 Reserved
bit2 Safety I/O unit Unit 3 error occurring bit10 Reserved
bit3 Safety I/O unit Unit 4 error occurring bit11 Reserved
bit4 Safety I/O unit Unit 5 error occurring bit12 Reserved
bit5 Safety I/O unit Unit 6 error occurring bit13 Reserved
bit6 Safety I/O unit Unit 7 error occurring bit14 Reserved
bit7 Safety I/O unit Unit 8 error occurring bit15 Reserved
Unit1 Unit2 Unit3 Unit4 Unit5 Unit6 Unit7 Unit8
Channel No. #51501 #51511 #51521 #51531 #51541 #51551 #51561 #51571
Station No. #51502 #51512 #51522 #51532 #51542 #51552 #51562 #51572
Input device name #51503 #51513 #51523 #51533 #51543 #51553 #51563 #51573
Input device No. #51504 #51514 #51524 #51534 #51544 #51554 #51564 #51574
Output device
name #51505 #51515 #51525 #51535 #51545 #51555 #51565 #51575
Output device No. #51506 #51516 #51526 #51536 #51546 #51556 #51566 #51576

[Function]
This signal outputs details of safety I/O unit observation error for each safety I/O unit.
For the safety I/O unit, the devices are assigned with the parameters.
For the device assignment of the safety I/O unit, refer to the descriptions of the "Safety I/O unit observation state" (SIOERRUNIT).
[Operation]
When an error occurs in a safety I/O unit observation function, the error details are output.
[Related signals]
(1) Safety I/O observation state (SIOERRSTS)

(2) Safety I/O unit observation state (SIOERRUNIT)
Cont. Signal name Abbrev. Unit1 Unit2 Unit3 Unit4 Unit5 Unit6 Unit7 Unit8
A Safety I/O unit observation er ror details
SIOER RUNIT STS
ZR1540 ZR1541 ZR1542 ZR1543 ZR1544 ZR1545 ZR1546 ZR1547
Bit Description Bit Description
bit0 Slave station communication error 1 bit8 Host station communication error 1
bit1 Slave station communication error 2 bit9 Host station communication error 2
bit2 Slave station communication error 3 bit10 Host station communication error 3
bit3 Slave station data compare error bit11 Output signal cross-check error
bit4 Output OFF check error bit12 Reserved
bit5 Output return signal cross-check error bit13 Reserved
bit6 Transmission cross-check error bit14 Reserved
bit7 Reception cross-check error bit15 Reserved

4.6.2 Memory Switch (PLC Switch)
[Function]
This signal designates the PLC switch (#1 to #96) to hide.
[Operation]
When this signal is turned ON, the corresponding PLC switch (#1 to #96) on the PLC switch screen is not displayed and cannot be set on the screen.
The interface for this signal is as follows:
Each bit corresponds to a PLC switch No. This PLC switch is hidden when this signal is turned ON.
Cont. Signal name Abbrev. Common ($)
A PLC switch non-display
ZR3200
to
ZR3205
bitF bit0
ZR3200 #16 #1
ZR3201 #32 #17
ZR3202 #48 #33
ZR3203 #64 #49
ZR3204 #80 #65
ZR3205 #96 #81

4.6.3 MES Interface Library
[Function]
This signal is used to specify the desirable arbitrary character to register to the database.
[Operation]
Specify the desirable ASCII code (hexadecimal number) corresponding to the character to set.
[Function]
This signal is used to specify the desirable arbitrary 32-bit integer data to register to the database.
[Operation]
Specify the desirable 32-bit integer data to set.
[Function]
For extraction operation, this signal is used to specify the record to be extracted when multiple records corresponding to the condition exist.
[Operation]
Specify the record to be extracted when the concerned record is sorted in ascending or descending order in the field "Update Time".
0: Searches and extracts the most recent record for the field "Update Time".
1: Searches and extracts the oldest record for the field "Update Time".
+n: Searches and extracts the (n-1)th in ascending order from the oldest record for the field "Update Time". (2 n 100)
-n: Searches and extracts the n-th in descending order from the most recent record for the field "Update Time". (1 n 100)

When "-n" (the number of the concerned records) x (-1), the record whose update time is the oldest among the concerned records will be extracted.
When "+n" (the number of the concerned records) x (-1), the record whose update time is the most recent among the concerned records will be extracted.
When n 101 is set, it will be processed for specifying n = 100.
When there is one concerned record, any concerned records will be extracted regardless of the specified values.
[Function]
This signal is used to specify the relation between 1st set and 2nd set in the condition setting for updating, deleting, or extraction operation.
[Operation]
Specify the logical operator to show the conditions relation with the bit values below.
bit0
0: AND Execute the operation if the conditions both before and after the operator are true.
1: OR Execute the operation if the condition either before or after the operator is true.
[Related signals]
(1) MES interface library: Condition register (Field value) 1st set (ZR10056)
(2) MES interface library: Condition register (Condition value) 1st set (ZR10058 to 89)
(3) MES interface library: Condition register (Comparison condition) 1st set (ZR10057)
(4) MES interface library: Condition register (Field value) 2nd set (ZR10090)
(5) MES interface library: Condition register (Condition value) 2nd set (ZR10092 to 123)
(6) MES interface library: Condition register (Comparison condition) 2nd set (ZR10091)
Cont. Signal name Abbrev. Common ($)
A MES interface library: Common user area C1 ZR10000 to
ZR10031
Cont. Signal name Abbrev. Common ($)

A MES interface library: Common user area L1 to L10
ZR10032,3
to
ZR10050,1
Cont. Signal name Abbrev. Common ($)
A MES interface library: Condition register (Extract sort condi tion) ZR10054
Cont. Signal name Abbrev. Common ($)
A MES interface library: Condition register (Combination con dition) ZR10055

[Function]
This signal is used to specify the field value to be the condition target in the condition setting for updating, deleting, or extraction operation.
[Operation]
Specify the field number to be the condition target.
[Related signals]
(1) MES interface library: Condition register (Condition value) 1st set (ZR10058 to 89)
(2) MES interface library: Condition register (Comparison condition) 1st set (ZR10057)
(3) MES interface library: Condition register (Condition value) 2nd set (ZR10092 to 123)
(4) MES interface library: Condition register (Comparison condition) 2nd set (ZR10091)
(5) MES interface library: Condition register (Combination condition) (ZR10055)
[Function]
This signal is used to specify the relation between condition value and field value to be the condition target in the condition setting for update, delete, or extraction operation.
[Operation]
Specify the comparison operator that shows the relation between the condition value and the field value to be the condition target as follows.
1: = Field value equals to condition value.
2: Field value does not equal to condition value.
3: < Field value is smaller than condition value.
4: > Field value is larger than condition value.
5: Field value is equal or smaller than condition value.
6: Field value is equal or larger than condition value.
The condition sets are invalid when you specify "0".
[Related signals]
(1) MES interface library: Condition register (Field value) 1st set (ZR10056)
(2) MES interface library: Condition register (Condition value) 1st set (ZR10058 to 89)
(3) MES interface library: Condition register (Field value) 2nd set (ZR10090)
(4) MES interface library: Condition register (Condition value) 2nd set (ZR10092 to 123)
(5) MES interface library: Condition register (Combination condition) (ZR10055)
[Function]
This signal is used to specify the condition value corresponding to the field value to be the condition target in the condition setting for updating, deleting, or extraction operation.
[Operation]
Specify the condition value corresponding to the field value to be the condition target.
[Related signals]
(1) MES interface library: Condition register (Field value) 1st set (ZR10056)
(2) MES interface library: Condition register (Comparison condition) 1st set (ZR10057)
(3) MES interface library: Condition register (Field value) 2nd set (ZR10090)
(4) MES interface library: Condition register (Comparison condition) 2nd set (ZR10091)
(5) MES interface library: Condition register (Combination condition) (ZR10055)
Cont. Signal name Abbrev. Common ($)
A MES interface library: Condition register (Field value) 1st set ZR10056
A MES interface library: Condition register (Field value) 2nd
set ZR10090
Cont. Signal name Abbrev. Common ($)
A MES interface library: Condition register (Comparison con dition) 1st set ZR10057
A MES interface library: Condition register (Comparison con dition) 2nd set ZR10091
Cont. Signal name Abbrev. Common ($)
A MES interface library: Condition register (Condition value)
1st set
ZR10058 to
ZR10089
A MES interface library: Condition register (Condition value)
2nd set
ZR10092 to
ZR10123

[Function]
This signal is used to set the workpiece serial number after the update at the time of the update operation.
The workpiece serial number extracted from the database is stored at the time of the extraction operation.
[Operation]
For the update operation, specify the ASCII code (hexadecimal number) corresponding to the serial number.
For the extraction operation, the ASCII code (hexadecimal number) corresponding to the serial number is stored.
[Function]
This signal is used to set the operator ID after the update at the time of the update operation.
The operator ID extracted from the database is stored at the time of the extraction operation.
[Operation]
For the update operation, specify the ASCII code (hexadecimal number) corresponding to the operator ID.
For the extraction operation, the ASCII code (hexadecimal number) corresponding to the operator ID is stored.
[Function]
This signal is used to set the NC unit number after the update at the time of the update operation.
The NC unit number extracted from the database is stored at the time of the extraction operation.

[Operation]
For the update operation, specify the ASCII code (hexadecimal number) corresponding to the NC unit number.
For the extraction operation, the ASCII code (hexadecimal number) corresponding to the NC unit number is stored.
[Function]
This signal is used to set the line number after the update at the time of the update operation.
The line number extracted from the database is stored at the time of the extraction operation.
[Operation]
For the update operation, specify the ASCII code (hexadecimal number) corresponding to the line number.
For the extraction operation, the ASCII code (hexadecimal number) corresponding to the line number is stored.
[Function]
This signal is used to set the machine type after the update at the time of the update operation.
The machine type extracted from the database is stored at the time of the extraction operation.
[Operation]
Specify the machine type after the update at the time of the update operation.
The machine type extracted from database is stored at the time of the extraction operation.
[Function]
This signal is used to set the character after the update at the time of the update operation.
The character extracted from the database is stored at the time of the extraction operation.
[Operation]
For the update operation, specify the ASCII code (hexadecimal number) corresponding to the character after the update.
For the extraction operation, the ASCII code (hexadecimal number) corresponding to the character is stored.
Cont. Signal name Abbrev. Common ($)
A Data I/O register for MES interface library (Serial number) ZR10330 to
ZR10361
Cont. Signal name Abbrev. Common ($)
A Data I/O register for MES interface library (Operator ID) ZR10362 to
ZR10393
Cont. Signal name Abbrev. Common ($)
A Data I/O register for MES interface library (NC unit number) ZR10394 to
ZR10401
Cont. Signal name Abbrev. Common ($)
A Data I/O register for MES interface library (Line number) ZR10402 to
ZR10417
Cont. Signal name Abbrev. Common ($)
A Data I/O register for MES interface library (Machine type) ZR10418
Cont. Signal name Abbrev. Common ($)
A Data I/O register for MES interface library (Common user area C1) ZR10420 to
ZR10451

[Function]
This signal is used to set the 32-bit integer data after the update at the time of the update operation.
The 32-bit integer data extracted from the database is stored at the time of the extraction operation.
[Operation]
For the update operation, specify the 32-bit integer data after the update.
For the extraction operation, the 32-bit integer data extracted from the database is stored
[Function]
This signal is used to set the machining start time after the update at the time of the update operation.
The machining start time extracted from the database is stored at the time of the extraction operation.
[Operation]
For the update operation, specify the machining start time in total seconds from January 1, 1970.
For the extraction operation, the machining start time in total seconds from January 1, 1970 is stored.
[Function]
This signal is used to set the machining end time after the update at the time of the update operation.
The machining end time extracted from the database is stored at the time of the extraction operation.
[Operation]
For the update operation, specify the machining end time in total seconds from January 1, 1970.
For the extraction operation, the machining end time in total seconds from January 1, 1970 is stored.
[Function]
This signal is used to set the cycle time after the update at the time of the update operation.
The cycle time extracted from the database is stored at the time of the extraction operation.
[Operation]
For the update operation, specify the value of cycle time [ms].
For the extraction operation, the value of cycle time [ms] is stored.
[Function]
This signal is used to set the program number after the update at the time of the update operation.
The program number extracted from the database is stored at the time of the extraction operation.
[Operation]
For the update operation, specify the value in the ASCII code (hexadecimal number) corresponding to the program number.
For the extraction operation, the value in the ASCII code (hexadecimal number) corresponding to the program number is stored.
[Function]
This signal is used to set the sequence number after the update at the time of the update operation.
The sequence number extracted from the database is stored at the time of the extraction operation.
[Operation]
For the update operation, specify the value of the sequence number.
For the extraction operation, the sequence number is stored.
Cont. Signal name Abbrev. Common ($)
A Data I/O register for MES interface library (Common user area L1 to L10)
ZR10452,3
to
ZR10470,1
Cont. Signal name Abbrev. Common ($)
A Data I/O register for MES interface library (Machining start time) ZR10474, 5
Cont. Signal name Abbrev. Common ($)

A Data I/O register for MES interface library (Machining end time) ZR10476, 7
Cont. Signal name Abbrev. Common ($)
A Data I/O register for MES interface library (Cycle time) ZR10478, 9
Cont. Signal name Abbrev. Common ($)
A Data I/O register for MES interface library (Program number at machining start) ZR10480 to
ZR10495
Cont. Signal name Abbrev. Common ($)
A Data I/O register for MES interface library (N number at machining start) ZR10496, 7

[Function]
This signal is used to set the block number after the update at the time of the update operation.
The block number extracted from the database is stored at the time of the extraction operation.
[Operation]
For the update operation, specify the value of the block number.
For the extraction operation, the block number is stored.
[Function]
This signal is used to set the 1st spindle's maximum current value after the update at the time of the update operation.
The 1st spindle's maximum current value extracted from the database is stored at the time of the extraction operation.
[Operation]
For the update operation, specify the maximum current value [%] of the 1st spindle.
For the extraction operation, the maximum current value [%] of the 1st spindle is stored.
[Function]
This signal is used to set the 2nd spindle's maximum current value after the update at the time of the update operation.
The 2nd spindle's maximum current value extracted from the database is stored at the time of the extraction operation.
[Operation]
For the update operation, specify the maximum current value [%] of the 2nd spindle.
For the extraction operation, the maximum current value [%] of the 2nd spindle is stored.
[Function]
This signal is used to set the power consumption amount after the update at the time of the update operation.
The consumption amount extracted from the database is stored at the time of the extraction operation.
[Operation]
For the update operation, specify the value of power consumption amount [Wh].
For the extraction operation, the power consumption amount [Wh] is stored.
[Function]
This signal is used to set the power regeneration amount after the update at the time of the update operation.
The power regeneration amount extracted from the database is stored at the time of the extraction operation.
[Operation]
For the update operation, specify the value of power regeneration amount [Wh].
For the extraction operation, the power regeneration amount [Wh] is stored.
[Function]
This signal is used to set the number of machined workpieces after the update at the time of the update operation.
The number of machined workpieces extracted from the database is stored at the time of the extraction operation.
[Operation]
For the update operation, specify the number of the machined workpieces.
For the extraction operation, the number of the machined workpieces is stored.
Cont. Signal name Abbrev. Common ($)
A Data I/O register for MES interface library (B number at machining start) ZR10498, 9
Cont. Signal name Abbrev. Common ($)
A Data I/O register for MES interface library (Spindle 1 maximum load) ZR10500
Cont. Signal name Abbrev. Common ($)
A Data I/O register for MES interface library (Spindle 2 maximum load) ZR10501
Cont. Signal name Abbrev. Common ($)
A Data I/O register for MES interface library (Power consumption amount) ZR10502, 3
Cont. Signal name Abbrev. Common ($)
A Data I/O register for MES interface library (Power regeneration amount) ZR10504, 5
Cont. Signal name Abbrev. Common ($)
A Data I/O register for MES interface library (Number of machined workpieces) ZR10506, 7

[Function]
This signal is used to set the tool number after the update at the time of the update operation.
The tool number extracted from the database is stored at the time of the extraction operation.
[Operation]
For the update operation, specify the value of the tool number.
For the extraction operation, the tool number is stored.
[Function]
This signal is used to set the tool compensation number after the update at the time of the update operation.
The tool compensation number extracted from the database is stored at the time of the extraction operation.
[Operation]
For the update operation, specify the value of the tool compensation number.
For the extraction operation, the tool compensation number is stored.
[Function]
This signal is used to set the tool length compensation amount after the update at the time of the update operation.
The tool length compensation amount extracted from the database is stored at the time of the extraction operation.
[Operation]
For the update operation, specify the value of the tool length compensation amount.
For the extraction operation, the tool length compensation amount is stored.
[Function]
This signal is used to set the tool radius compensation amount after the update at the time of the update operation.
The tool radius compensation amount extracted from the database is stored at the time of the extraction operation.
[Operation]
For the update operation, specify the value of the tool radius compensation amount.
For the extraction operation, the tool radius compensation amount is stored.

[Function]
This signal is used to set the tool length wear amount after the update at the time of the update operation.
The tool length wear amount extracted from the database is stored at the time of the extraction operation.
[Operation]
For the update operation, specify the value of the tool length wear amount.
For the extraction operation, the tool length wear amount is stored.
Cont. Signal name Abbrev. Common ($)
A Data I/O register for MES interface library (Tool number 1 to 5)
ZR10508,9
to
ZR10516,7
Cont. Signal name Abbrev. Common ($)
A Data I/O register for MES interface library (Tool offset number 1 to 5) ZR10518 to
ZR10522
Cont. Signal name Abbrev. Common ($)
A Data I/O register for MES interface library (Tool length offset 1 to 5)
ZR10524,5
to
ZR10532,3
Cont. Signal name Abbrev. Common ($)
A Data I/O register for MES interface library (Tool radius offset 1 to 5)
ZR10534,5
to
ZR10542,3
Cont. Signal name Abbrev. Common ($)
A Data I/O register for MES interface library (Tool length wear amount 1 to 5)
ZR10544,5
to
ZR10552,3

[Function]
This signal is used to set the tool radius wear amount after the update at the time of the update operation.
The tool radius wear amount extracted from the database is stored at the time of the extraction operation.
[Operation]
For the update operation, specify the value of the tool radius wear amount.
For the extraction operation, the tool radius wear amount is stored.
[Function]
This signal is used to set the tool life after the update at the time of the update operation.
The tool life extracted from the database is stored at the time of the extraction operation.
[Operation]
For the update operation, specify the value of the tool life.
For the extraction operation, the screen displays the tool life is stored.
[Function]
This signal is used to set the character after the update at the time of the update operation.
The character extracted from the database is stored at the time of the extraction operation.
[Operation]
For the update operation, specify the ASCII code (hexadecimal number) corresponding to the character after the update.
For the extraction operation, the ASCII code (hexadecimal number) corresponding to the character is stored.
[Function]
This signal is used to set the 32-bit integer data after the update at the time of the update operation.
The 32-bit integer data extracted from the database is stored at the time of the extraction operation.
[Operation]
For the update operation, specify the 32-bit integer data after the update.
For the extraction operation, the 32-bit integer data extracted from the database is stored
[Function]
This signal is used to set the alarm occurrence time after the update at the time of the update operation.
The alarm occurrence time extracted from the database is stored at the time of the extraction operation.
[Operation]
For the update operation, specify the time of alarm occurrence in total seconds from January 1, 1970.
For the extraction operation, the time of alarm occurrence in total seconds from January 1, 1970 is stored.
Cont. Signal name Abbrev. Common ($)
A Data I/O register for MES interface library (Tool radius wear amount 1 to 5)
ZR10554,5
to
ZR10562,3
Cont. Signal name Abbrev. Common ($)
A Data I/O register for MES interface library (Tool life 1 to 5)
ZR10564,5
to
ZR10572,3
Cont. Signal name Abbrev. Common ($)
A Data I/O register for MES interface library (User arbitrary C1 at machining end) ZR10576 to
ZR10607
Cont. Signal name Abbrev. Common ($)
A Data I/O register for MES interface library (User arbitrary L1 to L10 at machining end)
ZR10608,9
to
ZR10626,7
Cont. Signal name Abbrev. Common ($)
A Data I/O register for MES interface library (Time of alarm occurrence) ZR10632, 3

[Function]

This signal is used to set the alarm number after the update at the time of the update operation.
The alarm number extracted from the database is stored at the time of the extraction operation.
[Operation]
For the update operation, specify the value in the ASCII code (hexadecimal number) corresponding to that alarm.
For the extraction operation, the value in the ASCII code (hexadecimal number) corresponding to that alarm number is stored.
[Function]
This signal is used to set the power ON time after the update at the time of the update operation.
The power ON time extracted from the database is stored at the time of the extraction operation.
[Operation]
For the update operation, specify the power ON time in seconds.
For the extraction operation, the power ON time in seconds is stored.
[Function]
This signal is used to set the program number after the update at the time of the update operation.
The program number extracted from the database is stored at the time of the extraction operation.
[Operation]
For the update operation, specify the value in the ASCII code (hexadecimal number) corresponding to the program number.
For the extraction operation, the value in the ASCII code (hexadecimal number) corresponding to the program number is stored.
[Function]
This signal is used to set the subprogram number after the update at the time of the update operation.
The subprogram number extracted from the database at the time of the extraction operation is stored.
[Operation]
For the update operation, specify the value in the ASCII code (hexadecimal number) corresponding to the subprogram number.
For the extraction operation, the value in the ASCII code (hexadecimal number) corresponding to the subprogram number is stored.
[Function]
This signal is used to set the sequence number after the update at the time of the update operation.
The sequence number extracted from the database is stored at the time of the extraction operation.
[Operation]
For the update operation, specify the value of the sequence number.
For the extraction operation, the sequence number is stored.
Cont. Signal name Abbrev. Common ($)
A Data I/O register for MES interface library (Alarm number 1) ZR10634 to
ZR10649
A Data I/O register for MES interface library (Alarm number 2) ZR10650 to
ZR10665
A Data I/O register for MES interface library (Alarm number 3) ZR10666 to
ZR10681
A Data I/O register for MES interface library (Alarm number 4) ZR10682 to
ZR10697
Cont. Signal name Abbrev. Common ($)
A Data I/O register for MES interface library (Time of power ON) ZR10698, 9
Cont. Signal name Abbrev. Common ($)
A Data I/O register for MES interface library(Program number at alarm) ZR10700 to
ZR10715
Cont. Signal name Abbrev. Common ($)
A Data I/O register for MES interface library (Subprogram number at alarm) ZR10716 to
ZR10731
Cont. Signal name Abbrev. Common ($)
A Data I/O register for MES interface library (N number at alarm) ZR10732, 3

[Function]
This signal is used to set the block number after the update at the time of the update operation.
The block number extracted from the database is stored at the time of the extraction operation.
[Operation]
For the update operation, specify the value of the block number.
For the extraction operation, the block number is stored.
[Function]
This signal is used to set the G code modal after the update at the time of the update operation.
The G code modal extracted from the database is stored at the time of the extraction operation.
[Operation]
For the update operation, specify the value in the ASCII code (hex number) corresponding to the G code modal.
For the extraction operation, the value in the ASCII code (hex number) corresponding to the G code modal is stored.
[Function]
This signal is used to set the 1st spindle's current value after the update at the time of the update operation.
The 1st spindle's current value extracted from the database is stored at the time of the extraction operation.
[Operation]
For the update operation, specify the current value [%] of the 1st spindle.
For the extraction operation, the current value [%] of the 1st spindle is stored.
[Function]
This signal is used to set the 2nd spindle's current value after the update at the time of the update operation.
The 2nd spindle's current value extracted from the database is stored at the time of the extraction operation.
[Operation]
For the update operation, specify the current value [%] of the 2nd spindle.
For the extraction operation, the current value [%] of the 2nd spindle is stored.
[Function]
This signal is used to set the tool number after the update at the time of the update operation.
The tool number extracted from the database is stored at the time of the extraction operation.
[Operation]
For the update operation, specify the value of the tool number.
For the extraction operation, the tool number is stored.
[Function]

This signal is used to set the tool compensation number after the update at the time of the update operation.
The tool compensation number extracted from the database is stored at the time of the extraction operation.
[Operation]
For the update operation, specify the value of the tool compensation number.
For the extraction operation, the tool compensation number is stored.
Cont. Signal name Abbrev. Common ($)
A Data I/O register for MES interface library (B number at alarm) ZR10734, 5
Cont. Signal name Abbrev. Common ($)
A Data I/O register for MES interface library (G code modal) ZR10736 to
ZR10767
Cont. Signal name Abbrev. Common ($)
A Data I/O register for MES interface library (Spindle 1 load value) ZR10768
Cont. Signal name Abbrev. Common ($)
A Data I/O register for MES interface library (Spindle 2 load value) ZR10769
Cont. Signal name Abbrev. Common ($)
A Data I/O register for MES interface library (Tool number) ZR10770, 1
Cont. Signal name Abbrev. Common ($)
A Data I/O register for MES interface library (Tool offset number) ZR10772

[Function]
This signal is used to set the tool length compensation amount after the update at the time of the update operation.
The tool length compensation amount extracted from the database is stored at the time of the extraction operation.
[Operation]
For the update operation, specify the value of the tool length compensation amount.
For the extraction operation, the tool length compensation amount is stored.
[Function]
This signal is used to set the tool radius compensation amount after the update at the time of the update operation.
The tool radius compensation amount extracted from the database is stored at the time of the extraction operation.
[Operation]
For the update operation, specify the value of the tool radius compensation amount.
For the extraction operation, the tool radius compensation amount is stored.
[Function]
This signal is used to set the tool length wear amount after the update at the time of the update operation.
The tool length wear amount extracted from the database is stored at the time of the extraction operation.
[Operation]
For the update operation, specify the value of the tool length wear amount.
For the extraction operation, the tool length wear amount is stored.
[Function]
This signal is used to set the tool radius wear amount after the update at the time of the update operation.
The tool radius compensation amount extracted from the database is stored at the time of the extraction operation.
[Operation]
For the update operation, specify the value of the tool radius wear amount.
For the extraction operation, the tool radius wear amount is stored.
[Function]
This signal is used to set the tool life after the update at the time of the update operation.
The tool life extracted from the database is stored at the time of the extraction operation.
[Operation]
For the update operation, specify the value of the tool life.
For the extraction operation, the screen displays the tool life is stored.
[Function]
This signal is used to set the character after the update at the time of the update operation.
The character extracted from the database is stored at the time of the extraction operation.
[Operation]
For the update operation, specify the ASCII code (hexadecimal number) corresponding to the character after the update.
For the extraction operation, the ASCII code (hexadecimal number) corresponding to the character is stored.
Cont. Signal name Abbrev. Common ($)
A Data I/O register for MES interface library (Tool length offset) ZR10774, 5
Cont. Signal name Abbrev. Common ($)
A Data I/O register for MES interface library (Tool radius offset) ZR10776, 7
Cont. Signal name Abbrev. Common ($)
A Data I/O register for MES interface library (Tool length wear amount) ZR10778, 9
Cont. Signal name Abbrev. Common ($)
A Data I/O register for MES interface library (Tool radius wear amount) ZR10780, 1
Cont. Signal name Abbrev. Common ($)
A Data I/O register for MES interface library (Tool life) ZR10782, 3
Cont. Signal name Abbrev. Common ($)
A Data I/O register for MES interface library (User area C1 at alarm) ZR10786 to
ZR10817

[Function]
This signal is used to set the 32-bit integer data after the update at the time of the update operation.
The 32-bit integer data extracted from the database is stored at the time of the extraction operation.
[Operation]
For the update operation, specify the 32-bit integer data after the update.
For the extraction operation, the 32-bit integer data extracted from the database is stored
[Function]
This signal is used to set the character after the update at the time of the update operation.
The character extracted from the database is stored at the time of the extraction operation.
[Operation]
For the update operation, specify the ASCII code (hexadecimal number) corresponding to the character after the update.
For the extraction operation, the ASCII code (hexadecimal number) corresponding to the character is stored.
[Function]

This signal is used to set the 16-bit integer data after the update at the time of the update operation.
The 16-bit integer data extracted from the database is stored at the time of the extraction operation.
[Operation]
For the update operation, specify the 16-bit integer data after the update.
For the extraction operation, the 16-bit integer data extracted from the database is stored.
[Function]
This signal is used to set the 32-bit integer data after the update at the time of the update operation.
The 32-bit integer data extracted from the database is stored at the time of the extraction operation.
[Operation]
For the update operation, specify the 32-bit integer data after the update.
For the extraction operation, the 32-bit integer data extracted from the database is stored.
[Function]
This signal is used to set the desirable arbitrary character to register to the database when the machining is completed.
[Operation]
Specify the ASCII code (hexadecimal number) corresponding to the desirable character to set.
This data is send to the database at the time of machining completion.
Cont. Signal name Abbrev. Common ($)
A Data I/O register for MES interface library (User area L1 to L10 at alarm)
ZR10818,9
to
ZR10836,7
Cont. Signal name Abbrev. Common ($)
A Data I/O register for MES interface library (Arbitrary user area C1) ZR10842 to
ZR10873
Cont. Signal name Abbrev. Common ($)
A Data I/O register for MES interface library (Arbitrary user area S1 to S20) ZR10874 to
ZR10893
Cont. Signal name Abbrev. Common ($)
A Data I/O register for MES interface library (Arbitrary user area L1 to L10)
ZR10894,5
to
ZR10912,3
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A MES interface library:
User area C1 at machining end
ZR1094
0 to
ZR1097
1
ZR1112
0 to
ZR1115
1
ZR1130
0 to
ZR1133
1
ZR1148
0 to
ZR1151
1
ZR1166
0 to
ZR1169
1
ZR1184
0 to
ZR1187
1
ZR1202
0 to
ZR1205
1
ZR1220
0 to
ZR1223
1

[Function]
This signal is used to set the desirable arbitrary 32-bit integer data to register to the database at the time of machining completion.
[Operation]
Specify the desirable 32-bit integer data to set.
This data is send to the database at the time of machining completion.
[Function]
This signal is used to set the desirable arbitrary character to register to the database when an alarm occurs.
[Operation]
Specify the ASCII code (hexadecimal number) corresponding to the desirable character to set.
This data is sent to the database at the time of alarm occurrence.
[Function]
This signal is used to set the desirable arbitrary 32-bit integer data to register to the database when an alarm occurs.
[Operation]
Specify the desirable 32-bit integer data to set.
This data is sent to the database at the time of alarm occurrence.
[Function]

This signal is used to set the desirable arbitrary character to register to the database at the time of user's option.
[Operation]
Specify the ASCII code (hexadecimal number) corresponding to the desirable character to set.
This data is sent to the database at the time of user's option.
[Function]
This signal is used to set the desirable arbitrary 16-bit integer data to register to the database at the time of user's option.
[Operation]
Specify the desirable 16-bit integer data to set.
This data is sent to the database at the time of user's option.
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A MES interface library:
User area L1 to L10 at machining end
ZR1097
2,3 to
ZR1099
0,1
ZR1115
2,3 to
ZR1117
0,1
ZR1133
2,3 to
ZR1135
0,1
ZR1151
2,3 to
ZR1153
0,1
ZR1169
2,3 to
ZR1171
0,1
ZR1187
2,3 to
ZR1189
0,1
ZR1205
2,3 to
ZR1207
0,1
ZR1223
2,3 to
ZR1225
0,1
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A MES interface library:
User area C1 at alarm
ZR1099
4 to
ZR1102
5
ZR1117
4 to
ZR1120
5
ZR1135
4 to
ZR1138
5
ZR1153
4 to
ZR1156
5
ZR1171
4 to
ZR1174
5
ZR1189
4 to
ZR1192
5
ZR1207
4 to
ZR1210
5
ZR1225
4 to
ZR1228
5
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A MES interface library:
User area L1 to L10 at alarm
ZR1102
6,7 to
ZR1104
4,5
ZR1120
6,7 to

ZR1122
4,5
ZR1138
6,7 to
ZR1140
4,5
ZR1156
6,7 to
ZR1158
4,5
ZR1174
6,7 to
ZR1176
4,5
ZR1192
6,7 to
ZR1194
4,5
ZR1210
6,7 to
ZR1212
4,5
ZR1228
6,7 to
ZR1230
4,5
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A MES interface library:
Arbitrary user area C1
ZR1104
8 to
ZR1107
9
ZR1122
8 to
ZR1125
9
ZR1140
8 to
ZR1143
9
ZR1158
8 to
ZR1161
9
ZR1176
8 to
ZR1179
9
ZR1194
8 to
ZR1197
9
ZR1212
8 to
ZR1215
9
ZR1230
8 to
ZR1233
9
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A MES interface library:
Arbitrary user area S1 to S20
ZR1108
0 to
ZR1109
9
ZR1126
0 to
ZR1127
9
ZR1144
0 to
ZR1145
9
ZR1162
0 to
ZR1163
9
ZR1180
0 to
ZR1181
9
ZR1198
0 to
ZR1199
9

ZR1216
0 to
ZR1217
9
ZR1234
0 to
ZR1235
9

[Function]
This signal is used to set the desirable arbitrary 32-bit integer data to register to the database at the time of user's option.
[Operation]
Specify the desirable 32-bit integer data to set.
This data is sent to the database at the time of user's option.
Cont. Signal name Abbrev. $1 $2 $3 $4 $5 $6 $7 $8
A MES interface library:
Arbitrary user area L1 to L10
ZR1110
0,1 to
ZR1111
8,9
ZR1128
0,1 to
ZR1129
8,9
ZR1146
0,1 to
ZR1147
8,9
ZR1164
0,1 to
ZR1165
8,9
ZR1182
0,1 to
ZR1183
8,9
ZR1200
0,1 to
ZR1201
8,9
ZR1218
0,1 to
ZR1219
8,9
ZR1236
0,1 to
ZR1237
8,9

4.6.4 Diagnosis Data Output
[Function] [Operation]
The accumulated use time of the NC unit battery is set in the register. (0 to 4, 294, 967, 295)
The register is cleared to zero at the time of NC unit replacement.
[Caution]
(1) The data is in the units of 1.0 min.
(2) The data format is unsigned binary.
(3) The data remains unchanged even when you input the backup data using the SRAM backup function.
[Function] [Operation]
The accumulated use time of the drive unit battery is set in the register.
The register is cleared to zero at the time of drive unit replacement.
[Caution]
(1) The data is in the units of 1.0 hour.
(2) The data format is unsigned binary.
(3) The data of servo axes (NC and PLC axes) is output to these registers, in the order of the axis specified with the base axis specification parameter.
(4) The data remains unchanged even when you input the backup data using the SRAM backup function.
(5) When the NC control unit is replaced, this ZR register is cleared to "0". To keep the value before the replacement, take a note of the data and change the ZR register value when the replacement is completed.
(6) The data is always updated.
Cont. Signal name Abbrev. Common ($)
A Diagnosis data output: Battery exchange ZR12404
ZR12405
Cont. Signal name Abbrev. 1st axis 2nd axis 3rd axis 4th axis 5th axis 6th axis 7th axis 8th axis
A Diagnosis data output:
Battery exchange (drive)
ZR12608
ZR12609
ZR12610
ZR12611
ZR12612
ZR12613

ZR12614
ZR12615
ZR12616
ZR12617
ZR12618
ZR12619
ZR12620
ZR12621
ZR12622
ZR12623
9th axis 10th axis 11th axis 12th axis 13th axis 14th axis 15th axis 16th axis
ZR12624
ZR12625
ZR12626
ZR12627
ZR12628
ZR12629
ZR12630
ZR12631
ZR12632
ZR12633
ZR12634
ZR12635
ZR12636
ZR12637
ZR12638
ZR12639
17th axis 18th axis 19th axis 20th axis 21th axis 22th axis 23th axis 24th axis
ZR12640
ZR12641
ZR12642
ZR12643
ZR12644
ZR12645
ZR12646
ZR12647
ZR12648
ZR12649
ZR12650
ZR12651
ZR12652
ZR12653
ZR12654
ZR12655
25th axis 26th axis 27th axis 28th axis 29th axis 30th axis 31th axis 32th axis
ZR12656
ZR12657
ZR12658
ZR12659
ZR12660
ZR12661
ZR12662
ZR12663
ZR12664
ZR12665
ZR12666
ZR12667
ZR12668
ZR12669
ZR12670
ZR12671

[Function] [Operation]
The present insulation resistance of the motor is set in the register.
If the insulation resistance is less than 1M, "0" is set.
If the insulation resistance is 100M or greater, "100" is set.
If your drive unit does not support this function, or if the data has not been obtained from the drive unit, "-1" (0xFFFFFFFF) is set in the register.
[Caution]
(1) The data is in the units of 1.0M.
(2) The data format is signed binary.
(3) The data of servo axes (NC and PLC axes) is output to these registers, in the order of the axis specified with the base axis specification parameter.
(4) The effective value can be obtained only when the drive unit is MDS-E/EH Series (when the drive unit S/W version is A3 or later, and the H/W supports the insulation degradation detection function).
[Function] [Operation]
The present insulation resistance of the motor is set in the register.
If the insulation resistance is less than 1M, "0" is set.
If the insulation resistance is 100M or greater, "100" is set.
If your drive unit does not support this function, or if the data has not been obtained from the drive unit, "-1" (0xFFFFFFFF) is set in the register.
[Caution]
(1) The data is in the units of 1.0M.
(2) The data format is signed binary.
(3) The effective value can be obtained only when the drive unit is MDS-E/EH Series (when the drive unit S/W version is

A3 or later, and the H/W supports the insulation degradation detection function).
[Function] [Operation]
Set the length of time before automatic log clear takes place.
[Caution]
(1) The data is in the units of 1.0 hour.
(2) If this signal is unspecified, the default time (24 hours) is applied.
Cont. Signal name Abbrev. 1st axis 2nd axis 3rd axis 4th axis 5th axis 6th axis 7th axis 8th axis
A
Diagnosis data output:
Motor insulation resistance
(motor)
ZR12784
ZR12785
ZR12786
ZR12787
ZR12788
ZR12789
ZR12790
ZR12791
ZR12792
ZR12793
ZR12794
ZR12795
ZR12796
ZR12797
ZR12798
ZR12799
9th axis 10th axis 11th axis 12th axis 13th axis 14th axis 15th axis 16th axis
ZR12800
ZR12801
ZR12802
ZR12803
ZR12804
ZR1280
ZR12806
ZR12807
ZR12808
ZR12809
ZR12810
ZR12811
ZR12812
ZR12813
ZR12814
ZR12815
17th axis 18th axis 19th axis 20th axis 21th axis 22th axis 23th axis 24th axis
ZR12816
ZR12817
ZR12818
ZR12819
ZR12820
ZR12821
ZR12822
ZR12823
ZR12824
ZR12825
ZR12826
ZR12827
ZR12828
ZR12829
ZR12830
ZR12831
25th axis 26th axis 27th axis 28th axis 29th axis 30th axis 31th axis 32th axis
ZR12832
ZR12833
ZR12834
ZR12835
ZR12836
ZR12837
ZR12838
ZR12839
ZR12840
ZR12841
ZR12842
ZR12843
ZR12844
ZR12845
ZR12846
ZR12847
Cont. Signal name Abbrev. 1stSP 2ndSP 3rdSP 4thSP 5thSP 6thSP 7thSP 8thSP
A Diagnosis data output:
Motor insulation resistance (motor)
ZR12848
ZR12849
ZR12850
ZR12851
ZR12852
ZR12853
ZR12854

ZR12855
ZR12856
ZR12857
ZR12858
ZR12859
ZR12860
ZR12861
ZR12862
ZR12863
Cont. Signal name Abbrev. Common ($)
A Diagnosis data output: Automatic log clear time ZR12945

[Function] [Operation]
The accumulated travel distance of the servo axis is set in the register.
[Caution]
(1) The data is in the units of 1.0 (m). For a rotary axis, the unit is 1.0 (revolution).
When the rotation axis type is all coordinate linear type, the data is output in the unit of 1.0 (m).
(2) The data format is unsigned binary.
(3) The data of servo axes (NC and PLC axes) is output to these registers, in the order of the axis specified with the base axis specification parameter.
(4) The data remains unchanged even when you input the backup data using the SRAM backup function.
(5) Even when the drive unit or motor is replaced, this register is not automatically reset. To reset the accumulated travel distance, write "0" in this register.
(6) When the NC control unit is replaced, this register is cleared to "0". To keep the value before the replacement, take a note of the data and change the ZR register value when the replacement is completed.
(7) The accumulated travel distance is not added while the axis is being removed.
Cont. Signal name Abbrev. 1st axis 2nd axis 3rd axis 4th axis 5th axis 6th axis 7th axis 8th axis
A
Diagnosis data output:
Accumulated travel dis tance (motor)
ZR12946
ZR12947
ZR12948
ZR12949
ZR12950
ZR12951
ZR12952
ZR12953
ZR12954
ZR12955
ZR12956
ZR12957
ZR12958
ZR12959
ZR12960
ZR12961
9th axis 10th axis 11th axis 12th axis 13th axis 14th axis 15th axis 16th axis
ZR12962
ZR12963
ZR12964
ZR12965
ZR12966
ZR12967
ZR12968
ZR12969
ZR12970
ZR12972
ZR12972
ZR12973
ZR12974
ZR12975
ZR12976
ZR12977
17th axis 18th axis 19th axis 20th axis 21th axis 22th axis 23th axis 24th axis
ZR12978
ZR12979
ZR12980
ZR12981
ZR12982
ZR12983
ZR12984
ZR12985
ZR12986
ZR12987
ZR12988
ZR12989
ZR12990
ZR12991
ZR12992
ZR12993
25th axis 26th axis 27th axis 28th axis 29th axis 30th axis 31th axis 32th axis
ZR12994
ZR12995
ZR12996
ZR12997

ZR12998
ZR12999
ZR13000
ZR13001
ZR13002
ZR13003
ZR13004
ZR13005
ZR13006
ZR13007
ZR13008
ZR13009

4.6.5 Spindle Protection
[Function]
This signal outputs the spindle motor equivalent load factor from the start of the last automatic operation to the current operation with 1% increment.
The output value can be adjusted using the parameter "#43101 sp_rated_ratio".
[Operation]
Values are cleared to zero at the following timings:
The automatic operation starts.
M99 command is issued in the main program.
[Function]
This signal outputs the number of errors which occurred at the time the log was output with the spindle protection function.
[Operation]
When the error occurs at the time the log was output with the spindle protection function, ZR13018 is incremented.
Cont. Signal name Abbrev. 1stSP 2ndSP 3rdSP 4thSP 5thSP 6thSP 7thSP 8thSP
A Spindle protection: Motor equivalent
load factor SPEQLD ZR13010 ZR13011 ZR13012 ZR13013 ZR13014 ZR13015 ZR13016 ZR13017
Cont. Signal name Abbrev. Common ($)
A Spindle protection: Number of times log output error oc curred PRSPERR ZR13018

4.6.6 External Encoder Position Output I/F
[Function]
This signal outputs the position (angle) calculated based on the pulse input of the external encoder 1 in the PLC setting units.
[Operation]
When the PLC setting unit is B (0.001mm), 0 to 359999 [0.001] is output.
The value of this register is held even when the power is OFF.
(1) When the power is OFF, the position change cannot be detected.
[Related signals]
(1) External encoder 1: Position output clear request (ENC1PCLR: Y1C88)
Cont. Signal name Abbrev. Common ($)
A External encoder 1: Position output ENC1POS ZR13020,1
Note

4.6.7 Machine Contact Input/Output I/F
[Function]
This signal enables the following temperature value to be read from the file register: temperature acquired with the thermistor that is connected to the designated connector of the thermistor input-equipped remote I/O unit.
[Operation]
This signal outputs the temperature value acquired with the thermistor in 0.1C units.
(Example) 0x01F5 = 501 -> 50.1 C
When the thermistor is disconnected or short-circuited, this register is not updated.
The below shows the data update cycle of the thermistor input and the interface:
[Related signals]
(1) Thermistor disconnection (TIOPN: ZR13040)
(2) Thermistor short-circuit (TISRT: ZR13041)
[Function]
This signal notifies that the thermistor is not connected to the thermistor input-equipped remote I/O unit, or the thermistor is disconnected or ground-fault.
[Operation]
When the thermistor is unconnected, disconnected or ground-fault, the bit of the corresponding channel is turned ON.
The thermistor input (TI0 to TI11) of the channel which is disconnected or ground-fault is not updated.
[Related signals]
(1) Thermistor input (TI0 to TI11: ZR13028 to 13039)
Cont. Signal name Abbrev. Common ($)
A Thermistor input n TIn ZR13028 to
ZR13039
Channel File register Data update cycle
TI0 ZR13028
The thermistor voltage acquired with the thermistor input-equipped remote I/O unit is in put after converted to a temperature value per PLC medium-speed cycle.
One station of remote I/O has 4 thermistor inputs, thus 4 PLC medium-speed cycles are required for the inputs of one station.
TI1 ZR13029
TI2 ZR13030
TI3 ZR13031
TI4 ZR13032
TI5 ZR13033

TI6 ZR13034
TI7 ZR13035
TI8 ZR13036
TI9 ZR13037
TI10 ZR13038
TI11 ZR13039
Cont. Signal name Abbrev. Common ($)
A Thermistor disconnection TIOPN ZR13040
FEDCBA9 8 7 6 5 4 3 2 1 0

Thermistor input channel 0 disconnection
Thermistor input channel 1 disconnection
Thermistor input channel 11 disconnection

[Function]
This signal notifies that the thermistor input of the thermistor input-equipped remote I/O unit is short-circuited.
[Operation]
When the thermistor input is short-circuited, the bit of the corresponding channel is turned ON.
The "Thermistor input" (TI0 to TI11) of the channel which is short-circuited is not updated.
[Related signals]
(1) Thermistor input (TI0 to TI11: ZR13028 to 13039)
[Function]
This signal can read the data of analog voltage, current or temperature acquired from the remote I/O unit with multi-analog input.
[Operation]
The data acquired from the remote I/O unit with multi-analog input is output in the format selected with the parameters "#11351 manasel_00" to "#11366 manasel_15" (Multi-analog input data type ch0 to ch15).
(*1) Output in hexadecimal to the register.
If the normal analog input value cannot be acquired from the remote I/O unit with multi-analog input (due to disconnection detection or input value error), this register is not updated. The error cause is output to the multi-analog input status (MASTSn).
A thermocouple can measure temperature relative to the reference junction. For the multi-analog input unit, the unit's connector part serves as the reference junction. While the connector part is not at 0 C, cold junction compensation is required. The compensation uses a Pt100 resistor.
[Related signals]
(1) Multi-analog input status (MASTS00 to 15: ZR13066 to ZR13081)
Cont. Signal name Abbrev. Common ($)
A Thermistor short-circuit TISRT ZR13041
Cont. Signal name Abbrev. Common ($)
A Multi-analog input ch n MAn ZR13050 to
13065
#11351 Data type
Register output
range(*1)
Accuracy guaran tee range Output unit
Corresponding data
(decimal) (decimal) Register output
range
Accuracy guaran tee range
0 Analog voltage 32000 32000 312.5V 10V 10V
1 Analog current 16000 16000 1.25A 20mA 20mA
2 to 5 Temperature (resistance
thermometer bulb, normal)
-700 to 3200 -500 to 3000 0.1 -70.0 to 320.0 -50.0 to 300.0
6 to 9 Temperature (resistance
thermometer bulb, high-ac curacy)
-7000 to 32000 -5000 to 30000 0.01 -70.00 to 320.00 -50.00 to 300.00
10 Temperature (thermocou ple (K))
-600 to 6200 -400 to 6000 0.1 -60.0 to 620.0 -40.0 to 600.0
11 Temperature (thermocou ple (J))
-600 to 6200 -400 to 6000 0.1 -60.0 to 620.0 -40.0 to 600.0
FEDCBA9 8 7 6 5 4 3 2 1 0

Thermistor input channel 0 short-circuit
Thermistor input channel 1 short-circuit
Thermistor input channel 11 short-circuit

[Function]
This signal outputs the input data type and error status of the remote I/O unit with multi-analog input.
[Operation]
<bit0 to 3 [Data type]>
Data type selected with the parameter "#11351 manasel_00" to "#11366 manasel_15 (Multi-analog input data type ch0 to ch15) is output.
0: Analog voltage
1: Analog current
2: Temperature (resistance thermometer bulb, normal, Pt100, 3-wire)
3: Temperature (resistance thermometer bulb, normal, Pt100, 4-wire)
4: Temperature (resistance thermometer bulb, normal, Pt1000, 3-wire)
5: Temperature (resistance thermometer bulb, normal, Pt1000, 4-wire)
6: Temperature (resistance thermometer bulb, high-accuracy, Pt100, 3-wire)
7: Temperature (resistance thermometer bulb, high-accuracy, Pt100, 4-wire)
8: Temperature (resistance thermometer bulb, high-accuracy, Pt1000, 3-wire)

9: Temperature (resistance thermometer bulb, high-accuracy, Pt1000, 4-wire)
10: Temperature (thermocouple (K))
11: Temperature (thermocouple (J))
<bitD [Input data upper limit exceeded]>
When the input value from the remote I/O unit with multi-analog input exceeds the upper limit of accuracy guarantee range, this turns ON.
<bitE [Input data lower limit exceeded]>
When the input value from the remote I/O unit with multi-analog input exceeds the lower limit of accuracy guarantee range, this turns ON.
<bitF [Disconnection]>
When the remote I/O unit with multi-analog input detects the disconnection of temperature sensor, this turns ON.
[Related signals]
(1) Multi-analog input (MA00 to 15: ZR13050 to ZR13065)
Cont. Signal name Abbrev. Common ($)
A Multi-analog input status ch n MASTSn ZR13066 to
13081
FEDCBA9 8 7 6 5 4 3 2 1 0
Data type (0 to 11)
Input data upper limit exceeded
Input data lower limit exceeded
Disconnection

4.6.8 BiSS Encoder I/F
[Function] [Operation]
The communication status of BiSS encoder I/F is output to this register.
Create a sequence program not to use data of the "BiSS encoder I/F: Encoder 1 data output n" signal (ZR13091: BENC1DATn) while bit0 of this register is "1". (Refer to the figure below.)
When a communication error occurs, the operation error corresponding to the error code is displayed. Restart CNC when the communication error occurs.
[Related signals]
(1) BiSS encoder I/F: Encoder 1 data output n (ZR13091 to ZR13094: BENC1DATn)
[Function]
Data of BiSS encoder 1 is output to this signal.
[Operation]
Data received from BiSS encoder is output to this signal.
The unit of this signal does not depend on the parameter "#1040 M_inch" setting.
The update cycle of this signal depends on the parameter "#1334 DI/DO refresh cycl" setting.
The value of this signal is not updated when a communication error is detected on the CNC side and an error code is being output to the "BiSS encoder I/F: Communication status" signal (ZR13090).
Create a sequence program not to use data of this register while an error occurs on the BiSS encoder side (*1).
When this function is invalid (the parameter "#1762 cfgPR12/bit5" is set to "0"), the value of this register is "0".
(*1) This indicates the period when bit0 of the "BiSS encoder I/F: Communication status" signal (ZR13090: BENCSTS) is "1".
[Related signals]
(1) BiSS encoder I/F: Communication status (ZR13090: BENCSTS)
Cont. Signal name Abbrev. Common ($)
A BiSS encoder I/F: Communication status BENCSTS ZR13090
Error code
(ZR13090/bit1, bit2, bit3) Operation errors
001 M01 0350
010 M01 0351
110 M01 0352
Cont. Signal name Abbrev. Common ($)
A BiSS encoder I/F: Encoder 1 data output 1 to 4 BENC1-
DAT1 to 4
ZR13091 to
ZR13094
FEDCBA9 8 7 6 5 4 3 2 1 0
BiSS encoder I/F communication status
0: Normal
1: Error, or the BiSS encoder I/F is invalid.
Error code of BiSS encoder I/F communication status
ZR13090/bit0 ZR13091/bit0 ZR13091/bit1

4.6.9 Variable torsion compensation
[Function]
The acceleration rate when the traveling direction is reversed is set in this register.
[Operation]
Only when the variable torsion compensation is enabled, this register is enabled.
The acceleration rate when the traveling direction is reversed is displayed.
[Caution]
(1) The unit is "m/s2".
(2) The data format is unsigned binary.
(3) The data of servo axes is output to these registers, in the order of the axis specified with the parameter.
[Function]
When the traveling direction is reversed, the value of the "Variable torsion compensation: Acceleration rate at change of direction" signal (R9802) before update is stored as history.
[Operation]
Only when the variable torsion compensation is enabled, this register is enabled.
When the traveling direction is reversed, the value set in the "Variable torsion compensation: Acceleration rate at change of direction" signal (R9802) is set in this register.

[Caution]
(1) The unit is "m/s2".
(2) The data format is unsigned binary.
(3) The data of servo axes is output to these registers, in the order of the axis specified with the parameter.
Cont. Signal name Abbrev. 1st axis 2nd axis 3rd axis 4th axis 5th axis 6th axis 7th axis 8th axis
A
Variable torsion compensa tion: Acceleration rate at
change of direction
ZR9800
ZR9801
ZR9804
ZR9805
ZR9808
ZR9809
ZR9812
ZR9813
ZR9816
ZR9817
ZR9820
ZR9821
ZR9824
ZR9825
ZR9828
ZR9829
9th axis 10th axis 11th axis 12th axis 13th axis 14th axis 15th axis 16th axis
ZR9832
ZR9833
ZR9836
ZR9837
ZR9840
ZR9841
ZR9844
ZR9845
ZR9848
ZR9849
ZR9852
ZR9853
ZR9856
ZR9857
ZR9860
ZR9861
17th axis 18th axis 19th axis 20th axis 21th axis 22th axis 23th axis 24th axis
ZR9864
ZR9865
ZR9868
ZR9869
ZR9872
ZR9873
ZR9876
ZR9877
ZR9880
ZR9881
ZR9884
ZR9885
ZR9888
ZR9889
ZR9892
ZR9893
25th axis 26th axis 27th axis 28th axis 29th axis 30th axis 31th axis 32th axis
ZR9896
ZR9897
ZR9900
ZR9901
ZR9904
ZR9905
ZR9908
ZR9909
ZR9912
ZR9913
ZR9916
ZR9917
ZR9920
ZR9921
ZR9924
ZR9925
Cont. Signal name Abbrev. 1st axis 2nd axis 3rd axis 4th axis 5th axis 6th axis 7th axis 8th axis
A
Variable torsion compensa tion: History of acceleration
rate at change of direction
ZR9802
ZR9803
ZR9806
ZR9807
ZR9810
ZR9811
ZR9814
ZR9815
ZR9818

ZR9819
ZR9822
ZR9823
ZR9826
ZR9827
ZR9830
ZR9831
9th axis 10th axis 11th axis 12th axis 13th axis 14th axis 15th axis 16th axis
ZR9834
ZR9835
ZR9838
ZR9839
ZR9842
ZR9843
ZR9846
ZR9847
ZR9850
ZR9851
ZR9854
ZR9855
ZR9858
ZR9859
ZR9862
ZR9863
17th axis 18th axis 19th axis 20th axis 21th axis 22th axis 23th axis 24th axis
ZR9866
ZR9867
ZR9870
ZR9871
ZR9874
ZR9875
ZR9878
ZR9879
ZR9882
ZR9883
ZR9886
ZR9887
ZR9890
ZR9891
ZR9894
ZR9895
25th axis 26th axis 27th axis 28th axis 29th axis 30th axis 31th axis 32th axis
ZR9898
ZR9899
ZR9902
ZR9903
ZR9906
ZR9907
ZR9910
ZR9911
ZR9914
ZR9915
ZR9918
ZR9919
ZR9922
ZR9923
ZR9926
ZR9927

4.6.10 Brake wear diagnostics
4.6.10.1 PLC -> CNC
[Function]
This signal is used to start diagnosis of the wear of brake mounted on each axis.
This signal (ZR9600) is available only when the parameter "#12590 BWD_Enable" is set to "1" (Enable).
This signal (ZR9600) is ignored when the parameter "#12590 BWD_Enable" is set to "0" (Disable).
[Operation]
After a certain period of time (the parameter "#11386 BWD_INT") has passed since the last brake wear diagnostics, the "Brake wear diagnostics: Diagnosis incomplete (control axis)" signal (ZR9604: BWDNFm) turns ON as a warning. Turn ON this signal (ZR9600) and perform the brake wear diagnostics. When the brake wear diagnostics completes successfully, the "Brake wear diagnostics: Diagnosis incomplete (control axis)" signal turns OFF. The brake wear diagnostics can be temporarily stopped by turning OFF this signal (ZR9600) during the brake wear diagnostics. After the temporary stop, the brake wear diagnostics starts from the beginning by turning ON this signal (ZR9600).
Cont. Signal name Abbrev. 1st axis 2nd axis 3rd axis 4th axis 5th axis 6th axis 7th axis 8th axis
A
Brake wear diagnostics:
Diagnosis start
(control axis)
BWDSTm
ZR9600
bit0
ZR9600
bit1
ZR9600
bit2
ZR9600

bit3
ZR9600
bit4
ZR9600
bit5
ZR9600
bit6
ZR9600
bit7
9th axis 10th axis 11th axis 12th axis 13th axis 14th axis 15th axis 16th axis
ZR9600
bit8
ZR9600
bit9
ZR9600
bit10
ZR9600
bit11
ZR9600
bit12
ZR9600
bit13
ZR9600
bit14
ZR9600
bit15
17th axis 18th axis 19th axis 20th axis 21th axis 22th axis 23th axis 24th axis
ZR9601
bit0
ZR9601
bit1
ZR9601
bit2
ZR9601
bit3
ZR9601
bit4
ZR9601
bit5
ZR9601
bit6
ZR9601
bit7
25th axis 26th axis 27th axis 28th axis 29th axis 30th axis 31th axis 32th axis
ZR9601
bit8
ZR9601
bit9
ZR9601
bit10
ZR9601
bit11
ZR9601
bit12
ZR9601
bit13
ZR9601
bit14
ZR9601
bit15
SV023
SV013
SV023
SV013
Diagnosis start
(ZR9600)
Diagnosis in progress
(ZR9606)
Excessive error
detection width
Current limit value
Brake starting signal
(PLC -> External)
Wait time
Command position
FB position
Diagnosis incomplete
(ZR9604)
Excessive error detection width for diagnosis (automatically calculated)
Current limit value for diagnosis (#12591 BWD_ILIM)
Command wait time
(#12592 BWD_CMDWT)
Monitoring time (#12595 BWD_OBTIM)
Travel amount for diagnosis
(#12593 BWD_FD)
Allowable travel amount (warning)
(#12596 BWD_TOL(Warning))
Allowable travel amount (caution)

(#12597 BWD_TOL(Caution))

[Caution]
When this signal (ZR9600) is turned ON without meeting the following conditions, the operation error (M01 0370) occurs.
When this signal (ZR9600) is turned OFF, the operation error (M01 0370) is canceled.
(Condition)
(1) All part systems are not in automatic operation.
(2) The target axis of brake wear diagnostics is in in-position.
(3) The target axis of brake wear diagnostics is in servo ON state.
(4) The target axis of brake wear diagnostics is not in current limit.
(5) The target axis of brake wear diagnostics is not the slave axis in the synchronous control.
(6) The target axis of brake wear diagnostics is not a related axis in superimposition control.
(7) There is no axis which is in arbitrary axis exchange control in the part system to which the target axis of brake wear diagnostics belongs.
(8) There is no axis which is in mixed control in the part system to which the target axis of brake wear diagnostics belongs.
(9) The parameter "#12591 BWD_ILIM" (Brake wear diagnostics current limit value) of the target axis of brake wear diag nostics is not "0".
(10)The parameter "#12593 BWD_FD" (Brake wear diagnostics command travel amount) of the target axis of brake wear diagnostics is not "0".
(11)The parameter "#12594 BWD_FDRATE" (Brake wear diagnostics feedrate) of the target axis of brake wear diagnos tics is not "0".
(12)The setting value of the parameter "#12596 BWD_TOL(Warning)" (Brake wear diagnostics allowable travel amount (Warning)) of the target axis of brake wear diagnosis is larger than that of the parameter "#12597 BWD_TOL(Cau tion)" (Brake wear diagnostics allowable travel amount (Caution)).
(13)The "Reference position establishment" signal (X9E0) of the target axis of brake wear diagnostics is ON.
(14)Smart safety observation is disabled.
(15)The target axis of brake wear diagnostics is not a PLC axis.
(16)The "Brake wear diagnostics: Alarm reset (control axis)" signal (ZR9602) is OFF.
(17)Coordinate rotation is not applied.
(18)The target axis of brake wear diagnostics is not in control as an auxiliary axis.
(19)The target axis of brake wear diagnostics is not an inclined axis on which the inclined axis control is enabled.
(20)The target axis of brake wear diagnostics is not a secondary axis in multiple-axis synchronization control.
(21)The target axis of brake wear diagnostics is not a related axis in control axis synchronization between part systems.
[Related signals]
(1) Brake wear diagnostics: Diagnosis incomplete (control axis) (ZR9604: BWDNFm)
(2) Brake wear diagnostics: Diagnosis in progress (control axis) (ZR9606: BWDBRm)

[Function]
This signal is used to reset the brake wear diagnostics result alarm of the control axis.
The brake wear diagnostics result alarm is an alarm that occurs when an error is detected in a brake as a result of the brake wear diagnostics. There are the following two types.
Operation error (M01 0371) (brake wear diagnostics (warning))
Operation error (M50 5006) (brake wear diagnostics (caution))
Even when this signal (ZR9602) turns ON during the brake wear diagnostics, the brake wear diagnostics is not interrupted.
When the brake wear diagnostics result alarm has not occurred, this signal (ZR9602) is ignored.
[Operation]
By turning ON this signal (ZR9602), the NC carries out the following operations.
When the operation error (M01 0371) has occurred, the operation error is canceled.
When the operation error (M50 5006) has occurred, the operation error is canceled.
The "Brake wear diagnostics: Servo axis in warning (control axis)" signal (ZR9736: BWDWRG_SVm) is turned OFF.
The "Brake wear diagnostics: Warning No. (system common)" signal (ZR9738: BWDWRG_WNO) is turned OFF.
(Note) The "Brake wear diagnostics: Diagnosis incomplete (control axis)" signal (ZR9604: BWDNFm) is not turned ON/OFF.
[Caution]
(1) When the "Brake wear diagnostics: Diagnosis start (control axis)" signal (ZR9600: BWDSTm) is turned ON while this signal (ZR9602) is ON, the operation error (M01 0370) occurs and the brake wear diagnostics does not start.
(2) When this signal (ZR9602) is turned ON during the brake wear diagnostics and the brake wear diagnostics is com pleted while this signal is still ON, the brake wear diagnostics result alarm does not occur even if a caution state or warning state is detected.
[Related signals]
(1) Brake wear diagnostics: Diagnosis in progress (control axis) (ZR9606: BWDBRm)
(2) Brake wear diagnostics: Servo axis in warning (control axis) (ZR9736: BWDWRG_SVm)
(3) Brake wear diagnostics: Warning No. (system common) (ZR9738: BWDWRG_WNO)
Cont. Signal name Abbrev. 1st axis 2nd axis 3rd axis 4th axis 5th axis 6th axis 7th axis 8th axis
A Brake wear diagnostics:
Alarm reset (control axis) BWDRSTm
ZR9602
bit0
ZR9602
bit1
ZR9602
bit2
ZR9602
bit3
ZR9602
bit4
ZR9602
bit5
ZR9602
bit6
ZR9602
bit7
9th axis 10th axis 11th axis 12th axis 13th axis 14th axis 15th axis 16th axis
ZR9602

bit8
ZR9602
bit9
ZR9602
bit10
ZR9602
bit11
ZR9602
bit12
ZR9602
bit13
ZR9602
bit14
ZR9602
bit15
17th axis 18th axis 19th axis 20th axis 21th axis 22th axis 23th axis 24th axis
ZR9603
bit0
ZR9603
bit1
ZR9603
bit2
ZR9603
bit3
ZR9603
bit4
ZR9603
bit5
ZR9603
bit6
ZR9603
bit7
25th axis 26th axis 27th axis 28th axis 29th axis 30th axis 31th axis 32th axis
ZR9603
bit8
ZR9603
bit9
ZR9603
bit10
ZR9603
bit11
ZR9603
bit12
ZR9603
bit13
ZR9603
bit14
ZR9603
bit15

4.6.10.2 CNC -> PLC
[Function]
This signal indicates that a certain period of time (NC system operating time) has passed since the last brake wear diagnostics was performed.
When this signal (ZR9604) turns ON, perform the brake wear diagnostics as soon as possible.
[Operation]
This signal (ZR9604) turns ON after a certain period of time (parameter "#11386 BWD_INT") has passed since the last brake wear diagnostics. To turn OFF this signal (ZR9604), turn ON the "Brake wear diagnostics: Diagnosis start (control axis)" signal (ZR9600), perform the brake wear diagnostics and complete it in a state that the brake wear diagnostics result is normal.
Whether or not to turn ON this signal (ZR9604) when the NC is turned ON can be selected with the parameter "#11387 BWD_INIT_NF" (Brake wear diagnostics incomplete state at power-on).
Refer to the signal description of the "Brake wear diagnostics: Diagnosis start (control axis)" signal (ZR9600) for the operation sequence of this signal (ZR9604).
[Related signals]
(1) Brake wear diagnostics: Diagnosis start (control axis) (ZR9600: BWDSTm)
[Function]
This signal indicates that the axis corresponding to the signal is under the brake wear diagnostics.
[Operation]
When the "Brake wear diagnostics: Diagnosis start (control axis)" signal (ZR9600) is turned ON, this signal (ZR9606) is turned ON at the same time as the function operation start.
When NC ends a series of brake wear diagnostics sequence, this signal (ZR9606) turns OFF.
Incorporate the signal processing logic to apply brake while this signal (ZR9606) is ON.
[Related signals]
(1) Brake wear diagnostics: Diagnosis start (control axis) (ZR9600: BWDSTm)
Cont. Signal name Abbrev. 1st axis 2nd axis 3rd axis 4th axis 5th axis 6th axis 7th axis 8th axis
A
Brake wear diagnostics:
Diagnosis incomplete (con trol axis)
BWDNFm
ZR9604
bit0
ZR9604
bit1
ZR9604

bit2
ZR9604
bit3
ZR9604
bit4
ZR9604
bit5
ZR9604
bit6
ZR9604
bit7
9th axis 10th axis 11th axis 12th axis 13th axis 14th axis 15th axis 16th axis
ZR9604
bit8
ZR9604
bit9
ZR9604
bit10
ZR9604
bit11
ZR9604
bit12
ZR9604
bit13
ZR9604
bit14
ZR9604
bit15
17th axis 18th axis 19th axis 20th axis 21th axis 22th axis 23th axis 24th axis
ZR9605
bit0
ZR9605
bit1
ZR9605
bit2
ZR9605
bit3
ZR9605
bit4
ZR9605
bit5
ZR9605
bit6
ZR9605
bit7
25th axis 26th axis 27th axis 28th axis 29th axis 30th axis 31th axis 32th axis
ZR9605
bit8
ZR9605
bit9
ZR9605
bit10
ZR9605
bit11
ZR9605
bit12
ZR9605
bit13
ZR9605
bit14
ZR9605
bit15
Cont. Signal name Abbrev. 1st axis 2nd axis 3rd axis 4th axis 5th axis 6th axis 7th axis 8th axis
A
Brake wear diagnostics:
Diagnosis in progress (con trol axis)
BWDBRm
ZR9606
bit0
ZR9606
bit1
ZR9606
bit2
ZR9606
bit3
ZR9606
bit4
ZR9606
bit5
ZR9606
bit6
ZR9606
bit7
9th axis 10th axis 11th axis 12th axis 13th axis 14th axis 15th axis 16th axis
ZR9606
bit8
ZR9606
bit9

ZR9606
bit10
ZR9606
bit11
ZR9606
bit12
ZR9606
bit13
ZR9606
bit14
ZR9606
bit15
17th axis 18th axis 19th axis 20th axis 21th axis 22th axis 23th axis 24th axis
ZR9607
bit0
ZR9607
bit1
ZR9607
bit2
ZR9607
bit3
ZR9607
bit4
ZR9607
bit5
ZR9607
bit6
ZR9607
bit7
25th axis 26th axis 27th axis 28th axis 29th axis 30th axis 31th axis 32th axis
ZR9607
bit8
ZR9607
bit9
ZR9607
bit10
ZR9607
bit11
ZR9607
bit12
ZR9607
bit13
ZR9607
bit14
ZR9607
bit15
ZR9606 / ZR9607
(Y*** / ZR***)
Brake starts

[Function]
This signal is used to indicate the position of the brake wear diagnostics start.
[Operation]
This signal saves the position on the machine coordinate at the start of the brake wear diagnostics.
This data is updated at the execution of the brake wear diagnostics. (The data is retained until the next brake wear diagnostics is executed even after the power is turned OFF.)
The output unit differs depending on the value of the parameter "#1040 M_inch".
If the target axis is a rotary axis, the output unit is fixed to 0.0001 () regardless of the value of the parameter "#1040 M_inch".
<When the target axis is a linear axis and "#1040 M_inch" is "0" (metric system)>
The output unit is fixed to submicron (0.0001 mm).
(Example) When the machine position of the 1st axis (linear axis) is 123.4567 (mm)
ZR9608: "D687" is stored here.
ZR9609: "0012" is stored here.
<When the target axis is a linear axis and "#1040 M_inch" is "1" (inch system)>
The output unit is fixed to 0.00001 (inch).
(Example) When the machine position of the 1st axis (linear axis) is 1.23456 (inch)
ZR9608: "E240" is stored here.
ZR9609: "0001" is stored here.
<For the linear type rotary axis or the rotation-type rotary axis>
The output unit is fixed to 0.0001 ().
(Example) When the machine coordinate of the 1st axis (rotary axis) is 12.3456 ()
ZR9608: "E240" is stored here.
ZR9609: "0001" is stored here.
[Related signals]
(1) Brake wear diagnostics: Diagnosis start (control axis) (ZR9600: BWDSTm)
Cont. Signal name Abbrev. 1st axis 2nd axis 3rd axis 4th axis 5th axis 6th axis 7th axis 8th axis
A Brake wear diagnostics:
Start position (control axis) BWDPOSm
ZR9608
ZR9609
ZR9612
ZR9613
ZR9616
ZR9617

ZR9620
ZR9621
ZR9624
ZR9625
ZR9628
ZR9629
ZR9632
ZR9633
ZR9636
ZR9637
9th axis 10th axis 11th axis 12th axis 13th axis 14th axis 15th axis 16th axis
ZR9640
ZR9641
ZR9644
ZR9645
ZR9648
ZR9649
ZR9652
ZR9653
ZR9656
ZR9657
ZR9660
ZR9661
ZR9664
ZR9665
ZR9668
ZR9669
17th axis 18th axis 19th axis 20th axis 21th axis 22th axis 23th axis 24th axis
ZR9672
ZR9673
ZR9676
ZR9677
ZR9680
ZR9681
ZR9684
ZR9685
ZR9688
ZR9689
ZR9692
ZR9693
ZR9696
ZR9697
ZR9700
ZR9701
25th axis 26th axis 27th axis 28th axis 29th axis 30th axis 31th axis 32th axis
ZR9704
ZR9705
ZR9708
ZR9709
ZR9712
ZR9713
ZR9716
ZR9717
ZR9720
ZR9721
ZR9724
ZR9725
ZR9728
ZR9729
ZR9732
ZR9733

[Function]
This signal indicates the servo axis where the brake wear diagnostics result alarm occurred.
Refer to the section of the "Brake wear diagnostics: Alarm reset (control axis)" signal (ZR9602) for the brake wear diagnostics result alarm.
[Operation]
When the brake wear diagnostics is completed, the bit corresponding to the servo axis in which the brake wear diagnostics result alarm occurred is turned ON. "0" is output when no alarm has occurred.
[Related signals]
(1) Brake wear diagnostics: Warning No. (system common) (ZR9738: BWDWRG_WNO)
[Function]
This signal indicates the warning No. of the brake wear diagnostics in hexadecimal.
[Operation]
When an operation error of the brake wear diagnostics occurs, the number that shows which operation error occurred is output. "0" is output when an operation error related to the brake wear diagnostics has not occurred.
(Example 1) When the operation error (M01 0370) occurs
ZR9738: 0172 (370 in decimal)
(Example 2) When the operation error (M01 0371) occurs
ZR9738: 0173 (371 in decimal)
[Related signals]
(1) Brake wear diagnostics: Servo axis in warning (control axis) (ZR9736: BWDWRG_SVm)
4.6.11 High Speed Processing Unit I/F
For details of high speed processing unit, refer to "High Speed Processing Unit User's Manual".
Cont. Signal name Abbrev. 1st axis 2nd axis 3rd axis 4th axis 5th axis 6th axis 7th axis 8th axis

A
Brake wear diagnostics:
Servo axis in warning (con trol axis)
BWD WRG_SVm
ZR9736
bit0
ZR9736
bit1
ZR9736
bit2
ZR9736
bit3
ZR9736
bit4
ZR9736
bit5
ZR9736
bit6
ZR9736
bit7
9th axis 10th axis 11th axis 12th axis 13th axis 14th axis 15th axis 16th axis
ZR9736
bit8
ZR9736
bit9
ZR9736
bit10
ZR9736
bit11
ZR9736
bit12
ZR9736
bit13
ZR9736
bit14
ZR9736
bit15
17th axis 18th axis 19th axis 20th axis 21th axis 22th axis 23th axis 24th axis
ZR9737
bit0
ZR9737
bit1
ZR9737
bit2
ZR9737
bit3
ZR9737
bit4
ZR9737
bit5
ZR9737
bit6
ZR9737
bit7
25th axis 26th axis 27th axis 28th axis 29th axis 30th axis 31th axis 32th axis
ZR9737
bit8
ZR9737
bit9
ZR9737
bit10
ZR9737
bit11
ZR9737
bit12
ZR9737
bit13
ZR9737
bit14
ZR9737
bit15
Cont. Signal name Abbrev. Common ($)
A Brake wear diagnostics: Warning No. (system common) BWD WRG_WNO ZR9738

5.1 Details

PLC window is a function that uses the "read window" or "write window" arbitrary assigned to the R register user area to read and write the CNC operation status, axis information, parameters and tool data, etc.
5.1 Details
The PLC window has "read window" for read and "write window" for write.
The "read window" and "write window" designate arbitrary position of the R register with parameters (window start R register).
Up to three window areas can be specified simultaneously for both "read window" area and "write window" area. This enables read/write window area to be split and used even when a part of the user area is fixed.
R registers that can be used

(Note that R register for window start must be an even number.)
D registers that can be used
User area
R8300 to R9799 1500 points of backup area
R9800 to R9899 100 points of non-backup area
R18300 to R19799 1500 points of backup area
R19800 to R19899 100 points of non-backup area
R28300 to R29799 1500 points of backup area
R29800 to R29899 100 points of non-backup area
Application Device
Control data (MELSEC -> CNC) D4096 to D5295 (1200 words)
Read data status (CNC ->MELSEC) D1024 to D1523 (500 words)

Sixteen R registers are used for one read window or write window. (18 registers for when extended interface is used.)
The read window is further divided into the "read control window" and "read data window". The write window is also divided into the "write control window" and "write data window". Up to four data items can be successively read or written from the data designated in one read window or write window.
After reading, whether reading succeeded or failed and the number of data read will be displayed on the "read control window", and details on the "read data window". After writing, whether writing succeeded or failed and number of data written will be displayed on the "writing control window"
When reading/writing is finished, bit0 (refer to the section on "5.2.2 Read Window Interface" and "5.2.3 Write Window Interface") turns ON regardless of reading/writing successfulness.
Number of data read/written is defined by the number of data actually read or written. When all reading/writing failed, it shows "0".
When two or more data are read/written, it finishes as soon as reading/writing is failed. For example, when the second reading/writing is illegal, it finishes on the spot, even if the third data may be read/written normally. Consequently, the first data is the only one read/written successfully, resulting the number of data read/written to 1.
(1) (2)
(2)
(3)
(3)
(1) (2)
(2)
(2)
(3)
Operation
status
Axis
information
Parameters
Tool data
PLC turns control signal ON.
CNC receives control signal,
and reads designated data in
control window.
Results of CNC read are set in
read control window and read
data window.
<Reading>
<Writing>
CNC
CNC
Read window
Read control
window
Read data window
Write window
Write control
window
Write dat a window
Outline drawing for PLC window
(1)
(2)
(3)
Designate arbitrary position
with parameter (R register)
PLC turns control signal ON.
CNC receives control signal,
and writes contents of write
data window corresponding to
designated data in control
window.
Results of CNC write are set in
write control window.
(1)
(2)
(3)
Operation
status
Axis
information
Parameters
Tool data
PLC
PLC

R register
(user area)
R register
(user area)

5.1.1 Read/Write Operation
Procedure to read data is as follows:
(1) On "Read control window", specify the data to read with "Section No.", "Section sub-ID No.", "Sub-section No." and "Data No.".
(2) Specify "Number to be read (max. 4 data)" and "Read method" when "Number to be read" is two or more.
For "Read method", specify either 0: "Data No.", 1: "Sub-section No." or 2: "Section sub-ID No." to read the continuous data from the data of the specified items.
(3) Turn ON bit0 of "Control signal" to start the read operation. (Refer to (3) in the below timing chart.)
(4) Check the read result on "Read control window".
The "Result" of read result is valid after the read operation is completed. (Refer to (4)-1 in the below timing chart.)
If you want to read with one-shot, turn OFF bit0 of control signal on "Read control window" when "Status" of read result shows read completed status. (Refer to the section of "One-shot read" in the below timing chart.)
If you want to read all the time, always turn ON bit0 of control signal on "Read control window". With this ON, NC per forms the read operation every time. (Refer to the section of "Continuous read" in the below timing chart.)
For both "One-shot read" and "Continuous read", when bit0 of control signal on "Read control window" is turned OFF, the read result "Status (bit0)" on "Read control window" is turned OFF. (Refer to (4)-2 in the below timing chart.)
If necessary, check "Status" and "Result" of the read result on "Read control window" and then perform the next opera tion.
[Timing chart of read operation]
Read operation
(4)-1 (3)
(4)-1
(4)-2 (4)-2
(3)
Reading data
Read operation of
NC data
One-shot read Continuous read
Read control window
Control signal bit0
Read control window
Read result, "Status"

Procedure to write data is as follows:
(1) On "Write control window", specify the data to write with "Section No.", "Section sub-ID No.", "Sub-section No." and "Data No.".
(2) Specify "Number to be written (max. 4 data)" and "Write method" when "Number to be written" is two or more.
For "Write method", specify either 0: "Data No.", 1: "Sub-section No." or 2: "Section sub-ID No." to write the continuous data from the data of the specified items.
(3) Turn ON bit0 of "Control signal" to start the write operation. (Refer to (3) in the below timing chart.)
(4) Check the write result on "Write control window".
The "Result" of write result is valid after the write operation is completed. (Refer to (4)-1 in the below timing chart.)
If you want to write with one-shot, turn OFF bit0 of control signal on "Write control window" when "Status" of write result shows write completed status. (Refer to the section of "One-shot write" in the below timing chart.)
If you want to write all the time, always turn ON bit0 of control signal on "Write control window". With this ON, NC per forms the write operation every time. (Refer to the section of "Continuous write" in the below timing chart.)
However, for the parameter data, write it with one-shot. When you write parameters consecutively, the operation alarm (M50 5003) occurs.
For both "One-shot write" and "Continuous write", when bit0 of control signal on "Write control window" is turned OFF, the write result "Status (bit0)" on "Write control window" is turned OFF. (Refer to (4)-2 in the below timing chart.)
If necessary, check "Status" and "Result" of the write result on "Write control window" and then perform the next opera tion.
[Timing chart of write operation]
[Parameter update timing]
When a parameter is written, update timing of the parameter is as follows according to the setting of the parameter "#1254 set26/bit3" (Select timing for updating axis parameter).
Write operation
#1254 set26/bit3 Axis parameter update Spindle parameter update
0 Performed after smoothing zero of NC axes (excluding PLC axes) in all the part systems.
1 Performed after smoothing zero of all axes in the part system including the axis.
While the spindle is in any of the following states, update is waited.
When these states are no longer applied, update is performed.
Smoothing zero of NC axes or PLC axes is not waited.
(1) The spindle is in motion by spindle position control (spindle/C axis control).
(2) Synchronous tapping is in execution.
(3) Tool spindle synchronization IC (spindle-NC axis, polygon) is in execution.
(4) Tool spindle synchronization II (hobbing) is in execution.
(4)-1 (3)
(4)-1
(4)-2 (4)-2
(3)
Writing data
Write operation of
NC data
One-shot write Continuous write
Write control window
Control signal bit0
Write control window

Write result, "Status"

5.2 PLC Window Interface
5.2.1 Parameter Interface
For the PLC window interface, specify the start R register and the number of windows of read window 1, 2, 3, and write window 1, 2, 3 in the parameter (R424 to R435). Error status is set in (R37) when an error is found in the set parameter.
For the read window or write window, the arbitrary assigned area of the R register's user area is used.
(For the area to be used, refer to "Details".)
(R424 to R435 and R37 are non-backup area.)
16 R registers are used for one read window or write window.
When the number of read windows or write windows is set to "1001" to "1100", an extended interface can be used, which enables to specify the sub-section No. and data No. as DWORD-available data. With this interface, the data can be read or written even if the data No. exceeds the allowable range of WORD-type data. In this case, the number of windows is handled as "1" to "100". When the extended interface is used, 18 R registers are used for one read window or one write window.
PLC window parameter error status (R37)
It is set when an error is found in the values set for R424 to R435.
When value is already set, it does not read or write.
(1) If an error occurs in one of the windows to be used, read/write is not possible in all the windows. Set from R424 to R435 without letting the window area overlap.
NC ->PLC interface signal
Values of
R37 Error details
0x8001 One of the values set for R424 to R427 exceed the setting range.
0x8002 Area of read window exceeds the R resister's user area 1.
0x8003 Area of write window exceeds the R resister's user area 1.
0x8004 Write window is found on the read window.
0x8005 Read window is found on the write window.
0x8006 Read window is found on the read window.
0x8007 Write window is found on the write window.
0x8008 Odd number is set for Reading/Writing start R register 1.
0x8101 One of the values set for R428 to R431 exceed the setting range.
0x8102 Area of read window 2 exceeds the R resister's user area.
0x8103 Area of write window 2 exceeds the R resister's user area.
0x8108 Odd number is set for Reading/Writing start R register 2.
0x8201 One of the values set for R432 to R435 exceed the setting range.
0x8202 Area of read window 3 exceeds the R resister's user area.
0x8203 Area of write window 3 exceeds the R resister's user area.
0x8208 Odd number is set for Reading/Writing start R register 3.
The area is exceeded.
Note

PLC window Reading start R register 1 to 3 (R424, R428, R432)
It sets the PLC window Reading start R register 1 to 3.
The setting range is 8300 to 9884, 18300 to 19884 and 28300 to 29884. (Even number only)
PLC window Number of read windows 1 to 3 (R425, R429, R433)
It designates the number of read windows 1 to 3.
The setting range is 0 to 100. When it is 0, it does not read.
When a number from "1001" to "1100" is set, the number of windows of the extended interface is handled as "1" to "100".
PLC window Writing start R register 1 to 3 (R426, R430, R434)
It sets PLC window Writing start R register 1 to 3.
The setting range is 8300 to 9884, 18300 to 19884 and 28300 to 29884. (Even number only)
PLC window Number of write windows 1 to 3 (R427, R431, R435)
It designates number of write windows 1 to 3.
The setting range is 0 to 100. When it is "0", it does not write.
When a number from "1001" to "1100" is set, the number of windows of the extended interface is handled as "1" to "100".
PLC -> NC interface signals
Signal name R register (Common for part systems)
n=1 n=2 n=3
PLC window Reading start R register n R424 R428 R432
PLC window Number of read windows n R425 R429 R433
PLC window Writing start R register n R426 R430 R434
PLC window Number of write windows n R427 R431 R435
R register Details
R424 The value is not checked when the value of R425 is "0".
R428 The value is not checked when the value of R429 is "0".
R432 The value is not checked when the value of R433 is "0".
R register Details
R425 The read windows 1 will be the consecutive area for the number of windows designated.
The read windows start from the R register designated with R424.
R429 The read windows 2 will be the consecutive area for the number of windows designated.
The read windows start from the R register designated with R428.
R433 The read windows 3 will be the consecutive area for the number of windows designated.
The read windows start from the R register designated with R432.
R register Details
R426 The value is not checked when the value of R427 is "0".
R430 The value is not checked when the value of R431 is "0".
R434 The value is not checked when the value of R435 is "0".
R register Details
R427 The write windows 1 will be the consecutive area for the number of windows designated.
The write windows start from the R register designated with R426.
R431 The write windows 2 will be the consecutive area for the number of windows designated.
The write windows start from the R register designated with R430.

R435 The write windows 3 will be the consecutive area for the number of windows designated.
The write windows start from the R register designated with R434.

5.2.2 Read Window Interface
Read control window
(Area where both PLC and NC set data)
(*1) These items are set by PLC.
(*2) This item is set by NC.
(*3) Turn ON the control signal after setting Section No., Section sub-ID No., Sub-section No., Data No., Reading method, and Number to be read.
Read data window (Area where NC sets data)
R register Item Details
RA
Read data win dow
Control signal(*1)(*3) Data will be read by turning bit0 ON. NC and PLC read asynchronously.
When the reading is finished, the bit0 under "Status" of the reading results turns ON.
When the bit0 under "Status" turns ON, turn OFF the bit0 of the control sig nal. In case of reading in constant, leave the bit0 ON.
RA+1 Section No.(*1) Designate data type
RA+2 Section sub-ID No.(*1) Designate part system No. (1 to maximum number of part system for each model)
RA+3 Sub-section No.(*1) Designate data
RA+4 Data No.(*1) Designate axis No. used in the part system and variable No., etc.
(The axis No. is 1 to maximum number of axes for each model)
RA+5
Reading method(*1) 0: Read up to 4 consecutive data from the designated data No.
1: Read up to 4 consecutive data from the designated sub-section No.
2: Read up to 4 consecutive data from the designated section sub-ID No.
RA+6
Number to be read(*1) Designate number to be read.
Maximum number of data to be read is 4. If 5 or more is designated, the number of data is regarded as 4.
RA+7
Reading results(*2) <Status> (bit0 to bit7)
bit0: Read finished (It turns ON when reading is finished regardless of read ing successfulness)
bit1: Blank
bit2 to 7: Read error
The value and its meaning when the control signal is ON are as below:
0x01: Normally finished
0x41: Address illegal
0x45: Section No. illegal
0x49: Sub-section No. illegal
0x59: Not fit in the buffer
0x5D: Data type illegal
0x75: Unable to read
0x7D: Read write-only data
0x81: Axis designation illegal
0x85: Data No. illegal
<Results> (bit8 to bitF)
Number of data read
R register Item Details
RA+8 to 9 Read data window Read data 1 Store the read data.
RA+10 to 11 Read data 2
RA+12 to 13 Read data 3
RA+14 to 15 Read data 4

5.2.3 Write Window Interface
Writing control window
(Area where both PLC and NC set data)
(*1) These items are set by PLC.
(*2) This item is set by NC.
(*3) Turn ON the control signal after setting Section No., Section sub-ID No., Sub-section No., Data No., Writing method, Number to be written, and write data 1 to 4 in the write data window.
Write data window (Area where PLC sets data)
R register Item Details
RB
Writing control window
Control signal(*1)(*3) Data will be written by turning bit0 ON. NC and PLC write asynchronously.
When the writing is finished, the bit0 under "Status" of the writing result turns ON.
When the bit0 under "Status" turns ON, turn OFF the bit0 of the control sig nal.
RB+1 Section No.(*1) Designate data type
RB+2 Section sub-ID No.(*1) Designate part system No. (1 to maximum number of part system for each model)
RB+3 Sub-section No.(*1) Designate data
RB+4 Data No.(*1) Designate axis No. used in the part system and variable No., etc.
(The axis No. is 1 to maximum number of axes for each model)
RB+5
Writing method(*1) 0: Write up to 4 consecutive data from the designated data No.
1: Write up to 4 consecutive data from the designated sub-section No.
2: Write up to 4 consecutive data from the designated section sub-ID No.

RB+6
Number to be writ ten(*1)
Designate number of data to be written.
Maximum number of data to be written is 4. If 5 or more is designated, the
number of data is regarded as 4.
RB+7
Writing results(*2) <Status> (bit0 to bit7)
bit0: Write finished (It turns ON when the writing is finished regardless of
writing successfulness)
bit1: Blank
bit2 to 7: Write error
The value and its meaning when the control signal is ON are as below:
0x01: Normally finished
0x41: Address illegal
0x45: Section No. illegal
0x49: Sub-section No. illegal
0x59: Not fit in the buffer
0x5D: Data type illegal
0x6D: Written in read-only data
0x79: Unable to write data
0x81: Axis designation illegal
0x85: Data No. illegal
<Results> (bit8 to bitF)
Number of data written
R register Item Details
RB+8 to 9 Write data window Write data 1 Store the write data.
RB+10 to 11 Write data 2
RB+12 to 13 Write data 3
RB+14 to 15 Write data 4

5.2.4 Read Window Expanded Interface
Read control window (Area where both PLC and NC set data)
(*1) These items are set by PLC.
(*2) This item is set by NC.
(*3) Turn ON the control signal after setting the data of RA+1 to RA+8.
Read data window (Area where NC sets data)
R register Item Details
RA
Read control win dow
Control signal(*1)(*3) Data will be read by turning bit0 ON. NC and PLC read asynchronously.
When the reading is finished, the bit0 under "Status" of the reading results
turns ON.
When the bit0 under "Status" turns ON, turn OFF the bit0 of the control sig nal. In case of reading in constant, leave the bit0 ON.
RA+1 Section No.(*1) Designate data type
RA+2 Section sub-ID No.(*1) Designate part system No. (1 to maximum number of part system for each
model)
RA+3 to 4 Sub-section No.(*1) Designate data
RA+5 to 6 Data No.(*1) Designate axis No. used in the part system and variable No., etc.
(The axis No. is 1 to maximum number of axes for each model)
RA+7
Reading method(*1) 0: Read up to 4 consecutive data from the designated data No.
1: Read up to 4 consecutive data from the designated sub-section No.
2: Read up to 4 consecutive data from the designated section sub-ID No.
RA+8
Number to be read(*1) Designate number to be read.
Maximum number of data to be read is 4. If 5 or more is designated, the
number of data is regarded as 4.
RA+9
Reading results(*2) <Status> (bit0 to bit7)
bit0: Read finished (It turns ON when reading is finished regardless of read ing successfulness)
bit1: Blank
bit2 to 7: Read error
The value and its meaning when the control signal is ON are as below:
0x01: Normally finished
0x41: Address illegal
0x45: Section No. illegal
0x49: Sub-section No. illegal
0x59: Not fit in the buffer
0x5D: Data type illegal
0x75: Unable to read
0x7D: Read write-only data
0x81: Axis designation illegal
0x85: Data No. illegal
<Results> (bit8 to bitF)
Number of data read
R register Item Details
RA+10 to 11 Read data window Read data 1 Store the read data.
RA+12 to 13 Read data 2
RA+14 to 15 Read data 3
RA+16 to 17 Read data 4

5.2.5 Write Window Expanded Interface

Writing control window (Area where both PLC and NC set data)
(*1) These items are set by PLC.
(*2) This item is set by NC.
(*3) Turn ON the control signal after setting the data of RB+1 to RB+8 and RB+10 to RB+17 in the write data window.
Write data window (Area where PLC sets data)
R register Item Details
RB
Writing control
window
Control signal(*1)(*3) Data will be written by turning bit0 ON. NC and PLC write asynchronously.
When the writing is finished, The bit0 under "Status" of the writing result
turns ON.
When the bit0 under "Status" turns ON, turn OFF the bit0 of the control sig nal.
RB+1 Section No.(*1) Designate data type
RB+2 Section sub-ID No.(*1) Designate part system No. (1 to maximum number of part system for each
model)
RB+3 to 4 Sub-section No.(*1) Designate data
RB+5 to 6 Data No.(*1) Designate axis No. used in the part system and variable No., etc.
(The axis No. is 1 to maximum number of axes for each model)
RB+7
Writing method(*1) 0: Write up to 4 consecutive data from the designated data No.
1: Write up to 4 consecutive data from the designated sub-section No.
2: Write up to 4 consecutive data from the designated section sub-ID No.
RB+8
Number to be writ ten(*1)
Designate number of data to be written.
Maximum number of data to be written is 4. If 5 or more is designated, the
number of data is regarded as 4.
RB+9
Writing results(*2) <Status> (bit0 to bit7)
bit0: Write finished (It turns ON when the writing is finished regardless of
writing successfulness)
bit1: Blank
bit2 to 7: Write error
The value and its meaning when the control signal is ON are as below:
0x01: Normally finished
0x41: Address illegal
0x45: Section No. illegal
0x49: Sub-section No. illegal
0x59: Not fit in the buffer
0x5D: Data type illegal
0x6D: Written in read-only data
0x79: Unable to write data
0x81: Axis designation illegal
0x85: Data No. illegal
<Results> (bit8 to bitF)
Number of data written
R register Item Details
RB+10 to 11 Write data window Write data 1 Store the write data.
RB+12 to 13 Write data 2
RB+14 to 15 Write data 3
RB+16 to 17 Write data 4

5.2.6 Interface for Consecutive Writes Detection Log
Detection log area (Area where NC sets data)
R register Item Details
R20058 Number of consecutive writes detected The NC detects that consecutive write of parameters was performed
through the write window.
The number of detections is stored in R20058.
This number is counted up only at the first detection after the NC power is
turned ON. This number is retained even after the power is turned OFF.
R20059 Consecutive write window No. The NC detects that consecutive write of parameters was performed
through the write window.
The head register number of write window at the detection is stored in
R20059.
Regardless of the number of consecutive write operations, the head R reg ister number of the first detected window after turning ON the power.

5.3 Data Type
Data Type Description Unit (when the control unit and minimum setting
unit are 1m)
PLC setting unit
This is position data, and is input and output in the minimum set ting unit which is specified by the machine parameter. This data
is not changed by the initial inch parameter or constant inch input
(M_inch) parameter.
However, this data may change depending on the PLC setting
unit.
m
PLC setting unit/
min.
This is speed data, and is input and output at the minimum setting
unit/min. This data is not changed by the initial inch parameter or
constant inch input (M_inch) parameter.

However, this data may change depending on the PLC setting
unit.
m/min
Machine error
compensation
unit
The unit of this data is one half of the NC control unit. The control
unit depends on the specification.
0.5 m
Fixed point
This is real number type data in a unit other than the above or
without a unit.
The input/output specification of the decimal point data for the
PLC window can be selected with "#1259 set31/bit2" (Disabling
decimal point for PLC window).
0: Enable decimal point
Fraction data is output as the fixed fraction information.
(The numbers of digits in the integer and fraction parts are the
same as of the on-screen specifications.)
1: Disable decimal point (cut off all digits after decimal point)
Only the integer part is input/output.
Unit specific to data
This data is not changed by the control unit or minimum
setting unit.
Integer This is data in a unit other than the above types or the data with out a unit.
-
Character string This is character string data. Up to two characters can be input
and output.
-

5.4 Read/Write PLC Axis Data
The section No. to read/write PLC axis data differs from the section No. to read/write NC axis data. The section No. related to the axis data described in "6 Appx.2: List of PLC Window Data" is for the NC axis. Refer to the following section No. for PLC axis data.
Sub-section No. is same for both NC axis and PLC axis.
(*1) Refer to the PLC axis control device for axis status.
(*2) Refer to the PLC axis control device for the counter (machine position and remaining distance). The information in servo monitor (Section No. 60) can be also referred there.
Data section NC axis Section No. PLC axis Section No.
Axis status 36 Not applicable(*1)
Counter 37 Not applicable(*2)
Servo monitor 59 60
Reference position return pa rameters
95 131
Servo parameters 96 132
Absolute position parameters 101 133
Base parameters 126 Same as the left
Axis parameters 127 130

5.5 Precautions
(1) Set the read window start R register (R424, R428, R432) and the write window start R register (R426, R430, R434), securing enough space for the number of windows in between. When mistakenly set in the area, it does not read or write correctly. Up to 16 R registers are needed for one read window or write window. (18 R registers are necessary when the extended interface is used.)
(Example)In case the reading starts at R8300 and the number of read windows is set to 10, it uses 160 registers in total. Therefore, the writing start R register must be set in R8460 or later.
(2) Area of read/write window must be within the user area.
When reading/writing is attempted exceeding the user area, reading/writing finishes on the right spot.
Set the reading/writing start R registers and the numbers of read/write windows properly to ensure that all the R registers to be used fit within the user area.
(3) With this function, up to 100 windows can be read or written. Scan time in ladder may be extended, depending on the number of read/write windows.
(4) When 4 consecutive data are first read and then 3 consecutive data are read using the same window, the forth data will not be set to "0", leaving the first data read.
(5) When read control signal and write control signal are ON at the PLC stop, reading and writing are conducted because this function operates even while PLC is stopped.
(6) Read/write window area 1, 2, or 3 can be specified in an arbitrary order, as long as they are specified within R register user area.
(7) Using this function, do not create PLC in which parameters are written each time scan is performed. It might affect some performance. It might also affect the measurement tool such as NC Analyzer2. If parameters are written consecutively on the PLC, the operation alarm (M50 5003) occurs.
(8) When the parameter "#1251 set23/bit5" is set to "1", the operation alarm (M50 5003) display can be released. However, use this as a temporary setting until the user PLC is corrected because the operation may become unstable.
(9) If you create such a PLC program that write servo or spindle parameter per scan, the operation error (M01 0292) will occur upon the execution of the following functions:
- Spindle/C axis changeover
- Speed monitor mode signal ON
- High-speed synchronous tapping
- PLC axis indexing

However, when the parameter "#1282 ext18/bit7" has been set to "1", the writing of the servo parameter or spindle parameter stops temporarily to execute the functions above so that this error does not occur.
(10)The range of value to write/read is within the setting range of the R register.

However, the value to write/read for the PLC window may be limited according to the combination of the control units and the PLC setting units.
(Example) When the value of the data converted from the PLC setting units to the control unit exceeds the maximum command value of the NC.
(11)When data is read from a diameter specification axis (an axis where "#1019 dia" is set to "1"), the data is converted to a radius value, and then output to the read window. When data is written to the diameter specification axis, data input in the write window is handled as a radius value, and the data is converted to a diameter value before written. To input/output the diameter value on the PLC window, set the parameter "#1752 cfgPR02/bit0" (PLC window diameter specification valid) to "1".
Precautions

5.6 Usage Example
(Example 1) G54 workpiece coordinate offset of the 1st to 4th axes in the 1st part system is read with one-shot.
(1) Set the data to be read as follows:
(2) Set the read window 1.
(*1) For the data of the number of windows to be used, the continuous areas will be secured from the register designated with R0424.
For example, when 0x2328 (9000) is set in R0424 and 0x0003 is set in R0425, the area from R9000 to R9047 serves as read window area.
(3) Set the data in the read window.
(4) Turn ON the control signal of the read control window.
(5) Confirm the read result on the read control window.
For the upper 8 bits, the number of read is "4".
For the lower 8 bits, it will be as follows.
bit0: Read is completed.
bit2 to bit7: Read error contents
(6) After bit0 (the read result) is turned ON, the control signal that was turned ON in (4) is turned OFF.
(7) Confirm the read data on the read data window.
G54
X1 100.000
Y1 150.000
Z1 200.000
V1 250.000
B1 0.000
R0424 0x2328 The R register of the read window start is R9000.
R0425 0x0001 The number of the read window is 1. (*1)
R9001 0x0008 Section No.: 8
R9002 0x0001 Section sub-ID No.: 1
R9003 0x0036 Sub-section No.: 54
R9004 0x0001 Data No.: 1
R9005 0x0000 Reading method: 0
R9006 0x0004 Number to be read: 4
R9000 0x0001
R9007 0x0403 R9007 0x0403
R9008 0x86A0 1st axis: 100000 = 100.000
R9009 0x0001
R9010 0x49F0 2nd axis: 150000 = 150.000
R9011 0x0002
R9012 0x0D40 3rd axis: 200000 = 200.000
R9013 0x0003
R9014 0xD090 4th axis: 250000 = 250.000
R9015 0x0003

(Example 2) Write the data to the workpiece coordinate offset G54, G55 and G56.
(1) Set the offset amount of all the axes of the workpiece coordinate offset G54, G55 and G56 to "0.000".
(2) Set the write window 1.
Set the write window 2.
Set the write window 3.
(3) Set the data in the write control window 1.
(4) Set the data in the write control window 2.
R0426 0x2328 The start R register of the write window 1 is R9000.
R0427 0x0001 The number of the write window is 1.
R0430 0x22C4 The start R register of the write window 2 is R8900.
R0431 0x0001 The number of the write window is 1.
R0434 0x2260 The start R register of the write window 3 is R8800.
R0435 0x0001 The number of the write window is 1.
R9001 0x0008 Section No.: 8
R9002 0x0001 Section sub-ID No.: 1
R9003 0x0036 Sub-section No.: 54
R9004 0x0001 Data No.: 1
R9005 0x0000 Writing method: 0
R9006 0x0004 Number to be written: 4
R9007 0x0000 Writing results: 0
R9008 0xC350 1st axis: 50000 = 50.000
R9009 0x0000
R9010 0x86A0 2nd axis: 100000 = 100.000
R9011 0x0001
R9012 0x49F0 3rd axis: 150000 = 150.000
R9013 0x0002
R9014 0x0D40 4th axis: 200000 = 200.000
R9015 0x0003
R8901 0x0008 Section No.: 8

R8902 0x0001 Section sub-ID No.: 1
R8903 0x0037 Sub-section No.: 55
R8904 0x0001 Data No.: 1
R8905 0x0000 Writing method: 0
R8906 0x0004 Number to be written: 4
R8907 0x0000 Writing results: 0
R8908 0xEA60 1st axis: 60000 = 60.000
R8909 0x0000
R8910 0xADB0 2nd axis: 110000 = 110.000
R8911 0x0001
R8912 0x7100 3rd axis: 160000 = 160.000
R8913 0x0002
R8914 0x3450 4th axis: 210000 = 210.000
R8915 0x0003

(5) Set the data in the write control window 3.
(6) Turn ON the control signal in the write control window.
R8800: 0x0001, R8900: 0x0001, R9000: 0x0001
(7) Confirm the writing results in the write control window.
R8807: 0x0403, R8907: 0x0403, R9907: 0x0403
(8) Turn OFF the control signal which was turned ON in (6).
R8800: 0x0000, R8900: 0x0000, R9000: 0x0000
(9) Confirm that the data were written.
Confirm that the workpiece coordinate offset screen is as follows:
R8801 0x0008 Section No.: 8
R8802 0x0001 Section sub-ID No.: 1
R8803 0x0038 Sub-section No.: 56
R8804 0x0001 Data No.: 1
R8805 0x0000 Writing method: 0
R8806 0x0004 Number to be written: 4
R8807 0x0000 Writing results: 0
R8808 0x1170 1st axis: 70000 = 70.000
R8809 0x0001
R8810 0xD4C0 2nd axis: 120000 = 120.000
R8811 0x0001
R8812 0x9810 3rd axis: 170000 = 170.000
R8813 0x0002
R8814 0x5B60 4th axis: 220000 = 220.000
R8815 0x0003

6.1 Section No. List
Section No. Details Write Axis designa tion
Part system
designation Remarks
1 System information (For each part system) Not possible Invalid Valid
2 System information (Common to part systems) Not possible Invalid Invalid
3 File System information Not possible Invalid Valid
4 Common variable (For each part system #100-) Possible Invalid Valid
5 Common variable (Common to part systems #400-) Possible Invalid Invalid
6 Local variables Not possible Invalid Valid
8 Workpiece coordinate system offset (Workpiece coordi nate)
Possible Valid Valid
9 Workpiece coordinate system offset (Extension work piece coordinate)
Possible Valid Valid
10 Workpiece coordinate system offset (Local coordinate) Possible Valid Valid
11 Workpiece coordinate system offset (Other coordinate
system)
Possible Valid Valid
12 Tool offset for each part-system (Type1) Possible Invalid Valid
13 Tool offset for each part-system (Type2) Possible Invalid Valid
14 Tool offset for each part-system (Type3) Possible Invalid Valid
18
Life management data M system only, no group No. In
the order of registration
Possible (par tially not possi ble)
Invalid Valid
19 Life management information Not possible Invalid Valid
20
Tool registration Possible (par tially not possi ble)
Invalid Valid (partially
invalid)
21
Spindle standby Not possible
(partially possi ble)
Invalid Magazine No.
(partially inval id)
22 Tool measurement Not possible Invalid (partially
valid)
Valid

25 File information Not possible Invalid Invalid
33 Speed information Not possible Invalid Valid
34 Spindle information Not possible Valid Invalid
35 Operation status Not possible Invalid Valid (partially
invalid)
36 Axis status Not possible Valid (partially
invalid)
Valid
37 Counter Not possible Valid (partially
invalid)
Valid
38
MSTB execution status Possible (par tially not possi ble)
Invalid Invalid (partially
valid)
40
Cumulative time Possible (par tially not possi ble)
Invalid (partially
valid)
Invalid (partially
valid)
41 G modal Not possible Invalid (partially
valid)
Valid
42 F modal Not possible Invalid Valid
43 MSTB modal Not possible Invalid Invalid
45 Program execution status Not possible Invalid Valid
46 Program tree Not possible Invalid Valid
47 Program tree for graphic check Not possible Invalid Valid
59 Servo monitor Not possible Valid Invalid
60
Servo monitor (PLC axis) Not possible
(partially possi ble)
Valid Invalid
62 Synchronous error monitor Not possible Invalid Invalid
63
Spindle monitor Not possible
(partially possi ble)
Valid Invalid

64
Power supply monitor Not possible
(partially possi ble)
Valid Invalid
65 Auxiliary axis drive unit monitor Not possible Valid Invalid
66 Hardware configuration Not possible Invalid Invalid
67 Software configuration Not possible Invalid Invalid
72
Auxiliary axis control Possible (par tially not possi ble)
Valid (partially
invalid)
Invalid
74
Sampling parameters Possible (par tially not possi ble)
Invalid Invalid
95 Reference position return parameters Possible Valid Invalid
96 Servo parameters Possible Valid Invalid
97 Spindle specification parameters Possible Valid Invalid
98 Spindle parameters Possible Valid Invalid
100 Auxiliary axis: axis parameters Possible Valid Invalid
101 Absolute position parameters Possible Valid Invalid
102 Machine error compensation parameters Possible Invalid Invalid
104 Position switch Possible Invalid Valid (partially
invalid)
106 Macro list Possible Invalid Invalid
107 PLC constants Possible Invalid Invalid
108
PLC timer Possible (par tially not possi ble)
Invalid Invalid
109
PLC counter Possible (par tially not possi ble)
Invalid Invalid
110 PLC bit selection Possible Invalid Invalid
111 Open param 1 Possible Invalid Invalid
112 Open param 2 Possible Invalid Invalid
120
PLC SW Possible (par tially not possi ble)
Invalid Invalid
121 Operation parameters Possible Invalid Invalid
122 Input/Output parameters Possible Invalid Invalid
123 Computer link parameters Possible Invalid Invalid
124 Ethernet parameters Possible Invalid Invalid
125 Barrier data Possible Invalid Invalid (partially
valid)
126

Base parameters Possible (par tially not possi ble)
Invalid Invalid (partially
valid)
127 Axis parameters Possible Valid Valid
128 Rotary axis configuration parameters Possible Invalid Valid
140 Ladder I/F (common) Not possible Invalid Valid (partially
invalid)
150
User open I/F parameter Not possible
(partially possi ble)
Invalid Invalid
151
User open I/F data Not possible
(partially possi ble)
Invalid Invalid
171 RIO device assignment check Possible Invalid Invalid
193 Extended common variable Possible Invalid Invalid
194
Extended common variable operation Possible (par tially not possi ble)
Invalid Invalid
Section No. Details Write Axis designa tion
Part system
designation Remarks

Section No.: 1 System information (For each part system)
Sub-ID Significance of data
No. Sub-section No. Details of Sub-section No. Data type R/W
System No. Not used.
1 Number of axes in part system (Cross configuration)
2 Number of axes in part system (Base configuration) Integer R
100 Number of common variable (#100-) sets
Section No.: 2 System information (Common to part systems)
Sub-ID Significance of data
No. Sub-section No. Details of Sub-section No. Data type R/W
Not used. Not used.
1 Number of part systems
Integer R
2 Total number of NC axes (NC)
3 Total number of control axes (NC+PLC+SP)
4 Number of spindles
5 Number of PLC axes
6 Number of auxiliary axes
7 File system
8 Number of common variable (#500-) sets
9 Information on maximum number of registered ma chining programs
10 Number of power supply axes (SV+SP)
100 NC type
101 PLC device assignment type
Section No.: 3 File System information
Sub-ID Significance of data
No. Sub-section No. Details of Sub-section No. Data type R/W
System No. Not used.
1 Tool offset type Character string
2 Number of tool offset sets R
Integer 3 Number of workpiece offset sets
Section No.: 4 Common variable (For each part system #100-)
Sub-ID Significance of data
No. Sub-section No. Details of Sub-section No. Data type R/W
System No. Not used. 700 + n 100 to 199 (n=100 to 199) Integer RW

Section No.: 5 Common variable (Common to part systems #400-)
Sub-ID Significance of data
No. Sub-section No. Details of Sub-section No. Data type R/W
Not used. Not used.
900 + n Common variable Variable (Common for part systems
#400 to #999) (n=400 to 999) Integer
RW
2000 + n Common variable Comment (Common for part sys tems #500 to #519) (n=500 to 519) Character string
10000 + n Common variable Variable (Common for part systems
#100100 to #100199) (n=100 to 199)
Integer
11000 + n Common variable Variable (Common for part systems
#200100 to #200199) (n=100 to 199)
12000 + n Common variable Variable (Common for part systems
#300100 to #300199) (n=100 to 199)
13000 + n Common variable Variable (Common for part systems
#400100 to #400199) (n=100 to 199)
14000 + n Common variable Variable (Common for part systems
#500100 to #500199) (n=100 to 199)
15000 + n Common variable Variable (Common for part systems
#600100 to #600199) (n=100 to 199)

16000 + n Common variable Variable (Common for part systems
#700100 to #700199) (n=100 to 199)
17000 + n Common variable Variable (Common for part systems
#800100 to #800199) (n=100 to 199)
20000 + n
Common variable Variable (Common to part systems
#900000 to #907399)
(n=0 to 7399)
Section No.: 6 Local variables
Sub-ID Significance of data
No. Sub-section No. Details of Sub-section No. Data type R/W
System No. Not used.
1000 + n Local variables (level 0) (n=1 to 33)
Integer R
1100 + n Local variables (level 1) (n=1 to 33)
1200 + n Local variables (level 2) (n=1 to 33)
1300 + n Local variables (level 3) (n=1 to 33)
1400 + n Local variables (level 4) (n=1 to 33)
2000 Local variables Blank variable
Section No.: 8 Workpiece coordinate system offset (Workpiece coordinate)
Sub-ID Significance of data
No. Sub-section No. Details of Sub-section No. Data type R/W
System No. Axis No. in part sys tem n Gn (n=54 to 59) Workpiece coordinate system offset PLC setting unit RW
Section No.: 9 Workpiece coordinate system offset (Extension workpiece coordinate)
Sub-ID Significance of data
No. Sub-section No. Details of Sub-section No. Data type R/W
System No. Axis No. in part sys tem n G54.1Pn (n=1 to 96) PLC setting unit RW
Section No.: 10 Workpiece coordinate system offset (Local coordinate)
Sub-ID Significance of data
No. Sub-section No. Details of Sub-section No. Data type R/W
System No. Axis No. in part sys tem
1 Local coordinate system offset (G54)
PLC setting unit RW
2 Local coordinate system offset (G55)
3 Local coordinate system offset (G56)
4 Local coordinate system offset (G57)
5 Local coordinate system offset (G58)
6 Local coordinate system offset (G59)

Section No.: 11 Workpiece coordinate system offset (Other coordinate system)
Sub-ID Significance of data
No. Sub-section No. Details of Sub-section No. Data type R/W
System No. Axis No. in part sys tem 1 External workpiece offset (EXT) PLC setting unit RW
Section No.: 12 Tool offset for each part-system (Type1)
Sub-ID Significance of data
No. Sub-section No. Details of Sub-section No. Data type R/W
System No. Not used. n Compensation data (n=1 to 999) PLC setting unit RW
Section No.: 13 Tool offset for each part-system (Type2)
Sub-ID Significance of data
No. Sub-section No. Details of Sub-section No. Data type R/W
System No. Not used.
n Length dimension (n=1 to 999)
PLC setting unit RW 1000 + n Radius dimension (n=1 to 999)
2000 + n Length wear (n=1 to 999)
3000 + n Radius wear (n=1 to 999)
Section No.: 14 Tool offset for each part-system (Type3)
Sub-ID Significance of data
No. Sub-section No. Details of Sub-section No. Data type R/W
System No. Not used.
n Nose point P (n=1 to 999) Integer
RW
1000 + n Tool length X (n=1 to 999)
2000 + n Tool length Y (n=1 to 999) PLC setting unit
3000 + n Tool length Z (n=1 to 999)
4000 + n Nose point R (n=1 to 999) Integer
5000 + n Wear X (n=1 to 999)
PLC setting unit 6000 + n Wear Y (n=1 to 999)
7000 + n Wear Z (n=1 to 999)
8000 + n Wear R (n=1 to 999)
Section No.: 18 Life management data M system only, no group No. In the order of registration
Sub-ID Significance of data
No. Sub-section No. Details of Sub-section No. Data type R/W
System No. Not used.
1000 + n Tool No. (n=1 to 1000)
Integer
RW
2000 + n Status (n=1 to 1000)
3000 + n Method (n=1 to 1000)
4000 + n Length compensation (n=1 to 1000) PLC setting unit 5000 + n Radius compensation (n=1 to 1000)
6000 + n Usage (time, times, wear amount) (n=1 to 1000)
Integer
7000 + n Life (time, times, wear amount) (n=1 to 1000)
8000 + n Miscellaneous (n=1 to 1000)
9000 + n Group No. (n=1 to 1000)
10003 Group ID of the designated group No.

11000 + n Group No. of the designated group ID
(n=1 to 1000)
R
12000 + n Head record ID of the designated group ID
(n=1 to 1000)
13000 + n Number of tools registered in the designated group ID
(n=1 to 1000)
16000 + n Tool information of the designated record (n=1 to
1000)

Section No.: 19 Life management information
Sub-ID Significance of data
No. Sub-section No. Details of Sub-section No. Data type R/W
System No.
Not used.
1 Life management number of registered tool
Integer R
2 Life management number of registration groups
3 Life management data renewal flag
4 Life management maximum number of registered tools
Group No. 100 Life management next tool No. (for L system type II on ly)
Section No.: 20 Tool registration
Sub-ID Significance of data
No. Sub-section No. Details of Sub-section No. Data type R/W
System No. Not used.
n Tool registration data (pot No.) (n=1 to 360)
Integer
R
1000 + n Tool registration data (tool No.) (n=1 to 360) RW
2000 + n Tool registration data (miscellaneous: D) (n=1 to 360)
Section No.: 21 Spindle standby
Sub-ID Significance of data
No. Sub-section No. Details of Sub-section No. Data type R/W
Magazine
No.
Not used.
n Spindle standby (tool No.) (n=0 to 4)
Integer
RW
10 + n Spindle standby (miscellaneous D) (n=0 to 4)
Not used. 200 Number of spindle standby displays
Magazine R
No.
1000 Tool life management data for spindle tool PLC setting unit 1001 Tool life management data for standby tool
Section No.: 22 Tool measurement
Sub-ID Significance of data
No. Sub-section No. Details of Sub-section No. Data type R/W
System No.
Not used. 1 TLM switch
Integer R
Axis No. 2 Final movement direction
Not used.
3 Final movement axis
4 Second skip contact
Section No.: 25 File information
Sub-ID Significance of data
No. Sub-section No. Details of Sub-section No. Data type R/W
Not used. Not used.
1 Machining program number of registrations
Integer R
2 Machining program number of remains
3 Machining program number of memory characters
4 Machining program number of remaining characters
10 melCopyFile transferred data size
Section No.: 33 Speed information
Sub-ID Significance of data
No. Sub-section No. Details of Sub-section No. Data type R/W
System No. Not used.
1 FC (resultant speed)
2 FA: F command feedrate PLC setting unit/min. R
101 Feedrate display FC (resultant speed)
Section No.: 34 Spindle information
Sub-ID Significance of data
No. Sub-section No. Details of Sub-section No. Data type R/W
Not used. Axis No. 1 Spindle rotation speed (rev/min) Integer R

Section No.: 35 Operation status
Sub-ID Significance of data
No. Sub-section No. Details of Sub-section No. Data type R/W
System No.
Not used.
1 Macro execution level

Integer
R
2 In collation and stop RW
10 Operation status 1 (operation status) Character string
R
11 Operation status 2 (operation mode)
20 Automatic operation is starting
Integer
21 In automatic operation
22 In automatic operation stop
100 Data protect key 1
101 Data protect key 2
102 Data protect key 3
103 Data protect key (memory card)
104 Data protect key (DS)
200 External input signal 1
201 JOG mode (special) signal
202 NC status output signal 1
203 Alarm status signal
204 Operation (automatic) mode related signal
205 Operation (manual) mode related signal
206 Restart search status
207 Restart search type 1 valid
208 Extended operation search status
209 Current search line No. during search mode
210 In checking mode
Not used. 220 Parameter flag to prompt a reboot
221 PLC Run/Stop status
System No. 222 MDI setting status
Section No.: 36 Axis status
Sub-ID Significance of data
No. Sub-section No. Details of Sub-section No. Data type R/W
System No.
Axis No.
1 Axis status (axis detachment)
Integer R
2 Axis status (servo OFF)
3 Axis status (1st ref)
4 Axis status (2nd ref)
5 Axis status (3rd ref)
6 Axis status (4th ref)
7 Axis status (mirror image)
8 Axis status (restart search RP)
Not used.
100 Axis status (servo OFF) all axes
101 Axis status (1st ref) all axes
102 Axis status (2nd ref) all axes
103 Axis status (3rd ref) all axes
104 Axis status (4th ref) all axes
105 Axis status (mirror image) all axes
106 Axis status (restart search RP) all axes
200 Program mirror axis (all axes)

Section No.: 37 Counter
Sub-ID Significance of data
No. Sub-section No. Details of Sub-section No. Data type R/W
System No.
Axis No.
1 Workpiece coordinate position counter
PLC setting unit
R
2 Machine position counter
3 Current position counter
4 Absolute position counter
5 Program position counter
6 Remain command
7 Skip coordinate counter (workpiece coordinate)
8 Manual interrupt amount 1(ABS Off)
9 Manual interrupt amount 2(ABS On)
10 Next command
11 Restart position counter (workpiece coordinate)
12 Restart remaining distance counter
13 Restart position counter (machine coordinate)
14 Program position counter 2
15 TLM position counter
16 TLM skip position counter
17 TLM position counter
18 Skip coordinate counter (machine coordinate)
19 Skip remaining distance counter
Not used. 20 Interpolation composite vector length Interpolation unit
Axis No.
21 Current position B counter
PLC setting unit
22 Skip machine value
23 Skip coordinate position (skip coordinate counter)

24 Measurement position
32 Machine position on the orthogonal coordinate
33 Feedback position
Section No.: 38 MSTB execution status
Sub-ID Significance of data
No. Sub-section No. Details of Sub-section No. Data type R/W
Not used.
Not used.
1 + n M Command/Manual numerical value command (M1
to M4) (n = 0 to 3)
Integer RW
101 + n M Command/Manual numerical value command (S1 to
S6) (n = 0 to 5)
201 M Command/Manual numerical value command (T1)
301 + n M Command/Manual numerical value command (B1 to
B4) (n = 0 to 3)
System No. 401 Restart search T command history
Character string R Not used. 411 + n Restart search S1 to S6 command history (n = 0 to 5)
System No. 421 Restart search B command history
431 Restart search M command history

Section No.: 40 Cumulative time
Sub-ID Significance of data
No. Sub-section No. Details of Sub-section No. Data type R/W
Not used.
Not used.
1 Power ON time
Character string
RW
2 Automatic operation time
3 Cycle start time
4 External cumulative time 1
5 External cumulative time 2
6 Date
7 Time
System No. 8 Cycle time R

Section No.: 41 G modal
Sub-ID Significance of data
No. Sub-section No. Details of Sub-section No. Data type R/W
System No.
Not used.
n G code (n=group 1 to 27)
Integer
R
51 Tool compensation No. for shape (radius) compensa tion modal
52 Compensation amount for shape (radius) compensa tion modal PLC setting unit
53 Wear amount for shape (radius) compensation modal
54 Tool wear No. for radius compensation modal Integer 101 Tool compensation No. for length compensation modal
Axis No. 102 Axis name of length compensation modal Character string
Not used.
103 Compensation amount of length compensation modal PLC setting unit 104 Wear amount for length compensation modal
105 Axis information during length compensation (all axes) Integer Axis No. 106 Tool compensation No. for length compensation modal
Not used.
201 Scaling factor (G50P_)[Grp11]
202 Coordinate rotation angle (G68R_)[Grp16] Character string
203 High-speed machining mode (G5P_)
204 gmov cutting/non-cutting command Integer
205 Extended workpiece coordinate selection (G54.1P_) Character string
206 Information during cutting Integer
207 Scaling factor (G50P_)[Grp11] (Magic compatible)
Character string 208 Coordinate rotation angle (G68R_)[Grp16] (Magic
compatible)
209 3-dimensional coordinate conversion status (to display
workpiece coordinate selection G68)
Section No.: 42 F modal
Sub-ID Significance of data
No. Sub-section No. Details of Sub-section No. Data type R/W
System No. Not used.
1 Program command F modal (FA) Integer
R
2 Manual feedrate (FM) PLC setting unit/min. 3 Synchronous feedrate (FS)
4 Thread cutting lead (FE)
Integer 5 Dwell remaining time
10 + n Constant surface speed control (surface speed S) (n=1
to 6)
Section No.: 43 MSTB modal
Sub-ID Significance of data
No. Sub-section No. Details of Sub-section No. Data type R/W
Not used. Not used.
n S modal (S1 to S6) (n=1 to 6)
Integer R 100 + n T modal (T1 to T2) (n=1 to 2)

200 + n M modal (M1 to M4) (n=1 to 4)
300 + n B modal (B1 to B4) (n=1 to 4)

Section No.: 45 Program execution status
Sub-ID Significance of data
No. Sub-section No. Details of Sub-section No. Data type R/W
System No. Not used.
1 Nest level of the sub-program currently operating
Integer
R
2 Invalid status: Single block/MST finish
3 Invalid status: Feed hold/Override/Exact
100 Main program path during execution Character string
101 Main program during execution O No.
Integer
102 Main program during execution N No.
103 Main program during execution B No.
201 Sub program during execution O No.
202 Sub program during execution N No.
203 Sub program during execution B No.
300 Last operated program path Character string
301 Last operated main program O No.
Integer
302 Last operated main program N No.
303 Last operated main program B No.
401 Last operated sub program O No.
402 Last operated sub program N No.
403 Last operated sub program B No.
Section No.: 46 Program tree
Sub-ID Significance of data
No. Sub-section No. Details of Sub-section No. Data type R/W
System No. Not used.
1 Main program during execution Device name Character string
R
2 Main program during execution O No.
3 Main program during execution N No. Integer
4 Main program during execution B No.
100 + n Sub 1 to 10 device name (n=1 to 10) during execution
Character string
200 + n Sub program 1 to 10 during execution O No. (n=1 to
10)
300 + n Sub program 1 to 10 during execution N No. (n=1 to
10)
400 + n Sub program 1 to 10 during execution B No. (n=1 to
10)
500 + n Sub program 1 to 10 during execution Number of rep etitions (n=1 to 10) Integer
1000 Program tree information (ONB, Path) during execu tion
Section No.: 47 Program tree for graphic check
Sub-ID Significance of data
No. Sub-section No. Details of Sub-section No. Data type R/W
System No. Not used.
1 Execution main O No. for checking
2 Execution main N No. for checking Integer R
3 Execution main B No. for checking

Section No.: 59 Servo monitor
Sub-ID Significance of data
No. Sub-section No. Details of Sub-section No. Data type R/W
Not used. Axis No.
1 Gain
Integer
R
2 Droop
3 Rotation speed PLC setting unit/min.
4 Load current (%)
Integer
5 MAX current 1
6 MAX current 2
7 Overload
8 Regenerative load
9 Drive unit display Character string 10 + n Alarm 1 to 4 (n = 0 to 3)
14 Cycle counter
15 Grid spacing Integer
16 Grid amount
17 Machine position
PLC setting unit
18 Motor side FB
19 Machine side FB
20 FB error
21 DFB compensation amount
22 Remain command
23 Current value (2)

24 Manual interrupt amount
25 Detection system Character string
26 Power ON position
27 Power OFF position PLC setting unit
28 Current position
29 R0 (multi-rotation counter at basic point setting)
Integer
30 P0 (position within 1 rotation at basic point setting)
31 E0 (absolute position error at basic point setting)
32 Rn (multi-rotation counter)
33 Pn (position within 1 rotation)
34 En (absolute position error at power OFF)
35 ABS0 (absolute position basic counter)
36 ABSn (absolute position counter)
37 MPOS (initial offset amount)
38 Drive unit type
Character string
39 Drive unit serial No.
40 S/W version
41 Control method
42 Motor side encoder
43 Machine side encoder
44 Motor type
45 Work time
46 + n Alarm history 1 to 8 (time) (n = 0 to 7)
54 + n Alarm history 1 to 8 (alarm No.) (n = 0 to 7)
62 + n Maintenance history (MNT1 to 4) (n = 0 to 3)
66 /SYS

Sub-section No. is equivalent to the section No. 59.
Section No.: 60 Servo monitor (PLC axis)
Section No.: 62 Synchronous error monitor
Sub-ID Significance of data
No. Sub-section No. Details of Sub-section No. Data type R/W
Not used. Not used.
1 + n Command error (1st to 3rd set) (n = 0 to 2)
11 + n FB error (1st to 3rd set) (n = 0 to 2) PLC setting unit R
21 + n Machine position (1st to 3rd set) (n = 0 to 2)
Section No.: 63 Spindle monitor
Sub-ID Significance of data
No. Sub-section No. Details of Sub-section No. Data type R/W
Not used. Axis No.
1 Gain
Integer
R
2 Droop
3 Rotation speed PLC setting unit/min.
4 Load Integer
5 Drive unit display Character string 6 + n Alarm 1 to 4 (n = 0 to 3)
10 Cycle counter Integer
11 Control input 1L
Character string
12 Control input 1H
13 Control input 2L
14 Control input 2H
15 Control input 3L
16 Control input 3H
17 Control input 4L
18 Control input 4H
19 Control output 1L
20 Control output 1H
21 Control output 2L
22 Control output 2H
23 Control output 3L
24 Control output 3H
25 Control output 4L
26 Control output 4H
27 Drive unit type
28 Drive unit serial No.
29 S/W version
30 Work time RW
31 + n Alarm history 1 to 8 (time) (n = 0 to 7)
R
39 + n Alarm history 1 to 8 (alarm No.) (n = 0 to 7)
47 + n Maintenance history (MNT1 to 4) (n = 0 to 3)
51 /SYS
52 + n Control input 1 to 4 (n = 0 to 3)
56 + n Control output 1 to 4 (n = 0 to 3)
60 Spindle angle Integer 221 Spindle thermistor temperature

Section No.: 64 Power supply monitor
Sub-ID Significance of data

No. Sub-section No. Details of Sub-section No. Data type R/W
Not used. Axis No.
1 Unit type
Character string
R
2 Unit No.
3 S/W version
4 Work time
5 + n Alarm history 1 to 8 (time) (n = 0 to 7)
13 + n Alarm history 1 to 8 (alarm No.) (n = 0 to 7)
21 + n Maintenance history (MNT1 to 4) (n = 0 to 3)
25 /SYS
26 Connection drive W
Section No.: 65 Auxiliary axis drive unitmonitor
Sub-ID Significance of data
No. Sub-section No. Details of Sub-section No. Data type R/W
Not used. Axis No.
1 Droop Integer
R
2 Rotation speed PLC setting unit/min.
3 Load current
Integer
4 MAX current 1
5 MAX current 2
6 Overload
7 Regenerative load
8 Current station No.
9 Current position PLC setting unit
10 Target station No. Integer
11 Command position PLC setting unit
12 Auxiliary axis name Character string
13 Position control gain 1
Integer
14 Speed control gain 1
15 Position control gain 2
16 Speed control gain 2
17 Speed integral compensation
18 Load inertia ratio
19 Unit type
Character string
20 S/W version
21 Motor type
22 + n Alarm 1 to 4 (n = 0 to 3)
26 Unit serial No.
30 + n Alarm history 1 to 6 (alarm No.) (n=1 to 6)
50 + n Alarm history 1 to 6 (Detailed information of alarm)
(n=1 to 6)
70 + n Alarm history 1 to 6 (n=1 to 6)

Section No.: 66 Hardware configuration
Sub-ID Significance of data
No. Sub-section No. Details of Sub-section No. Data type R/W
Not used. Not used.
4000 + (x) RIO unit (x=1 to 256)
Character string R
100 + n Terminal RIO unit 1 to 4
200 Control unit (NC card)
201 Extension unit
Section No.: 67 Software configuration
Sub-ID Significance of data
No. Sub-section No. Details of Sub-section No. Data type R/W
Not used.
Not used.
1 NC system version
Character string R
2 PLC version
3 PLCe version (extension external alarm message)
4 3rd language version
5 4th language version
Axis No.
6 Servo drive unit version
7 Spindle drive unit version
Not used.
8 OS version
9 APLC version
20 NC system version (4-digit display)
Section No.: 72 Auxiliary axis control
Sub-ID Significance of data
No. Sub-section No. Details of Sub-section No. Data type R/W
Not used.
Axis No.
1 Operation adjustment mode
Integer
RW
2 Absolute position set

3 Position set method
R
4 Position set status
5 Operation mode
RW
6 Operation parameter group
7 Scale
8 Operation status
9 Auxiliary axis basic point set
Not used. 1000 Auxiliary axis parameter SRAM backup W

Section No.: 74 Sampling parameters
Sub-ID Significance of data
No. Sub-section No. Details of Sub-section No. Data type R/W
Not used. Not used.
1 Sampling trigger
Integer
RW
2 Sampling cycle
3 Number of sampling data
4 Sampling data storing address Character string
5 Sampling data storing size Integer
6 + n Sampling address #1 to #8 (M625 conventional com patibility) (n = 0 to 7)
Character string 20 + n Sampling address #1 to #8 (n = 0 to 7)
41 + n Sampling address for AT #1 to #8 (n = 0 to 7) W
50 Buffer designation (0: built-in memory, 1: cassette
memory)
Integer
RW
51 Buffer capacity (1024 x (setting value +1) byte)
52 Starting condition
53 Processing format (0: 1shot, 1: repeat, 2: ring buffer)
54 Ending condition
55 Variables No. (0: #1299, other than 0: common vari ables)
56 PLC device
Character string 57 Condition address
58 Condition data
Integer
59 Condition data mask
70 Sampling status (for automatic tuning) R
71 Sampling delay time (for automatic tuning) RW
72 Cycle start request (for automatic tuning) W
73 Cycle start restriction (for automatic tuning) RW
74 Number of samplings (for automatic tuning) R
75 OP check information (for automatic tuning) RW
100 Number of sampling data R
Section No.: 95 Reference position return parameters
Sub-ID Significance of data
No. Sub-section No. Details of Sub-section No. Data type R/W
Not used. Axis No.
2025, 2026
Refer to the "Alarm/Parameter Manual" for axis speci fications parameters.
PLC setting unit/min.
RW 2027, 2028 PLC setting unit
2029 to 2033 Integer
2037 to 2040 PLC setting unit
Section No.: 96 Servo parameters
Sub-ID Significance of data
No. Sub-section No. Details of Sub-section No. Data type R/W
Not used. Axis No. 1 to 65, 73, 81 to
256
SVn (n= Sub-section No.)
Refer to the "Alarm/Parameter Manual" for servo pa rameters.
Integer RW

Section No.: 97 Spindle specification parameters
Sub-ID Significance of data
No. Sub-section No. Details of Sub-section No. Data type R/W
Not used. Axis No.
1 to 31, 35, 37 to
72, 101 to 118,
120 to 138
3000 + n equals to parameter No. ("n": Sub-section No.
)
Refer to the section of "Spindle parameter" in "Alarm/
Parameter Manual" for details.
Integer
RW
RW
Section No.: 98 Spindle parameters
Sub-ID Significance of data
No. Sub-section No. Details of Sub-section No. Data type R/W

Not used. Axis No.
1001 to 1003
SPn (n = Sub-section No.-1000)
Refer to the section of "Spindle parameter" in "Alarm/
Parameter Manual" for details.
Integer
RW
1004 (Not used)
1005 to 1010 Integer
1011 to 1013 (Not used)
1014 to 1029 Integer
1030 (Not used)
1031 to 1050 Integer
1051,1052 (Not used)
1053 Integer
1054 (Not used)
1055 to 1057 Integer
1058 to 1060 (Not used)
1061 Integer
1062 to 1064 (Not used)
1065 to 1084 Integer
1085,1086 (Not used)
1087,1088 Integer
1089 to 1112 (Not used)
1113 to 1117 Integer
1118 to 1120 (Not used)
1121 to 1192 Integer
1193 to 1224 (Not used)
1125 to 1233 Integer
1234 to 1236 (Not used)
1237 to 1239 Integer
1240 (Not used)
Section No.: 101 Absolute position parameters
Sub-ID Significance of data
No. Sub-section No. Details of Sub-section No. Data type R/W
Not used. Axis No.
1, 2
2048 + n equals to parameter No. ("n": Sub-section No.
)
Refer to the "Alarm/Parameter Manual" for axis speci fications parameters.
Integer
RW
3 PLC setting unit
6 Integer
7 PLC setting unit/min.
8 to 10 PLC setting unit
11 Integer
12, 13 2049 + n equals to parameter No. ("n": Sub-section No.
)
Refer to the "Alarm/Parameter Manual" for axis speci fications parameters.
PLC setting unit
14 Integer
M800V/M80V Series PLC Interface Manual
6 Appx.2: List of PLC Window Data
6.2 Sub-section No. List
757 IB-1501616-F
Section No.: 102 Machine error compensation parameters
Sub-ID Significance of data
No. Sub-section No. Details of Sub-section No. Data type R/W
Not used. Not used.
1 Compensation machine error compensation amount
increment method Integer
RW
1 + n 1st to 28th axis basic axis (n=1 to 28) Character string 29 + n 1st to 28th axis compensation axis (n=1 to 28)
57 + n 1st to 28th axis division point No. at reference position
(n=1 to 28)
Integer
85 + n 1st to 28th axis division point No. at the most negative
side (n=1 to 28)
113 + n 1st to 28th axis division point No. at the most positive
side (n=1 to 28)
141 + n 1st to 28th axis compensation scale factor (n=1 to 28)
169 + n 1st to 28th axis division interval (n=1 to 28) PLC setting unit
198 + n Pitch error compensation amount (n=0 to 1023) Integer
Section No.: 104 Position switch
Sub-ID Significance of data
No. Sub-section No. Details of Sub-section No. Data type R/W
Not used.
Not used.
1 PSW selection Integer
RW
System No.
2 1st position switch axis name Character string
3 1st position switch imaginary dog position 1 PLC setting unit 4 1st position switch imaginary dog position 2
5 1st position switch PSW check method changeover Integer
6 + n
2nd Position switch axis name/Position switch imagi nary dog position 1/Position switch imaginary dog po sition 2/Position switch PSW check method
changeover

10 + n
3rd Position switch axis name/Position switch imagi nary dog position 1/Position switch imaginary dog po sition 2/Position switch PSW check method changeover
14 + n
4th Position switch axis name/Position switch imagi nary dog position 1/Position switch imaginary dog po sition 2/Position switch PSW check method changeover
18 + n
5th Position switch axis name/Position switch imagi nary dog position 1/Position switch imaginary dog po sition 2/Position switch PSW check method changeover
22 + n
6th Position switch axis name/Position switch imagi nary dog position 1/Position switch imaginary dog po sition 2/Position switch PSW check method changeover
26 + n
7th Position switch axis name/Position switch imagi nary dog position 1/Position switch imaginary dog po sition 2/Position switch PSW check method changeover
30 + n
8th Position switch axis name/Position switch imagi nary dog position 1/Position switch imaginary dog po sition 2/Position switch PSW check method changeover
100 + n 9th to 24th position switch axis name (n = 9 or later) Character string
200 + n 9th to 24th position switch imaginary dog position 1 (n
= 9 or later) PLC setting unit
300 + n 9th to 24th position switch imaginary dog position 2
(n=9 or later)
400 + n 9th to 24th position switch PSW check method
changeover (n = 9 or later) Integer
M800V/M80V Series PLC Interface Manual
6 Appx.2: List of PLC Window Data
6.2 Sub-section No. List
IB-1501616-F 758
Section No.: 106 Macro list
Sub-ID Significance of data
No. Sub-section No. Details of Sub-section No. Data type R/W
Not used.
Not used.
1 M[01] Code
Integer
RW
2 M[01] Type
3 M[01] Program No.
4 + n M[02] Code/Type/Program No. (n = 0 to 2)
7 + n M[03] Code/Type/Program No. (n = 0 to 2)
10 + n M[04] Code/Type/Program No. (n = 0 to 2)
13 + n M[05] Code/Type/Program No. (n = 0 to 2)
16 + n M[06] Code/Type/Program No. (n = 0 to 2)
19 + n M[07] Code/Type/Program No. (n = 0 to 2)
22 + n M[08] Code/Type/Program No. (n = 0 to 2)
25 + n M[09] Code/Type/Program No. (n = 0 to 2)
28 + n M[10] Code/Type/Program No. (n = 0 to 2)
31 M2mac Type
32 M2mac Program No.
33 G[01] Code
34 G[01] Type
35 G[01] Program No.
36 + n G[02] Code/Type/Program No. (n = 0 to 2)
39 + n G[03] Code/Type/Program No. (n = 0 to 2)
42 + n G[04] Code/Type/Program No. (n = 0 to 2)
45 + n G[05] Code/Type/Program No. (n = 0 to 2)
48 + n G[06] Code/Type/Program No. (n = 0 to 2)
51 + n G[07] Code/Type/Program No. (n = 0 to 2)
54 + n G[08] Code/Type/Program No. (n = 0 to 2)
57 + n G[09] Code/Type/Program No. (n = 0 to 2)
60 + n G[10] Code/Type/Program No. (n = 0 to 2)
63 Smac Type
64 Smac Program No.
65 Tmac Type
66 Tmac Program No.
System No.
100 + n ASCII[ ]ASCII code macro valid (n=1 to 2)
200 + n ASCII[ ]ASCII code (n=1 to 2) Character string
300 + n ASCII[ ] call type
(0: M98, 1: G65, 2: G66, 3: G66.1) (n=1 to 2)
Integer 400 + n ASCII[ ] program No. (n=1 to 2)
500 + n ASCII[ ] common variable No. (100 to 149) (n=1 to 2)
Section No.: 107 PLC constants
Sub-ID Significance of data
No. Sub-section No. Details of Sub-section No. Data type R/W
Not used. Not used. 1 + n
PLC constants (n=0 to 95)
Refer to the "Alarm/Parameter Manual" for PLC con stants.
Integer RW
M800V/M80V Series PLC Interface Manual
6 Appx.2: List of PLC Window Data
6.2 Sub-section No. List
759 IB-1501616-F
Section No.: 108 PLC timer
Sub-ID Significance of data
No. Sub-section No. Details of Sub-section No. Data type R/W
Not used. Not used.

1 + n 10ms timer <10ms>
(n=0 to 703)
Integer
1000 + n RW 100ms timer <100ms>
(n=0 to 703)
2000 + n 100ms integral timer <100msINC>
(n=0 to 63)
10000 Number of PLC timers (variable) R
10001 Number of PLC integral timers (variable)
Section No.: 109 PLC counter
Sub-ID Significance of data
No. Sub-section No. Details of Sub-section No. Data type R/W
Not used. Not used. 1 + n Counter (n=0 to 255) Integer
RW
10000 Number of PLC counters (variable) R
Section No.: 110 PLC bit selection
Sub-ID Significance of data
No. Sub-section No. Details of Sub-section No. Data type R/W
Not used. Not used. 1 + n PLC bit selection (n=0 to 195) Integer RW
Section No.: 111 Open param 1
Sub-ID Significance of data
No. Sub-section No. Details of Sub-section No. Data type R/W
Not used. Not used. n Open parameter value 1 (long) (n=1 to 896) Integer RW
Section No.: 112 Open param 2
Sub-ID Significance of data
No. Sub-section No. Details of Sub-section No. Data type R/W
Not used. Not used. n Open parameter value 2 (double) (n=1 to 96) 8-digit integer and 4-
digit decimal R
Section No.: 120 PLC Switch
Sub-ID Significance of data
No. Sub-section No. Details of Sub-section No. Data type R/W
Not used. Not used.
0 + n PLC switch X(IN) (n=1 to 64)
Integer
RW
100 + n PLC switch Y(OUT) (n=1 to 64) R
200 PLC switch X(IN) 1 to 16
RW
201 PLC switch X(IN) 17 to 32
202 PLC switch X(IN) 33 to 48
203 PLC switch X(IN) 49 to 64
210 PLC switch Y(OUT) 1 to 16
R
211 PLC switch Y(OUT) 17 to 32
212 PLC switch Y(OUT) 33 to 48
213 PLC switch Y(OUT) 49 to 64
Section No.: 121 Operation parameters
Sub-ID Significance of data
No. Sub-section No. Details of Sub-section No. Data type R/W
Not used. Not used.
8900 + n Counter type 1 to 6 (n=1 to 6)
8910 Edit undo valid Integer RW
8920 Solid drawing tool compensation selection

Section No.: 122 Input/Output parameters
Sub-ID Significance of data
No. Sub-section No. Details of Sub-section No. Data type R/W
Not used. Not used.
1 to 32
9000 + n equals to parameter No. ("n": Sub-section No.
)
Refer to the "Alarm/Parameter Manual" for user pa rameters.
Integer
RW
33 to 40 Character string
41 to 58 Integer
59 to 66 Character string
67 to 84 Integer
85 to 92 Character string
93 to 110 Integer
111 to 118 Character string
119 to 136 Integer
137 to 144 Character string
Section No.: 123 Computer link parameters
Sub-ID Significance of data
No. Sub-section No. Details of Sub-section No. Data type R/W
Not used. Not used. 1 to 24
"9600 + n" equals to parameter No. ("n": Sub-section
No.)
Refer to the "Alarm/Parameter Manual" for user pa rameters.
Integer RW
Section No.: 124 Ethernet parameters
Sub-ID Significance of data
No. Sub-section No. Details of Sub-section No. Data type R/W
Not used. Not used.

1 Service start Integer
RW
2 IP address
3 Subnet mask Character string
4 Gateway
5 Port No. Integer
6 Ethernet parameter before conversion (Host IP ad dress) Character string
7 Host port No. Integer 50 Automatic IP address setting
51 IP address (PC)
52 Subnet mask (PC) Character string
53 Gateway (PC)
54 Timeout
Integer 55 Host No. to use
100 + n User name (Host A to D) (n = 0 to 3)
Character string 200 + n Password (Host A to D) (n = 0 to 3)
300 + n Directory (Host A to D) (n = 0 to 3)
400 + n Host address (Host A to D) (n = 0 to 3)
500 + n Host type (Host 1 to 4) (n = 0 to 3)
Integer
600 + n Host Word position:
File (Host 1 to 4) (n = 0 to 3)
700 + n Host Word position:
Size (Host 1 to 4) (n = 0 to 3)
800 + n Host Word position:
<DIR> (Host 1 to 4) (n = 0 to 3)
900 + n Host Word position:
Comment (Host 1 to 4) (n = 0 to 3)
1000 + n Host Word count:
Comment (Host 1 to 4) (n = 0 to 3)
1100 + n Host Character remain (Host 1 to 4) (n = 0 to 3)

Section No.: 125 Barrier
Sub-ID Significance of data
No. Sub-section No. Details of Sub-section No. Data type R/W
Not used.
Not used.
1 P0 X
PLC setting unit
RW
2 P1 X
3 P1 Z
4 P2 X
5 P2 Z
6 P3 X
7 P3 Z
8 P4 X
9 P4 Z
10 P5 X
11 P5 Z
12 P6 X
13 P6 Z
System No.
20 Barrier valid Integer
21 P7 X
PLC setting unit
22 P8 X
23 P8 Z
24 P9 X
25 P10 X
26 P10 Z
27 Barrier type (left) Integer 28 Barrier type (right)
29 Delivery axis name Character string
30 Tailstock angle (left) Integer 31 Tailstock angle (right)

Section No.: 126 Base parameters
Sub-ID Significance of data
No. Sub-section No. Details of Sub-section No. Data type R/W
System No.
Not used.
1 System validation setup
Integer
RW
Not used. 2 System validation setup (PLC)
System No. 3 Number of axes
Not used. 4 Number of axes (PLC)
System No. 5 Input setting unit
Not used. 6 PLC unit
System No. 7 Control unit
Not used. 8 Control unit (PLC)
System No.
10 Initial plane selection
11 Base axis I

Character string
12 Base axis J
13 Base axis K
14 Flat axis I
15 Flat axis J
16 Flat axis K
System No. 20 Command type
Integer
Not used.
21 Ladder selection
22 Number of spindles
23 Constant input (inch)
24 Initial state (inch)
25 PLC axis command (inch)
26 Select language displayed
27 MR-J2-CT Connections
System No.
73 Initial absolute setting
74 Initial synchronous feed
75 Initial G00
76 ABS/INC address (for L system only)
Not used.
77 Incremental command for diameter specification axis
78 Decimal point type 2
79 Validate F 1-digit
80 Specify boring axis (for M system only)
81 Give priority to G code parameter
82 Geometric
84 Arc error
System No. 85 G00 dry run
86 G00 non-interpolation
Not used.
87 Constant surface speed control by rapid traverse feed
command
88 Disable G30 soft limit
91 Ignore middle point
92 Replace tools for additional axis
93 Synchronization between part systems method
94 Select life count for single block (for L system only)
95 TF output
96 Tool life management type
97 Tool wear compensation number 1-digit command
98 Tool length offset number
99 Cancel tool compensation amount

Sub-ID Significance of data
No. Sub-section No. Details of Sub-section No. Data type R/W
Not used.
Not used.
100 Tool compensation
Integer RW
101 Tool compensation method
102 Manual tool length measuring system (for L system
only)
103 Validate life management
104 Tool command method 2
105 Tool selection method 2
106 Life management (for L system only)
107 Split life management display screen (for L system
only)
108 Life management re-count M code (for L system only)
System No.
109 Validate substitute M code
110 M96 substitute M code
111 M97 substitute M code
Not used.
112 Validate status trigger method
113 Validate interrupt method type 2
114 Macro argument initialization
115 Waiting for retract
116 Invalidate soft limit (manual operation)
117 H_sens
118 Select how to set up the length of tools on cutter ta bles (opposed tables) (for L system only)
119 Select the mirror image of each facing turret with T
command (for L system only)
120 Change macro variable
121 Edit lock C
122 Program display lock C
123 Origin set prohibit
124 Fix tool compensation No.
125 Actual feedrate display
126 Playback G90
127 DPRINT alignment
128 Clear variables by resetting
129 Clear variables by power-ON

130 Display selected tool number
132 brightness
135 Unit name
140 + n M code number (n = 0 to 3)
144 MDI setup lock
145 Manual ABS parameter
146 Spindle rotation speed clamp function
147 Minimum spindle rotation speed clamp type
148 Initial high precision
149 Arc deceleration speed change
System No. 151 Reset initial
Not used.
153 Hole bottom deceleration check
159 Fixed cycle editing
161 Simulation test
System No. Not used.
162 Part system name
163 Second miscellaneous code
164 Tapping retract override
165 Tap return override
166 G04 skip condition

Sub-ID Significance of data
No. Sub-section No. Details of Sub-section No. Data type R/W
System No.
Not used.
167 G31 skip speed PLC setting unit/min.
RW
168 G31.1 skip condition Integer
169 G31.1 skip speed PLC setting unit/min.
170 G31.2 skip condition Integer
171 G31.2 skip speed PLC setting unit/min.
172 G31.3 skip condition Integer
173 G31.3 skip speed PLC setting unit/min.
176 Constant surface speed axis Integer
177 Thread cutting speed PLC setting unit/min.
178 M code for clamp Integer 179 Dwelling time after outputting M code for unclamp
180 + n F 1-digit feedrate F1 to F5 (n = 0 to 4) PLC setting unit/min.
185 Validate inclined axis control (for L system only)
Integer
186 Inclination angle (for L system only)
187 Compensation at reference position return (for L sys tem only)
188 Deceleration check method 1/ Validate in-position
check
189 Time constant 0 for handle feed
190 Macro call for M command
191 Macro call for S command
192 Macro call for T command
193 Macro call with 2nd miscellaneous code
194 Select initial spindle control
195 Validate acceleration and deceleration with constant gradient G0
196 Validate acceleration and deceleration with constant gradient G1
197 Distance between facing turrets (for L system only) PLC setting unit
198 Select turrets as facing turrets with T command (for L
system only)
Integer 199 Select turrets as facing turrets with T command (for L
system only)
200 Acceleration and deceleration before G0 interpolation
201 Maximum speed PLC setting unit/min.
202 Time constant
Integer 203 Arc radius error compensation factor
204 Arc deceleration speed PLC setting unit/min.
205 Modal G code reset Integer
208 Side 1 of inclination angle (for L system only)
209 Side 2 of inclination angle (for L system only) PLC setting unit
210 Side 3 of inclination angle (for L system only)
211 External deceleration PLC setting unit/min.
Not used.
300 + n aux01 to 12 (n = 0 to 11)
Integer
350 + n set01 to 12 (n = 0 to 11)
400 + n ext01 to 36 (n = 0 to 35)
500 Near reference position check method
501 Automatic return by program restart
502 No. of #100 address part system common variables
503 No. of #500 address part system common variables
506 Deceleration check specification type
509 Switch command format
510 Minimum value for synchronization M code
511 Maximum value for synchronization M code

Sub-ID Significance of data

No. Sub-section No. Details of Sub-section No. Data type R/W
Not used.
Not used.
512 Tool life management standard number
Integer
RW
513 Synchronous tap hole bottom wait time
514 Synchronous tap in-position check width (tap axis)
524 Chopping compensation value fixing method
527 Tool change method specification
528 Tool measurement standard positions election
System No.
600 PLC unit
602 Machine error compensation unit
System No.
1501 to 1503,
1505
Refer to the "Alarm/Parameter Manual" for base sys tem parameter.
1506 PLC setting unit/min.
1507, 1510 to
1513 Integer
1514, 1515 Character string
1516 to 1522 Integer
1523 PLC setting unit/min.
1524 Integer
1533 Character string
1534 Integer
1535 PLC setting unit
1537 to 1544 Character string
1561 to 1563 Integer
1564 PLC setting unit/min.
1568 to 1574,
1590 to 1593
Integer Not used. 1901 to 1911
System No.
8001 to 8003
Refer to the "Alarm/Parameter Manual" for user pa rameters.
8004 PLC setting unit/min.
8005, 8006 PLC setting unit
8007, 8008 Integer
8009 to 8013 PLC setting unit
8014, 8015 Integer
8016 to 8018 PLC setting unit
8019 to 8023,
8025, 8026 Integer
8027 to 8030 PLC setting unit
8033 to 8036 Integer
8037, 8041 to
8043 PLC setting unit
Not used. 8044 Integer

Sub-ID Significance of data
No. Sub-section No. Details of Sub-section No. Data type R/W
System No.
Not used.
8051 to 8054
Refer to the "Alarm/Parameter Manual" for user pa rameters.
PLC setting unit
RW
8055 Integer
8056, 8057 PLC setting unit
8058 Integer
8059 PLC setting unit
8071, 8072 Integer
8075 PLC setting unit
Not used. 8078
Integer
System No.
8083
8084 PLC setting unit
8085, 8086 PLC setting unit/min.
8090 Integer
8091 PLC setting unit
8092 Integer
8093 PLC setting unit
System No. 8051 to 8054 PLC setting unit
Not used.
8101 to 8103,
8105 to 8114,
8116
Integer
System No.
8621, 8622 Character string
8623 to 8626 PLC setting unit
8627 Integer

8701 to 8705 PLC setting unit
8706 PLC setting unit/min.
8707, 8708 PLC setting unit
8709, 8710
Integer
8711, 8712
Not used.
10001 G code format
10002 M2 Label O
10003 M2 Macro converter valid
10004 Coordinate rotation angle
System No. 10005 Coordinate rotation center (Horizontal)
10006 Coordinate rotation center (Vertical)
Not used.
10007 Machine manufacturer macro password No.
10008 Parameter for M3/L3
10009 operat1
10010 operat2
10011 operat3
10012 operat5
10013 operat7
10035 masmac5
11823
Refer to the description of the parameters #11823 to
#11829 of "Alarm/Parameter Manual" for details.
11824
11825
11826
11827
11828
11829

Section No.: 127 Axis parameters
Sub-ID Significance of data
No. Sub-section No. Details of Sub-section No. Data type R/W
System No. Axis No.
1 Axis name
Character string
RW
2 Displayed axis name
3 Increment command axis name
4 Command unit
Integer
5 Output in inch
6 Rotary axis
7 Motor CCW
8 Diameter specification axis
9 Spindle interpolation
10 Drive unit I/F channel No.
12 Command address during cross machining
Character string 13 Incremental command address during cross machin ing
101 Manual ABS updating
Integer
102 Tool compensation function
103 Manual dog-type
104 Error correction
105 JOG response type
106 JOG start (+) Device selection Character string 107 JOG start (-) Device selection
108 Slave axis No.
Integer
109 No_dsp
110 Axis name
111 Axis release
112 +/- JOG start signal device name
1010 Axis designated for chopping

Sub-ID Significance of data
No. Sub-section No. Details of Sub-section No. Data type R/W
System No. Axis No.
2001, 2002
Refer to the "Alarm/Parameter Manual" for axis spec ifications parameters.
PLC setting unit/min.
RW
2003 to 2010 Integer
2011, 2012 Interpolation unit
2013 to 2016 PLC setting unit
2017 to 2019 Integer
2020 PLC setting unit
2021 PLC setting unit/min.
2022 Integer
2023 PLC setting unit/min.
2024, 2061, 2062 PLC setting unit

2063, 2068 to
2071 Integer
2072 PLC setting unit
2073 to 2080 Integer
2081 PLC setting unit/min.
2082, 2084, 2087 Integer
2088, 2089 Character string
2090, 2091 PLC setting unit/min.
2092 to 2095 Integer
2096 PLC setting unit/min.
2097, 2098 PLC setting unit
2102, 2103, 2106 Integer
2109, 2110 PLC setting unit/min.
2111 to 2115,
2121 to 2129 Integer
2130 to 2133 PLC setting unit
2134 to 2137 Integer
2138 PLC setting unit
8201 to 8203 Integer
8204 to 8206 PLC setting unit
8207, 8208 Integer
8209 PLC setting unit
8210, 8211 Integer
10000 Character string
10001, 10002 PLC setting unit
10003, 10004
10101 Rapid traverse rate (for integer setting) Integer
10102 Cutting feed clamp speed(for integer setting)

Section No.: 128 Rotary axis configuration parameters
Sub-ID Significance of data
No. Sub-section No. Details of Sub-section No. Data type R/W
System No. Not used.
7900 to 7902
Refer to the "Alarm/Parameter Manual" for rotary axis
configuration parameters.
Character string
RW
7903 to 7907,
7920 Integer
7922 Character string
7923 Integer
7924 to 7926 PLC setting unit
7930 Integer
7932 Character string
7933 Integer
7934 to 7936 PLC setting unit
7940 Integer
7942 Character string
7943 Integer
7944 to 7946 PLC setting unit
7950 Integer
7952 Character string
7953 Integer
7954 to 7956 PLC setting unit
Section No.: 140 Ladder I/F(common)
Sub-ID Significance of data
No. Sub-section No. Details of Sub-section No. Data type R/W
Not used. Not used. n + 100 Spindle standby tool comment (n=0 to 4) Character string R n + 200 PLC switch message (n=1 to 64)
Section No.: 150 User open I/F parameter
Sub-ID Significance of data
No. Sub-section No. Details of Sub-section No. Data type R/W
Not used. Not used.
1 SRAM open usable amount Integer R
2 SRAM open spare amount Integer R
101 Device open parameter clear Character string W
102 SRAM open parameter clear Character string W
(x) Device open parameter device allocation
(x=40001 to 40100) Character string RW
(10000 + (x)) Device open parameter data type
(x=40001 to 40100) Character string RW
(20000 + (x)) Device open parameter number of data
(x=40001 to 40100) Integer RW
(30000 + (x)) Device open parameter display format
(x=40001 to 40100) Character string RW
(x) SRAM open parameter data type
(x=41001 to 41100) Character string RW
(10000 + (x)) SRAM open parameter number of data
(x=41001 to 41100) Integer RW
(20000 + (x)) SRAM open parameter display format
(x=41001 to 41100) Character string RW

Section No.: 151 User open I/F data
Sub-ID Significance of data
No. Sub-section No. Details of Sub-section No. Data type R/W
Not used. Not used.
(x) #41001 SRAM open data (x=1 to 9999999)
Integer RW
(10000000 + (x)) #41002 SRAM open data (x=1 to 9999999)
(20000000 + (x)) #41003 SRAM open data (x=1 to 9999999)
(30000000 + (x)) #41004 SRAM open data (x=1 to 9999999)
(40000000 + (x)) #41005 SRAM open data (x=1 to 9999999)
(50000000 + (x)) #41006 SRAM open data (x=1 to 9999999)
(60000000 + (x)) #41007 SRAM open data (x=1 to 9999999)
(70000000 + (x)) #41008 SRAM open data (x=1 to 9999999)
(80000000 + (x)) #41009 SRAM open data (x=1 to 9999999)
(90000000 + (x)) #41010 SRAM open data (x=1 to 9999999)
(100000000 + (x)) #41011 SRAM open data (x=1 to 9999999)
(110000000 + (x)) #41012 SRAM open data (x=1 to 9999999)
(120000000 + (x)) #41013 SRAM open data (x=1 to 9999999)
(130000000 + (x)) #41014 SRAM open data (x=1 to 9999999)
(140000000 + (x)) #41015 SRAM open data (x=1 to 9999999)
(150000000 + (x)) #41016 SRAM open data (x=1 to 9999999)
(160000000 + (x)) #41017 SRAM open data (x=1 to 9999999)
(170000000 + (x)) #41018 SRAM open data (x=1 to 9999999)
(180000000 + (x)) #41019 SRAM open data (x=1 to 9999999)
(190000000 + (x)) #41020 SRAM open data (x=1 to 9999999)
(200000000 + (x)) #41021 SRAM open data (x=1 to 9999999)
(210000000 + (x)) #41022 SRAM open data (x=1 to 9999999)
(220000000 + (x)) #41023 SRAM open data (x=1 to 9999999)
(230000000 + (x)) #41024 SRAM open data (x=1 to 9999999)
(240000000 + (x)) #41025 SRAM open data (x=1 to 9999999)
(250000000 + (x)) #41026 SRAM open data (x=1 to 9999999)
(260000000 + (x)) #41027 SRAM open data (x=1 to 9999999)
(270000000 + (x)) #41028 SRAM open data (x=1 to 9999999)
(280000000 + (x)) #41029 SRAM open data (x=1 to 9999999)
(290000000 + (x)) #41030 SRAM open data (x=1 to 9999999)
(300000000 + (x)) #41031 SRAM open data (x=1 to 9999999)
(310000000 + (x)) #41032 SRAM open data (x=1 to 9999999)
(320000000 + (x)) #41033 SRAM open data (x=1 to 9999999)
(330000000 + (x)) #41034 SRAM open data (x=1 to 9999999)
(340000000 + (x)) #41035 SRAM open data (x=1 to 9999999)
(350000000 + (x)) #41036 SRAM open data (x=1 to 9999999)
(360000000 + (x)) #41037 SRAM open data (x=1 to 9999999)
(370000000 + (x)) #41038 SRAM open data (x=1 to 9999999)
(380000000 + (x)) #41039 SRAM open data (x=1 to 9999999)
(390000000 + (x)) #41040 SRAM open data (x=1 to 9999999)

Sub-ID Significance of data
No. Sub-section No. Details of Sub-section No. Data type R/W
Not used. Not used.
(400000000 + (x)) #41041 SRAM open data (x=1-9999999)
Integer RW
(410000000 + (x)) #41042 SRAM open data (x=1-9999999)
(420000000 + (x)) #41043 SRAM open data (x=1-9999999)
(430000000 + (x)) #41044 SRAM open data (x=1-9999999)
(440000000 + (x)) #41045 SRAM open data (x=1-9999999)
(450000000 + (x)) #41046 SRAM open data (x=1-9999999)
(460000000 + (x)) #41047 SRAM open data (x=1-9999999)
(470000000 + (x)) #41048 SRAM open data (x=1-9999999)
(480000000 + (x)) #41049 SRAM open data (x=1-9999999)
(490000000 + (x)) #41050 SRAM open data (x=1-9999999)
(500000000 + (x)) #41051 SRAM open data (x=1-9999999)
(510000000 + (x)) #41052 SRAM open data (x=1-9999999)
(520000000 + (x)) #41053 SRAM open data (x=1-9999999)
(530000000 + (x)) #41054 SRAM open data (x=1-9999999)
(540000000 + (x)) #41055 SRAM open data (x=1-9999999)
(550000000 + (x)) #41056 SRAM open data (x=1-9999999)
(560000000 + (x)) #41057 SRAM open data (x=1-9999999)
(570000000 + (x)) #41058 SRAM open data (x=1-9999999)
(580000000 + (x)) #41059 SRAM open data (x=1-9999999)
(590000000 + (x)) #41060 SRAM open data (x=1-9999999)
(600000000 + (x)) #41061 SRAM open data (x=1-9999999)
(610000000 + (x)) #41062 SRAM open data (x=1-9999999)
(620000000 + (x)) #41063 SRAM open data (x=1-9999999)
(630000000 + (x)) #41064 SRAM open data (x=1-9999999)
(640000000 + (x)) #41065 SRAM open data (x=1-9999999)
(650000000 + (x)) #41066 SRAM open data (x=1-9999999)
(660000000 + (x)) #41067 SRAM open data (x=1-9999999)
(670000000 + (x)) #41068 SRAM open data (x=1-9999999)
(680000000 + (x)) #41069 SRAM open data (x=1-9999999)
(690000000 + (x)) #41070 SRAM open data (x=1-9999999)
(700000000 + (x)) #41071 SRAM open data (x=1-9999999)
(710000000 + (x)) #41072 SRAM open data (x=1-9999999)
(720000000 + (x)) #41073 SRAM open data (x=1-9999999)
(730000000 + (x)) #41074 SRAM open data (x=1-9999999)
(740000000 + (x)) #41075 SRAM open data (x=1-9999999)

(750000000 + (x)) #41076 SRAM open data (x=1-9999999)
(760000000 + (x)) #41077 SRAM open data (x=1-9999999)
(770000000 + (x)) #41078 SRAM open data (x=1-9999999)
(780000000 + (x)) #41079 SRAM open data (x=1-9999999)
(790000000 + (x)) #41080 SRAM open data (x=1-9999999)

Sub-ID Significance of data
No. Sub-section No. Details of Sub-section No. Data type R/W
Not used. Not used.
(800000000 + (x)) #41081 SRAM open data (x=1-9999999)
Integer RW
(810000000 + (x)) #41082 SRAM open data (x=1-9999999)
(820000000 + (x)) #41083 SRAM open data (x=1-9999999)
(830000000 + (x)) #41084 SRAM open data (x=1-9999999)
(840000000 + (x)) #41085 SRAM open data (x=1-9999999)
(850000000 + (x)) #41086 SRAM open data (x=1-9999999)
(860000000 + (x)) #41087 SRAM open data (x=1-9999999)
(870000000 + (x)) #41088 SRAM open data (x=1-9999999)
(880000000 + (x)) #41089 SRAM open data (x=1-9999999)
(890000000 + (x)) #41090 SRAM open data (x=1-9999999)
(900000000 + (x)) #41091 SRAM open data (x=1-9999999)
(910000000 + (x)) #41092 SRAM open data (x=1-9999999)
(920000000 + (x)) #41093 SRAM open data (x=1-9999999)
(930000000 + (x)) #41094 SRAM open data (x=1-9999999)
(940000000 + (x)) #41095 SRAM open data (x=1-9999999)
(950000000 + (x)) #41096 SRAM open data (x=1-9999999)
(960000000 + (x)) #41097 SRAM open data (x=1-9999999)
(970000000 + (x)) #41098 SRAM open data (x=1-9999999)
(980000000 + (x)) #41099 SRAM open data (x=1-9999999)
(990000000 + (x)) #41100 SRAM open data (x=1-9999999)
Section No.: 171 RIO device assignment check
Sub-ID Significance of data
No. Sub-section No. Details of Sub-section No. Data type R/W
Not used. Not used. 1
0, 1
"1" cannot be entered when #53001 is set to "0"
(Fixed allocation).
Integer RW
Section No.: 193 Extended common variable
Sub-ID Significance of data
No. Sub-section No. Details of Sub-section No. Data type R/W
Not used. Not used.
10000 + n Extended common variable I/Extended common vari able II (n = 0 to 79999)
8-digit integer and 4-
digit decimal 90000 + n RW Extended common variable III (for NC operation) (n =
0 to 7999)
1090000 + n Extended common variable III (for setting/display) (n
= 0 to 7999)
Section No.: 194 Extended common variable operation
Sub-ID Significance of data
No. Sub-section No. Details of Sub-section No. Data type R/W
Not used. Not used.
1 Load file No. of extended common variable III (for NC
operation) 8-digit integer and 4-
digit decimal RW
2 Load file No. of extended common variable III (for set ting/display)
3 Storage status of extended common variable III (for
NC operation) Integer R
4 Storage status of extended common variable III (for
setting/display)

R register No. Bit loca tion Additional specification R register No. Bit loca tion Additional specification
R8260 0 Max. number of axes (32 axes) R8262 0
1 Max. number of NC axes in a part sys tem (12 axes)
1
2 2
3 3
4 Max. number of part systems (8 part
systems)
4
5 5
6 6
7 7
8 Least command increment 0.01 m (10
nm)
8 Feed per revolution (synchronous feed)
9 Least command increment 0.001 m (1
nm)
9 Inverse time feed
A A Manual speed command

B B G00 feedrate designation (",F" com mand)
C C
D D
E E
F F
R8261 0 Program format switch R8263 0 Rapid traverse constant-gradient multi step acceleration/deceleration
1 1
2 2
3 3
4 4 Thread cutting (lead/thread number
designation)
5 Unidirectional positioning 5 Pecking tapping cycle/Deep-hole tap ping cycle
6 Spiral/Conical interpolation 6
7 Cylindrical interpolation 7 Circular thread cutting
8 Polar coordinate interpolation/Milling in terpolation
8
9 Hypothetical axis interpolation 9 High-speed synchronous tapping
(OMR-DD)
A Involute interpolation A
B Exponential interpolation B Thread recutting
C Spline interpolation (G05.1Q2/G61.2) C Thread cutting override
D NURBS interpolation D Variable feed thread cutting
E 3-dimensional circular interpolation E
F Spline interpolation 2 (G61.4) F

R register No. Bit loca tion Additional specification R register No. Bit loca tion Additional specification
R8264 0 R8266 0
1 1 Control unit-side SD card I/F [up to 32
GB]
2 2 Computer link B
3 3 Handy terminal connection
4 Manual feedrate B surface speed con trol
4
5 5
6 6
7 7
8 Memory capacity (2560m) (1000 pro grams)
8 Spindle-mode servo motor control
9 Memory capacity (5120m) (1000 pro grams)
9 Spindle-mode rotary axis control
A A C axis control during Spindle synchroni zation
B B Spindle synchronization I/Spindle syn chronization II
C C Guide bushing spindle synchronization
D D Tool spindle synchronization IA/IB
(spindle-spindle, polygon)
E E Tool spindle synchronization IC (spin dle-NC axis, polygon)
F F Tool spindle synchronization II (hob bing)
R8265 0 Special program editing display for syn chronization between part systems
R8267 0 Spindle oscillation
1 Finish shape view programming 1 Spindle superimposition control
2 2 Spindle speed fluctuation detection
3 3
4 4
5 5
6 6
7 7
8 Machining program input mistake check
warning
8
9 Remote desktop connection 9
A A
B B
C C Tool position compensation (G43.7)/
Tool nose radius compensation (G40/
41/42)
D D
E E
F F

R register No. Bit loca tion Additional specification R register No. Bit loca tion Additional specification
R8268 0 Number of tool offset sets (128 sets) R8270 0 Tool retract and return
1 Number of tool offset sets (256 sets) 1
2 Number of tool offset sets (400 sets) 2
3 Number of tool offset sets (999 sets) 3
4 4
5 5
6 6
7 7
8 Extended workpiece coordinate system
selection (48 sets) G54.1P1 to P48
8 Figure rotation
9 Extended workpiece coordinate system
selection (96 sets) G54.1P1 to P96
9 Scaling

A Extended workpiece coordinate system
selection (300 sets) G54.1P1 to P300
A
B B
C C User macro
D D
E E
F F
R8269 0 Workpiece coordinate system preset
(G92.1)
R8271 0 Variable command (700 sets)
1 Workpiece position offset for rotary axis 1 Variable command (8000 sets)
2 2
3 3
4 4
5 5
6 6
7 7
8 Graphic check rotary axis drawing/
Graphic trace rotary axis drawing
8 Special fixed cycle
9 Manual arbitrary reverse run (program
check operation)
9 Fixed cycle for turning machining
A High-speed simple program check A Compound type fixed cycle for turning
machining
B B Compound type fixed cycle for turning
machining (type II)
C C Small diameter deep hole drilling cycle
D D
E E
F F

R register No. Bit loca tion Additional specification R register No. Bit loca tion Additional specification
R8272 0 R8274 0 Control axis synchronization between
part systems
1 1 Two-part system simultaneous thread
cutting
2 2 Single block between part systems
3 3 Dwell/Miscellaneous function time over ride
4 Coordinate rotation by program 4 Synchronization between part systems
OFF
5 Coordinate rotation by parameter 5 Sub part system control I
6 3-dimensional coordinate conversion 6 Sub part system control II
7 7
8 8
9 9
A A
B B
C Corner chamfering/Corner R C
D Linear angle command D
E Geometric command E
F Polar coordinate command F
R8273 0 R8275 0 Rapid traverse block overlap (G0/G28/
G30)
1 1
2 2
3 3
4 Chopping 4 Automatic error detection
5 5
6 6
7 7
8 8 High-speed machining mode I (G05P1)
9 9 High-speed machining mode II (G05P2)
A A
B B
C Mixed control (cross axis control) C
D Arbitrary axis exchange control D High-accuracy control (G61.1/G08)
E Control axis superimposition E Multi-part system simultaneous high accuracy control
F Arbitrary axis superimposition control F SSS control

R register No. Bit loca tion Additional specification R register No. Bit loca tion Additional specification
R8276 0 Variable-acceleration pre-interpolation
acceleration/deceleration
R8278 0 Position-dependent gradually increas ing-type backlash compensation
1 High-accuracy acceleration/decelera tion time constant extension
1 Bidirectional pitch error compensation
2 Axis-specific acceleration tolerance
control
2
3 3 Spatial error compensation
4 4
5 High-speed high-accuracy control I
(G05.1Q1)

5
6 High-speed high-accuracy control II
(G05P10000)
6
7 High-speed high-accuracy control III
(G05P20000)
7
8 8
9 9
A A
B Smooth fairing B
C Direct command mode C
D D OMR II (backlash with filter)
E E
F F OMR-FF
R8277 0 R8279 0
1 1
2 2
3 3
4 Playback 4
5 Interactive cycle insertion 5
6 Simple programming (NAVI MILL/
LATHE)
6
7 7
8 8
9 9
A A
B B
C External machine coordinate system
compensation
C
D Circular radius error compensation D
E Ball screw thermal expansion compen sation
E PLC skip
F Rotation center error compensation F Speed change skip

R register No. Bit loca tion Additional specification R register No. Bit loca tion Additional specification
R8280 0 Torque limitation skip R8282 0 Chuck/Tailstock barrier check
1 Workpiece coordinate offset measure ment
1 Interlock
2 2 Interference check III
3 3 3D machine interference check
4 4 Data protection by user's level
5 5
6 6 Machine group-based alarm stop
7 7
8 8
9 9
A A
B B
C Tool life management IB C
D Tool life management IIB D
E E
F F
R8281 0 Number of tool life management sets
(128 sets)
R8283 0 Email notification to operator
1 Number of tool life management sets
(256 sets)
1 Safety observation/Smart Safety obser vation
2 Number of tool life management sets
(400 sets)
2
3 Number of tool life management sets
(999 sets)
3
4 4 Pallet program registration
5 5
6 6
7 7
8 Load monitoring I 8 Number of PLC projects: 3
9 9 Number of PLC projects: 6
A A
B B
C Stored stroke limit IB C Memory switch (PLC switch) 64 points
D Stored stroke limit IIB D Memory switch (PLC switch) 96 points
E Stored stroke limit IC E
F Stroke check before travel F

R register No. Bit loca tion Additional specification R register No. Bit loca tion Additional specification
R8284 0 Large PLC capacity: 256000 steps R8286 0
1 Large PLC capacity: 512000 steps 1
2 2

3 3
4 Synchronous control 4 Circular feed in manual mode
5 Inclined axis control 5
6 6 NC axis/PLC axis switchover
7 Tool length compensation along the tool
axis
7
8 Tool handle feed & interruption 8
9 Tool center point control/Tool center co ordinate display
9
A Inclined surface machining command A
B Simple inclined surface machining com mand
B
C 3-dimensional tool radius compensa tion
C
D 3-dimensional tool radius compensa tion (tool's vertical-direction compensa tion)
D
E Workpiece installation error compensa tion
E
F 3-dimensional manual feed F
R8285 0 R-Navi R8287 0 APLC release
1 1 MES interface library
2 Real-time tuning 1 (speed gain) 2
3 Real-time tuning 2 (rapid traverse time
constant)
3
4 4 System lock
5 5
6 6
7 7
8 8
9 9
A A
B B
C C
D D
E E
F F
M800V/M80V Series PLC Interface Manual
7 Appx.3: List of Option Status Exported to PLC
781 IB-1501616-F
R register No. Bit loca tion Additional specification
R8288 0
1
2
3
4
5
6
7
8
9
A
B
C
D
E
F
R8289 0
1
2
3
4
5
6
7
8
9
A
B
C
D
E
F
M800V/M80V Series PLC Interface Manual
7 Appx.3: List of Option Status Exported to PLC
IB-1501616-F 782
Index
Numbers
$1 to $8 display.....177
1st cutting feed override.....573
1st handle axis selection code m 450
1st handle valid 451
1st handle/incremental feed magnification.....577
1st reference position reached n-th axis 182
24 hours continuous operation.....175
2nd cutting feed override valid 458
2nd cutting feed override.....574

2nd handle axis selection code m.....451
2nd handle feed magnification 577
2nd handle valid.....451
2nd M function data 1 to 4.....303
2nd M function strobe 1 to 4.....226
2nd reference position reached n-th axis.....183
2nd reference position return interlock.....483
3D coordinate conversion:
Manual feed coordinates switch.....496
Manual feed valid.....246
3D machine interference check:
Enabled shape group No. 1 to 4 603
Requested shape group No. 1 to 4 324
3D manual feed (1st handle):
Feature coordinate system selected 248
Feature coordinate system selection 497
Table coordinate system selected 248
Table coordinate system selection.....497
Tool axis coordinate system selected 248
Tool axis coordinate system selection 497
3D manual feed (2nd handle):
Feature coordinate system selected 249
Feature coordinate system selection 497
Table coordinate system selected 249
Table coordinate system selection.....497
Tool axis coordinate system selected 249
Tool axis coordinate system selection 497
3D manual feed (3rd handle):
Feature coordinate system selected 249
Feature coordinate system selection 497
Table coordinate system selected 249
Table coordinate system selection.....497
Tool axis coordinate system selected 249
Tool axis coordinate system selection 497
3D manual feed (JOG, INC):
Feature coordinate system selected 248
Feature coordinate system selection 496
Table coordinate system selected 248
Table coordinate system selection.....496
Tool axis coordinate system selected 248
Tool axis coordinate system selection 496
3rd handle axis selection code m.....451
3rd handle feed magnification.....577
3rd handle valid.....451
3rd reference position reached n-th axis.....183
4th reference position reached n-th axis.....18
A
Absolute position data loss 340
Absolute position power shutoff movement over
.....340
Absolute position warning 235
Actual cutting mode (thread, tap)
in manual arbitrary reverse run 385
Alarm 1 339
Alarm 2 340
Alarm 4 340
Alarm message I/F 1 to 4..... 582
All axes in-position..... 205
All axes smoothing zero..... 205
Analog input m..... 284
Analog output m..... 542
APLC version..... 548
Arbitrary axis superimposition complete n-th axis
..... 184
Arbitrary point feed command valid 617
ATC control parameter 622
Automatic error detection..... 489
Automatic initialization mode 420
Automatic interlock- n-th axis..... 396
Automatic interlock+ n-th axis..... 396
Automatic machine lock n-th axis 398
Automatic operation "pause" command (Feed hold)
..... 423
Automatic operation "start" command (Cycle start)
..... 422
Automatic operation mode..... 620
Automatic power OFF request..... 383
Automatic restart..... 430
Automatic set position reached..... 344
Axis selection n-th axis 180
Axis selection output..... 342
B
Ball screw thermal displacement compensation:
Compensation amount n-th axis..... 290
Max. compensation amount n-th axis..... 566
Offset amount n-th axis 566
Part-system, axis No. n-th axis..... 566
Barrier check invalid 488

Barrier valid (left) 486
Barrier valid (right) 486
Base PLC mounting check 349
Basic point initialization setting mode..... 621
Basic point setting..... 621
Basic position -> upper dead point path flag 227
Battery alarm 171
Battery drop cause..... 286
Battery warning..... 170
BiSS encoder I/F: Communication status..... 713
BiSS encoder I/F: Encoder 1 data output 1 to 4 ... 713
Block start interlock..... 424
Board reset 169
Bottom dead point -> upper dead point path flag
..... 227
Brake wear diagnostics:
Alarm reset (control axis)..... 717
Diagnosis in progress (control axis) 718
Diagnosis incomplete (control axis)..... 718
Diagnosis start (control axis) 715
Servo axis in warning (control axis)..... 720
Start position (control axis) 719
Warning No. (system common) 720
Buzzer sound control: Buzzer ON 536
C
C axis selection..... 583
CC-Link IE TSN remote data link status 647
Chamfering 429
Chopping compensation update prevented 227
Chopping compensation update prevention request
..... 485
Chopping control data address..... 584
Chopping error No. 304
Chopping override 575
Chopping parameter valid..... 447
Chopping 446
Chuck close confirmation..... 269
Chuck close 533
Circular feed in manual mode
Current position H..... 317
Current position V..... 317
gradient/arc center H data 603
gradient/arc center V data 603
Operation mode data..... 601
Reference point H data..... 602
Reference point V data..... 602
travel range H (-) data..... 602
travel range H (+) data..... 602
travel range V (-) data..... 602
travel range V (+) data..... 602
Circular feed in manual mode valid 466
Clamp command n-th axis 191
Clamp completion n-th axis 411
CLC: Maximum load 364
CLC: Minimum load 364
CLC: Spindle selection 644
Clock data Date/Hour 285
Clock data Minute/Second..... 285
Clock data Year/Month 285
CNC completion standby status 305
CNC software version code 285
Collecting diagnosis data stop 376
Collecting diagnosis data..... 173
Connection status of each channel RIO1, RIO2
..... 347
Connection status of each channel RIO3, RIO4
..... 347
Constant torque control:
Axis under constant torque/
proportional torque stopper control 316
Constant torque droop cancel axis status..... 316
Constant torque droop cancel request axis 596
Constant torque/proportional torque stopper
control request axis 596
Contactor shutoff test..... 381
Control axis detachment 2 n-th axis 406
Control axis detachment n-th axis 392
Control unit temperature 288
Controller ready completion..... 199
Controller ready completion..... 343
Coordinate rotation by parameter:
Coordinate switch for manual feed 466
Manual feed coordinate system..... 221
CRC warning channel RIO1, RIO2 348
CRC warning channel RIO3, RIO4 348
CRT changeover completion 375
Current detection 256
Current limit changeover n-th axis 404

Current limit changeover..... 590
Current limit mode 1 483
Current limit mode 2 483
Current limit reached n-th axis 186
Current spatial error compensation value
(1st rotary axis) 360
Current spatial error compensation value
(2nd rotary axis) 360
Current spatial error compensation value
(orthogonal coordinate height axis).....360
Current spatial error compensation value
(orthogonal coordinate horizontal axis).....360
Current spatial error compensation value
(orthogonal coordinate vertical axis) 360
Cutting block start interlock 424
Cutting feed override code m 457
Cutting feedrate override method selection.....458
D
Data I/O register for MES interface library
(Alarm number 1) 699
(Alarm number 2) 699
(Alarm number 3) 699
(Alarm number 4) 699
(Arbitrary user area C1).....702
(Arbitrary user area L1 to L10) 702
(Arbitrary user area S1 to S20) 702
(B number at alarm) 700
(B number at machining start).....696
(Common user area C1).....694
(Common user area L1 to L10) 695
(Cycle time) 695
(G code modal).....700
(Line number).....694
(Machine type).....694
(Machining end time).....695
(Machining start time).....695
(N number at alarm) 699
(N number at machining start).....695
(NC unit number).....694
(Number of machined workpieces).....696
(Operator ID) 694
(Power consumption amount) 696
(Power regeneration amount).....696
(Program number at machining start).....695
(Serial number).....694
(Spindle 1 load value).....700
(Spindle 1 maximum load).....696
(Spindle 2 load value).....700
(Spindle 2 maximum load).....696
(Subprogram number at alarm).....699
(Time of alarm occurrence) 698
(Time of power ON).....699
(Tool length offset 1 to 5) 697
(Tool length offset) 701
(Tool length wear amount 1 to 5) 697
(Tool length wear amount) 701
(Tool life 1 to 5) 698
(Tool life) 701
(Tool number 1 to 5).....697
(Tool number).....700
(Tool offset number 1 to 5).....697
(Tool offset number).....700
(Tool radius offset 1 to 5) 697
(Tool radius offset) 701
(Tool radius wear amount 1 to 5) 698
(Tool radius wear amount) 701
(User arbitrary C1 at machining end) 698
(User arbitrary L1 to L10 at machining end) 698
(User area C1 at alarm) 701
(User area L1 to L10 at alarm).....702
(Program number at alarm).....699
Data protection key (DS).....536
Data protection key (memory card).....536
Data protection key 1 369
Data protection key 2 370
Data protection key 3 370
Detailed screen No.....545
Diagnosis data output:
Accumulated travel distance (motor) 707
Automatic log clear time.....706
Battery exchange (drive).....705
Battery exchange 705
Motor insulation degradation detection request
.....642
Motor insulation resistance (motor).....706
Motor insulation resistance (motor).....706
Select axis for servomotor insulation degradation
detection (PLC axis) 640

Select axis for servomotor insulation degradation
detection 643
Select spindle for motor insulation degradation
detection 641
Servomotor insulation degradation
detection in progress (PLC axis).....359
Servomotor insulation degradation
detection in progress 360
Spindle motor insulation degradation
detection in progress 359
DIO card information.....290
Direct screen selection.....559
Display changeover $1 to $8.....378
Display lock.....440
Display tool selection parameter.....629
Displayed screen No.....543
Door interlock spindle speed clamp 488
Door open enable.....243
Door open I 387
Door open II 487
Door open signal input (spindle speed monitor)....487
Droop cancel request n-th axis 404
Dry run invalid 489
Dry run 425
E
E number of smart safety observation error
(system common) 688
Each axis in-position n-th axis.....192
Each axis manual feedrate B n-th axis.....604
Each axis manual feedrate B valid.....464
Each axis reference position selection.....584
EcoMonitorLight connection:
Acquired data.....351
Completion bit 350
Completion status 351
Read start bit.....637
Register address.....638
Size of data to read.....638
Station #1 to #16 consumed power 349
Station #1 to #16 maximum number of
successive reception errors 350
Station #1 to #16 maximum number of
successive transmission errors.....350
Station #1 to #16 number of reception errors
..... 350
Station #1 to #16 number of transmission errors
..... 350
Station #1 to #16 regenerated power 349
Station No..... 638
Edit/search window displayed..... 253
Edit/Search 503
Emergency stop cause 289
Encoder 1 arbitrary pulse 1..... 569
Encoder 1 arbitrary pulse 2..... 569
Encoder 1 arbitrary pulse selection 386
Encoder 1 arbitrary pulse valid 387
Encoder 2 arbitrary pulse 1..... 569
Encoder 2 arbitrary pulse 2..... 569
Encoder 2 arbitrary pulse selection 386
Encoder 2 arbitrary pulse valid 387
Encoder selection 583
Error detection 426
Error temporary cancel 532
Exclude spindle..... 534
Ext. machine coordinate system offset data illegal
n-th axis..... 191
Ext. machine coordinate system offset data
n-th axis..... 604
External brake SBT incomplete (control axis)..... 673
External brake SBT start (control axis)..... 653
External deceleration- n-th axis 395
External deceleration+ n-th axis 395
External encoder 1: Position output clear request
..... 537
External encoder 1: Position output..... 709
External search block No..... 579
External search device No..... 579
External search finished 206
External search program No..... 579
External search sequence No..... 579
External search status 299
External search strobe..... 431
External search: Program return complete status
..... 299
External search: Program return completed..... 243
External search: Program return..... 473
F
F1-digit commanded..... 210

F1-digit No. code (1, 2, 4, 8)..... 214
F1-digit speed change valid..... 441
Feed axis selection- n-th axis 400
Feed axis selection+ n-th axis 399
Feedback machine position n-th axis 324
Feedrate least increment code 1, 2 463
G
G/B spindle synchronization valid..... 390
G/B spindle synchronization:
Average value of the relative position error
during the steady state..... 571
Keep position error compensation amount signal
..... 392
Maximum range of the relative position error
during the steady state..... 571
Maximum range of the relative position error
..... 570
Maximum value of the relative position error
during the steady state 571
Maximum value of the relative position error... 571
Phase alignment..... 390
Phase alignment complete 178
Phase memory..... 391
Phase shift amount..... 572
Position control synchronizing 178
Position error compensating..... 178
Position error compensation amount..... 572
Position error compensation scale, and
the number of times of compensations 564
Position error compensation..... 391
Temporary cancel..... 391
G/B spindle synchronizing mode 178
Gear shift completion..... 504
Graphic check (check method II) in progress 177
Group in tool life management..... 305
H
Handle feed operation mode 620
Handle feed: 1st handle pulse counter 295
Handle feed: 2nd handle pulse counter 295
Handle feed: 3rd handle pulse counter..... 295
Handle mode 416
Handle polarity..... 580
Handle pulse encoder communication
connector priority..... 370
Handle/Incremental feed magnification code m.... 467
Handle/incremental feed magnification method
selection 468
Handy terminal Cause of communication error 554
Handy terminal Data area top address 553
Handy terminal Data valid number of registers..... 554
Handy terminal key 1 to 45 282
High-speed simple program check mode ON..... 171
High-speed simple program check mode 381
High-speed simple program check:
Coordinate position check ON..... 172
Enable coordinate position check..... 389
Time measurement output..... 561
Time reduction coefficient..... 562
Hob axis delay excess 273
Hob machining:
Alarm retract inhibit..... 486
Retract amount selection n-th axis 411
Retract complete..... 236
Retract request 486
Retracting 235
Holding power of spindle increased..... 273
I
Illegal axis selected..... 214
Image input I/F:
Behavior at operation..... 558
Display range (height)..... 556
Display range (width)..... 556
Image display position (H) 556
Image display position (V) 556
IPC screen horizontal inversion..... 537
IPC screen transfer range (height) 557
IPC screen transfer range (width)..... 557
IPC screen transfer start position (H) 557
IPC screen transfer start position (V)..... 557
IPC screen vertical inversion 537
Screen selection.....537
In "reset".....202
In "reset".....343
In 3-dimensional coordinate conversion.....238
In automatic initial set mode.....197
In automatic operation "pause" 202
In automatic operation "run" 200
In automatic operation "start" 201

In automatic operation mode.....339
In axis minus motion.....342
In axis motion (-) n-th axis 181
In axis motion (+) n-th axis 181
In axis name switch 235
In axis plus motion.....342
In barrier valid (left) 242
In barrier valid (right) 242
In basic point initialization setting mode 339
In chopping mode.....227
In chopping start.....227
In circular feed in manual mode 220
In constant surface speed 209
In current limit n-th axis 186
In cutting feed.....208
In display lock.....210
In handle feed operation mode.....343
In handle mode.....195
In high-speed machining mode (G05) 207
In inch unit selection.....210
In incremental mode.....196
In incremental mode.....339
In initialization.....306
In jog mode.....195
In JOG operation mode 339
In JOG-handle simultaneous mode.....197
In L coil selection.....260
In M coil selection.....264
In manual arbitrary feed mode 196
In manual arbitrary feed 203
In manual operation mode.....339
In manual speed command valid.....216
In MDI mode.....198
In memory mode 197
In mirror image n-th axis.....189
In mixed control (cross axis control) n-th axis 188
In multi-step speed monitor 176
In NC axis control n-th axis 190
In PLC interrupt 214
In rapid traverse 207
In reference position return mode 196
In reference position return mode 339
In reference position return 209
In reference position return 339
In rewind.....203
In Safe torque off (control axis) 672
In Safe torque off (spindle).....684
In safety absolute position establishing
(control axis) 675
In safety external emergency stop
(system common) 687
In SBC motor brake enabled (control axis) 672
In SBC motor brake start signal (control axis).....673
In SBT external brake test (control axis) 674
In skip.....209
In SLP range (control axis).....667
In small diameter deep hole cycle 242
In SOS stop (control axis) 669
In SOS stop (spindle) 682
In spindle alarm.....256
In spindle forward run.....261
In spindle off.....274
In spindle reverse run.....262
In spindle synchronization 2.....268
In spindle synchronization.....265
In spindle torque limit 263
In spindle-NC axis polygon mode 236
In spindle-spindle polygon mode.....237
In SS1 stop (control axis).....670
In SS1 stop (spindle).....683
In synchronized tapping selection (M command)
.....241
In synchronous feed.....209
In synchronous/superimposition control n-th axis
.....189
In tape mode 198
In tapping 208
In thread cutting 209
In tool center point rotation.....250
In tool escape and return mode 217
In tool life management.....210
In tool spindle synchronization I (Polygon).....270
In tool spindle synchronization II.....270
In torque limit.....342
Inclined axis control valid 448
Inclined axis control: No Z axis compensation.....448
Increase holding power of spindle.....508
Incremental feed magnification 1, 2 618

Incremental mode 416
Incremental mode 622
Index positioning completion.....264
Initialization incompletion 306
Initialization setting completed 340
Initialization setting error completed.....340
In-position.....341
Integration time input 1.....369
Integration time input 2.....369
Interface of load meter for analog I/F spindle.....610
Interference check between part systems:
Alarm information.....294
Data address.....572
Interference check enabled.....381
Mode is active 177
Setting error alarm information 293
Interference check III:
Data setting error information 1 297
Data setting error information 2 298
Enable interfering object selection data 388
Entry in interference alarm area
interfering object information 297
Entry in interference alarm area
solid information.....323
Entry in interference warn area
solid information.....322
Entry in interference warning area
interfering object information 297
In interference check III mode.....177
Interference check III mode 388
Interference detection
interfering object information 297
Interference detection solid information 323
Interfering object selection
data setting completed.....177
Interfering object selection 638
Interlock- 619
Interlock+ 619
J
Jog handle synchronous..... 464
Jog mode..... 415
JOG operation mode 621
K
Key in 1..... 284
KEY OUT 1..... 543
L
L coil selection 516
Laser:
Approach in height control completed 281
Axis stop time with beam ON monitoring OFF
..... 540
Enable height retention in height control 539
Height being retained in height control 281
Height control high-speed retraction in progress
..... 282
Height control in progress..... 281
Height control 539
Laser beam irradiating..... 282
Laser beam irradiation ON 538
Laser beam irradiation ready..... 539
Laser condition change complete..... 538
Laser condition change strobe 282
Laser output feedback value (W)..... 359
Laser output override..... 641
Load monitoring I:
Axis selection..... 583
Cutting torque output n-th axis 327
Effective spindle torque output 337
Effective torque output n-th axis 327
Estimated spindle disturbance torque output
..... 337
Longitudinal hole drilling axis selection..... 485
M
M code data 1..... 300
M code data 2..... 300
M code data 3..... 300
M code data 4..... 300
M code independent output M00 215
M code independent output M01 215
M code independent output M02 215
M code independent output M30 215
M coil selection 518
M function finish 1..... 432
M function finish 2..... 433
M function strobe 1 222
M function strobe 2 222
M function strobe 3 222
M function strobe 4 222

Machine group-based alarm stop:
Machine group-based PLC interlock ON... 195
Machine group-based alarm stop:
Machine group-based PLC interlock 415
Machine parameter lock I/F 561
Machine position n-th axis 324
Machine tool builder macro password No..... 558
Machining condition selection I:
Current machining condition (application) 365
Current machining condition (condition) 365
Current machining condition status 366
Machining condition parameter group switch
cancel completed 240
Machining condition parameter group switch
cancel request 461
Machining condition parameter group switch
completed..... 239
Machining condition parameter group switch
error status 367
Machining condition parameter group switch
request 460
Selection of machining application 645
Selection of machining condition 645
Macro interrupt priority..... 492
Macro interrupt..... 437
Magnification valid for each handle 467
Manual absolute 439
Manual arbitrary feed 1st axis selection code m
..... 477
Manual arbitrary feed 1st axis travel amount..... 581
Manual arbitrary feed 1st axis valid 477
Manual arbitrary feed 2nd axis selection code m
..... 478
Manual arbitrary feed 2nd axis travel amount..... 581
Manual arbitrary feed 2nd axis valid 478
Manual arbitrary feed 3rd axis selection code m
..... 478
Manual arbitrary feed 3rd axis travel amount 581
Manual arbitrary feed 3rd axis valid..... 478
Manual arbitrary feed ABS/INC 480
Manual arbitrary feed Axis independent 479
Manual arbitrary feed completion 206
Manual arbitrary feed EX.F/MODAL.F..... 479
Manual arbitrary feed G0/G1 480
Manual arbitrary feed MC/WK 480
Manual arbitrary feed mode..... 417
Manual arbitrary feed Smoothing off..... 478
Manual arbitrary feed stop 481
Manual arbitrary feed Strobe 482
Manual arbitrary reverse run handle selection..... 562
Manual arbitrary reverse run mode ON 173
Manual arbitrary reverse run mode..... 379
Manual arbitrary reverse run speed multiplier 563
Manual arbitrary reverse run speed selection..... 380
Manual arbitrary reverse run:
Actual cutting mode ON..... 172
MSTB reverse run prohibited..... 490
Reverse run block stop designated part system
..... 492
Reverse run invalid status 253
Reverse run ON..... 173
Manual feedrate B override
(File register method) 578
Manual feedrate B surface speed control valid..... 465
Manual feedrate B valid n-th axis 402
Manual feedrate B 576
Manual feedrate code m 462
Manual feedrate method selection..... 463
Manual feedrate..... 576
Manual interlock- n-th axis..... 397
Manual interlock+ n-th axis..... 397
Manual machine lock n-th axis 398
Manual measurement status 305
Manual numerical command..... 216
Manual operation mode 620
Manual override method selection..... 452
Manual speed clamp ON 463
Manual speed command reverse run valid 476
Manual speed command sign reversed 476
Manual speed command valid.....475
Manual/Automatic simultaneous valid n-th axis 401
Master reset 619
MDI mode.....421
Mechanical axis specifications 1st rotary axis angle
.....599
Mechanical axis specifications 2nd rotary axis angle
.....599
Memory mode 420

MES interface library:
Alarm number 1.....634
Alarm number 2.....634
Alarm number 3.....634
Alarm number 4.....634
Arbitrary user area C1.....703
Arbitrary user area L1 to L10.....704
Arbitrary user area S1 to S20.....703
B number at alarm.....635
B number at machining start 630
Common user area C1.....692
Common user area L1 to L10.....692
Condition register (Combination condition) 692
Condition register (Comparison condition)
1st set 693
Condition register (Comparison condition)
2nd set 693
Condition register (Condition value) 1st set 693
Condition register (Condition value) 2nd set 693
Condition register (Extract sort condition) 692
Condition register (Field value) 1st set.....693
Condition register (Field value) 2nd set.....693
Cycle time.....630
Database connection status.....352
Database operation reception register 353
Database operation request register.....352
Database operation result register 353
DB operation selection 354
Function selection at alarm 356
Function selection at machining end.....356
Function selection at user's option 356
G code modal registration selection.....357
G code modal status 635
Line number 352
Machine type.....352
Machining end time 629
Machining start time 629
N number at alarm.....635
N number at machining start 630
NC unit number 351
Operation table selection.....355
Operation trigger status.....175
Operation trigger 535
Operator ID.....351
Power consumption amount.....631
Power ON time.....634
Power regeneration amount.....631
Program number at alarm 634
Program number at machining start.....630
Sending user arbitrary information 252
Serial number.....351
Spindle 1 load.....635
Spindle 1 maximum load.....630
Spindle 2 load value.....635
Spindle 2 maximum load.....631
Subprogram number at alarm 634
Time of alarm occurrence 633
Tool length offset 1 to 5 632
Tool length offset 636
Tool length wear amount 1 to 5 633
Tool length wear amount 636
Tool life 1 to 5 633
Tool life 637
Tool number 1 to 5.....631
Tool number.....636
Tool offset number 1 to 5 632
Tool offset number 636
Tool radius offset 1 to 5 632
Tool radius offset 636
Tool radius wear amount 1 to 5 633
Tool radius wear amount 637
User arbitrary information send request.....474
User area C1 at alarm.....703
User area C1 at machining end 702
User area L1 to L10 at alarm 703
User area L1 to L10 at machining end.....703
Mirror image n-th axis 394
Miscellaneous function command high-speed output:
2nd M function finish 1 to 4 502
M function finish 1 to 4 499
S function finish 1 to 8.....500
T function finish 1 to 4.....501
Miscellaneous function lock 453
Mixed control (cross axis control) request n-th axis
.....407
Motion command completion 204
Motion control release:
Implementation check by function.....360

Valid/Invalid status 359
Motor brake SBT incomplete (control axis).....674
Motor brake SBT start (control axis) 655
Motor load current n-th axis 325
Motor rotation speed n-th axis.....325
Multi-analog input ch n.....711
Multi-analog input status ch n 712
Multiple-spindle control I: Selected spindle No. 593
Multi-point orientation position data 610
Multi-step speed monitor selected speed output
.....292
N
NC alarm 1.....231
NC alarm 2 (Servo alarm) 231
NC alarm 3 (Program error) 231
NC alarm 4 (Operation error) 232
NC alarm 5.....237
NC axis control selection n-th axis.....410
NC axis up-to-speed n-th axis.....187
NC axis/PLC axis switchover invalid status 194
NC axis/PLC axis switchover n-th axis in process
.....194
NC axis/PLC axis switchover request 414
NC reset 1.....427
NC reset 2.....427
NC warning (Servo warning).....232
Near reference position (per reference position)
.....308
Near reference position n-th axis 184
Near set position 345
Near-point dog ignored 550
New tool change 229
No. of error occurrences n-th ch 346
No. of work machining (current value)..... 311
No. of work machining (maximum value)..... 311
No. of work machining over 234
Number of registered tool life control tools 317
O
Operation parameter selection 1, 2 618
Operation start..... 616
Operator message I/F 1 to 4..... 555
Operator message I/F..... 582
Option status export to PLC..... 345
Optional block skip m..... 449
OT ignored..... 549
Output OFF check request 665
Override cancel..... 452
P
Pallet program registration Ext. workpiece coordinate
transfer completion..... 176
Pallet program registration Ext. workpiece coordinate
transfer ready 377
Phase offset request..... 531
Phase shift calculation request..... 530
PLC axis 1st to 3rd handle valid 371
PLC axis alarm/warning No. n-th axis..... 298
PLC axis control buffering mode
information address..... 568
PLC axis control buffering mode valid 372
PLC axis control information address n-th axis 568
PLC axis control valid n-th axis..... 390
PLC axis indexing control command 1 619
PLC axis indexing control command 2 615
PLC axis indexing control command 3 615
PLC axis indexing control command 4 614
PLC axis indexing control status 1..... 340
PLC axis indexing control status 2..... 339
PLC axis indexing control status 3..... 339
PLC axis indexing control status 4..... 338
PLC axis near point detection n-th axis 371
PLC axis near-point dog ignored 551
PLC axis OT ignored 550
PLC coil changeover..... 527
PLC emergency stop 442
PLC interrupt program No..... 578
PLC interrupt..... 444
PLC main scan time..... 288
PLC skip 1 to 8 382
PLC switch non-display 691
Position loop in-position..... 262
Position switch 1 to 15..... 338
Position switch 1 to 24..... 283
Position switch n interlock..... 541
Power consumption computation:
Accumulated consumption of devices
other than drive system 1 to 4..... 296
Accumulated consumption of
entire drive system 1 to 4 296

Clear consumption accumulation 1 to 4 369
Clearing consumption accumulation 1 to 4
complete..... 169
Consumption accumulation ON 1 to 4..... 169
Consumption of devices
other than drive system 555
Drive system's fixed consumption correction... 555
Enable consumption accumulation 1 to 4..... 375
Present consumption of entire drive system.... 296
Power OFF indication Y device No..... 544
Power OFF processing 169
Power OFF required after parameter change..... 174
Presetter contact..... 309
Presetter interlock..... 310
Program format switch in progress 244
Program format switch request..... 491
Program restart..... 436
Program restart:
Restart position return check invalid 643
Punchtap cycle in progress..... 228
R
Rapid traverse override code 1..... 459
Rapid traverse override code 2..... 459
Rapid traverse override method selection 461
Rapid traverse override 574
Rapid traverse time constant: In switchover 245
Rapid traverse time constant: Switchover request
..... 493
Rapid traverse 438
Ready OFF 620
Real-time tuning 1: Speed control gain changeover
hold-down command 413
Real-time tuning 1: Speed control gain changeover
hold-down command 535
Real-time tuning 1: Speed control gain changeover
hold-down ON 193
Real-time tuning 1: Speed control gain changeover
hold-down ON 280
Real-time tuning 2: Acceleration/deceleration
time constant in automatic switchover..... 493
Real-time tuning 2: Acceleration/deceleration
time constant in manual switchover 494
Real-time tuning 2: Acceleration/deceleration
time constant in switchover 245
Real-time tuning 2: Acceleration/deceleration
time constant reset 494
Recalculation request 442
Reference position adjustment completion..... 590
Reference position adjustment value
parameter setting completed..... 306
Reference position establishment n-th axis 189
Reference position reached..... 343
Reference position retract..... 443
Reference position return direction n-th axis 190
Reference position return mode 419
Reference position return mode 621
Reference position selection code 1..... 470
Reference position selection code 2..... 470
Reference position selection method..... 471
Reflection of reserved tool wear compensation is
complete..... 245
Request for reflecting reserved tool wear
compensation 495
Reservation of tool wear compensation..... 539
Reserved tool wear compensation not reflected... 245
Reset & rewind 428
Reverse run control mode 493
Reverse run from block start..... 492
Reverse run 438
R-Navi: Machine surface index complete 251
R-Navi: Machining surface being indexed 251
R-Navi: Machining surface being selected 250
R-Navi: Selected workpiece No. 322
R-Navi: selecting machine surface number.....322
Rotary axis configuration parameter output 321
Rotary axis configuration parameter switch 595
Rotation center error compensation enabled 496
Rotation center error compensation in progress ...246
Rotation direction 617
S
S code data 1 to 8 301
S command gear No. illegal 253
S command max./min. command value over 254
S command no gear selected.....254
S command override 609
S function strobe 1 to 8 224
Safe cam is active (control axis).....668
Safe cam request (control axis).....650

Safe stop 1 request (control axis).....651
Safe stop 1 request (spindle) 661
Safe stop 2 request (control axis).....651
Safe stop 2 request (spindle) 662
Safe torque OFF request (control axis) 652
Safe torque OFF request (spindle).....662
Safety absolute position confirm (control axis).....656
Safety I/O observation state 689
Safety I/O unit observation error details 690
Safety I/O unit observation state 689
Safety reset (control axis).....657
Safety reset (spindle) 662
Sampling start/stop.....377
SBC motor brake starting request (control axis) ...652
SBT start position (control axis) 681
SCA safe cam position (control axis) 680
Screen display request.....376
Search & start.....447
Search & start Error.....228
Search & start program No.....582
Search & start Search 228
Selected tool compensation No. (sub) 591
Selected tool wear No. (sub) 592
Servo alarm/warning No.....326
Servo deflection amount n-th axis 324
Servo OFF.....619
Servo OFF n-th axis 393
Servo ready completion output designation 597
Servo ready completion.....199
Servo ready completion.....344
Servo ready n-th axis 179
Servo ready 340
Set position reached.....345
Simple inclined surface machining command:
Tool axis rotation angle compensation amount
.....600
Simple inclined surface machining/
Inclined surface control command ON.....252
Single block between part systems 378
Single block 423
Skip coordinate position n-th axis feature coordinate
.....326
Skip coordinate position n-th axis.....325
SLP observation is active (control axis) 667
SLP observation request (control axis) 649
SLP position change input (control axis) 660
SLP position change output (control axis).....678
SLS observation is active (control axis) 666
SLS observation is active (spindle) 681
SLS observation request (control axis) 648
SLS observation request (spindle).....660
SLS speed change input (control axis) 658
SLS speed change input (spindle) 663
SLS speed change output (control axis) 676
SLS speed change output (spindle).....685
SLS speed override input (control axis) 659
SLS speed override input (spindle).....664
SLS speed override output (control axis).....677
SLS speed override output (spindle).....686
Small diameter deep hole drilling cycle.....483
Smart safety observation error
occurring servo axis (control axis) 675
Smart safety observation error
occurring spindle (spindle).....684
Smart safety observation warning
occurring servo axis (control axis) 676
Smart safety observation warning
occurring spindle (spindle).....684
Smoothing zero.....341
SOS is active (control axis).....669
SOS is active (spindle).....682
SOS observation request (control axis) 650
SOS observation request (spindle) 661
Spatial error compensation enabled 496
Spatial error compensation in progress 247
Special safety alarm cancel (system common).....664
Speed detection 256
Speed detection 2 263
Speed monitor door open possible 291
Speed monitor mode.....552
Speed override 1 to 64.....614
Speed override valid 615
Spindle 2nd in-position.....255
Spindle actual speed.....330
Spindle alarm/warning No.....335
Spindle command final data (rotation speed).....330
Spindle command rotation speed input.....330
Spindle command rotation speed output.....607

Spindle command selection 608
Spindle enable 265
Spindle forward run index 513
Spindle forward run start.....510
Spindle gear selection code 1, 2.....507
Spindle gear selection output 1, 2.....277
Spindle gear shift command 1, 2.....254
Spindle gear shift 508
Spindle in-position.....259
Spindle motor load ratio 335
Spindle OFF mode.....485
Spindle orientation command.....515
Spindle orientation 509
Spindle oscillation amplitude.....612
Spindle oscillation command.....534
Spindle oscillation frequency.....612
Spindle oscillation in progress.....277
Spindle override method selection.....506
Spindle phase synchronization completion.....267
Spindle phase synchronization 529
Spindle position control (Spindle/C axis control):
C axis mode ON.....276
C axis selection.....517
Spindle protection:
Mode in progress 278
Motor equivalent load factor.....708
Number of times log output error occurred 708
Resetting alarm of equivalent load factor over limit
.....536
Spindle ready-ON 260
Spindle reverse run index..... 514
Spindle reverse run start..... 511
Spindle rotation direction switch method selection
..... 526
Spindle rotation reversal..... 520
Spindle rotation speed synchronization completion
..... 266
Spindle selection..... 519
Spindle servo-ON 261
Spindle speed fluctuation detection:
Spindle speed out of setting range..... 275
Spindle speed override code m 506
Spindle stop..... 508
Spindle superimposition control ON 272
Spindle superimposition control:
Speed change disabled 271
Spindle superimposition clamped..... 272
Spindle synchronization..... 528
Spindle synchronization:
Maximum phase error/
Maximum hob axis delay angle..... 331
Phase error 1..... 334
Phase error 2..... 334
Phase error monitor (lower limit) 333
Phase error monitor (upper limit)..... 333
Phase error monitor..... 332
Phase error over..... 271
Phase error tolerance 612
Phase error/Hob axis delay angle 331
Phase offset data..... 332
Phase shift amount..... 611
Reference spindle selection 611
Synchronized spindle selection 611
Spindle synchronization/superimposition cancel
..... 533
Spindle synchronous rotation direction..... 529
Spindle temperature output 335
Spindle tool No. 629
Spindle torque limit 1 512
Spindle torque limit 2 512
Spindle torque limit reached 263
Spindle up-to-speed..... 258
Spindle-mode rotary axis control command n-th axis
..... 412
Spindle-mode rotary axis control mode n-th axis
..... 191
Spindle-spindle polygon cancel 484
Spindle-spindle polygon synchronization completion
..... 238
SS1 is active (control axis) 670
SS1 is active (spindle) 683
SS2 is active (control axis) 671
SS2 is active (spindle) 683
SSM is active (control axis) 668
SSM is active (spindle) 682
SSM request (control axis) 649
SSM request (spindle) 661
Standby tool No. 629

Start not possible..... 339
Station position 1 to 256 339
Station selection 1 to 256 615
STO is active (control axis)..... 671
STO is active (spindle)..... 683
Stored stroke limit I: Change request n-th axis..... 412
Stroke compensation completion..... 227
Sub part system control:
Caller of sub part system..... 315
Calling sub part system 313
Sub part system control I mode ON..... 198
Sub part system control I mode..... 421
Sub part system control II identification No. 312
Sub part system processing 218
Waiting for sub part system completion..... 314
Superimposition control request n-th axis..... 409
Synchronization between part systems OFF 488
Synchronization correction mode 435
Synchronous control operation method 585
Synchronous control request n-th axis 408
Synchronous error amount n-th axis..... 326
Synchronous tapping command polarity reversal
..... 484
Synchronous tapping Current error angle..... 336
Synchronous tapping Current error width 335
Synchronous tapping Maximum error angle 336
Synchronous tapping Maximum error width 336
T
T code data 1 to 4..... 302
T code data for L system 361
T function strobe 1 to 4 225
Tap retract possible state cancel 485
Tap retract possible 234
Tap retract 454
Tape mode..... 420
Temperature rise 647
Temperature warning cause 287
Thermistor disconnection..... 710
Thermistor input n..... 710
Thermistor short-circuit 711
Thread cutting: Feed-forward control ON 233
Thread cutting: Feed-forward control request..... 471
Thread recutting command..... 598
Thread recutting execution operation 598
Thread recutting execution status..... 319
Thread recutting lead axis No..... 320
Thread recutting spindle No..... 319
Thread recutting status 318
Thread, tap block stopping
in manual arbitrary reverse run 174
Thread, tap reverse run prohibition alarm
in manual arbitrary reverse run 175
Timing synchronization between part systems 214
Timing synchronization ignore 484
Tool alarm 1/Tool-skip 468
Tool alarm 2..... 468
Tool center point rotation 498
Tool change position return completion..... 229
Tool change reset 469
Tool escape and return
Transit point designation 469
Tool escape and return
transit point recognition completed..... 228
Tool group life over 213
Tool group No. designation..... 589
Tool handle feed mode 456
Tool head hot swapping:
Spindle switch status 338
NC axis switch n-th axis..... 645
NC axis switch status n-th axis..... 368
Spindle switch..... 613
Tool length compensation along the tool axis
Compensation amount change mode 471
Tool length measurement 1.....434
Tool length measurement 2 Tool No. 596
Tool length measurement 2.....434
Tool life management data sort.....584
Tool life management input 469
Tool life management:
Temporary cancel of tool group life expiration ON
.....211
Temporary cancel of tool group life expiration
.....473
Temporary cancel of tool life expiration ON 211
Temporary cancel of tool life expiration.....472
Tool life over.....212
Tool life prediction 230
Tool life usage data 317

Tool mounting information m.....592
Torque limitation skip: G160 torque limit ON.....244
Total distance traveled by n-th axis
during automatic operation 368
Touchscreen operation disabled 641
U
Unclamp command n-th axis.....188
Unclamp completion n-th axis 407
Under SLS limit (control axis).....666
Under SLS limit (spindle).....682
Under SSM safe speed (control axis).....679
Under SSM safe speed (spindle) 687
Upper dead point -> basic position path flag.....227
Upper dead point -> bottom dead point path flag
.....227
Usage data count valid.....468
User level-based data protection: Operation level
.....561
User macro input #1032 (PLC -> NC) 605
User macro input #1033 (PLC -> NC) 606
User macro input #1034 (PLC -> NC) 606
User macro input #1035 (PLC -> NC) 606
User macro output #1132 (NC -> PLC).....328
User macro output #1133 (NC -> PLC).....329
User macro output #1134 (NC -> PLC).....329
User macro output #1135 (NC -> PLC).....329
User macro section and sub-section designated
execution result.....307
User sequence program version code 2 547
User sequence program version code 546
V
V number of smart safety observation error
(system common) 687
V number of smart safety observation warning
(system common) 688
Variable torsion compensation:
Acceleration rate at change of direction.....714
History of acceleration rate at change of direction
.....714
VCC: Cause of non-vibration.....363
VCC: Frequency.....362
VCC: Mode in execution.....253
VCC: Number of vibrations.....361
VCC: Spindle rotation speed 338
VCC: Temporary cancel of axis vibration 644
VCC: Vibrating axis 362
Vertical axis pull-up prevented n-th axis 191
Vertical axis pull-up prevention request n-th axis
.....411
W
W number of smart safety observation warning
(system common) 688
Wear compensation No. (tool presetter) 590
Workpiece coordinate Measurement 2nd axis.....405
Workpiece coordinate offset measurement:
Tool compensation No./
Selected compensation tool No. (main).....591
Tool No./Selected tool No. (main).....591
Z
Zero point initialization set completed n-th axis 185
Zero point initialization set error completed n-th axis
.....186
Zero point initialization set mode n-th axis.....403
Zero point initialization set start n-th axis.....403
Zero speed.....257

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2.1 PLC Input Signals (Bit Type: X***)
2.3 PLC Output Signals (Bit Type: Y***)
2.4 PLC Output Signals (Data Type: R***)
4.1 PLC Input Signals (Bit Type: X***)
4.2 PLC Input Signals (Data Type: R***)
4.3 PLC Output Signals (Bit Type: Y***)
4.4 PLC Output Signals (Data Type: R***)
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2.1 PLC Input Signals (Bit Type: X***)
2.2 PLC Input Signals (Data Type: R***)
2.3 PLC Output Signals (Bit Type: Y***)

2.4 PLC Output Signals (Data Type: R***)
2.6 ZR Devices
2.7 Classified for Each Application
4.1 PLC Input Signals (Bit Type: X***)
4.2 PLC Input Signals (Data Type: R***)
4.3 PLC Output Signals (Bit Type: Y***)
4.4 PLC Output Signals (Data Type: R***)
4.6 Explanation of ZR Device
5.5 Precautions
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2.1 PLC Input Signals (Bit Type: X***)
2.2 PLC Input Signals (Data Type: R***)
2.4 PLC Output Signals (Data Type: R***)
2.6 ZR Devices
2.7 Classified for Each Application
4.1 PLC Input Signals (Bit Type: X***)
4.2 PLC Input Signals (Data Type: R***)
4.3 PLC Output Signals (Bit Type: Y***)
4.4 PLC Output Signals (Data Type: R***)
4.6 Explanation of ZR Device
6.1 Section No. List
6.2 Sub-section No. List
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A8.
1.1 List of Devices
2.2 PLC Input Signals (Data Type: R***)
2.4 PLC Output Signals (Data Type: R***)
4.1 PLC Input Signals (Bit Type: X***)
4.2 PLC Input Signals (Data Type: R***)
4.3 PLC Output Signals (Bit Type: Y***)
4.4 PLC Output Signals (Data Type: R***)
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2.1 PLC Input Signals (Bit Type: X***)
2.2 PLC Input Signals (Data Type: R***)
2.3 PLC Output Signals (Bit Type: Y***)
2.4 PLC Output Signals (Data Type: R***)
2.5 Special Relay/Special Register
2.6 ZR Devices
4.1 PLC Input Signals (Bit Type: X***)
4.2 PLC Input Signals (Data Type: R***)
4.3 PLC Output Signals (Bit Type: Y***)
4.4 PLC Output Signals (Data Type: R***)
4.5 Explanation of Special Relays (SM***)
5.1.1 Read/Write Operation
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4.6.9 Variable torsion compensation
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The interface signals in the following chapter were revised or added corresponding to S/W version
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2.6 ZR Devices
4.1 PLC Input Signals (Bit Type: X***)
4.2 PLC Input Signals (Data Type: R***)
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4.6.10 Brake wear diagnostics
4.6.11 High Speed Processing Unit I/F
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0562-874-748-1+ :XAF / 0052-874-748-1+ :LET 0195-684-2012-94+ :XAF / 0005-684-2012-94+ :LET
Minneapolis, MN Service Satellite
Detroit, MI Service Satellite South Germany Service Center (Stuttgart)
Grand Rapids, MI Service Satellite SCHELMENWASENSTRASSE 16-20, 70567 STUTTGART, GERMANY
Cleveland, OH Service Satellite TEL: + 49-711-770598-123 / FAX: +49-711-770598-141
St. Louis, MO Service Satellite
Indianapolis, IN Service Saltellite France Service Center (Paris)
2 RUE DE LUNION, 92565 RUEIL-MALMAISON CEDEX, FRANCE
TEL: +33-1-41-02-83-13 / FAX: +33-1-49-01-07-25
South/East Region Service Center (Georgia)
1845 SATELLITE BOULEVARD STE. 450, DULUTH, GEORGIA 30097, U.S.A. France Service Satellite (Lyon)
9154-852-876-1+ XAF / 9254-852-876-1+ LET ECNARF TSEIRP TNIAS 00896 DONOM SEUQCAJ EELLA ,042
Charleston, SC Service Satellite TEL: +33-1-41-02-83-13 / FAX: +33-1-49-01-07-25
Charlotte, NC Service Satellite
Raleigh, NC Service Satellite Italy Service Center (Milan)

Dallas, TX Service Satellite VIA ENERGY PARK 14, VIMERCATE 20871 (MB) ITALY
Houston, TX Service Satellite TEL: +39-039-6053-342 / FAX: +39-039-6053-206
Hartford, CT Service Satellite
Knoxville, TN Service Satellite Italy Service Satellite (Padova)
Nashville, TN Service Satellite VIA G. SAVELLI, 24 - 35129 PADOVA, ITALY
Huntsville, AL Satellite TEL: +39-039-6053-342 / FAX: +39-039-6053-206
Pittsburg, PA Service Satellite
Tampa, FL Service Satellite U.K. Service Center
Miami, FL Satelite TRAVELLERS LANE, HATFIELD, HERTFORDSHIRE, AL10 8XB, U.K.
Lafayette, LA Service Satellite TEL: +44-1707-288-780 / FAX: +44-1707-278-695
Allentown, PA Satelite
Spain Service Center
CTRA. RUBI, 76-80 8174 SAINT CUGAT DEL VALLES, BARCELONA, SPAIN
Western Region Service Center (California) TEL: +34-935-65-2236 / FAX: +34-935-89-1579
5900-B KATELLA AVE. - 5900-A KATELLA AVE. CYPRESS, CALIFORNIA 90630, U.S.A.
TEL: +1-714-699-2625 / FAX: +1-847-478-2650 Poland Service Center
San Francisco, CA Satelite UL.KRAKOWSKA 50, 32-083 BALICE, POLAND
Seattle, WA Service Satellite TEL: +48-12-347-6500 / FAX: +48-12-630-4701
Denver, CO Service Satellite
Hungary Service Center
Canada Region Service Center (Toronto) MITSUBISHI ELECTRIC EUROPE B.V. HUNGARIAN BRANCH
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5397-574-509-1+ :XAF / 8277-574-509-1+ :LET 3622-334-07-63+ :LET
Edmonton, AB Service Satellite
Montreal, QC Service Satellite Turkey Service Center
MITSUBISHI ELECTRIC TURKEY ELEKTRK RNLER A.
Mexico Region Service Center (Queretaro) SERIFALI MAHALLESI KALE SOKAK. NO.41 34775
Parque Tecnolgico Innovacin Quertaro, Lateral Carretera Estatal 431, Km 2+200, Lote 91 Modulos 1 y 2 UMRANIYE, ISTANBUL, TURKEY
hcaM al adneicaH ocixM ,oratreuQ ,suqraM IE ,64267 PC ,arro 74-44-166-612-09+ :XAF / 0052-969-612-09+ :LET
TEL: +52-442-153-6050
Monterrey, NL Service Satellite Czech Republic Service Center
Mexico City, DF Service Satellite MITSUBISHI ELECTRIC EUROPE B.V. PRAGUE OFFICE
Pekask 621/7, 155 00 PRAHA 5, CZECH REPUBLIC
TEL: +420-734-402-587
BRAZIL
Sweden Service Center
MITSUBISHI ELECTRIC DO BRASIL COMRCIO E SERVIOS LTDA. HAMMARBACKEN 14, P.O.BOX 750 SE-19127, SOLLENTUNA, SWEDEN
Votorantim Office TEL: +46-8-6251200 / FAX: +46-8-6251014
AV. GISELE CONSTANTINO,1578, PARQUE BELA VISTA, VOTORANTIM-SP, BRAZIL CEP:18.110-650
TEL: +55-15-3023-9000 Bulgaria Service Center
Blumenau, Santa Catarina Office AKHNATON Ltd. (Service Partner)
4 ANDREJ LJAPCHEV BLVD. POB 21, BG-1756 SOFIA, BULGARIA
TEL: +359-2-8176009 / FAX: +359-2-9744061
Ukraine Service Center (Kiev)
CSC Automation Ltd. (Service Partner)
4 B, YEVHENA SVERSTYUKA STR., 02002 KIEV, UKRAINE
TEL: +380-44-494-3344 / FAX: +380-44-494-3366
South Africa Service Center
Adroit Technologies (Service Partner)
20 WATERFORD OFFICE PARK, WATERFORD DRIVE, CNR OF WITKOPPEN ROAD,
FOURWAYS JOHANNESBURG SOUTH AFRICA
TEL: +27-11-658-8100 / FAX: +27-11-658-8101
ASEAN CHINA
)RETNEC AF NAESA(.DTL .ETP AISA CIRTCELE IHSIBUSTIM)RETNEC AF ANIHC(.DTL)ANIHC(NOITAMOTUA CIRTCELE IHSIBUSTIM
Singapore Service Center CNC Call Center
349951 EROPAGNIS GNIDLIUB CIRTCELE IHSIBUSTIM DAOR ARDNAXELA 703 0315-129-004-68+ :LET
TEL: +65-6473-2308 / FAX: +65-6476-7439
Shanghai Service Center
NO.1386 HONG QIAO ROAD, CHANG NING QU, SHANGHAI 200336, CHINA
PHILIPPINES TEL: +86-21-2322-3030 / FAX: +86-21-2322-3000*8422
Qingdao Service Center
MELCO FACTORY AUTOMATION PHILIPPINES INC. Suzhou Service Center
Head Office Wuhan Service Center
128 LOPEZ RIZAL STREET, BRGY., HIGHWAY HILLS, MANDALUYONG CITY , MM PHILIPPINES 1550 Ningbo Service Center
TEL: +63-2-8256-8042 / FAX: +632-8637-2294 Hefei Service Center
Beijing Service Center
Philippines Service Center Tianjin Service Center
KM.23 WEST SERVICE ROAD SSH, CUPANG ,MUNTINLUPA CITY, PHILIPPINES Xian Service Center
TEL: +63-2-8807-0420 / FAX: +63-2-8842-5202 Dalian Service Center
Chengdu Service Center
VIETNAM Shenzhen Service Center
LEVEL8, GALAXY WORLD TOWER B, 1 YABAO ROAD, LONGGANG DISTRICT,
MITSUBISHI ELECTRIC VIETNAM CO., LTD. SHENZHEN 518129, CHINA
Vietnam Ho Chi Minh Service Center TEL: +86-755-2399-8272 / FAX: +86-755-8229-3686
11TH & 12TH FLOOR, VIETTEL TOWER B, 285 CACH MANG THANG 8 STREET, WARD 12, DISTRICT 10, Dongguan Service Center
HO CHI MINH CITY, VIETNAM Xiamen Service Center
TEL: +84-28-3910-5945 / FAX: +84-28-3910-5947
Vietnam Hanoi Service Center KOREA
14TH FLOOR, CAPITAL TOWER, 109 TRAN HUNG DAO STREET, CUA NAM WARD,
HOAN KIEM DISTRICT, HA NOI CITY, VIETNAM MITSUBISHI ELECTRIC AUTOMATION KOREA CO., LTD. (KOREA FA CENTER)
TEL: +84-24-3937-8075 / FAX: +84-24-3937-8076 Korea Seoul Service Center
8F GANGSEO HANGANG XI-TOWER A, 401 YANGCHEON-RO, GANGSEO-GU,
SEOUL 07528 KOREA
INDONESIA TEL: +82-2-3660-9631 / FAX: +82-2-3664-8668
PT. MITSUBISHI ELECTRIC INDONESIA Korea Daegu Service Center
Indonesia Service Center (Cikarang) 2F KT BLDG. 8, HOGUK-RO, BUK-GU, DAEGU 41518, KOREA
JL. KENARI RAYA BLOK G2-07A, DELTA SILICON 5, LIPPO CIKARANG - BEKASI 17550, INDONESIA TEL: +82-53-382-7401 / FAX: +82-53-382-7412
TEL: +62-21-2961-7797 / FAX: +62-21-2961-7794

Korea Changwon Technical Center
#205, 888, CHANGWON-DAERO, SEONGSAN-GU, CHANGWON-SI,
MALAYSIA GYEONGSANGNAM-DO, 51532, KOREA
TEL: +82-55-261-5559 / FAX: +82-55-261-5558
MITSUBISHI ELECTRIC SALES MALAYSIA SDN. BHD.
Malaysia Service Center (Kuala Lumpur Service Center)
LOT 11, JALAN 219, P.O BOX 1036, 46860 PETALING JAYA, SELANGOR DARUL EHSAN, MALAYSIA TAIWAN
TEL: +60-3-7626-5032
MITSUBISHI ELECTRIC TAIWAN CO., LTD. (TAIWAN FA CENTER)
Johor Bahru Service Center Taiwan Taichung Service Center
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TEL: 07-3642250 / 2256 TEL: +886-4-2359-0688 / FAX: +886-4-2359-0689
Pulau Pinang Service Center Taiwan Taipei Service Center
25-G, Pusat Perniagaan Perdana Jaya, Jalan Permatang Rawa, 14000 Bukit Mertajam, Pulau Pinang 11F, NO.88, SEC.6, ZHONGSHAN N. RD., SHILIN DIST., TAIPEI CITY 11155, TAIWAN
5381-015-4-06+ :xaF / 8381-015-4-06+ :LET 3345-3382-2-688+ :XAF / 0345-3382-2-688+ :LET
Taiwan Tainan Service Center
THAILAND 11F-1, NO.30, ZHONGZHENG S. RD., YONGKANG DIST., TAINAN CITY 71067, TAIWAN
TEL: +886-6-252-5030 / FAX: +886-6-252-5031
MITSUBISHI ELECTRIC FACTORY AUTOMATION (THAILAND) CO., LTD.
Thailand Service Center (Bangkok)
101, TRUE DIGITAL PARK OFFICE, 5TH FLOOR, SUKHUMVIT ROAD, BANGCHAK, PHRA KHANONG, OCEANIA
BANGKOK, 10260 THAILAND
TEL: +66-2-092-8600 / FAX: +66-2-043-1231-33 MITSUBISHI ELECTRIC AUSTRALIA PTY. LTD.
Oceania Service Center
348 VICTORIA ROAD, RYDALMERE, N.S.W. 2116 AUSTRALIA
INDIA TEL: +61-2-9684-7269/ FAX: +61-2-9684-7245
MITSUBISHI ELECTRIC INDIA PVT., LTD.
Service Head office and South India Service Center (Bangalore)
CNC eXPerience Park, PLOT NO. 57/A, PEENYA PHASE 3,
PEENYA INDUSTRIAL AREA, BANGALORE 560058, KARNATAKA, INDIA
TEL : +91-80-4655-2121
Chennai Service Satellite
Coimbatore Service Satellite
Hyderabad Service Satellite
North India Service Center (Gurgaon)
PLOT 517, GROUND FLOOR, UDYOG VIHAR PHASE-III, GURUGRAM 122008, HARYANA, INDIA
TEL : +91-124-463-0300
Ludhiana Service Satellite
Panthnagar Service Satellite
Delhi Service Satellite
Jamshedpur Service Satellite
Manesar Service Satellite
West India Service Center (Pune)
ICC-Devi GAURAV TECHNOLOGY PARK, UNIT NO.402, FOURTH FLOOR, NORTH WING,
SURVEY NUMBER 191-192 (P), NEXT to INDIAN CARD CLOTHING COMPANY Ltd,
OPP. VALLABH NAGAR, PIMPRI, PUNE- 411 018, MAHARASHTRA, INDIA
TEL : +91-20-6819-2274
Kolhapur Service Satellite
Aurangabad Service Satellite
Mumbai Service Satellite
West India Service Center (Ahmedabad)
204-209, 2ND FLOOR, 31FIVE, CORPORATE ROAD PRAHLADNAGAR,
AHMEDABAD -380015, GUJARAT, INDIA
TEL : + 91-79-6777-7888
Rajkot Service Satellite
Notice
Every effort has been made to keep up with software and hardware revisions in the contents described in this manual. However, please understand that in some unavoidable cases simultaneous revision is not possible.
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